

**Fractures, dislocations, deformities and diseases of the lower extremities /
by Hugh Owen Thomas.**

Contributors

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Roth, Paul Bernard
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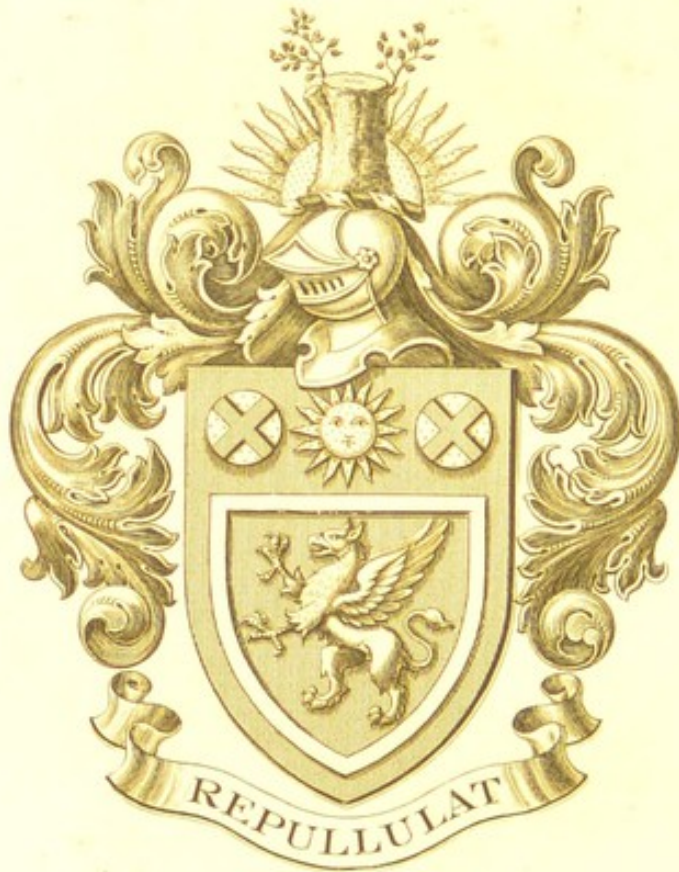
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Institute



of

Orthopaedics



Presented by

Mr. Paul Bernard Roth

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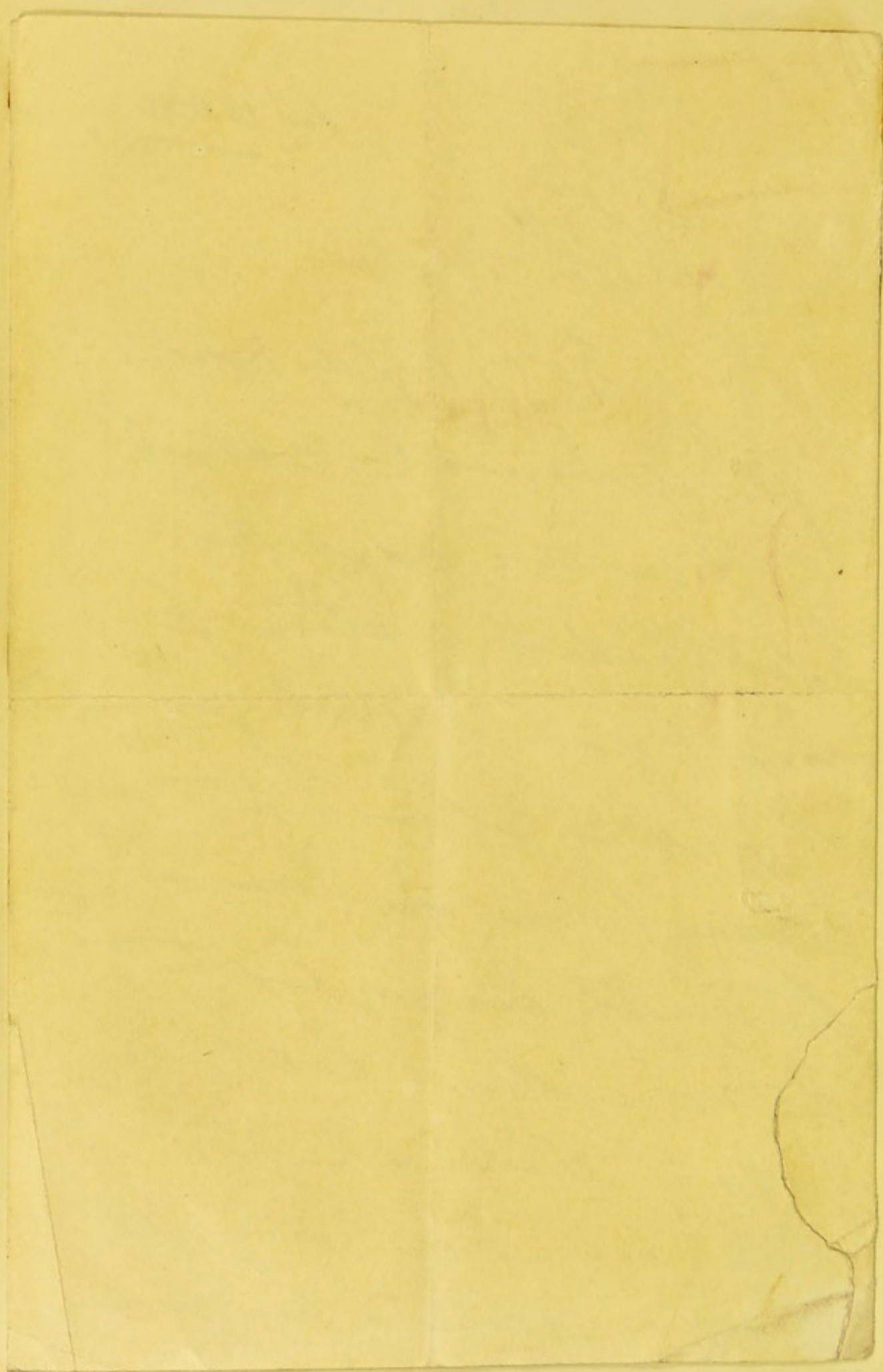
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Why you seem up to the catchment of
the R. Hopedale section of the summer
at least withdrawn. If you have been
in any way, slightly - the letter
from you - & the
- H. H. H.

July 16. 1890

My dear Rob -

D. P. Mylde editor
of the Annual, asked
if I would edit the
orthopedic section for
next year. I wrote yes
if you is allowed to
assist me as I was
too much engaged to
do so without help -
Today it struck me
I had better say I ought to
have engaged you for



PART VII.

MAY 1890.

CONTRIBUTIONS

TO

SURGERY AND MEDICINE.

etc
FRACTURES, DISLOCATIONS, DEFORMITIES

AND

DISEASES

OF THE

LOWER EXTREMITIES,

BY

HUGH OWEN THOMAS.

1890.

LONDON:

H. K. LEWIS, 136, GOWER STREET.

2031

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Bernard Roth
July 11, 1890.

THE TREATMENT OF DEFORMITIES,
FRACTURES AND DISEASES,
OF BONES IN THE LOWER EXTREMITY.

My tenets regarding the treatment of inflamed joints, and the means by which they are carried out to the curing of diseased articulations, were first published in 1875—fourteen years ago. The theory and treatment, at that time rampant among surgeons, regarding the management of diseased joints, greatly influenced me to publish my treatise on “Diseases of the Hip, Knee, and Ankle-joints.” The principles which had guided our predecessors were being set aside, and we were invited by some teachers in surgery to take instruction from the untrained and unreasoning. Others taught that the force of concussion and intra-articular pressure were greater evils than friction, during the existence of inflammation in a joint; consequently, that if these two modes of force were neutralized or diminished, diseased joints would progress easily to recovery though motion of the articulation was not arrested. This heresy soon leavened the practice of the whole body of surgeons. Backed by my friend, Professor R. Parker, now teacher of surgery in our city school, I was, in the year 1875, the only opponent to the heresy, which has not maintained its ground.

In "Contributions," Parts II and VI, will be found a full statement of my theoretical views ; consequently, in this part, I shall hold myself in most instances excused from giving reasons for my treatment. As before, it will be my contention, that while a special theory is indispensable, it is not so with the treatment ; various means have corrected in the past, do now, and will in future correct diseased, fractured or deformed bones. The foregoing admission, however, is qualified by the assertion that the means here introduced to the surgeon will relieve diseases, which the appliances of past times could not. By these means, hampering deformity is avoided, the period of treatment shortened, and the completion of cure is made as certain and as obvious as the onset of the ailment was. The treatment of diseased joints must be consistent with correct principles.

To reduce deformity, and to do so with little risk, and succeed, where tolerable force would not ; an effort must be made consistent with a theory the reverse of that, which is applicable to the treatment of joints diseased. In the treatment of fractures, a combination of the theory relating to diseased articulations and the one proper for deformities is required, thus the danger of non-union or defective symmetry is greatly lessened. As a result of such practice, it will be found that the management of such troublesome fractures as those of the patella, olecranon and neck of femur can be advanced almost to an exact art. As in medicine so in surgery : there are two methods of applying our means, whether

we have deformed, diseased or fractured bones to contend against ; the direct and the indirect method. In medicine the indirect method "carries the palm"; so, in the department of surgery here under illustration, the indirect method is the superior, as, by it, some cures and restorations, otherwise impossible, can be satisfactorily performed.

The indirect method gives us physiological rest, (non-interference with the life of the affected part), as well as mechanical repose. The direct method gives only mechanical rest with diminished vitality of the area under treatment. The indirect method in certain cases is indispensable; the direct one is very often permissible, some particular advantage overbalancing for a time the drawback attached to it, if the tendency to recovery be very strong. The direct method may sometimes have to be supplanted by the indirect, which may have to be changed again for the direct, after the former has answered its purpose ; still the indirect must always hold a higher value, being never employed as a means merely to gain time until a part feels equal to its standard of usefulness.

Continuing the plan adopted by me in some of my other "Contributions," actual cases will be related and ideal ones sketched. Instructed by long and frequent observation, it will be my special study to steadily "hold the mirror up to nature," transferring the reflected image ungarnished into type, so that the transfer can be thoroughly depended upon as a guide to practice

Further, among the illustrations, (wood-cuts) as in preceding parts, there will not be found sketches of extremes of disease or

deformity. Experience has taught me that such diseases may be often very easy of correction and cure, while other less extreme cases may test hard the surgeon's skill. The "much deformed" cases surprise the ignorant, but to the trained surgeon they are no more instructive than those of a lesser degree of deviation. It will be my endeavour while trying to instruct, never to omit acknowledging any indebtedness.

Inflammation of the metatarso-phalangeal joint of the toes.—

The surgeon is occasionally invited to treat inflammation of the base joint of the big-toe; this disease remaining after rheumatism, gout, injury or over-strain, or after an inflamed bunion has suppurated leaving a skin sinus connected with the joint.

A. consults a surgeon, and complains that during the last three or four months he feels, when walking, some discomfort in his right big-toe joint. The surgeon, upon examination, observes that the appearance of the toe and foot is normal, but yet on manipulation, the joint is slightly limited in its motion, and at the extremity of flexion and extension very slight strain gives some pain. Further pressure over the internal lateral ligament of the toe-joint causes more pain than the like pressure does when applied to the same point on the left foot. From enquiry the surgeon also learns that when the patient attempts running or subjects the toe to extra strain, the discomfort is most perceptible.

B. visits a surgeon, complains of much discomfort in walking, after exposing his foot to view, informs the surgeon that he cannot "bend" his toe. The surgeon perceives that the base joint of the big toe is obviously enlarged, though otherwise healthy looking; but on testing the joint's motion, though the surgeon finds it absolutely rigid, yet his manipulation, whilst using moderate force, gives only slight discomfort. On enquiry he is informed that the patient has suffered discomfort for at least nine to twelve months, but during that time had attended to his avocation.

C. sends an invitation to the surgeon to visit him. On responding to it the surgeon finds the patient sitting on a sofa with his foot elevated upon a chair, and the toes of the foot enveloped with the filth known as a linseed poultice. On its removal there was exposed to view a reddened œdematous swelling around the big-toe joint, on the inner and superior aspect of which was observed a sinus, from which pus discharged, flooding the poultice and irritating the surrounding skin. By manipulation, the surgeon found some motion of the joint, but accompanied by pain. The history given by the patient was, that for "years" he had an enlarged bunion over the joint, which did not trouble him much until lately when wearing a tight boot during a long walk, the irritation set up an acute attack of inflammation of the bunion, which, by poulticing, had suppurated, and since remained so, not progressing to recovery.

D. a lady, visits her medical adviser and requests him to examine her foot. She informs him that three months previously, after a "dance," she felt pain whenever she walked, and that the joint of one of her little toes gave her uneasiness. She was not certain that "the dance" was the cause, inasmuch as four months ago, she was injured by treading on a sharp stone with thin soled boots. Her medical adviser interrupted her with the remark that either of those actions might have caused her discomfort. The foot being now exposed, the doctor carefully scanned its upper surface especially the toes, and, not noticing any abnormality, he questioned the lady. "Which toe is it you complain of?" She immediately places the point of her index finger on the base joint of the third toe of the right foot. Then the doctor could see that, whereas the hollows of the skin, which usually commence at the bifurcation of the toes and imperceptibly disappear into the dorsum of foot, also the ridges of skin covering the extensor tendons of toes, which are usually symmetrical and severally parallel; that in this instance the ridge at the base of the third toe was very slightly distorted so that the skin hollows on either side of the base of the toe were shortened and the ridge between them was less prominent and in shape nearly a triangle with its base to the dorsum of the foot and the affected joint in its centre. While the doctor was cogitating, the lady interrupted him with the remark that she could walk better in slippers than in her strong "out of door" boots, and best without either. The doctor taking within the grip of his hand the whole circumference of the metatarsophalangeal joints of the lady's foot, gives them a sharp but moderate degree of compression, and asks if he has given any pain. The patient replies in the

affirmative, and applying her thumb to the base of third toe on the dorsal aspect and the point of the corresponding index finger to the undersurface of the foot opposite the position of her thumb, she compresses the toe-joint, remarking at the same time to the doctor, "I can feel the pain on doing as I do now." The doctor requests the patient to dress as he had made his diagnosis.

The foregoing sketch of ideal cases illustrates four varieties of inflammation affecting the toe joints, and their symptoms.

In such cases as A and B, the majority of patients will not abstain from using the joint. Such sufferers will only rarely consent to rest the body to cure so small a fraction of it, and are not well able to afford the luxury of total rest. Generally the advice to rest and use a crutch is looked upon as a great trouble employed to remove a small obstacle. The illustration, Fig. 1, shows an excellent mechanical aid, a compromise if



employed early, aiding the resolution of the disease without ankylosis, and even if ankylosis be far advanced, will make sound the articulation. The contrivance is very simple, and suits such cases of which A, B, C, and D are sketches. It consists of a patch of hoop-iron $1\frac{3}{4}$ by $\frac{1}{4}$ of an inch thick, screwed with two wood screws, Fig. 2

into the sole of the boot, the iron being so placed under the shoe sole that its front margin is just under the metatarsophalangeal joints, so that in walking, the toes miss concussion with the ground as the patient advances the opposite foot. The opposite foot is compensated by an extra sole of

leather thinned off towards the toes, both to lighten and make it less noticeable. The reader will have noticed that in case D, the patient said she felt her foot easier in slippers than in boots, and easiest when barefoot. Patients frequently make this remark, the interpretation of which is the fact, that when barefooted, the toes are not subject to circular compression; and again when "in slippers," compression is obviously less than when the foot is booted; hence a lesson, that our barred boot should be a capacious one for such cases as A, B, and D and for cases of type C, it is advisable to cut away the whole front of the "upper," leaving only the bare sole, so as to free the big-toe joint from all possible compression. This mechanical device can be supplemented by soothing applications at night when the patient is "at rest." This simple adjunct I have known to succeed, after varied treatment had failed to give either ease of pain or early resolution without defect.

Flat Foot—Splay Foot—Weak Ankles—Talipes Valgus.—

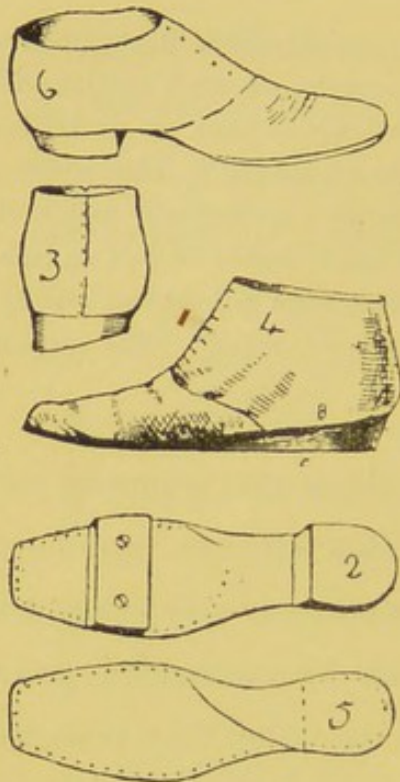
The foregoing terms refer to four degrees of variation from normal symmetry. This defect varies in degree from slight inversion of the foot when in use, to eversion of the foot so that at every step it grinds on the inner aspect of the point of the lower end of fibula. The last is easily recognised, as, by the time this condition is observable, the peronei muscles and extensors of the toes are, in most cases, permanently contracted. For convenience of description, we will include, in the term talipes valgus, these four deviations from the normal condition, of the foot. For prevention, restoration or relief of this defect more can be done by specially modelling the boot sole than by

any other means yet published. "Money" may be spent upon machinery, so-called spring plates, rubber pads, and steels, but they cannot assist so effectively as a few penny'sworths of leather used to vary the boot sole. There are three classes of feet, the excellent, the medium, and the bad. The first wear the outer side of shoe heels more than the inner side, the medium wear the heels level, the bad ones wear down the inner edge and posterior curve of the heels. By a modification of the boot sole it is possible to make a bad foot behave like an excellent one. Here are sketched four cases which will be useful guides to practice and will facilitate my demonstration.

Mrs. E. brings her son, 6 years of age, to surgeon A. for advice regarding the boy's feet. She commences the consultation as follows: Now doctor, we have noticed of late, that this boy has a habit of walking with his toes turned inwards; this bad habit we have tried to correct by discipline, but we cannot make him do as he has been told—that is, to keep his feet turned out in walking. His father and I would like to know if he requires "steels" to wear? The surgeon requests to see the feet exposed and, while the stockings are being removed, examines the boy's boots and sees that the heels have been slightly worn uneven, down on their inner edges, also that the inner wings of the boot "uppers" have been indented by the inner malleolus of the ankle. The boy's feet being now bare, the surgeon notices on his standing, that by the weight of the body the foot very slightly tends to rotate outwardly, the inner malleolus to slightly project inwardly; yet withal, there is no distinct deformity. The surgeon, diagnosing the initial tendency to "splay" of the feet, informs Mrs. E., first, that steels are not required; secondly, that the remedy for the existing condition, is to assist the boy to continue the inturn of his feet; thirdly, that hitherto, the boy was making, by his will, directed to his calf muscles, an effort to avoid deformity: fourthly, that these muscles, subjected to too continuous an effort would become tired, then probably, the feet might rapidly splay, other muscles then coming into play—but only to aggravate the difficulty. That the remedy is simply to specially form the boot heels, and that leather will do the labour, which at present, is continually thrown upon certain muscles, which are

not only doing their own work, but are sustaining a weight which ligaments, for the time, are unable to sustain. Mrs. E. did not accept the surgeon's opinion with any show of satisfaction, and made the remark: "Only to put a bit of leather on his shoes, and still make him walk with his toes turned in!" The surgeon made another attempt to explain why merely wearing a moderately high heel, well sloped, so that the outer depth of the heel of boot should be $\frac{3}{4}$ of an inch, and the inner edge 1 inch, was all-sufficient treatment for a pair of feet, perhaps only threatening or, at most, only in the initial stage of "splay." The surgeon did not, in this case, convince.

The foregoing case is typical of the patients that come for advice, during initial state of splay-foot. The surgeon has some difficulties to contend with: though the remedy is very efficient, it appears contemptible, this, combined, with the information given the parent, that the foot must be assisted to, rather than thwarted from, internal rotation, appears so unreasonable that some tact is required to convince. Another drawback, which places the surgeon at a disadvantage, is that in this early stage, there is not much discomfort, possibly none—complained of, so that when his remedy is accepted, no change is noted, except that the inner malleolus does not appear to jut over the foot so much. The person I had in view when sketching the case of Mrs. E., left me without any decided signs of unbelief. But some days after, meeting with a surgical friend, who had often discussed this topic with me, he enquired if Mrs. E. had consulted me, as he also had been consulted. This shows that it is advisable to take some trouble to convince when we are consulted. Not many years ago a medical friend came to consult me, bringing his boy, about 7 years of age, with both feet in the initial condition of splay, which, without help, might or might not have progressed to the full deformity. All cases that enter



upon the initial stage do not become deformed, though neglected. After examination, the crooked heel, Fig. 3, was advised to be worn. Casually seeing the boy afterwards in the street, I observed that he was rigged with "steels" as if he was being scaffolded for a general repair. This assistance was only a fraction of that which a sloped heel would have given. Altering the heel is enough for the initial

stage of splay. This modification is shown in Fig. 3, back view of a right side boot heel.

The inversion of the foot, which is premonitory of splay foot, may be confounded with that noticeable in connection with talipes equinus before treatment or after partially successful correction, a deferential diagnosis of which is easily made. For, where inversion, is a mere symptom of threatened or coming splay, then it is not palpable on manipulation of the foot, but only observable when the limb is in voluntary action. Inversion in connection with talipes equinus is palpable on manipulation and during voluntary use of the limb. The error has been made, of not perceiving that this inversion foretells the probability of eversion (splay) following. Treatises have been written and mechanical contrivances devised, to hinder an inversion which really requires encouragement,

as may be noticed in the *New York Medical Record*, September 17th, 1881, and "Transactions of American Medical Association for 1880-1."

I shall relate another very striking case in support of my teaching. Dr. Glencross, surgeon of the Atlantic S.S. Arizona, brought to my surgery Mr. Roberts, second officer of that steamer, suffering from non-union of the lower end of the right femur, the result of a compound fracture, which had happened sixteen weeks before he was examined by me. After we had attended to the case, and retired to my house, in my consulting room, we found a lady and gentleman, accompanied by a boy aged about seven years.

The lady, addressing us, said that she had observed that of late the child walked with his left foot inverted, and now desired our assistance to overcome this defect. At my request the boy was placed to stand and then walk, during which we noticed the complained of defect. I expressed my opinion of the case, and of the means to be employed to maintain the inversion but the parents appeared incredulous. Having observed the child's gait, and the form of the right shoe, I expressed to them my opinion that the right foot had already splayed, and requested it to be exposed, when there was revealed to us a fact confirmatory of our diagnosis. The right foot was in the second stage of splay; arch flattened with eversion, but no contraction of the peronei. The right foot had gone through the initial stage; the left one was in progress to deformity. The parents, however, were quite satisfied with the deformed one; the inversion, during use, of the otherwise normal foot only giving them anxiety.

The next degree of splay feet which surgeons observe are those where the arch of foot has "given" a little, with a feeling of weakness in walking, and discomfort under the external malleolus of ankle-joint, without any limitation of the motions of the ankle or foot.

Eight years ago, a young lady, suffering from splayfoot, came, accompanied by her mother, to consult me. The arch had "given" slightly. Noticing that they were foreigners, I enquired if they purposed staying long in England. They replied that they were leaving on the morrow for the United States. This consultation took place on a Sunday morning. During our conversation they informed me that the state of the younger lady's foot was one of the inducements which had led to their visiting this country, and on arrival, they had made their way direct to a city to which the best medical and surgical skill is supposed to gravitate. Several surgeons had been consulted, but with no benefit. My prognosis being favourable, they expressed a willingness to adopt my advice. The lady's boot heel was crooked, as Fig. 3; instep well flattened and filled up level, as Fig. 4, BC. A sole view of the alteration is shown in Fig. 5. After this alteration of the boot had been made, the reasons for so modelling it were fully explained. Further, their attention was drawn to the value of each change, particularly to the crooked heel as first in importance, the bevel of sole being the lesser; and that at a certain date the altered instep should be omitted, continuing the use of the crooked heel a longer period.

All this information would enable them to either superintend the repair of, or the construction of a fresh one when required. Thus instructed they were dismissed. Two years after I received the following note :—

" Excelsior, Minnesota,
" August, 12, 1880.

" Hugh Owen Thomas, Esq.,
" Dear Sir,

" You may remember being consulted about my daughter's ankle nearly two years ago, just previous to our returning to America. It gives me great pleasure to write to you that after wearing the boot you gave for nearly two years, as you directed, the ankle has entirely regained its natural strength and action. We both gratefully acknowledge your skill. I feel I have been rather tardy in informing you concerning the success of your treatment, and hope you will accept an apology for this apparent neglect, &c., &c."

As to the cause of non-congenital splay foot, I principally see only ligaments failing to sustain extra weight, either from children and youths quickly developing, or adults rapidly gaining in weight, or

injury causing extra strain, to meet which the unaided muscles can only temporarily act. In the non-traumatic "splay" met with specially affecting elderly persons, they invariably date the commencement of their trouble from their gaining in weight. Another cause for splay foot in adult life, and a very important one, hitherto utterly overlooked by surgeons, is the splay that may result after fractures through the ankle joint. This form of splay is strictly one from the ankle, and where generally the arch of the foot is normal. I maintain that no matter how successfully a surgeon may treat fractures through the ankle joint, even though the repair at the end of eight or ten week's treatment or longer, may appear perfect, yet withal if the patient is not instructed to wear a boot with a crooked heel and a bevelled instep, the deformity of splay may insidiously appear. During years long gone by, many such fractures were treated by me during the first twelve weeks, with perfect result, yet the patient often showed deformity of splay about nine months afterwards. After the fracture feels firmly consolidated—when the patient resumes use of his leg—this defect is always to be dreaded. To remedy this after-accident I devised the splay shoe, and afterwards found how suitable it was for splay feet in general. By its use the patient, after a fractured ankle, can walk much earlier than without it and is guarded from a re-developement of a deformity which the surgeon had corrected during treatment. In my opinion its beneficial action arises not from its bolstering up the arch of the foot (which should be avoided), but by giving the foot an inward rotation, thus bringing the central axis of leg and weight of body

more over the centre of the foot's width. In splay foot we have the analogue of knock-knee. Taking the weight off one condyle and maintaining it steadily on the other leads to correction of genu valgum; so, likewise, a transfer of the weight by the splay boot prevents initial cases, cures some, and in other cases gives relief.

As I look upon the valgus boot as a very useful addition to our orthopedic armamentaria, I shall here give a detailed description of its construction. To construct this boot so that we get the utmost assistance from it,—First, the inside surface of sole, the part directly in contact with the foot, should be perfectly flat. All old boots are so, the hump goes down by the constant pressure of walking. If the boot be new its “hump,” so graceful and yet useless, can be knocked down with a mallet or broken by straining over a chair back. This is of much importance in those splay feet not caused by injuries. Then the heel should be crooked, as is shown in Fig. 3, a right-foot boot. This is sufficient for slight cases and some traumatic ones. But for the severer cases of splay, no matter how caused, the crooked heel, Fig. 3, may be, with some little advantage supplemented by the sloped sole as well, shown, Fig. 4 and 5. The sloped sole should not extend quite to the ball of big toe, and the lines of the upper and lower surface of this sole, B C, Fig. 4, should be quite straight, not any feeling of hump at B, flat inside the boot, as well as on the ground surface of the sole; and this sole, when properly made, is not visible on the outer aspect of the boot, for example, see Fig. 6. The Figs. 3, 4, 5, 6, are plans of a right foot boot altered for splay foot. The construction of this boot is very simple, yet no shoemaker can be trusted to make

the alteration correctly. They generally make a hump at B, Fig. 4, and also neglect to slope or crook the heel, so that whether we look at the inner or outer aspect of the shoe, a wedge is seen as in Fig. 4, which should only show on the inner aspect. As the wedge B C, Fig. 4 is very noticeable when the boot is examined in your hands, a shoemaker concludes that a mere uniform wedge is required and the most important, because it is the greatest observable alteration, whereas to the surgeon, the crooked heel, which is not readily observed, is the most valuable alteration. So to make sure that the sufferer gets an efficient boot, the surgeon, besides instructing the shoemaker, should inspect the change before the boot is delivered for use, and if any repair be afterwards required, he should still distrust the repairer, and again inspect. This is my conclusion after twenty-four years' wrangling with St. Crispin's fraternity. No boot can be properly converted to suit a splay foot if the heel point be not as wide as the heel part of the foot sole.

The extreme form of splay foot is so well known to surgeons that there is no need of my giving here a description. Two varieties are presented for treatment, one with the foot fixedly everted by contraction of the peronei muscles, another in which the muscular part of the extensors of the toes is also contracted. These two forms of splay feet can, by the wearing of shoes with sloped heel and sole, be relieved from much discomfort, but mere mechanical aid will not correct the inversion and the limited radius of extension; to remedy which, the operation of tenotomy should be performed, dividing the tendons of the peronei, to relieve fixed eversion, and also the tendons of the extensors

of the toes, to increase the radius of extension. The details of this operation all surgeons know, but to gain a restoration resembling a normal condition, something more than merely dividing the tendon is required. Whether we divide the peronei only, or they and the extensors, the supplemental procedure, I purpose to describe, is equally necessary. I here sketch to the reader an ideal case :

Mr. P. consults the surgeon to have restored a left splay foot, presented in the following condition : the foot fixedly everted, limitation of extension, with flattened arch. The surgeon having prepared two pads of oiled cotton, bandage and padded sheet iron splint, and aided by an assistant whom he directs to stand on the inner aspect of the patient's leg, and to grasp the plantar aspect of the foot with his right hand. The surgeon now feeling for the ridge of the outer aspect of the fibula with his left index finger placed about two inches from its lower end, requests the assistant to forcibly invert the foot, and he feels the tendon of peronei rise so as to be easily felt parallel with the bone. The surgeon now, with the tenotome in his right hand introduces it, with its cutting edge directed downwards, and desires the assistant to relax his force, which enables him to give the tenotome a quarter turn, so that the cutting edge is at right angle to the tendons. At this time the assistant is directed to forcibly invert the foot again, while the surgeon by a sawing motion of the tenotome divides the tendons, turns it back a quarter of a turn, and withdrawing it, places an oil pad upon the puncture, upon which pressure is exercised until an operation similar in detail has been performed upon the extensors. Of course, during the operation upon the extensors the foot was more extended than inverted, this being the only difference between them. The necessary tendons having been sewn through and pads maintained upon the punctures, now the surgeon takes charge of the foot (a left one), grips it, so that the palm of his right hand rests upon the dorsum of the foot, pressing also upon the pad that covers the puncture leading to the extensor tendon ; his left hand he passes under the leg which he grips just above the ankle, so that he also maintains pressure upon the puncture leading to the peronei muscles, meanwhile an assistant having grasped the patient's knee and fixed it, the surgeon suddenly exerts his manual power and extremely inverts and extends the foot, maintaining it in those positions by a suitably padded concave sheet-iron splint.

The splint is applied thus :—The punctures being covered by cotton wadding dipped in an antiseptic oil, retaining it in position by a bandage wound round the limb in the direction of the inversion of the foot, then the padded splint is applied to the external aspect of the leg and foot, and maintained there by a bandage. This post operative dressing is shown at Fig. 7.



The after treatment of such a case as the preceding is obvious enough, the dressings are re-applied from time to time, until the foot appears to have "set" in a position in every-way the reverse of "splay". As this is the first instance of tenotomy discussed here, it may be the proper place to contribute a practical hint. It is not usually taught but still it forms an important factor towards success, viz., that the limb should be dressed at a period of from twelve to twenty-four hours after the operation, as much ease is given to the patient by the slackening of the bandage, which must, from swelling of the part, be exercising more pressure than when first applied ; often being enough to devitalise the part so as to bring on suppuration. The subsequent dressings depend upon the judgement of the surgeon and the condition of the part. After the release of the foot from the form shown in Fig. 7, the sloped heel and sole may be worn, and the foot exercised. Uni-lateral splay foot, if of an extreme form, by its shortening effect upon one of the lower extremities often brings about a secondary effect, namely, a lateral curve of the spine. Consequently it is advisable, when we are consulted concerning such a deviation from the normal line of the spine, to examine

the feet. In my experience it has happened that a person has been under treatment by a spinal specialist for years, fitted with irons from the shoulder to the sole of the foot, without perceptible effect, yet, a few pieces of leather applied to the boot produced the wished-for effect.

Club Foot:—There are two classes of this deformity; the congenital, and non-congenital. In the first class we have talipes calcaneus, equinus, equino-varus, and plantar-varus; in the second class arising either from constitutional or traumatic cause, we have generally talipes equinus, and valgus, very rarely the varus form. The diagnosis between congenital and non-congenital talipes is generally very easily made, with one exception, that of talipes equinus, which is not so easily differentiated. It has been my observation, that in the non-congenital form of talipes of the equinus type, the foot can be perfectly flexed, if the knee is also flexed, but when the knee is perfectly extended, flexion of the foot is limited. This is not generally the case in the congenital form; hence we may conclude that the muscular tissue of the soleus is principally affected in these cases. Before giving details of my method of treating the various forms of club foot, I here introduce a summary of principles.

They have already been referred to in a previous "Contribution."

First.—Having tenotomised, immediately force should be used to gain the utmost possible range of action.

Second.—The part is re-examined within twenty-four hours after the initial operation, so as to avoid any serious

devitalisation by circular compression of the parts injured by the initial procedure ; but there should not be any repetition of the violence at this early period, lest suppuration be induced.

Third.—The unsoundness that results from the primary manipulation, is : by the use of force applied periodically, continued until the desired symmetry has been secured.

Fourth.—Force, if employed to correct deformity, should be used at periods too short to allow of the part recovering from a preceding manipulation, yet not so limited as to cause the repeated manipulations to bring about such a degree of tenderness that may necessitate the interruption of corrective treatment.

By attention to these rules it is possible to make a better correction than can be done by either knife, saw, or mere wrenching.

Talipes Calcaneus :—The treatment of this form of talipes has not hitherto been productive of much improvement of the part, an occasional case excepted. Surgeons have tried various modes of treatment such as shortening the tendo Achillis, by the excision of a portion, mechanical aid combined with local application, such as friction, baths, linaments. One great impediment to successful treatment is the impeding strain to which the muscular tissue is subjected during walking; another is that we have to contend with lessened vitality in the muscles of the calf, again, the difficulty of uninterruptedly maintaining the foot in an extended position, so that muscular shortening may take place. Even if the last impediment was

successfully overcome, the great strain which the partially-paralysed muscles of the calf have afterwards to sustain, would debar us always expecting an excellent result. By the excision of a portion of this tendon, surgeons very reasonably expected to minimize the muscular defect, but many years of trial have convinced me, that beyond a slight increase of bulk in and around the tendon, not much is to be gained by this operation. This must also be the experience of other surgeons, as the operation has been tried during many years, yet there have been no jubilant reports published. Discouraging as the treatment of Talipes Calcaneus is admitted to be, still some improvement can be brought about; occasionally much can be gained by so arranging our operative, mechanical, and local treatment, that the vitality of the involved muscles is increased and the labour they have to perform, is for a time, lessened. Of Talipes Calcaneus we have three varieties, a fact we have to take into consideration when devising mechanical aid. We have Calcaneus pure, or combined with a tendency to valgus or varus. The physiological treatment of these three varieties is alike, but the mechanical varies slightly. For instance, if it be a case of calcaneo-valgus, then a boot with a very high valgus-shaped heel and sole (fig. 5) should be worn, but for the varus type, the sole and heel should have a slope the reverse of that proper for the valgus form. To the boot is attached a check-iron, Fig. 8, this being the proper mechanical aid for the three forms of calcaneus. The local treatment found by myself to answer best, is to per-

form at proper periods painful percussion of the tendon with a circular piece of wood, and flagellation of the calf muscles with a piece of leather one inch wide, one-sixteenth of an inch thick and about eight inches long, attached to a short wooden handle.* After each performance I apply below the knee a garter of adhesive plaster to slightly dam the circulation and thus improve the nutrition of the leg.

The foregoing method of treatment has given me at times excellent results.

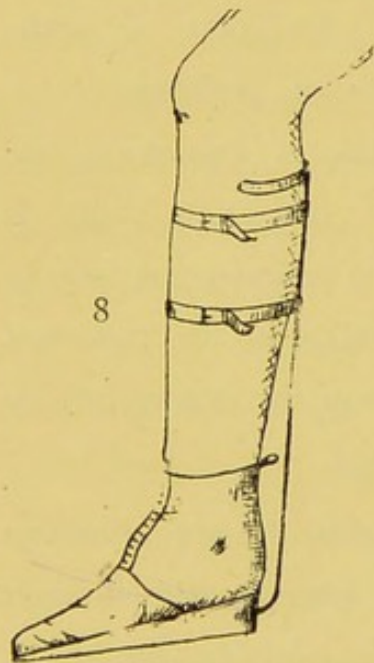


Fig. 8 represents a calcaneus boot with wedge heel and back stay, the latter set at an angle of 120° to the sole of the boot.

Talipes Equinus:—As a congenital defect this form of club-foot is rarely met with, but is a frequent condition noticeable after infantile and even adult paralysis; also after injuries. Of all forms of

deformity this is one the surgeon can easily, quickly, and effectually overcome. The time required being sometimes as short as five days, very rarely requiring fourteen days, before the patient is again walking about. As soon as we have assured ourselves that the equinus is of a permanent character, all treatment should be prefaced by the operation of tenotomy.

*The handle will also be useful for percussing the tendon.

I am well aware that surgical instrument makers and other dabblers in orthopedics, affirm that permanent extension of the foot from contraction of the muscular tissue controlling the tendo Achillis, has been overcome by purely mechanical treatment. I affirm that such cases would have been corrected without any treatment whatever; having myself, on several occasions prognosed that tenotomy would be required, but afterwards spontaneous correction took place from the weight of the body solely, during gentle exercise. They were cases of mere stiffness after resolution of ankle-joint inflammation. Simple and easy of performance as the operation for the relief of equinus is known to be; and essential as it is both to save time and to avoid pain, yet the details of the subsequent treatment are quite of equal value. The following is an outline of my treatment during the last twenty-five years; the use of the foot-wrench excepted, this being an item of a later period.

First:—The tendo Achillis is divided by the sawing motion of a fine tenotome, so fine, that to use leverage with it might cause its fracture. As soon as the tendon is divided, the foot is, if possible, flexed so that it forms an angle less than a right angle in relation to the leg. If the foot cannot be brought to normal form by manual power, the foot-wrench is applied to the foot; if by this extra leverage the foot cannot be brought to the required angle, the foot and leg are firmly fixed in the right angle splint, and at the time of the second dressing the wrench is re-applied; when a further range

of action is sure to be gained. If the second application of the wrench is not sufficient, a third, fourth or even a fifth is needed until we succeed, the angle of the splint being on each occasion suitably altered. The required overpowering force diminishes with successive manipulations, according to a law which I have already discussed in "Contribution to principles." The majority of cases we meet with are easily overcome by moderate manual power as soon as the tendon is divided. But there are some cases where we find that as soon as the tendon is divided, the foot becomes flail and slips to the position of extreme flexion, and it may be only after the performance of the operation we observe the prospective danger of having a calcaneus in lieu of an equinus. This accident we may be prepared for before operation; if in testing the range of motion at the ankle joint during extreme flexion of the knee, it is noticed that a relaxation of the gastrocnemii allows of extreme flexion of the foot, thus forewarned, (but not an operation contra-indicated), the foot, after section of the tendon, is placed in an angular splint of rather more than a right angle, fixed and dressed in the usual manner. At the second or third dressing a deviation from the ordinary course is made; the bandage is so applied that all compression over and about the seat of tenotomy is avoided, so as to allow it to swell and permit of both a strong and short reparative connection between the severed portions of the tendon. After a week's treatment the patient, wearing his ordinary boot, should begin to use the foot, still under the occasional supervision of the surgeon, who, if he

good

observes a tendency to calcaneus, prescribes an extra high heel to the boot, or, if a tendency to equinus then all the heel is removed from the boot, and a cross bar placed across the sole, just posterior to the big-toe joint, see Fig. 2. It may happen, that after a very successful correction of an equinus, there may be a tendency to varus or valgus, not obvious before operation, to remedy which, the slope of the sole can always be suitably altered. When performing tenotomy upon cases of simple equinus it often happens that the assistant, from the shortness of the tibial muscles, or from the formation of fibrous adhesions about the ankle, cannot make the tendo Achillis tight enough to enable the tenotome to act upon it; in such instance, if the operator presses with the thumb of his left hand upon the tendon a short distance from the skin puncture; he can tighten it sufficiently to make division easy.

Equino Varus.—This form of club foot, is, if not corrected, the one most annoying to its possessor in after life, and unfortunately amongst congenital deformities of the foot, is also the one most frequently met with. The main impediments to the correction of Equino-varus are the tendo Achillis limiting flexion of the ankle, and the shortened plantar structures.

To overcome the resistance to the correction of Equino-varus we ought to commence treatment by tenotomy of the tendo Achillis, and afterwards by mechanical aid to obliterate the plantar varus. The mechanical assistance employed by me for unfolding the foot, is the wrench Fig. 9, by the aid of this contrivance the period

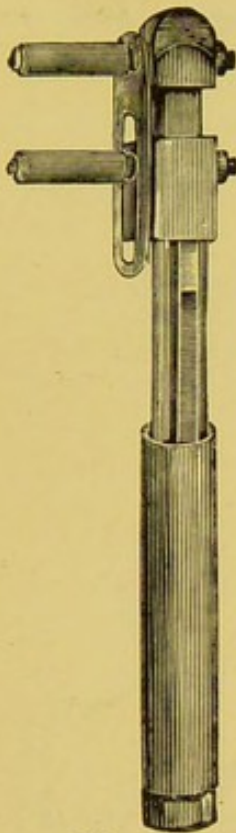
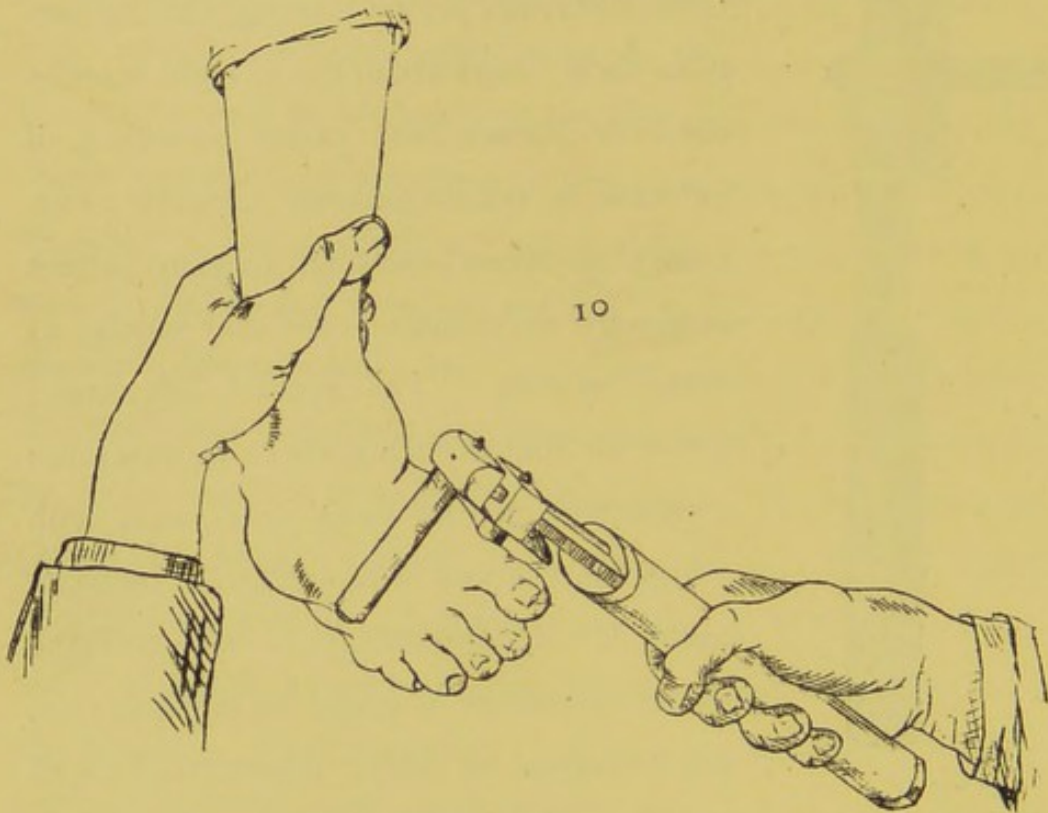


Fig. 9.
8th, 1889.

expended in correction is vastly curtailed. If the deformed person is brought to the surgeon early, from about two to eight months old—the sooner, the easier corrected, if the case is not an extreme example, four week's treatment is enough to gain correct symmetry; an extreme case may require as many months. The special advantage which the foot-wrench gives us, is, that often a case neglected for many years, can, with a little more labour be brought to be perfectly useful, if not symmetrical. I will give the reader an outline of a case of equino-varus, the treatment of which commenced April

The procedure was as follows :—The child being placed supine, with the aid of an assistant I divided the tendo Achillis, and placed an oiled pad upon the puncture, holding the same in position with the left hand while the infant was made prone, then still keeping my hold of the leg and pad ; with the right hand, I forcibly flexed and everted the foot ; afterwards, relaxing a little my efforts, the leg and foot were bandaged and put in a “club-foot shoe” as Fig. 17. The second day, the foot was merely re-bandaged, but with less firmness to the “club-foot shoe,” the third day's treatment was a repetition of that of the second day ; the fourth day, to the ankle a little more forcible flexion was given, and firmer retention in the “shoe.” On the fifth day, the foot-wrench was applied to the body of the foot, and sufficient force employed to extremely flex the ankle and evert the foot to the position indicative of splay foot, the “club-foot shoe” being re-modelled to this “splay” form, the wrench was now taken off, and the leg and foot firmly bound to the “shoe.” The manipulation was repeated on the sixth, seventh, and eighth day, when it was observable that the foot was symmetrical, and the parent was

instructed to return home, and daily examine and re-bandage the shoe to the child's leg and foot in the manner she had seen me dressing the limb.



When the deformity has been neglected, perhaps for years, it will be found advantageous first, to unfold the foot with the wrench while the patient is under the influence of æther, thus correcting the plantar defect, then to divide the tendo Achilles; otherwise we may be short of sufficient counter force to the wrench power to enable us to overcome the resistance of the plantar structures. The mechanical aids employed by me in the treatment of club foot, in conjunction with tenotomy are the club-foot wrench, and shoe. Although, division of the Achilles tendon immensely shortens the period of treatment, yet the subsequent employment of the wrench enables the period of treatment to be further greatly curtailed,

as the surgeon can easily overcome the resistance of the minor tendons and supplementary structures, which are beyond the limit of the safe application of the tenotome.

It will be easily noticed that the wrench shown in Fig. 9, is only a modification of the Belgian form of the old hammer-headed "monkey-wrench," from which the hammer head with a portion of spanner jaws have been cut off, and two prongs added to the remaining head; also a sliding guard to make it impossible that when being screwed up to its work, it can pinch up the integument of the foot. After a search in the mechanical workshops of the two continents, I have failed to find a better tool for my purpose than the modification sketched in Fig. 9.

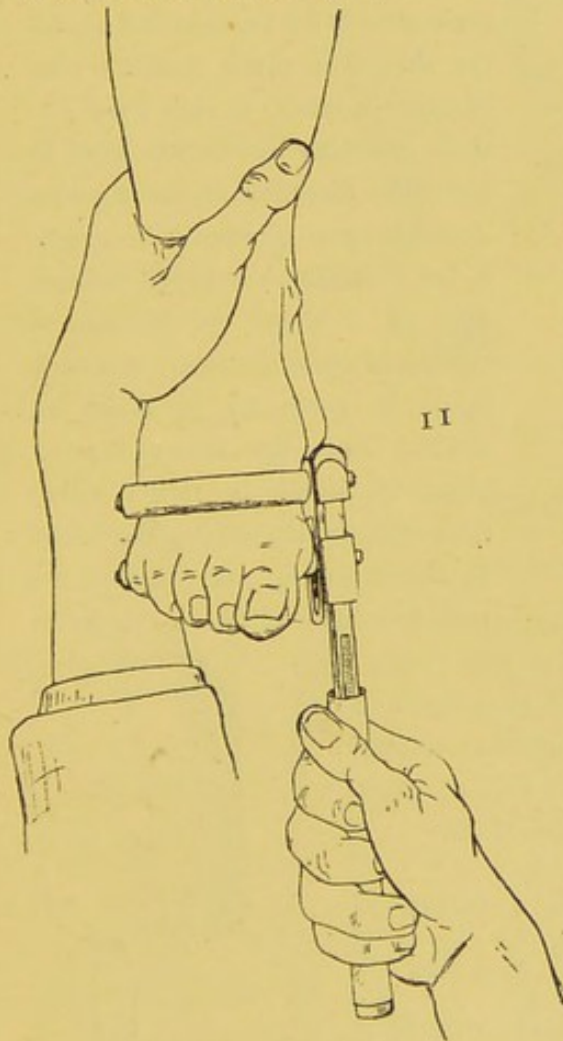


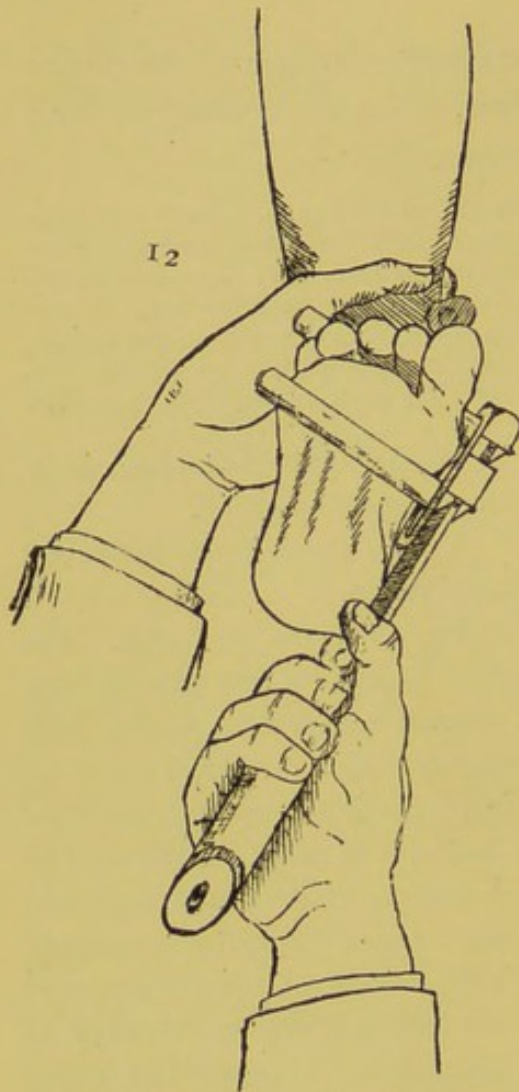
Fig. 10 shows the wrench in its first stage of operation.

Fig. 11 shows it in its second application.

Fig. 12 in the third stage. The two prongs of the wrench are covered with rubber tubing one eighth of an inch thick, so as to increase its gripping power, nevertheless, this is often insufficient, and it may slip off the foot during leverage; hence it is advisable to apply a few turns of calico bandage around the foot, and thus its tendency to slip is so much lessened that it does not require to be screwed up so tightly. The illustration shows the wrench applied to the naked foot, which is not my usual practice.

The "club-foot shoe," simple as it appears, was not adopted by me in a day; it is the outcome of thirty-two years experience,

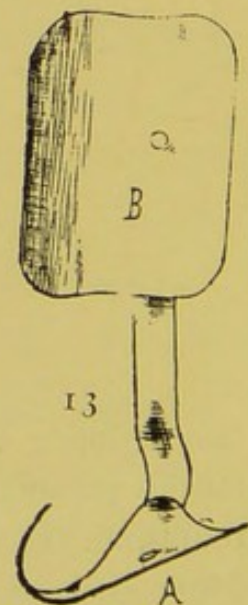
during which time nearly all known Orthopedic devices for this purpose were tried by me, but none have given me the results nor the satisfaction, which that shown in Fig. 14 has done. It is composed of flat bar and sheet iron.

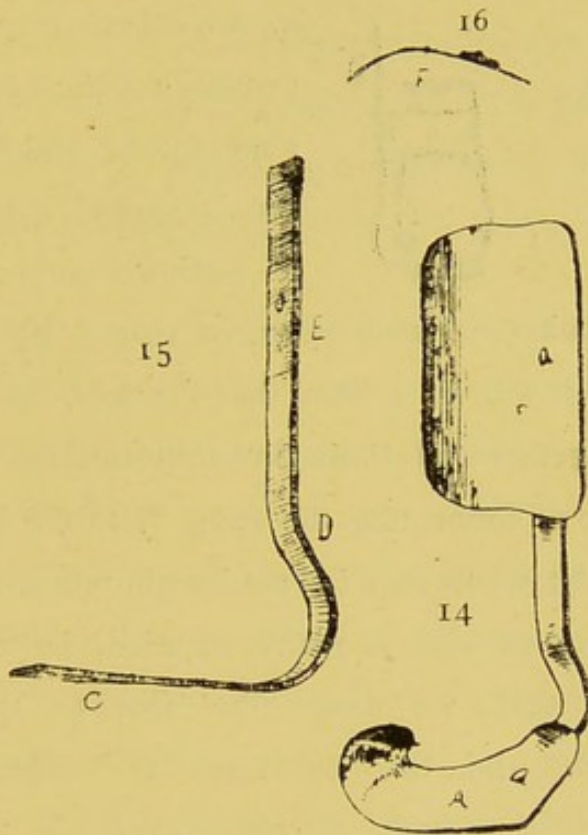


It is well also to see that the maker of the "shoe" makes the span at D in proportion a good deal over the depth of the patient's heel, more than enough to land the angle D above the heel. Fig. 17 shows the shoe applied for the purpose of treatment.

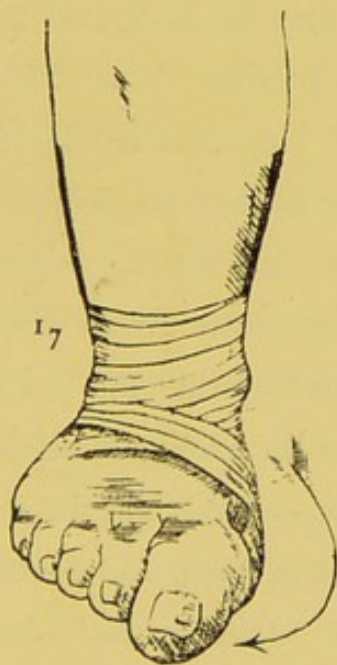
The last patient upon which I operated was at the time three weeks old, and had extreme equino-varus of both feet; one foot was first submitted to operation, and on the second day the other; to-day, the tenth day, complete symmetrical correction

Figures 13, 14, 15 and 16, show its appearance from various aspects: Fig. 13 is a front view, B, the leg portion a section of a cylinder. A, the sloped base and curled toe-piece suitably modelled to the splay form, ready for application to the treatment of a left foot. Fig. 14 is a side view of Fig. 13; and Fig. 15 is a lateral view of the main stem of flat bar iron that carries the sheet-iron plates A and B; an attempt is made, in vain I fear, to show the splay by rotation from D to C, the direction of the rotation depends upon whether it be a right or left foot that has to be treated. Fig. 16, F shows the position of the shield upon the stem, eccentric upon its convexity to make an efficient boot; the curve of the toe-piece. A, should be rather within the corresponding edge of the shield B, the more to press against the neighbourhood of the big toe-joint.



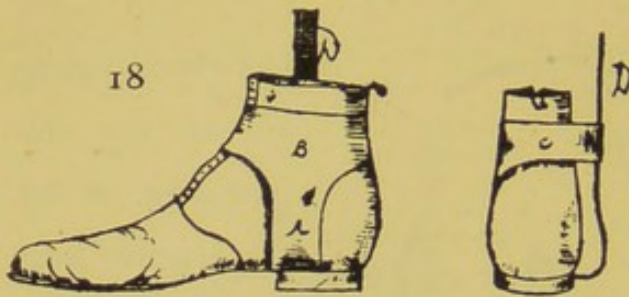


has been gained by the employment of the tenotome and "shoe" with daily dressing. Had this child been presented to me at two or even four months old, it could have been treated as quickly and suc-



cessfully, but it would have been necessary to use the wrench. After correction of cases long neglected, or of very exceptional difficulty, and when the patient is of an age that he can walk about, it may be advisable, that to his ordinary boot, some appliance should be attached to conserve what we have gained, or to overcome any tendency to relapse; this is usually done in the man-

ner shown in Fig. 18, a sketch I have purloined from a well-



known volume on orthopedics ; it is the invariable pattern, and is so usually applied, that for its intended purpose it is worthless, often spoiling a well managed case. By the examination of Fig. 18 it will be evident that the foot, ankle, and leg, are bound together and drawn inwardly towards the stem D, by the mistake of connecting the strap B to the heel by the bottom portion A ; whereas, if the reader will reflect over the disputed point, as to what is really required, he cannot fail to perceive that we desire the foot to splay away from the stem, and the leg from the ankle to tend inwards ; hence the error of construction in the arrangement as shown in Fig. 18. It may be said that the strap would slip up without the connecting tongue A, attaching it to the heel. Suppose it did slip up to a position two inches above the ankle, it would even then be in the best possible position to aid us. Another error of construction is made in connection with the construction of iron supports to thwart varus, a joint is usually placed upon the stem opposite the ankle, whereas none is required, it will answer the intended purpose better, if the iron stem is hooked into a brass-lined hole in the inner aspect of the heel. This is a sufficient joint, and makes the stem rigid where it is most wanted. I notice that some Orthopedists are now following my example. This, I think, is one fact showing the correctness of my criticism.

Fig. 18, though borrowed from another work, shows, in the design of the metal portion, the adoption of my practice, to omit the usual hinged joint opposite the ankle, substituting for it the old fishing-rod joint into the heel of the boot.

The cases of equinus which are almost uniformly found to be most stubborn to correct, are those that have recovered from the effects of abortive treatment. All such cases will be found more difficult of correction than those which have never been meddled with. In a preceding paragraph I have formulated four rules—only repetitions of my previous teaching—asserting that “by attention to these rules, we can make a better correction than can be made by knife, saw, or mere wrenching.” The errors which the orthopedists of the past committed in practice, arose from the fact, that while well aware that they were treating an animate limb, in practice this was not sufficiently taken into consideration, consequently the orthopedist was more a carpenter than a surgeon, and the limb treated as if it was inanimate material. The same objection has been frequently made against my teaching and treatment, that it is too mechanical. My answer is this: I have inculcated the application of less, but more efficient mechanism, than has hitherto been known in certain departments of surgery. Strict attention to details of treatment, the principles of which I have laid down, bring about such a physiological condition of the deformity, that it becomes more and more pliable, and possible of being progressively altered; the force required, condi-

tionally decreasing by lawful repetition. Though possessing them, I purposely refrain from publishing illustrative cases where they are not required to demonstrate the application of the treatment. Instances will unavoidably arise, justifying my deviation from this resolution. The following case is such, for while being a report of successful treatment, it is the more evidence of the truth and value of the four "rules" previously laid down, and minimising any supposed necessity that the surgeon should possess special dexterity rather than a knowledge of principles, to guide his manipulations.

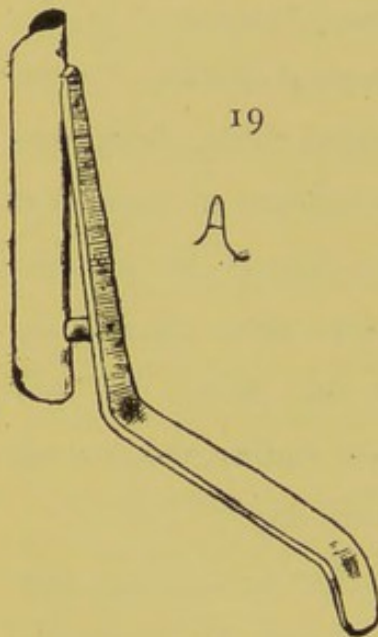
A boy, six years of age, was brought to me from the Principality, hampered by an extreme equino-varus of both feet, the right being the more extreme of the two. On the first day, the boy being under the influence of æther, the tendo Achillis was divided, the puncture dressed and the manipulations already described employed: the full power derived from the application of the wrench, with a handle ten inches long, was used, but with only very slight show of progress; then the feet were placed in the club-foot shoes, which had been suitably modelled, sufficiently so, that they slightly strained the deformity, in the direction of symmetry. On the second day the feet were unbandaged and re-adjusted, and placed again in the club shoes. On the third day, this procedure was repeated. On the fourth day, the boy being under æther, both feet were subjected to leverage by the wrench and replaced in the club-boots, as yet only slight progress. On the fifth day, without æther, the wrench was applied morning and evening, with the result, that on the sixth day, the feet appeared slightly swollen, and on manipulation tender with palpable elevation of temperature, there now was evidence of much improvement towards symmetry. Æther was again administered, manipulation with wrench repeated in the morning only, the feet very perceptibly yielding to the force employed. On the seventh day, morning and evening, manual power only was used, this amount of power also was used twice on the eighth day. On the ninth day, æther was given, wrench applied once. On the tenth day, æther was again administered, the wrench applied, first to the right foot, and to my delight, the foot was moved rapidly and easily into normal position, but on removing

the bandage, enveloping the foot to protect the skin from abrasion, I found that the skin, on the inner aspect of the heel, just between the tendo Achillis and the inner malleolus, had ruptured, exposing part of the severed tendon. Now, a little powdered Boracic Acid was sprinkled over the wound, and a thick pad of loose medicated sawdust was applied, then again, the foot was bandaged and replaced in the club-shoe. Profiting by my experience on this day, I was contented with less progress when applying the wrench to the left foot. By the aid of the medicated dust, suppuration was avoided and progressive treatment was not intermitted, merely slowed. In this case, occasionally, Mr. R. Jones assisted me, and at times, Dr. Morgan, of Liscard.

The foregoing case reminds me of a nautical phrase "over-running his distance." By attention to stated rules, there was gained on the tenth day with a certain amount of force, that which was certainly impossible at any time during the first six days, and a condition, favouring alteration more than I expected, was brought about by the tenth day, hence the employment of a force which was insufficient during the first six days, was found to be excessive on the tenth day.

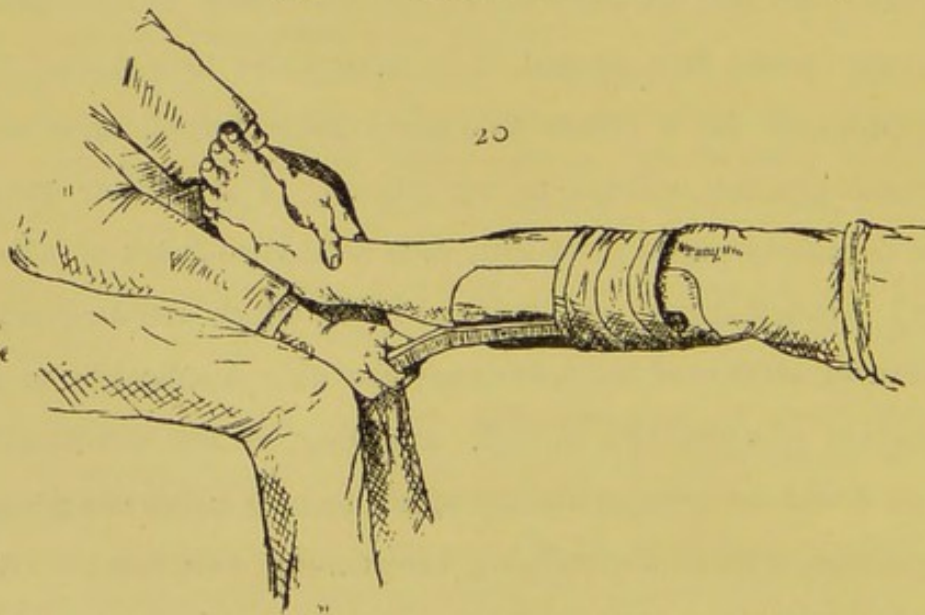
Bow Leg.—Until the present rage for performing subcutaneous section, for the relief of this and other deformities of the long bones, has abated, it is reasonable to suppose, that any proposal for a return to a more efficient application of a previous practice, will not be entertained. I admit that on very rare occasions we do meet with such a class of cases of "bow-legs", "knock-knees", and "flexed hips", which are unalterable except by section of bone, because the rule applicable to the reduction of deformity though applying, is not practicable; as we could not bring sufficient strain to bear upon the point of opposition, without devitalizing intervening structures. With the exception of a very small minority, the deformity popularly

known as "bow-leg", is easily altered without interference by either saw or chisel; this is done by fracturing the leg if possible: or when this is not practicable, to reduce it by straining repeated daily. To obtain sufficient leverage to attempt fracture, or failing this, then to get enough power to overstrain the bones of the leg; the lever is employed as shown in Fig. 19.



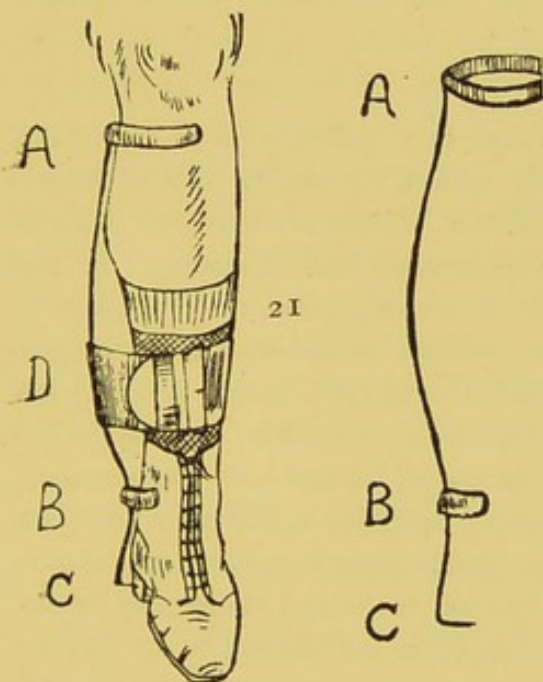
It is applied by bandaging it very firmly to the superior and outer aspect of the leg, so that the fulcrum is situated at, or just above the part to be damaged.

Fig. 20 shows the act of performing the attempt at immediate reduction by fracture, the operation is so simple that the publication of an illustrative case would be superfluous.



The Surgeon should use his utmost power, and if the leg

fractures the correction is immediate, and a suitably padded, hollowed, straight, sheet-iron splint is applied to the inner aspect of the leg, and then bandaged moderately firm; it should be slackened next day and re-adjusted, and as the irritation subsides, then more firmly bound. Supposing however, that the surgeon, though he has used his utmost manual power to the lever, fails



to fracture the leg, then he can successfully bend it by employing the lever daily, and firmly bandaging to the before-mentioned sheet-iron splint. Ten days generally suffice to reduce the deformity equal to any reduction by fracture, saw, or chisel. Whether we succeed by fracture or repeated straining, after about fourteen days

of daily supervision by the surgeon, the bandaging to the inner side sheet-iron-splint, can be trusted to be daily performed by the parent; or a suitable iron support may be worn, as the original cause may not have totally ceased to act, thus there may be a tendency to relapse. Fig. 21 is a plan of an applied iron support to be worn for maintaining the correction of a left "Bow-leg."

Notes on Injuries of the Foot and Ankle.—These two regions are liable to fractures and dislocations, simple and compound, of common and uncommon form; from the great utility of these

parts in locomotion, an early and efficient a restoration as possible is needed. For the reduction of Dislocations, simple or compound, as I have discussed elsewhere; all the manipulations should be commenced by increasing the deformity. If the dislocation be compounded and there is difficulty in reduction, the "lever" described in "Contribution," Part iii, should be requisitioned and used as there directed. In illustration of the foregoing, I will give a few examples :—

Some 16 years ago, I went to see a case in a branch street at the Dock's end of Athol Street, and found the patient, the second mate of the ship "Jeremiah Thompson," lying in bed with a compound dislocation inwards of the lower end of the Tibia, the whole articular facet presenting, the foot extremely splayed. My visit was made in the afternoon; three surgeons in consultation had already made fruitless attempts at reduction; one surgeon was a specialist devoting himself to Fractures and Dislocations. Aided by the Stevedore of the ship, I proceeded to reduce the dislocation; holding the foot everted, the lever was passed through the wound, hooked over the astragalus, and using the tibia as a fulcrum, between manipulation and leverage, reduction was effected, the limb was dressed and suitable counter pressure employed to maintain the parts in place. The patient was left in bed comfortably smoking his pipe. On returning in the evening to see the patient; to my surprise I learned that the ship's broker had removed him to a neighbouring hospital. Three months after that date he was discharged from that institution, and presented himself before me for examination. The appearance of the ankle then, was as follows: some portion of the maleolus was necrosed, and projecting through the skin, the foot in the condition of traumatic valgus. The patient informed me that the displacement occurred on removing my dressings. I sawed away the projecting necrosed portion of tibia, and the wound soon healed. By instructing him to wear a valgus sole to his boot, the defect of the after treatment was minimised.

The original restoration of this compound dislocation, relapsed because the "counter pressure" maintaining the reduction, was either neglected or mis-applied. An attempt was made

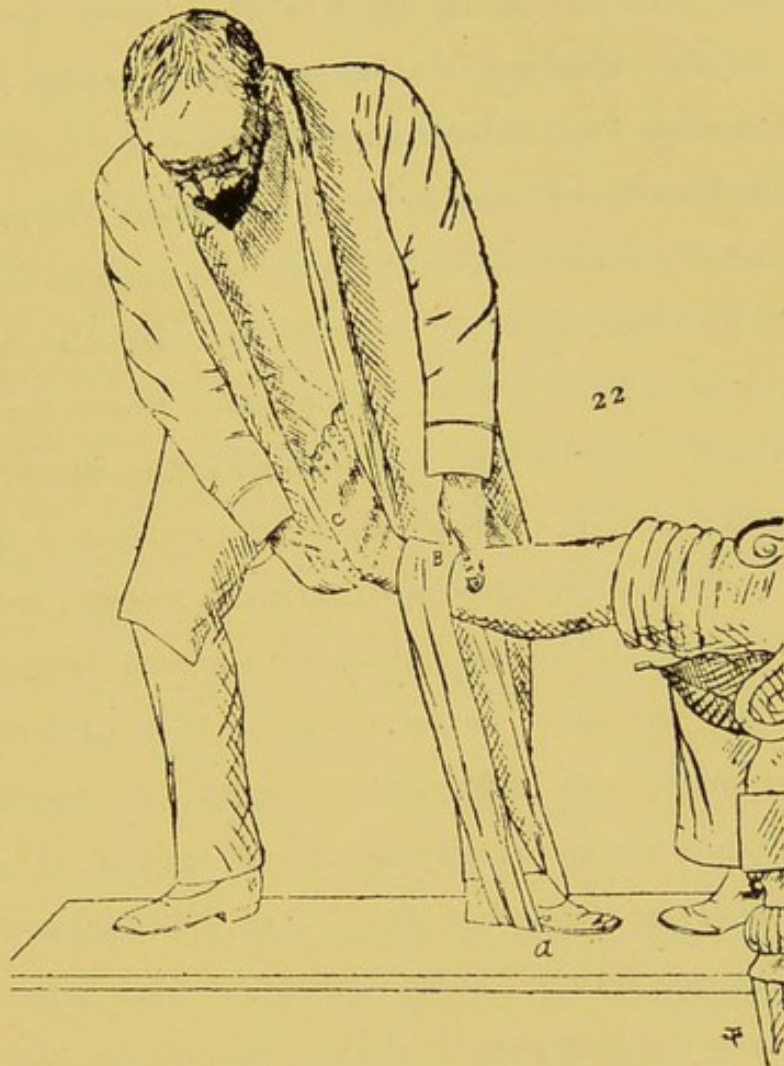
in the hospital to replace it, but it failed, though tried with the aid of an anæsthetic. The patient in this instance had noticed the defect of the after-treatment. This is a prevalent defect in our management of injuries in connection with the ankle-joint. I will relate another case illustrative of the value of the "lever."

Some eight years ago, I was sent for to one of those branch streets running east beyond St. George's Hill; on my arrival, I found the patient suffering from a compound dislocation of the internal, middle, and external cuneiform, and cuboid bones; so that the whole scaphoid facet presented, tightly gripped by the surrounding skin; this was my diagnosis of the situation. The patient had been seen by three surgeons in consultation, who had placed him twice under the influence of chloroform to aid reduction, but without success. My procedure was simply to further evert the displaced part of the foot, to get the "lever" well in, then to exert its power and reduction was effected, but not instantaneously, it required about three or four minutes.

For the reduction of dislocation of the astragalus, I know of no mode or means of restoration, and have failed in every case; it is true I have not seen many, my recollection only extends to four cases, and only as a witness of two of them in the practice of others. By perfect dislocation here is meant, where the astragalus has been displaced and its connections thoroughly ruptured. Other surgeons have been equally unsuccessful; I think providentially so, as it is highly probable that the astragalus would not live after replacement, and its removal from the normal site would be much more serious, and under very unfavourable local conditions. Of dislocations of the astragalus witnessed by me, none were compound yet in each instance except one, they came away by sloughing of the skin over them,

and they were situated on the inner aspect of the os-calcis just behind the tibia. The exceptional case was a total dislocation forward of the astragalus, and it was removed by skin incision the day after the accident. It is true that dislocations of the astragalus forward have been reported as successfully reduced without subsequent complications. But I am convinced that partial dislocations of the foot forward, and tibia and fibula backward, have been recorded as complete simple dislocations of the astragalus, although the astragalus was not at all disturbed from its base, consequently its nutrition was not interfered with; these cases closely simulate perfect dislocations so much so, that I have at first sight made this error.

Simple Dislocation of the Ankle Joint.—The foot backward and leg forward is easily reduced if the surgeon is consulted early, he will only have to flex the leg upon the thigh, and the thigh upon the trunk, then, while an assistant maintains the extremity in this form, the surgeon, with one hand, grasps the heel to draw forward the foot, while, with the other hand placed just above the ankle, he forces backwards the tibia and fibula, and reduction follows. But it frequently happens that no skilled assistance is at hand, or some other cause has allowed much time to elapse, there may be a delay extending so long as two or three weeks. The reduction at this late period is not so easily performed. The illustration Fig. 22 shows how the surgeon can much increase his individual powers and succeed without the aid of an assistant or of an anaesthetic. From the illustration it will be seen that the power of the surgeon's arms



is assisted by the efforts of his trunk muscles, through the medium of a bandage passing behind his neck and under the patient's heel; a counter force is gained by attaching the patient's leg to the surgeon's foot with a bandage. The surgeon, as he finds best, may employ both hands to the patient's heel, or as in the illustration, one hand to the heel and the other to the leg. The after treatment of these cases is a matter of no special skill, the ankle should be retained immovable until we notice its area of action has been nearly restored, and the ankle is

utterly free from pain during night, or when jarred. It has happened in my experience that a case of dislocation has been presented to me for restoration so late as three and four months; the reduction of such cases by me at one period, was performed by the aid of a mechanical contrivance, this has been discarded, and in its place it is my practice to tenotomise the tendo Achillis, and proceed as shown in Fig. 22. Should the case be an extremely obstinate one, and of much longer duration than three or four months, reduction may be impossible. In such cases I perform a simulation of reduction as follows: having relaxed the tendo Achillis by section, the surgeon has the part ready for its easy performance. The patient being already under the influence of æther, if possible by manual power the foot is fully flexed and maintained so, fixed in a suitable size "club-foot shoe," until it has set in the position of extreme flexion. If the surgeon's strength be insufficient to overcome the resistance to flexion, he may increase it by applying the "foot-wrench," which is adapted for use on either children or adults. The after-treatment of a simulation is the same as for a reduction, and the signs indicative of the part being fit for use are also the same. It is a remarkable fact, that the symptoms which show that a simulation is fit for being employed, are identical with those of health after genuine reduction, viz., that the area of the joint's movement, by use, increases on either side to and from the position in which the limb was fixed.

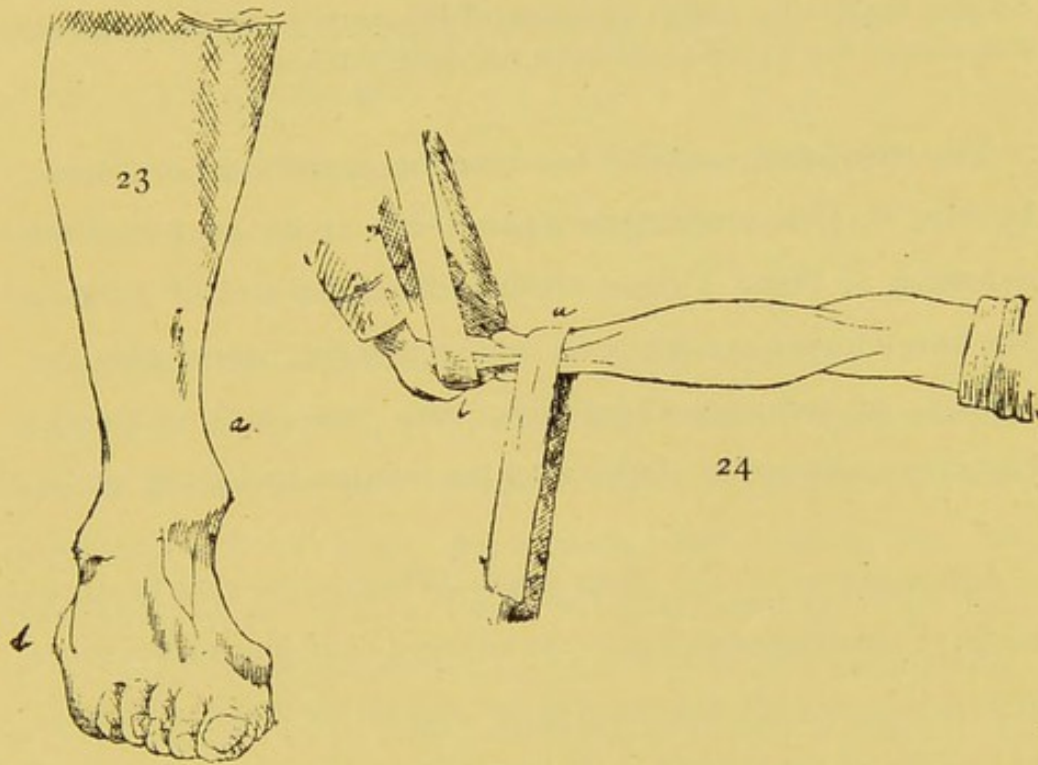
at the
wrench
use.

Fracture of the lower end of the Tibia and Fibula involving the ankle joint, commonly termed Pott's Fracture.—This injury is twin to another in the upper extremity, often named Colles' fracture, certainly it will happen that the surgeon has the misfortune to be called to treat examples of both these injuries, where inevitably some defect of restoration must be apparent after repair, even supposing the operator to be exceptionally skillful, nevertheless the defects of restoration after repair of Pott's fracture are scandalously frequent, but pardonable on account of the deficiency in our training for their management. Like Colles' fracture, this injury cannot be satisfactorily restored if an intelligent supervision is not exercised during the whole of the treatment; it is not at all a question of splints. The replacement after accident may be excellent, but the splay outwardly of the foot, characteristic of the injury, with or without some posterior luxation, may be allowed to recur during the two or three weeks of after-treatment, yet at this period it may be corrected by judicious pressure. The surgeon may make a perfect initial replacement, and maintain it so, up to the sixth, seventh or eight week, or even longer, until he by manipulation judges the part firm, nevertheless, soon after the patient has exercised his foot, the weight of the body brings about some degree of ankle valgus, which more and more cripples him, consequently, an excellently managed case, may finally show a defect of restoration, a blemish which mars its utility. A defective restoration following a Colles' fracture, is seldom more than a question of symmetry. It is not so in Pott's fractures, as

invariably there is with it a feeling of weakness in the foot, from the fact that the superincumbent weight of the body is frequently testing it. As I remarked before, the treatment is not a question of splint, but of intelligent and constant watching, the surgeon may have, by counter-pressure, to re-model according to the deviations outwardly or inwardly of the foot from its normal position in relation to the leg. The first dressing is so applied that the external points of counter pressure bear upon the foot and middle of the calf, while the internal points of pressure are applied along a surface corresponding to the interval between the two external points of pressure ; thus the initial restoration is maintained. But experience has taught us that this may be overdone, and the surgeon sees a slight traumatic varus, the foot having been pushed too far inwards by excessive counter pressure. At one, two, or more subsequent dressings, this can be corrected by either diminishing the counter power, or for a time suspending it, nay, even reversing the points of pressure. In fact, the surgeon has to watch until the fracture is consolidated, then when the patient even partially resumes the use of the foot, precaution has to be taken lest the callus yields, and allows the formation of any degree of valgus. To prevent this disaster, a "valgus boot" ought to be worn by the patient for six or seven months during locomotion after apparent consolidation.

Perchance the surgeon may be consulted concerning a Potts' Fracture with some degree of valgus, which is apparent six or seven weeks after the date of the injury, as Fig. 23 ; after a lapse of even so long a time this deformity can sometimes be

perfectly corrected, and partially so, after a lapse of a much longer period. The method of reduction is depicted in Fig. 24.



The reader will notice that the manner of employing the necessary force and counterforce, is similar to that for reduction of an ancient dislocation of the ankle, but with this difference, the counterforce attached to the surgeon's foot acts upon the inner aspect of the patient's leg, while the opposing force, the towel over the surgeon's neck, is applied to the outer aspect of the patient's foot and heel, being further supplemented by the surgeon's hands applied to the same locality. In cases of Potts' Valgus, existant six or seven weeks, I have found this method very successful, and so tolerable to the patient that an anaesthetic was needless.

The last case that came under my observation with the defect of Pott's Valgus, was that of a Dock-gateman named Gray, residing in Elwy Street. He had been discharged from a public institution after six or seven weeks' treatment, with the result that there remained an extreme valgus deformity. Assisted by Mr. R. Jones, we employed the method just discussed, with such success, that a perfect restoration and repair followed.

The "club-foot wrench" has been employed with fair success, by Mr. R. Jones, while the patient was under æther, for the reduction of Potts' Valgus which had existed several months. My own efforts have not been very successful, even with the wrench, in instances where more than two or three months have been allowed to elapse after the fracture had taken place.

Inflammation of the Ankle-joint.—Whether the case be traumatic or constitutional, the local treatment of all joints is the same in principle, though unavoidably our remedy must vary according to locality of application. If the inflammation be of traumatic origin, suspending the function of the joint, by arresting its motion, generally suffices. These cases usually possess a strong tendency to resolution, but when we have to treat inflammation of this and other joints, arising as a symptom of constitutional defect, perhaps complicated by a history of traumatism as well; though the constitutional treatment is very necessary, the local is equally so, and more so than when the inflammation cannot be traced to pure traumatism; as in the latter cases there is a tendency to a progression of the disease. At the risk of surfeiting my reader, I must repeat what I have so frequently enunciated.

First and foremost in importance, motion and its modification, tremor, should as far as practicable, be arrested.

Secondly, of equal importance to the first is the adoption of the indirect method to secure immobility; by it only can surgical rest be given to the part.

Thirdly: concussion, a fractional evil in comparison with motion, in principle should be avoided, but practically, it rarely has to be taken into consideration.

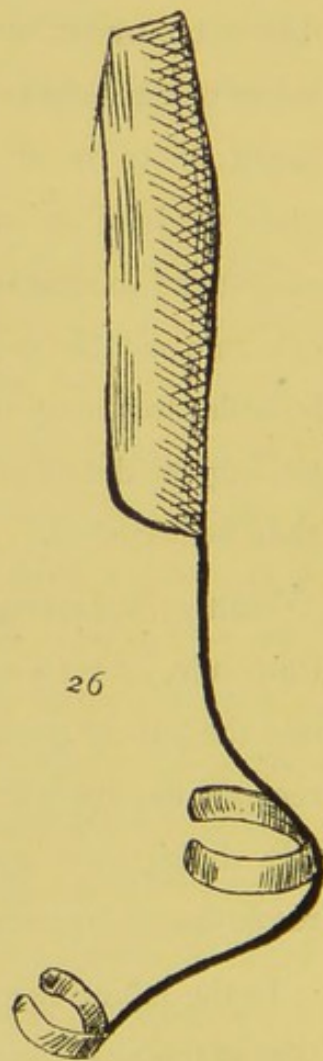
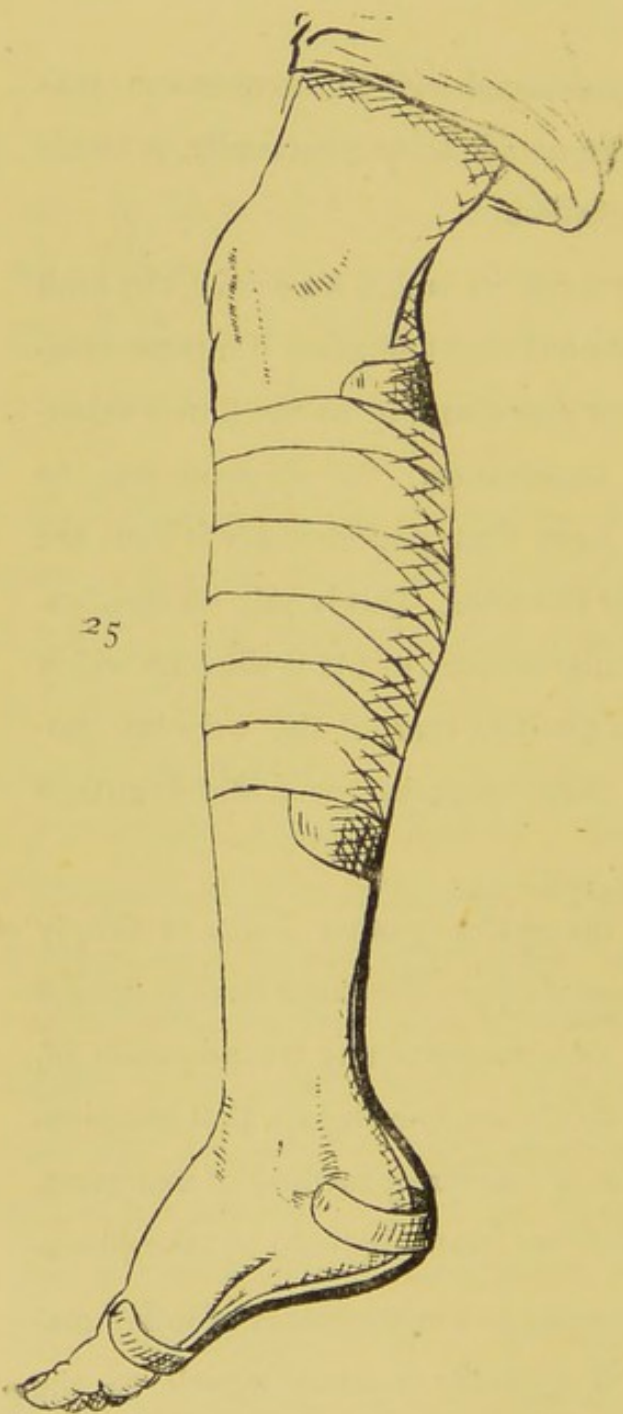
Fourthly: the position or form in which we retain the limb during treatment, would not need consideration if a mere resolution of the disease were our sole aim, but as the limb's subsequent utility is of some importance, the surgeon has to place the joint in such a form that preferentially it can the easiest and soonest resume its functions. This is only the application of a rule suitable to all articular defects, to place the limb which is under treatment in such a position that of the muscles controlling the defective joint; those labouring at a disadvantage shall be favoured.

Fifthly: inflammation of the ankle, or other joint, of simply traumatic, or even constitutional origin, the cause having ceased and the patient possessing, or soon becoming the possessor of, recuperative tendency, will explain the known fact, that occasionally during the application of the direct method of treatment, resolution of the inflammation has been observed to take place.

In the following pages devoted to the treatment of inflammation of the ankle joint, I will specially confine myself to the

details of treating cases progressing towards, or in the suppura-
tive stage. There are two classes of such presented to the
surgeon, cases under and over the age of twelve years. A confi-
dent prognosis of recovery, with little or no defect remaining, can

*Wegman
mdw 12*



safely be given if the patient is under twelve years of age ; when beyond that age, the prognosis is more and more uncertain as the patient advances in years. To the mechanical treatment of the suppurative stage of ankle joint disease, in subjects of the second class, I can only contribute the advice that the indirect method should be the local application, supplemented by crutches for locomotion ; the affected ankle to be kept from ground, and the error of slinging from the neck avoided ; Fig. 25 illustrates the indirect mechanical method applied so as to keep the ankle-joint immoveable. Fig. 26 shows the appliance apart from the limb, and is composed of three wings of sheet iron riveted to a flat iron stem sufficiently strong, according to the age of the patient, that it can arrest motion and tremor of the joint ; it is retained in place by a bandage applied to the calf portion of the leg and dorsum of the foot, the latter, the artist has omitted to show in illustration Fig. 25. The foregoing are the details of the method employed by me in the treatment of this ailment, when the patient is over the age of twelve years. Prior to this age, the treatment is the same as that for adults, with this exception : in place of crutches to aid locomotion, and prevent concussion to the affected limb of the patient, there is fitted to the limb a walking knee-splint, the length of which should be, so that it extends three inches beyond the patient's toes when the ankle is in an extended position ; and to the boot of the healthy foot is attached a patten three or four inches deep—The arrangement is shown in Fig. 27. The local treatment of the sinuses ejecting pus slightly varies ; at times a porous cloth



steeped in a solution of Boracic Acid, or else Medicated Wood Sawdust, very lightly enveloping the parts draining. As regards operative interference, whether the case be one in adult life or not, if my decision be to attempt complete conservation, then, if cognisant of suppuration having occurred, the integument is allowed to become partly ulcerated, before antiseptically incising the presenting collection of pus. Experience has taught me that an efficient drainage is thus

secured with less liability to constitutional disturbance, and time saved. As regards the question of excision after thirty years' experience, it is my opinion if the patient be under twelve years of age. the question need never be entertained, and further, at this age, only very rarely is there any occasion to interfere by gouging or scraping the bones. Of the many cases of Ankle-joint Inflammation presented to me for treatment, in no instance have I had to resort to excision, where the sufferer was under or about twelve years of age. By chance I have seen cases, which had been excised by others, the particulars of the last such instance are as follows:—

This year, during a visit to me, of Dr. Oswald Hermann, Ehem, Operateur an der Gussenbauer'schen Klinik, Prague, we examined a case of excision

*excision
of
ankle*

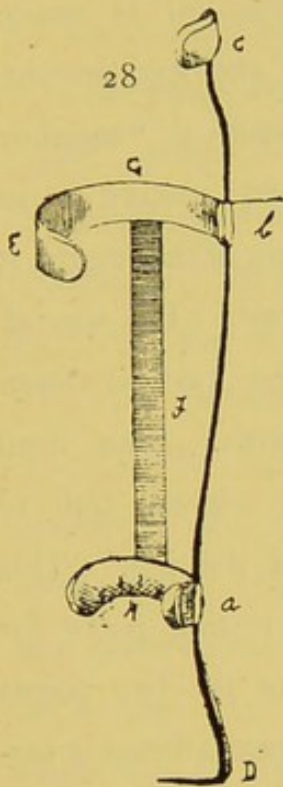
of the Ankle joint; the subject of it was eleven years of age, and the operation, so far as the health of the locality, was a perfect success. But the foot was an utter flail, limb shortened two inches, with very imperfect locomotion, though aided by cumbrous artificial support; it would not bear comparison with a very imperfectly restored ankle, after disease, where excision had not been employed. The history of the case was, that when a child three years of age, the parent had placed him under my care, but soon transferred him to an Institution for the treatment of patients of that age, where the operation was performed.

Let us suppose, though improbable, that to successfully restore the ankle in the foregoing case, it would have required a period so long as three years; the child then would be six years of age, the part sound and strong, no special appliance or boot then would be needed; and we have a great probability that the part, even if a little defective, an unlikely result at that age, yet being sound, would last the patient's life-time, giving him no care regarding it. Let the reader contrast the foregoing with the patient's condition now; a flail foot, a periodical necessity for visiting the Instrument Maker, to be continued as long as he lives. Can the reader come to a different conclusion than this? That a cure with full conservation of the part, gives a great return for the extra expenditure of time.

The mechanical treatment of Knock-knee, (genu valgum) when not complicated by ankylosis, the result of injury or disease.—Having no personal experience of the operative treat-

ment by section, for this deformity ; my opinion concerning such a method, is based upon what I have seen in the practice of other surgeons. My conclusions are, that very many of the cases operated upon are exceedingly creditable, though gained by incurring some risk. Section of the bone for this deformity, even when no serious harm has resulted, is not always followed by a complete reduction, nor a neutralization of the tendency to recurrence. In fact, I know that in some cases, mechanical treatment may be required for a long period after the operation. I have even had to reduce by mechanical means, cases that had been treated with apparent success, by section of the bone, years previously. If we have patients under the age of ten years, except they are extreme examples of deformity, they can be easily reduced in a period of from two to three weeks ; though I have known a reduction performed by mechanical means, on a patient as old as thirty years. Still it is very improbable of success, in subjects who have passed the age of eighteen or nineteen. The age of the patient is of much greater consideration in prognosis, than the degree of the deformity. A most efficient mechanical means of assistance, in the restoration of genu-valgum, I found to be the "calliper knee-splint" ; but the one I prefer now, is that shown in Fig. 28. The "calliper" in my opinion, is quite its equal in efficacy, but its defects are, that it (the "calliper") has to be altered in shape as the reduction progresses, it also requires some little care in training

under
10 yrs.

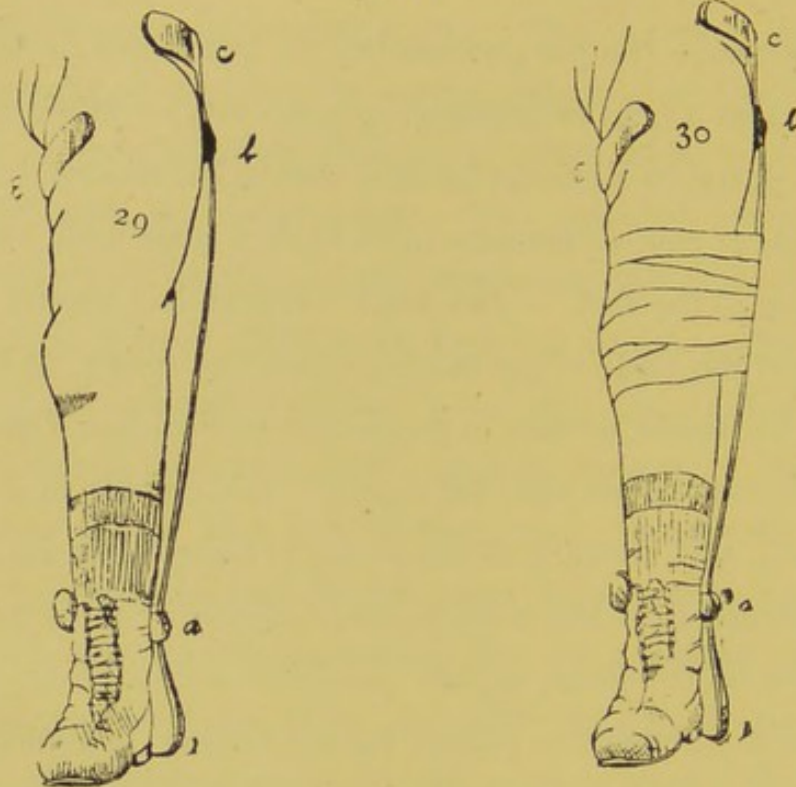


the patient and his friends for its management. These drawbacks are not present when using the appliance shown at Fig. 28. When once it (Fig. 28) has been fitted to the patient, so simple is it that if the patient and his friends make an error in its management, they must be exceptionally obtuse. Fig. 28 consists of a vertical outside stem of flat wrought iron, c. D. bent to a right angle at the lower end D, and made round, to go into a round hole in the heel of boot. At the upper end is a sheet-iron cross piece c, well padded and intended to bear upon the ilium, above the trochanter, room being made on the vertical stem by hollowing it just below the pad, to receive the trochanter. From b. to A., the stem is straight, but from a. to D. it is curved to clear the ankle-joint. Below the trochanter curve is the second cross-bar e. b. The position of this cross-bar e. b. on the stem is all-important, if it is not properly situated, the instrument is certain to be useless. To find the exact position required for this second cross-bar e. b., place the boot, having the hole in the outer aspect of its heel, on the patient's foot, then insert the hook D, laying the bar c. D. along the outer aspect of the limb, and mark a point on c. D. corresponding to the sulcus in the skin made by the junction of the nates and thigh, this point should be the position of the upper

edge of the second cross-bar, e. b. This cross-bar is made of hoop-iron, one inch wide, strong enough, and just permitting the surgeon to mould it with his hands, while a "monkey wrench" holds the vertical stem. The cross-bar should be so long, that when bent round the posterior aspect of the thigh, it shows itself in front of the thigh, half way across. The special duty of this second cross-bar, is to stop the vertical stem from coming forwards and rotating inwards. The third cross-bar A. a., like the second one, is curved, but to fit the posterior aspect of the lower third of the leg. This cross-bar, answers two purposes: first, as a resting place for the second vertical bar, G. A., it is also one of the two points of counter-pressure a. and c., consequently we want a bearing surface here of great extent like c., from $1\frac{1}{2}$ to 3 inches wide, according to the age of the patient and the probable amount of force required; it has also to be suitably padded. This bar A.a. should be placed on the vertical bar, at a point corresponding to the part over the fibula, where that bone ceases to be subcutaneous; as a rule it will be found that the distances between a. D. and c. b. are nearly equal. The second vertical bar G. A. connected to the second and lower cross-bars, is placed upon them in such a position, that when in use, it is behind the centre of the popliteal space. Its special purpose is to hinder the limb, by flexion of the knee, riding over the appliance by the pull of the bandage. This second vertical bar should be made, half the width and double the thickness, of the second cross-bar. Of course the foregoing are general rules for the construction of

the knock-knee restorer; so efficient an instrument do I believe it to be, that a brief recapitulation, with hints for fitting is justifiable. It has to be borne in mind during its construction, that the points of counter-pressure must have a large area, to avoid sloughing of the skin. The main vertical bar should be so rigid, that the strain of the bandage does not spring, or bend it. The same remark applies to the second vertical bar, but being much shorter, lighter iron will suffice. If the point of counter-pressure *c.* tilts forward off the ilium, to remedy this, the hollow in the second cross-bar must be made shallow enough to fix *c.* at a point on the ilium, slightly posterior to the centre of the trochanter. Should the patient have a feeling of difficulty in extending his foot while the machine is in use, the lower counter-pressure bar *A.* requires its curve making deeper, by bending the whole bar a little backwards. If the foot feels to be held too much inverted, the part *a. D.* of the vertical stem, requires to be slightly rotated upon itself, in a direction that will make the point of the hook at *D.* indicate a little backwards. Having now constructed the machine, and with the aid of the "hip-wrenches," made a perfect fit, we apply it as shown in Fig. 29, only requiring a bandage, which should be as wide as possible—consistent with the age of the patient—never narrower than three inches for children, up to five or six inches for patients eighteen or nineteen years old. The bandaging should be from without, inwards, and for some distance wound above and below the knee joint, including within its folds both of the vertical stems, as shown in Fig. 30. Occasionally it will

? in front
or below
the limb



happen that primarily bandaging both vertical stems, permits the knee to ride over the appliance. This annoyance can be thwarted by using two bandages ; a short one of about three folds, and with it, bandage the knee to the short vertical stem G. A., afterwards employing a longer bandage which should include both vertical stems, and wound from without inwards. The application of the machine is followed by pain and tenderness, with other symptoms, attendant upon the rapid progress of successful restoration of deformities in general. The change brought about, which enables the restoration to be permanent, will probably be found to be ; that the continued excessive pressure upon the internal condyle of the femur causes absorption, and again, that by the continued relief of pressure from the external condyle some addition to its length is permitted.

The treatment of fractures, diseases and functional defects, of the main bones, and joints of the lower extremities.—

The principles of the treatment of these ailments, have been discussed in "Contribution" Part vi. To thoroughly initiate the student, by mere reading, into the art of restoring fractures, requires more experience in literary composition than I have, or am likely to attain. This is essentially a clinical subject. Experience has taught me, that it is useful to carefully consider the complaints of pain, expressions of pleasure, and the suggestions of the sufferers. The first may point to a defect in treatment, just as the second might refer to efficiency of management; from the third may sometimes be gained a hint towards the improvement of our method, which the surgeon, experienced as he may be, has never thought of. As regards the mechanical treatment of fractures, our class books are crowded with devices for the restoration of fractured bones, most of them designed in the library, the feelings of the patient being utterly ignored; a serious oversight, in as much as the sufferer's sensations re-act upon the muscles, they again influence the fracture. As one who has tried most of the methods of treatment now in vogue, I may be considered sufficiently qualified to give an opinion upon their merits. For the convenience of review, they may be classified:—first, we have the immovable appliances of which the old long splint is typical; second, the restless suspension type, of which the cradle of Dr. Salter is the most objectionable, next to it the method of Dr. N. R. Smith; third, we have a type, which I can no better describe than as the "at ease moveable," of which the late Mr. James,

of Exeter, was the originator. Mr. James first gave the impetus to all improvements, of value, that have subsequently been made, in the management of important fractures in connection with the lower extremities. He supplied us with, what was at that time, a much-needed reform, that is, a method of making extension and counter-extension, in a straight line with the bone fractured. He also designed, by the introduction of wheels under his fracture apparatus, that some movement should be allowed the patient while in bed, and that the evil of such motion was minimised. The drawback inseparable from his mechanical management of these fractures, was the fact that the act of defecation, which the patient must perform many times before the repair and restoration of the fracture, was accompanied by no small injury to the part under treatment. This, and another practical objection, also applies to the "long splint," that is, the difficulty of maintaining extension and counter-extension in a straight line with the fracture. The treatment by suspension certainly prevents any injury during the act of defecation; this method, however, has its drawback, the patient's area of movement in bed is unnecessarily limited, as he is obliged to remain not far wide of the point of suspension. Again, extension in conjunction with the suspension method is seldom practicable, except by means of weight and pulley, an uncomfortable way of maintaining the length of the limb. I found that patients in hospital expressed a sense of insecurity while suspended, and contrary to what we might suppose, they informed me that the intermittent muscular spasms, attendant upon fractures, were more

severe when slung, than when resting on the couch. This has been confirmed by my observations in private practice; such patients, not being so much under our control as when in hospital, as soon as the surgeon leaves, habitually bolster the swinging "Fracture-cradle"; when detected and expostulated with, reply that otherwise the intermittent muscular spasms were unbearably severe. Having now pointed out the defects of the various types of machines in use, conclusions, the result of long observation assisted by the criticisms of the sufferers. Now, will be introduced to the reader, a mechanical appliance for the treatment of fractures of the lower extremities, which has not the faults of its predecessors. First, defecation is easily performed without nurse assistance. The patient is not confined constantly to any particular part of the bed; extension of a fixed character can be exercised to any amount in a line with the bone fractured; or this can be arranged to suit the prejudice of the surgeon, who might incline to a continuous rather than a fixed mode of extension. The apparatus is shown in detached portions, Fig. 31, and built up ready for use in Fig. 32. The reader will no doubt suspect from the appearance of this machine, that from it was evolved the knee splint, which has found favour with surgeons, as efficient in the treatment of knee joint inflammation. Before proceeding any further with my subject, I will enter into the details of the construction, of all the appliances employed by me for the treatment of fractures of the main bones of the lower extremities, also for the fixation of the knee and hip-joints—afterwards proceed to

describe their application ; and lastly answer the friendly objections, that have been made, in regard to their construction and use.

Fig. 31 shows the component parts of the fracture carriage depicted in Fig. 32.

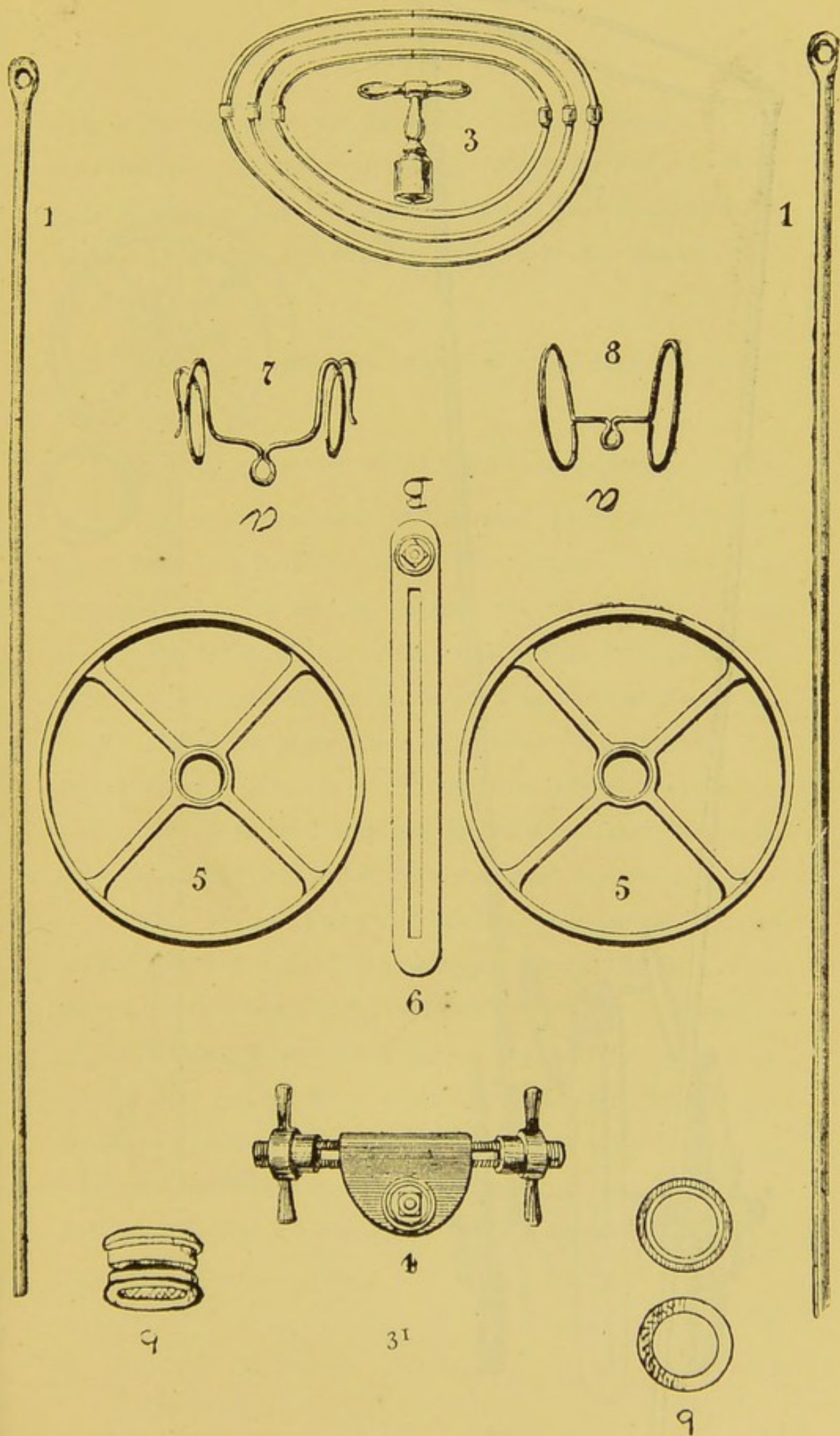
1, represents two cast-steel rods with an eyelet at one end of each.

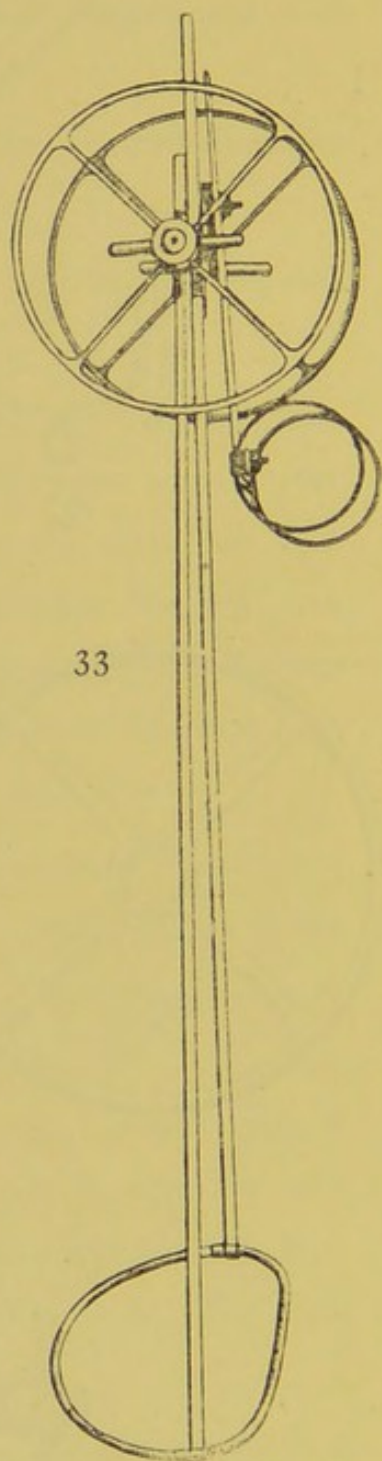
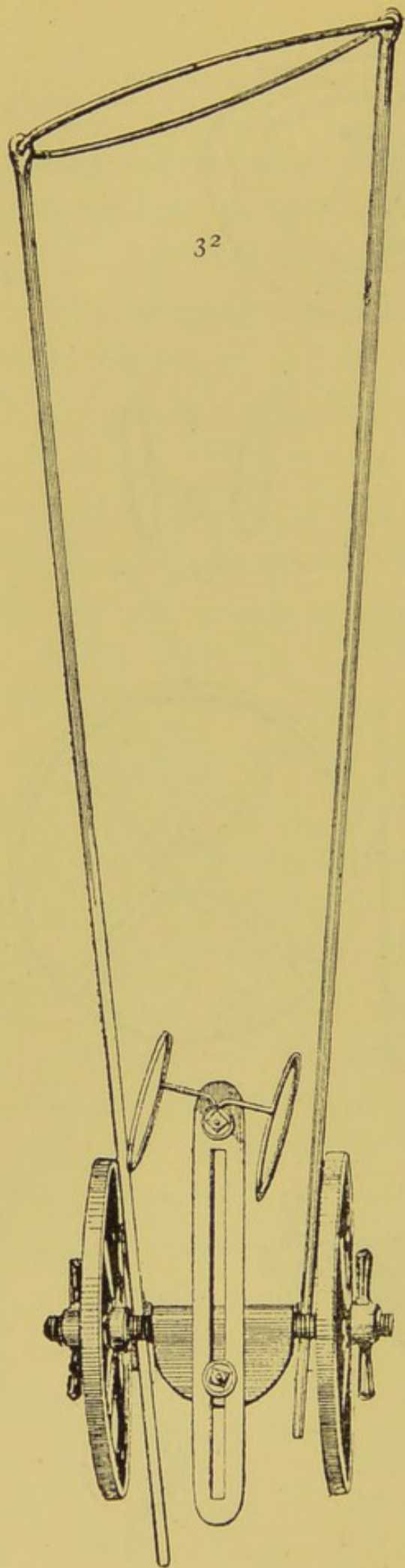
2, shows three ovoid cast-steel rings, these rings have two bosses or swellings at each end of their major axes. Just opposite to the position of the numeral 2, the rings are constructed to open, having male and female connections, being an imitation of the conjurors' rings. This arrangement enables the rings to be opened, so that the eyelets of the twin bars may be slipped on them, and rest one on each boss.

9, are two views of four sleeves intended to enter one partly into each side, of the bosses of the wheels 5. The purpose of the sleeves is to hinder locking of the wheels when screwed up in place.

4, is composed of a steel slotted axle, at each end of which are two hand-nuts ; between the nuts is seen the iron locking-flap, through the semi-circular end of which there is a bolt and nut which fits into the slot seen in 6. The locking-flap is loose upon the slotted axle, 4.

6, this, besides having the slot to take the small bolt in 4, has also a bolt and nut at the end B to take either of the foot pieces, 7 or 8.





7, is the foot piece for fractured thighs, with spring hooks for extension. A., is an eye through which the bolt B., in 6, goes through. This foot piece combines the convenience of assisting extension, and of being adapted to the support of a right or left foot.

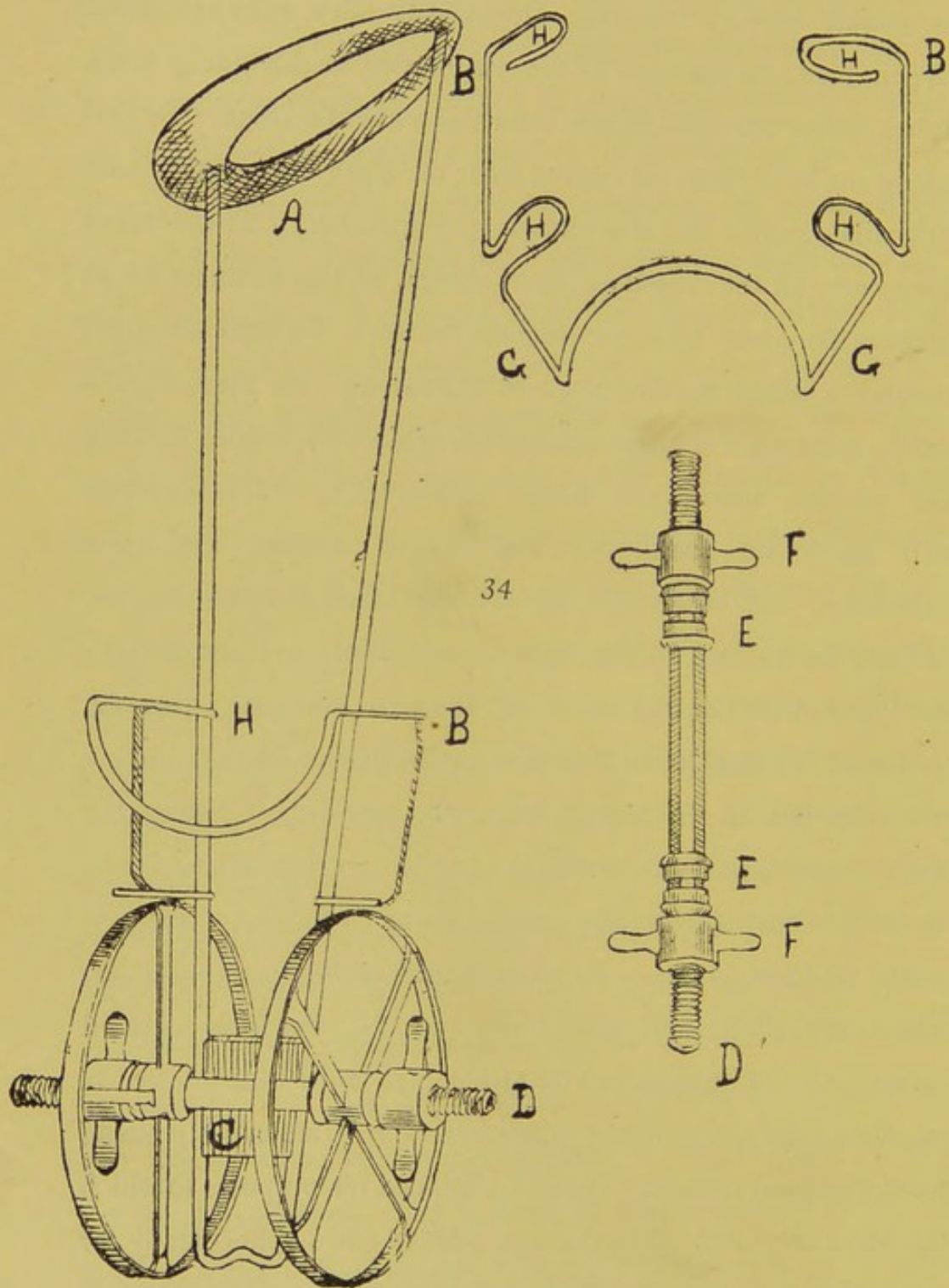
8, is a foot-piece for the support of the foot, in fracture of the leg only.

3, is merely a key or spanner for locking the square nuts.

Having now described the various parts, we will suppose them required for use. First:—One of the three cast-steel rings is sprung open, the free ends slipped through the eyelets of the two steel rods, and the ends of the ring closed as they are in the figs 32 and 33. Then the four sleeves, fig. 31, are placed one in each side of the bosses of the wheels. The hand-nuts of 4 are taken off; and the wheels, having the sleeves already in the bosses, are placed one on each end of the axle, having the locking-flap between them; leaving a portion of the slot in the axle exposed. Now the hand-nuts are replaced on the ends of the axle. Through the exposed part of the slot are passed the plain ends of the twin steel rods. The surgeon then regulates the angle between the groin ring and the steel bars, having done this, the whole machine is made rigid by screwing up the two hand-nuts, thus jamming the steel rods against the locking-flap; next, the slotted support 6 is attached to the latter, and finally a foot-piece 7 or 8 is fixed by the bolt B, of 6.

This instrument is designed so as to be taken to pieces for the convenience of carriage. Its re-construction is only a matter of five minutes. Fig. 32 shows the fracture-carriage put together by the surgeon, ready for use on a left lower extremity; the latter will be obvious on looking at the slope of the ring and the axis of 8, in Fig. 32. I have generally confined myself to three sizes of "groin" rings. These are sufficient for patients from the age of 12 years and upwards. Were the rings welded on to the rods, as in the knee bed-splint, seven or eight sizes would be required. This anomaly is explained by the fact, that the difference between the size of each ring can be increased or diminished, by the surgeon increasing or decreasing the angles which the ring makes with the stems, at the groin. It was very difficult to show this in the drawing. The rings when in use, are wrapped round with a suitable quantity of tow, or cotton wadding; this again is covered with guttapercha tissue, fastened here and there with a touch of chloroform, or benzole. It is obvious that when we wish to vary the length of the machine, the hand-nuts are slackened, and the slotted axle and flap are moved up or down the rods. This fracture-carriage has another advantage which cannot be shown in an illustration. If an assistant slackens the two hand-nuts a little, the surgeon, by gripping the ends of the two rods at the groin, and giving them a twist to right or left, causes the patient's limb to tend to a rotation outwards or inwards; thus saving the necessity of sometimes having to raise the whole limb from its bed of repose.

Fig. 32 is a plan of the carriage arranged for the left side ; fig. 33 is a side view of the same, arranged to suit a right extremity. When in use for fractures of the thigh, two slackly-fitting brass tubes, about one-third longer than the patient's thigh, are slid along the steel rods—of course from the plain ends of the rods upwards—before the machine is put together. These tubes then carry all the dressings, short splints, and so forth, so as to entirely do away with the friction between the machine and bandages, which greatly opposes extension ; by these means vastly reducing the force required for extension, besides shaking the patient much less, when rectifying it. This carriage will be found useful for any lesion affecting the lower extremity, and when in use can be made to tend towards, or from the patient, by placing it to rest upon a plane having the desired inclination from or towards him ; for instance, in disease of knee-joint, it is preferable that it should incline towards, but in fractures, from, the patient. Before the fracture carriage was brought to its present state, I had devised, constructed, and tried many models, during a period of fifteen years. By examination of Figures 32 and 33, which are plan and side views of the fracture wheeled carriage, it will be apparent that the more simple bed, and walking knee-splints, which have merits the former does not possess, were designed from it. It can be utilized for purposes to which the latter are unfit. Fig. 34 is a plan of a bed splint, ready for application to any injury of the lower extremities. The axle and wheels D of the "fracture carriage" have been transferred to a bed



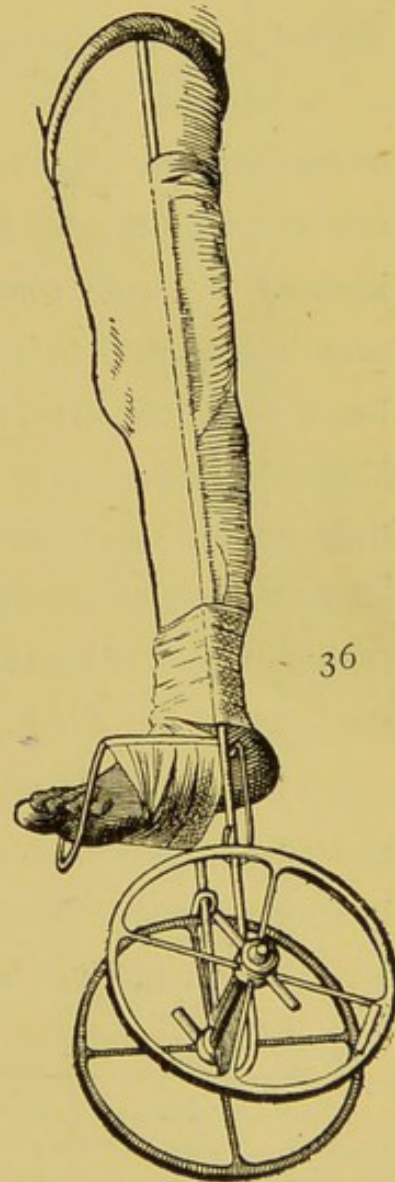
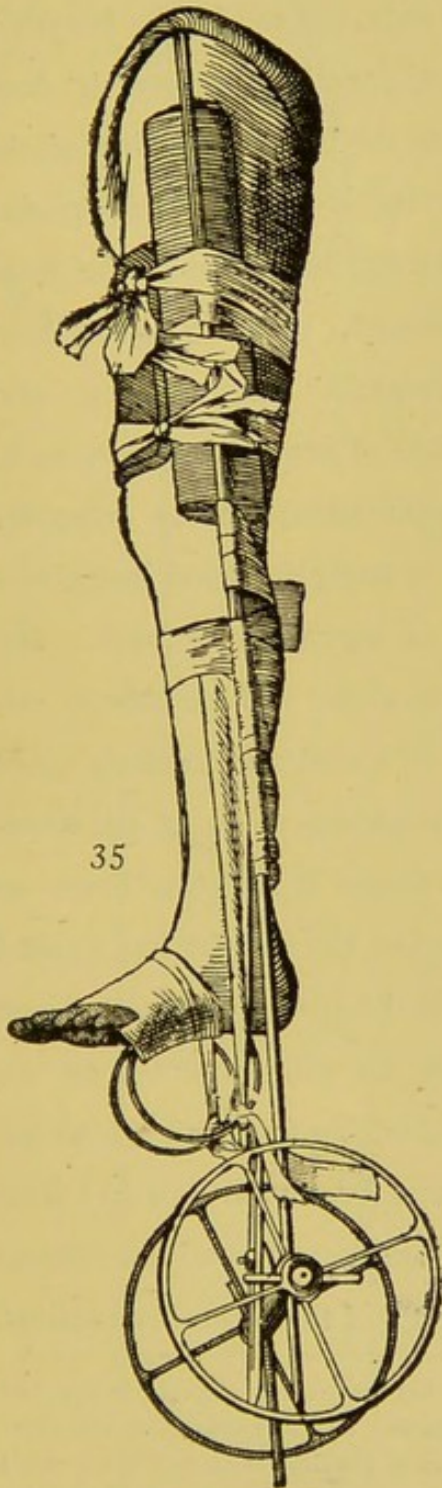
splint, with this difference, that the "locking flap" has been slipped off the "axle," thus exposing the long slot through which the lower end of the bed-splint has been thrust, and in lieu of the locking flap, a flat piece of wood C, has been inserted between the rods, without which, in screwing up the "hand-nuts" the bars would be bent out of shape, and the axle could not be firmly fixed at a proper position. The foot-piece, H. B. unlike that in the "fracture carriage," slides up or down the rods unconnected with the axle, but is self fixing. H, H, H, H, are indentations at its base into which the rods fit; G are its upright parts. By an examination of H, H, H, H, it can be seen that the free ends are wider apart than the diameter of the semi-circular end, consequently its free ends have to be compressed to get them between the "rods," then allowed to spring into position. Being made of quarter inch cast steel, they grip the rods and remain wherever placed. E, E, are the four sleeves which protect the wheels from being locked, on screwing up the "hand-nuts." The surgeon, if summoned to a patient,—whose lower extremity he surmises must be treated in bed—takes with him either the "fracture carriage" fig. 31 or the "bed-knee splint, axle, and foot piece," fig. 34; having placed together the various parts of either of these appliances, a bedroom towel is placed over the rods, from A to H, the limb thrust through the groin ring and drawn into position, the towel being under the limb, and folded down its centre, the folded side being round the inner rod, the two free ends of the towel are passed over the outer rod, afterwards under the limb and tightened,

then wrapped round this rod and fixed with blanket-pins at various points ; first near the tendo Achillis, also opposite the knee-joint, and just below the trochanter, thus regulating the tension, so that the line of the limb is that of perfect extension and comfortable support ; finally a few supplementary pins may be added. By this arrangement of the towel, the inner rod has one thickness over it, the outer rod will have two, and the pins are inserted through four layers. Let us suppose that the surgeon has to treat a fractured thigh, and that he has already applied his extension tackle to the limb before inserting it into the bed-splint, he then has only to apply short splints, one under the towel, others as he may judge to be required.

Fig. 35 shows the fracture carriage applied for the treatment of a fractured thigh. Fig. 36 shows the bed knee-splint applied for the same purpose.

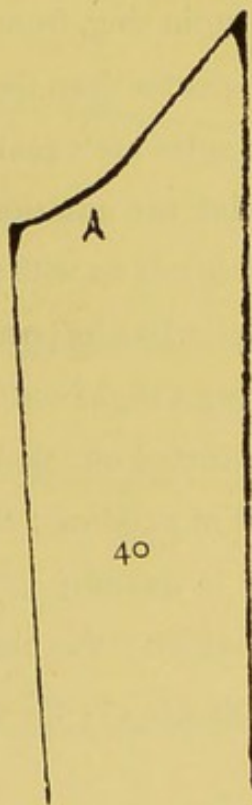
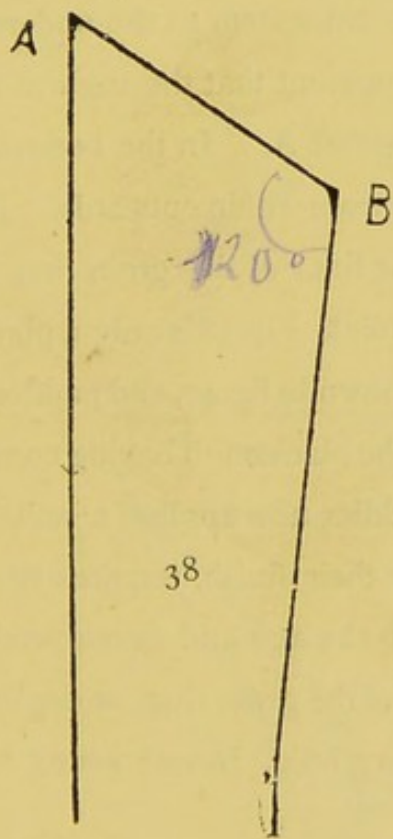
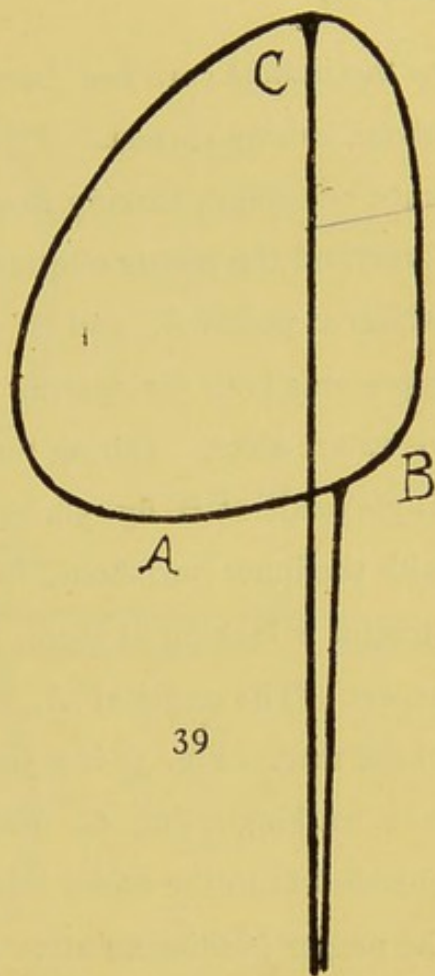
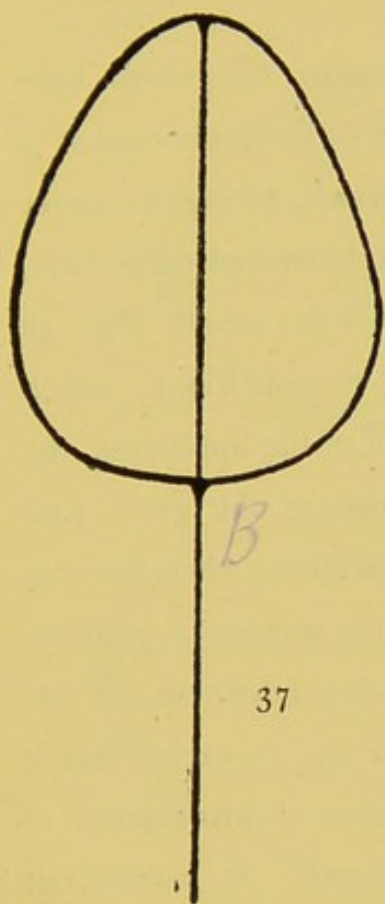
Fig. 35 is an attempt by the limner to shew the "fracture-carriage" when in use, and shows the padded groin ring, auxilliary short splints, means of extension, the foot in repose bandaged to the foot-rest 7, fig. 31. Posterior to the limb, the pinned towel is seen. The dressings have been somewhat scantily applied, to avoid veiling the general plan. Fig. 36 shews the bed-knee-splint on a patient, with the supporting towel, and foot-rest; other necessary adjuncts being omitted to permit the reader to observe the initial proceeding for fixing the limb in the machine. In the use of these machines, a great amount of variation is possible yet not inconsistent with correct practice, to meet the special requirements of each case.

by Gabel one
 then carriage
 the oth
 (knee splint)



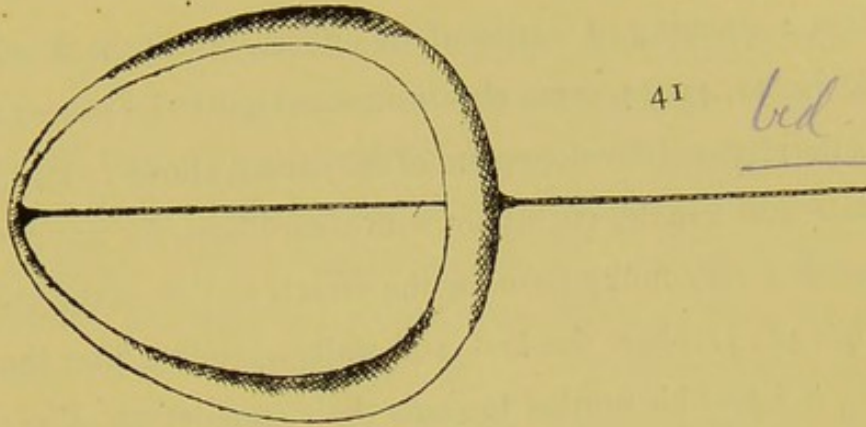
The lower end of the bed-knee splint, fig. 34 shows a termination and junction between the two rods, not unlike the letter W; this is, with me, a favourite form of junction, because it does not interfere with the application to the bed-knee splint of the axle for the wheels, and its concavity is also a handy resting place for tying the knot of the right and left wings of the fixed extension. This appliance is destined, before long to have a permanent place in our surgical armamentaria, and occupy the first place in its own field of action, as soon as its correct construction, and mode of application, become generally known.* A badly constructed or wrongly designed instrument may do good work in the hands of an ingenious surgeon. But like a master-musician, the master-surgeon will be able to exhibit more skill, when in possession of a well and correctly made instrument. The figures 37, 38, 39, 40 are plans of the knee-bed-splint and knee-walking-splint shown in skeleton form, as from the hands of the blacksmith, before the saddler has applied the padding, &c. They are constructed out of three sizes of best round bar iron—preferable to steel, as will presently be explained—for patients from the age of one to four years $\frac{1}{4}$ inch bar is strong enough; from 4 to 8 years, $\frac{3}{16}$ inch bar will do; from 8 years to adult, $\frac{3}{8}$ inch bar is quite sufficient. I shall not attempt to describe the forms of the groin rings of these two knee splints,

* My friend, Professor R. Parker, suggested that the groin ring should be attached to all forms of artificial limbs for the lower extremities, and its employment has given more than the expected advantage, the nutrition of the limb being much improved; all tension and compression being taken from the skin. Further, the addition of the groin ring relieves the surgeon from having to specially form his flaps during an amputation.



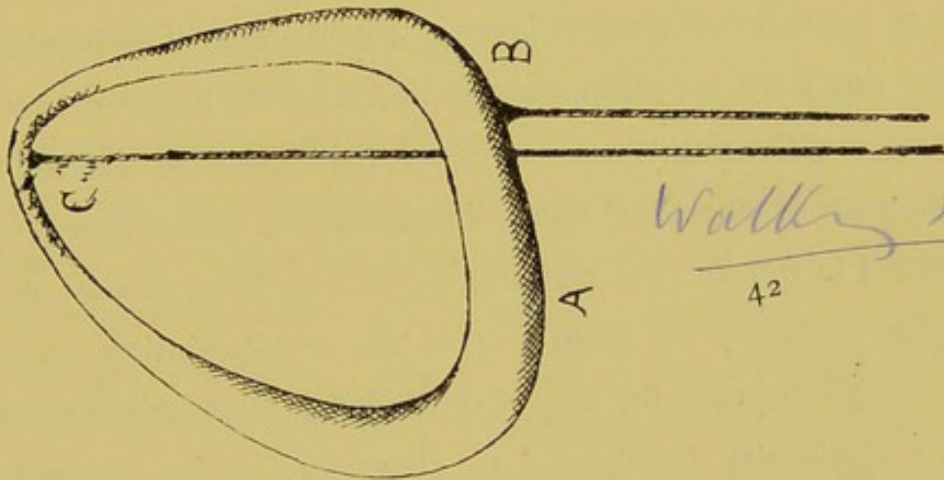
as the utmost care has been taken to make the views here given, strictly correct. Fig. 37 is a view of the groin-ring of a knee-bed-splint, looking from within outwards, giving its exact form, and the points of attachment of the inner and outer bars, which at points A. and B. exactly bisect the ovoid. Fig. 38 represents both the anterior and posterior views of Fig. 37, which views are alike. During the construction of the appliance, the angle made at B. fig. 38, by the lower edge of the groin ring with the inner bar, should be that of 120 degrees, when the constructor is looking at them, either from an anterior or posterior aspect. The angle at A. varies, being dependent on the size of the ring. Fig. 38 is a similar view to fig. 37, except that it is a walking-splint, C. indicates the point of attachment of outside bar to the under side of the groin ring. B, points out the proper position for attaching the inner stem to the underside of the groin ring, from which it is apparent that the angle at B is rather greater than the opposite angle at A. In the bed-splint, these angles are equal when viewed from within outwards. In a bed-splint, the anterior and posterior lines of the groin ring are alike, it is not so with the walking-splint. Fig. 38 is only a plan of its anterior line, its posterior line is shown in fig. 40, and padded at 44, having a slight concavity at A. The blacksmith having correctly constructed our skeletons, the saddler now applies a suitable amount of padding; this portion of their finish, requires to be applied in quantity proportionate to the age and development of the patient; the highest portion of the groin ring, as depicted in figures 41, 42, 43, 44, requires very little. In very young sub-

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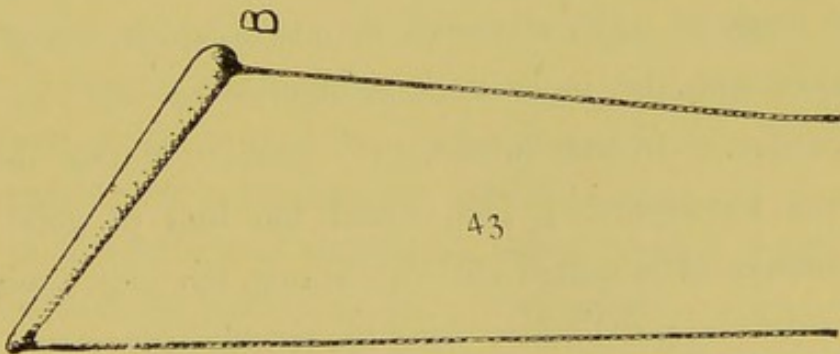
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bed splint

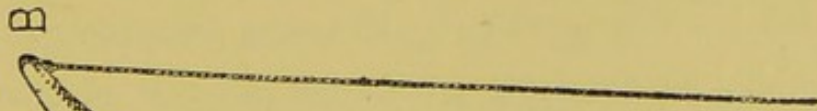


walking splint

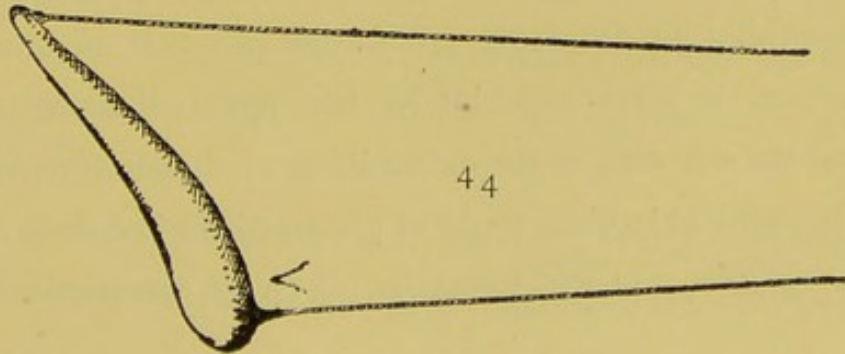
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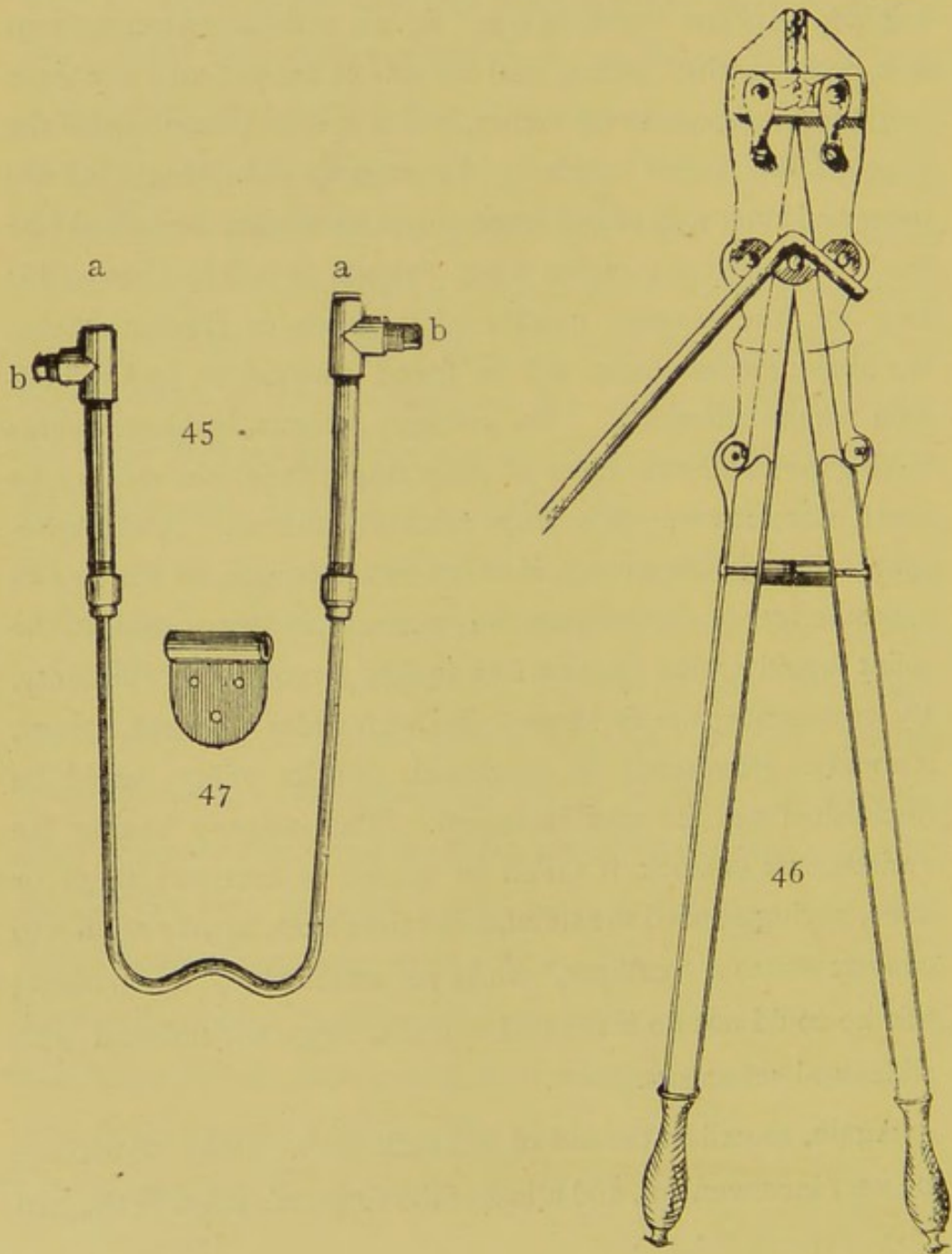
jects, a covering of leather alone suffices, but at the bearing parts B, fig. 42, 43, 44, some elastic material has to be placed, as much as the physical development of the patient allows; some patients, male and female, consistent with cleanliness, do not permit the use of a very bulky base for the crutch section of the groin ring. Fig's 41, 42, show the bed and walking splints after the saddler has finished his portion towards their completion. The padding is so applied that the first layer is wound around the whole of the iron ring; the second portion is placed on the upper or bearing surface of the ring, then, very firmly held there by the leather being drawn over, and tightly stitched while damp from being soaked in water. The padding, by its bulk being greater on the upper surface of the groin ring at the crutch portion, reduces the angle between the ring and the inner stem, this reduction the blacksmith is directed to allow for, and is allowed in the angle of 120° , otherwise the angle which the groin ring makes with the inner stem in figures 37 and 39 appears excessive. In the introductory portion of this description of the knee-splint, $\frac{3}{8}$ inch round bar iron of good quality is mentioned as quite sufficiently strong, but only conditionally that the surgeon does not bend the outside bar or stem; bending this bar is a very prevalent habit among practitioners, it not only diminishes its sustaining power, but what is of more consequence, the whole machine has less power of fixing the limb, and the nutrition of the extremity is needlessly interfered with. The same objections apply to the practice of bending the inner bar or stem, but the formation of curves at portions of this

inner bar is at times unavoidable, but the outer stem never requires it, and is only performed by practitioners who have not realised, that before they can improve the machine they ought to perfectly understand the mode of its application and range of action. When a splint with patten as shown in Fig. 27 is required for the treatment of ankle-joint disease, the groin ring ought to be of the "walking type" fig. 42, with patten termination to it, between which patten and the sole of the patient's foot there ought to be a space of six inches, and a special patten under the shoe of the sound limb. As regards the length of the outer and inner rods of bed-knee-splints for adults, they should be made three feet six inches long, though, as will be shown, it is easy for the surgeon quickly to lengthen or shorten them; the above measurement will be found convenient, and will seldom require alteration. For younger patients, bed-knee-splints having the smaller diameter of groin rings; their twin rods will be found more convenient if made relatively shorter. A bed-knee-splint when on the patient, if of the exact length, or one or two inches longer or shorter than the extremity, is almost useless, the splint should project at least four inches beyond the extremity. By constructing the bed-knee-splint with slides and set screws, it could be lengthened or shortened, but its utility would be diminished and its cost increased. The surgeon having the various sizes in stock, if called to attend a fractured thigh or knee, having applied the splint, some time after, he may require to convert it into a "calliper," while yet attached to the patient; this he could not do if the bed machine was encumbered with slides and set-screws.

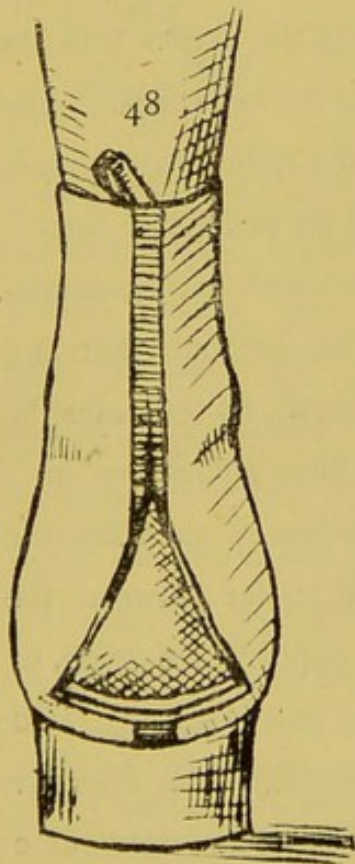
Again, to call in the aid of a blacksmith, would sometimes be very inconvenient, and a loss of the surgeon's time, or the part

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under treatment may be very tender, and the patient afraid of having the injury shaken by handling. Suppose the surgeon is invited to treat an injury to the lower extremity, and is informed that the sufferer is an adult of average development of flesh ; he selects from his stock of bed-splints a probable fit, also takes



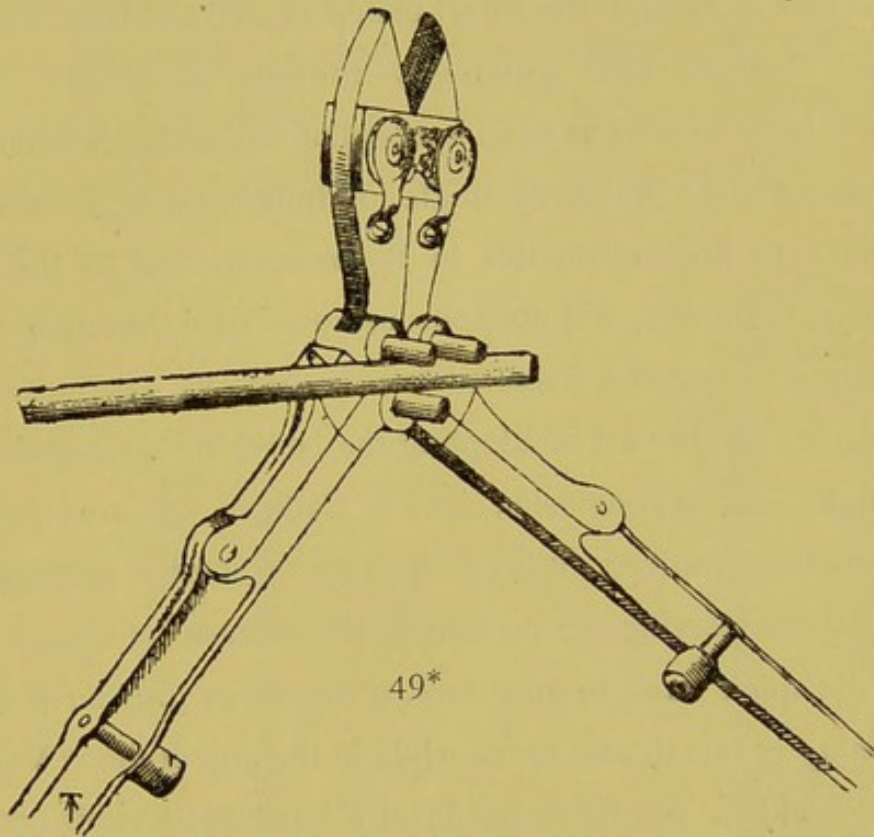
with him "the restorer," fig. 45, the "vulcan fitter," fig. 46, and a boot "heel plate," fig. 47. On applying the bed-splint to the patient's uninjured extremity, to test its fitness for the treatment of the injured one, the surgeon finds that it is several inches too short, or is so long, that if placed on the injured limb the foot of the bedstead interferes; the surgeon taking his "Vulcan," cuts away enough of the W end of the bed-splint, then inserts the freed ends of the outer and inner rods into the tubular ends A. A. of the "restorer," and with the set screws B. B., jams the inserted rods, so that "the restorer" added to the bed-splint gives it the required length. This the surgeon can perform in a shorter time than it would take a blacksmith to "blow up his fire." Supposing again, that the surgeon after



examining his patient, finds a fractured patella, and that he must convert a bed-splint into a calliper; he requests to be supplied with a *boot*, the older the better, which comfortably fits the foot of the injured limb, to this boot, with the aid of a gimlet, screw-driver and screws, the surgeon attaches a "heel plate," fig. 47 placing it so that its tubular portion with the $\frac{7}{16}$ inch hole is sunk in front of the step of the boot heel; the boot is further prepared by having a V. gap cut out of its pos-

terior aspect, as shown in fig. 48, wide enough to expose the heel covered by the stocking, and slit far enough upwards to expose nearly the whole of the tendo Achillis. As the boot will have to be worn day and night, its front aspect is slit up so far as the toe point, this last mutilation of the boot hinders the foot from becoming excessively heated. The surgeon now slips the bed-splint over the injured extremity, pushing it up until the groin ring is "well up," places the "translated" boot, on the patient's foot, then the injured extremity is fully extended. With a piece of chalk, a point is marked on each of the rods, just opposite the tube of "heel plate," and two other chalk marks $1\frac{1}{2}$ inch below the former. The surgeon now takes the "Vulcan," and applying it to one of the rods at the lower chalk mark, cuts through the rod; then repeating the action with the other rod, completely severs the W end of the bed-splint. The next step is to turn the mutilated end of the splint into a square termination, and finish the conversion of the bed-splint into a "calliper." The surgeon having only two chalk marks remaining, one on each rod, these are guides for correctly bending the free ends of the mutilated splint; to do so, he separates the handles of the "Vulcan" until two of its three pillars are in a line, and the hinge pillar has descended so low as to allow the cut end of one of the rods to be inserted so far between the pillars, that the chalk mark on it is just opposite the third, or lower pillar, as seen in fig. 49. Now, the previously separated handles are made to approach each other, until the operator notices that about $1\frac{1}{2}$ inch of the rod is set at a right angle

to the remainder, as shown in fig. 46.



The surgeon having made the required alteration of the outer rod, repeats the action upon the inner one. When making the square bend, the hinge or third pillar is always in contact with the inner aspect of the rods, consequently there is always a rod between the operator and the one operated upon ; it is very important that the rod which is not in the grip of the three pillars, should be held firmly across and upon, the upper surface of the handles or levers ; otherwise, when the two bends are formed, their points will not be in

* Fig. 46 also shows the cutting portion of the Vulcan approximated ; fig. 49 shows the cutters open for action. They are an American invention to which I have added the pillars for bending, thus making it a combination tool, and can be purchased from Mr. Birch, tool maker, Islington Grove, Salford, Manchester.

line, and there will be some difficulty in their insertion into the tube portion of the "heel plate," or into the hole in the boot heel. As a case progresses towards cure, the surgeon may have to convert a bed-knee-splint into a Calliper, during the treatment of a fractured thigh, or inflammation of the knee-joint; to accomplish this in the manner, and by the means pointed out here, will not consume more time than is spent over the re-dressing of a fractured femur. Having now initiated the surgeon into the art of adapting the bed-splint to a convenient length, and its conversion into a Calliper, the next useful information relative to it is; to instruct the surgeon as to the mode of either enlarging or diminishing the diameter of the groin ring of the splint; and to show how, if the rod or rods be of inferior quality of metal, and break while in the grip of the "Vulcan"; this accident can be rectified; or if he should find his bed-splint too short to make a suitable Calliper, then how to lengthen it. All these rectifications can be performed at the bed side.

First, to enlarge the groin ring, it requires the application of the cutters of the Vulcan to a mid-point on the anterior aspect of the ring, and with it, to cut through the leather felt and iron, at one nip, then applying a hand to each side of the cut, grip the ring and open it out.

Second, to diminish the groin ring, it requires two applications of the Vulcan to the anterior aspect of the ring, and to cut away a piece from $\frac{1}{2}$ to $1\frac{1}{2}$ inches or more, of the anterior aspect of the groin ring, and either by employing a mallet, or both hands, to obliterate the gap made by approximating the severed ends.

Third, should one or both rods break during the effort to convert the bed-splint into a Calliper, the surgeon applies to the broken rod one of the "restorers," shown in fig. 50, this can be slipped into its place on the rods, and into the heel of the boot, without taking the covered splint off the extremity.

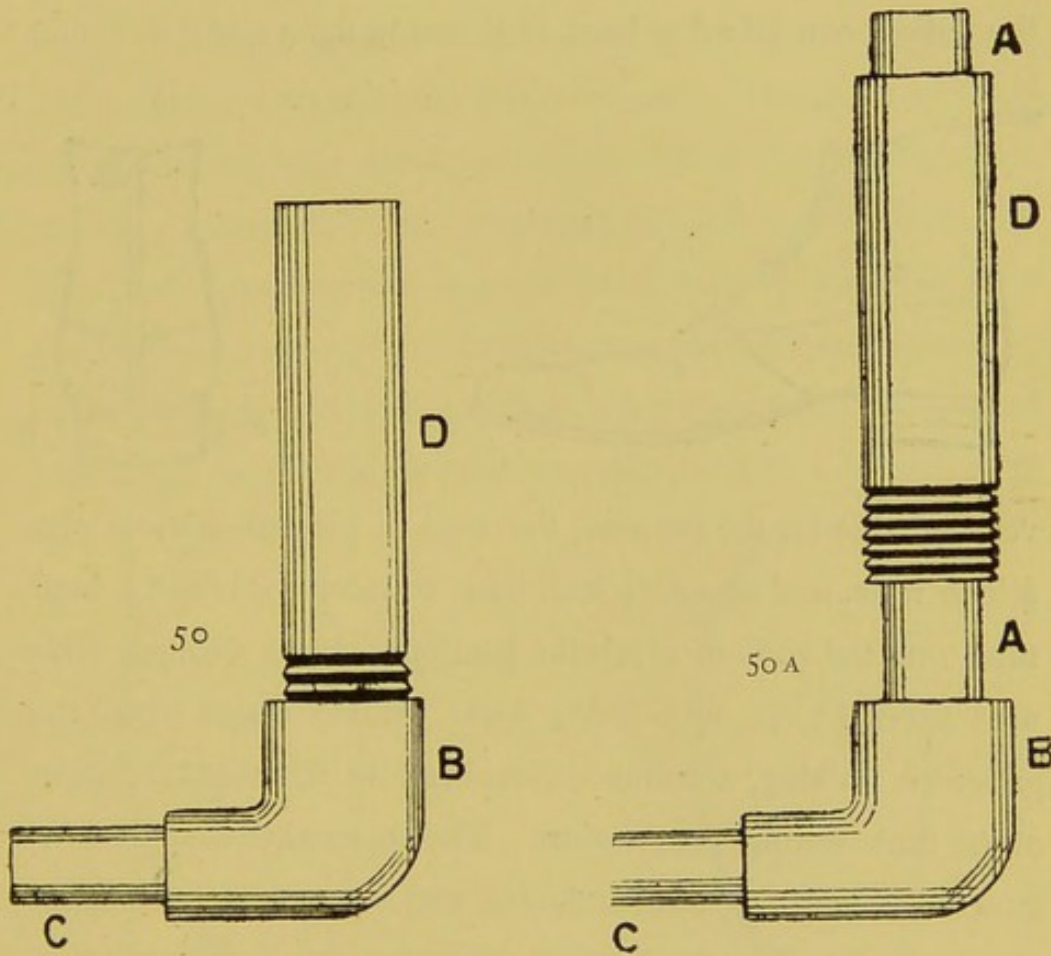
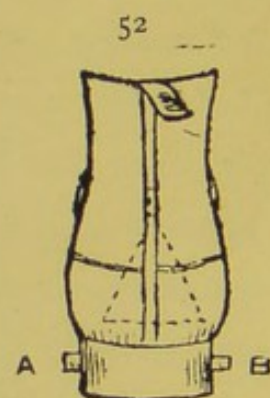
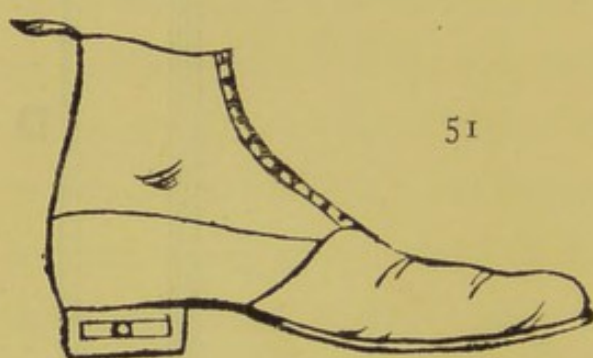


Fig. 50A, shows the broken Calliper inserted into tube of restorer, ready for screwing into place to make the connection, the tube screws into the elbow B., and the point C. enters into hole in heel of boot.

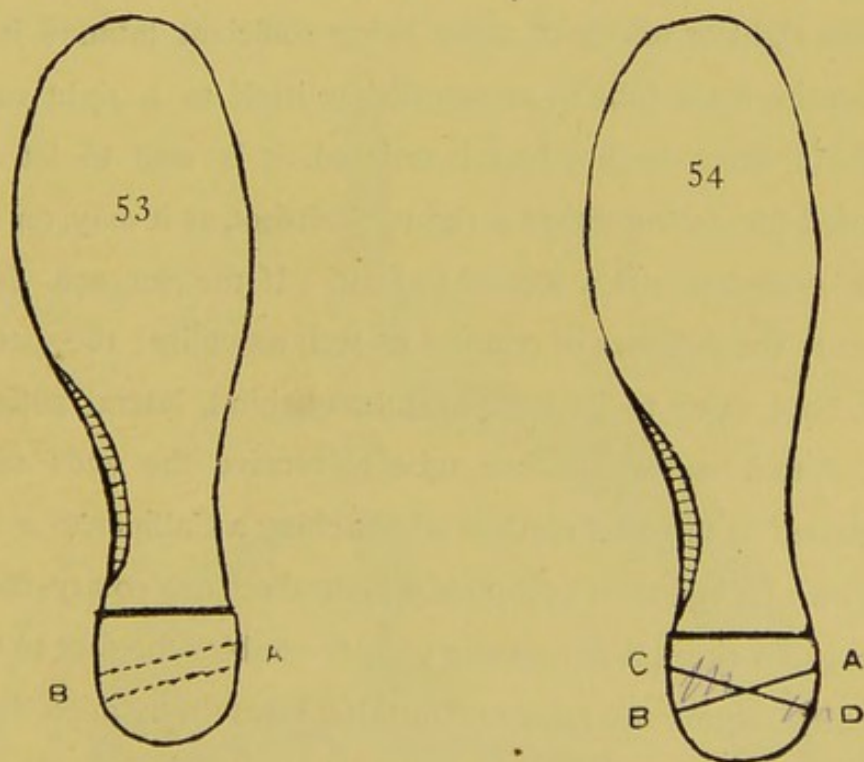
After the surgeon has, for a time, been employing the bed-knee-splint, a period arrives when he decides to discard it entirely, or to convert it into a Calliper. Whether he makes a Calliper by conversion or procures a ready made one, he will have to get the patient's boot altered, or a boot made, to which the Calliper must be connected. If time permits, and the patient can afford, a boot as shown in fig. 51, will be found



very suitable for the purpose, the heel is pierced with a slot $\frac{1}{2}$ inch wide, and about $1\frac{1}{4}$ inch long, to receive a brass $\frac{1}{2}$ inch tube, into the ends of which the bent ends of the Calliper rods are inserted; the tube being loose, moves about when the patient is walking, accommodating itself to the slight rotation of the limb during progression. The shoemaker should be instructed to omit the usual stiffening and seam, which are opposite the heel and tendo Achillis, otherwise much discomfort is felt by the wearer; and what is worse, the skin may become ulcerated from pressure and chafe. Even when the boot has been constructed without a heel stiffener or seam, if discomfort be felt, the surgeon should cut away the leather or cloth from the part of the boot shown by the dotted lines in

fig. 52, which also shows the brass tube A. B. projecting slightly on either side.

It generally happens, that the surgeon does not wish any delay in the application of the Calliper, and perchance the patient cannot well afford the luxury of a specially made boot (a much greater expense than the Calliper), the surgeon can by "translating" one of the patient's old boots, make it as comfortable and as useful as a specially designed one. The mode of translation is as follows. Having selected one of the patient's old and easy fitting boots, the surgeon, with his pocket-knife, rips the boot's front as far down as the toes, then removes from the posterior aspect of the boot, a triangular piece corresponding to the patient's heel and tendo Achillis, shown by the dotted line in fig. 52, then, if the boot operated upon be a left one, with

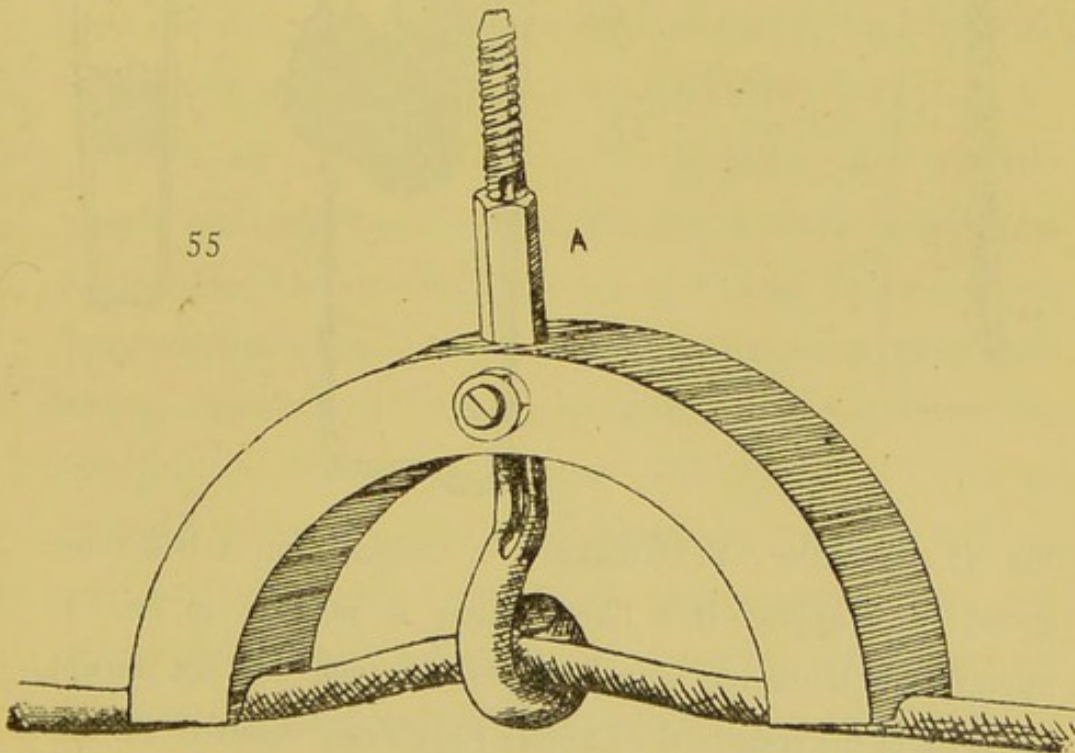


left boot

a centre-punch or a common nail and hammer, he makes an indentation on the outer aspect of the boot heel, rather forward of the centre of its length as at A, fig. 53, and another rather behind the centre of its heel as B, fig, 53. The indentations are guides to a "Morse twist drill" driven by a common brace guided in a slanting direction from B to A, or from A to B; the hole is most easily formed if the indent at B be placed against a lathe back centre, and the other indent at A. pressed against the revolving drill point, held in a chuck in the lathe spindle, by screwing up the back centre, the drill will run through the heel along the required slant without guidance. Fig. 54, though representing a left side boot, has marked on it the slant required for a right boot also, C. D.; A. B., representing a left one. The slot hole shown in fig. 51, allows the formation of either a right or left slant, there being sufficient latitude in the slot for the brass tube to accommodate itself to a right or left rotation; when such a boot is ordered, it is well to let it be designed for use on either a right or left foot, as it may, on some future occasion suit a second patient. If the surgeon desires to secure the extreme of comfort as well as utility; the specially made boot, open to the toes, seamless behind, lateral stiffening only, slotted heel with loose tube to receive the ends of the "Calliper," is the best method of attaching a Calliper to a boot. Such an arrangement completely neutralises any rotary friction of the groin ring on its bearing; it also enables the foot to automatically assume the most comfortable slant in relation to the "Calliper."

The art of fittingly "translating" a boot is well worth the surgeon's study, as it enables him immediately to adapt the boot which the patient may be wearing at the time of consultation; labour and time being economized.

By experience in the employment of the bed and Calliper splints, the surgeon will often observe both young patients and those of riper years that have a degree of genu valgum, which scarcely amounts to an abnormality, individuals with extra developed epiphyses to their limb, so it may happen that a bed-splint or Calliper otherwise an excellent fit, yet the inner rod comes in contact with the inner aspect of the knee, hindering the limb from being fixed perfectly and comfortably. This annoyance, the surgeon can in one minute remove by employing the "Bend-maker", shown in fig. 55. To make it act so as to form an embayment for the knee, the operator applies the hook exactly over



that part of the rod which he wishes to be deepest, then tightens the nut A. with the triple acting ratchet, fig. 56, which will tighten and relax the nut without being displaced therefrom.

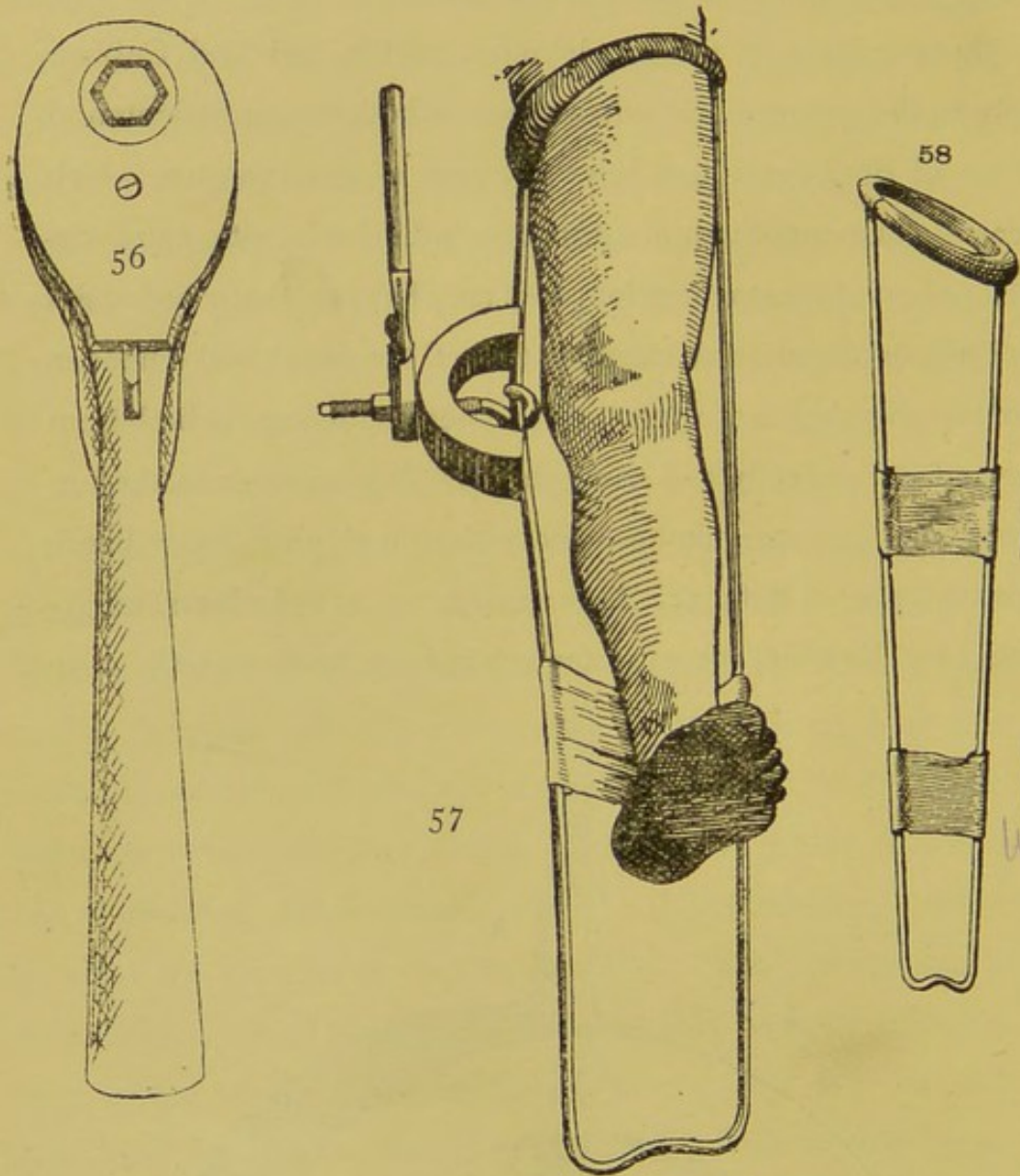
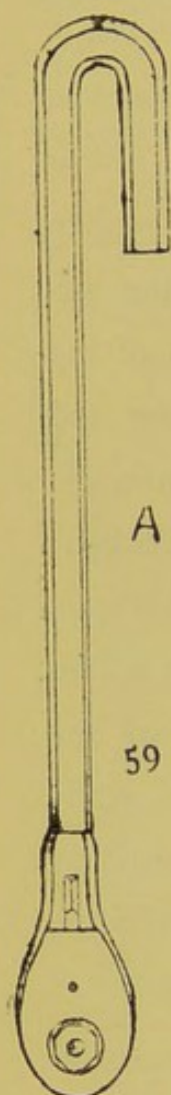


Fig. 57 shows the "Bend-maker" in action upon a bed-knee-splint. It is applied in a like manner in making an embayment on the inner rod of a Calliper, but will not act except the ends of the rods of the Calliper have been inserted in the

prepared heel. It will act well on a bed splint when the W end has not been cut off, or if it has been removed, the "Bend-maker" will still act if a restorer fig. 46 has been put in place of the W end. It is very advisable never to bend either the bed or Calliper splint except when required. It may happen that the outer rod requires hollowing opposite the external swell of the calf of leg; during the whole of my experience, I have only had to do so twice. The outer rod ought never to be either hollowed outwards or dented inwards, so doing is injurious to the limb under treatment, and weakens the machine. Fig. 58 shows a bed-splint with the leather posterior supports, to come under the popliteal space, also under, but just above the tendo Achillis, these two supports are the best mode for resting the limb in the horizontal position, while treating an inflamed knee-joint or fractured patella caused by direct violence, until the extreme fluid tension has been relieved; it may soon have to be altered into a Calliper.

Details for the construction of a hip-splint, for posterior fixation and support.—The most suitable material is first-class wrought-iron, which is very tenacious, and so not liable to break during manipulation. Being made of wrought-iron rather than steel, the splints admit of being modelled by the surgeon at the bed side, to the normal contour of the patient. This he does with the aid of a pair of combination wrenches figs. 59, and 60, these being two views of the same instrument. The hooked ends are employed for rotating the main stem and wings; the moveable, bifurcated ends are for bending or unbending the main

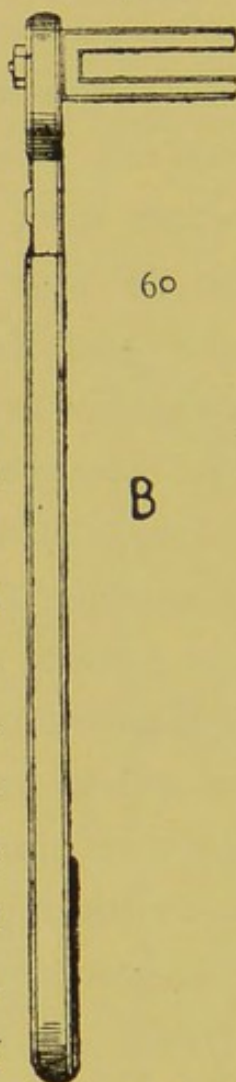
stem, and closing or opening either of the three cross-pieces.



A

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Most surgeons give instructions for constructing the "hip-splint" of iron deficient in weight, so, not sufficiently rigid to prevent tremor of the joint by voluntary, accidental or the unavoidable movements of nursing. The fact that the weight of the splint is carried by the bed, during the painful period, is overlooked; again it is forgotten that the required rigidity of the splint, and consequently its greater weight, is a necessary counterpoise to the disease; further, as soon as the patient is able to leave his bed, a splint that is strong enough, is still an important factor in the prevention of

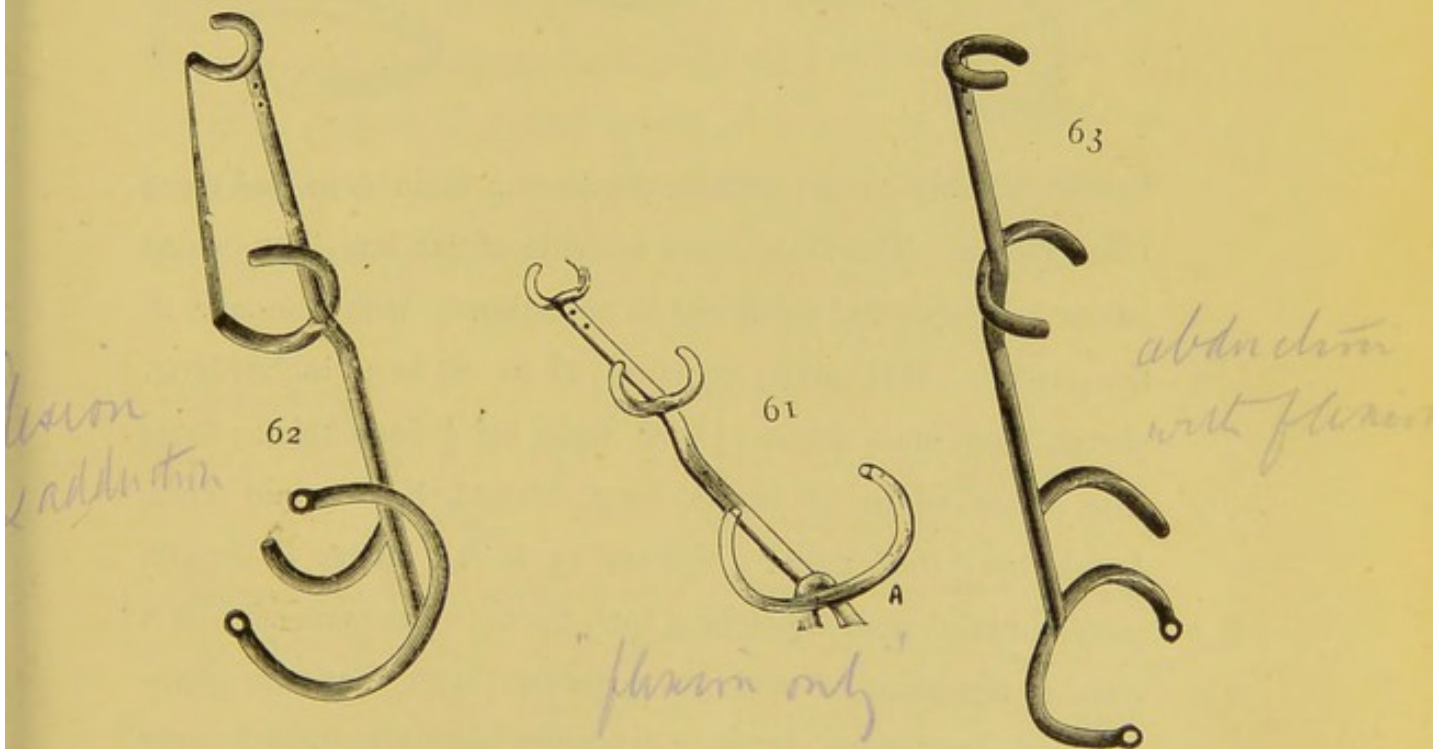


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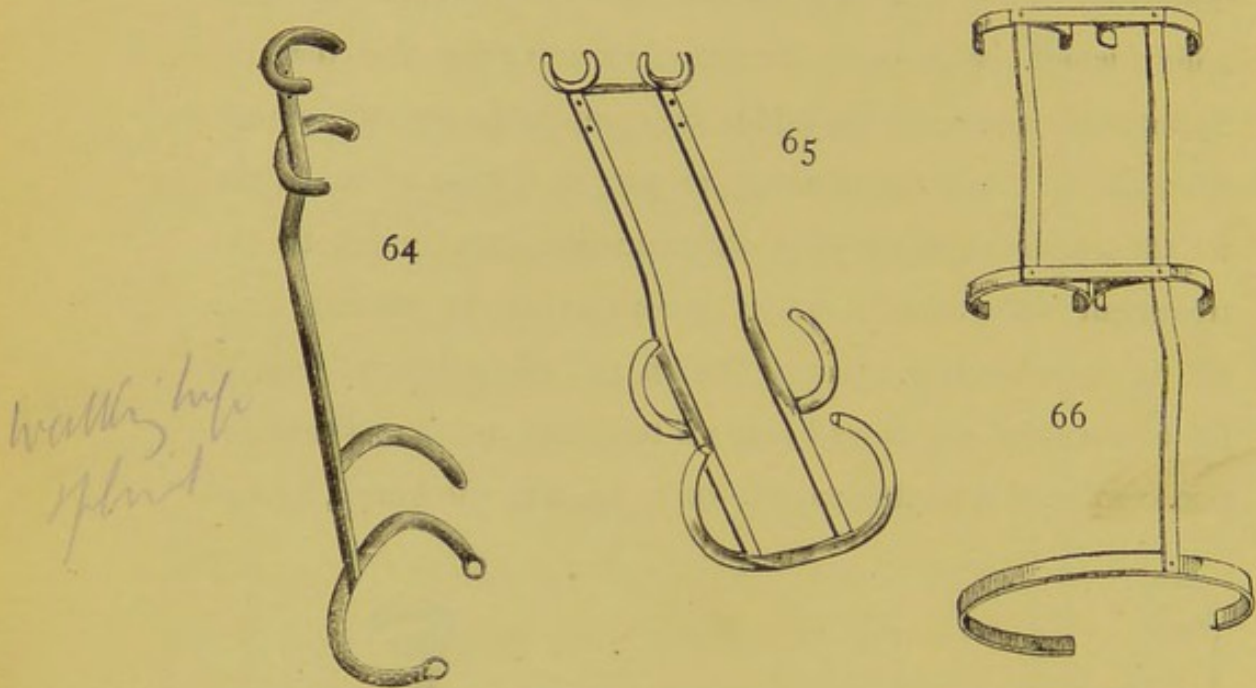
a relapse. A weak "hip-splint," like the extension method of treating hip disease, may have some effect in reducing or restraining deformity, but it certainly prolongs the period of the disease. So far as mere repair is concerned, it would be better if the patient had no treatment. Again a weak hip-splint, like the extension method, keeps the patient in an irksome position, from which he cannot deviate without injury; whereas a properly constructed and fitted hip-machine enables the patient to be handled, even by a "railway porter."

If of any clinical advantage, I would have here reported striking examples of the correctness of the foregoing opinions. The surgeon can seldom make the error of giving his patient a splint which shall be a burden heavier than the disease. Splints deficient in rigidity add to the complaint, only strong ones alleviate it. It is my practice to use six forms of machines for the treatment of hip-joint inflammation, one suited to the treatment of the ailment when accompanied by flexion only fig. 61 ; a second for cases of flexion and adduction, as seen in fig. 62 ; a third, for cases having a tendency to, or with abduction combined with flexion, shown in fig. 63 ; the fourth, fig. 64,



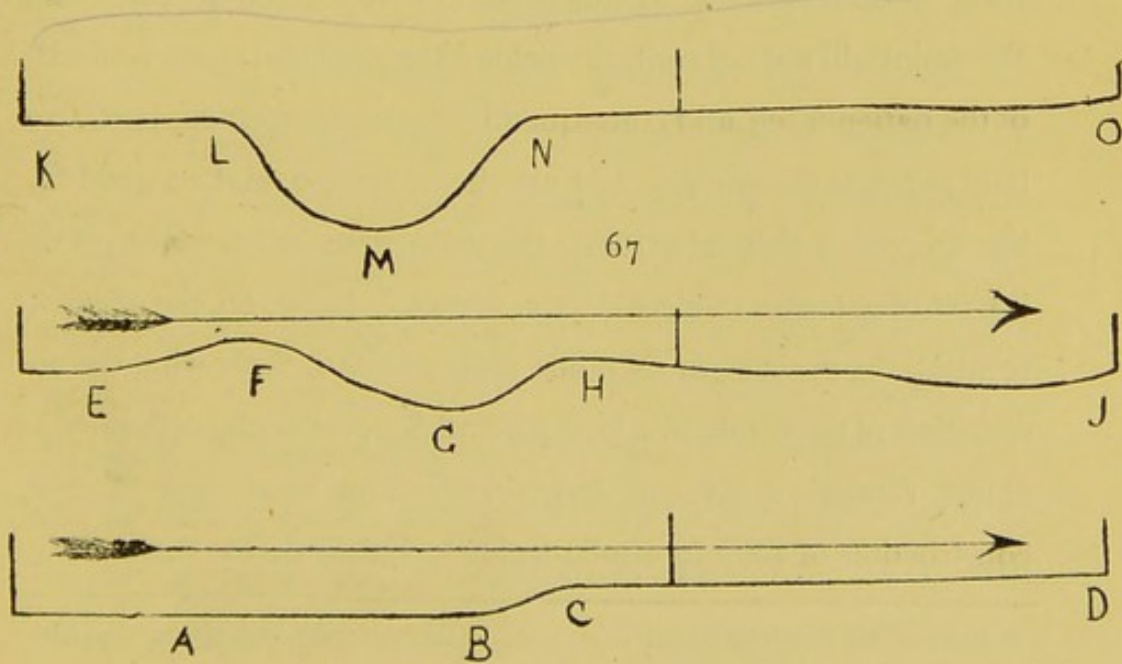
is the walking hip-splint, used only for the control of the hip-joint with ankylosis of doubtful soundness, and for the secondary stage of traumatic injuries of the hip in adults,

fig. 65 shows the fifth form, called a double hip-splint ; fig. 66 shows the sixth model, one that is rarely required. These six

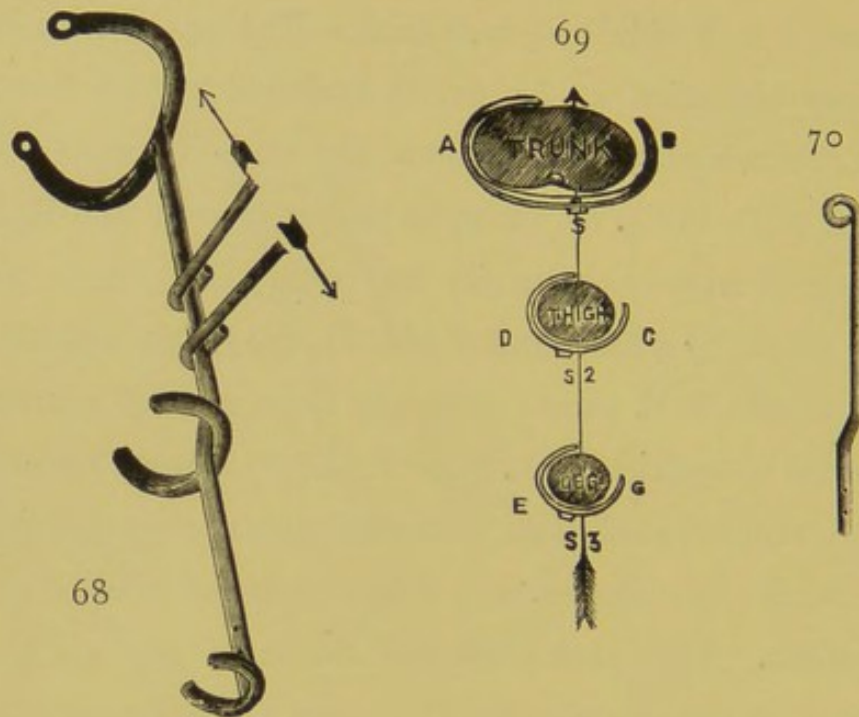


models notably consist of three portions, a main stem and three cross pieces. The main stem is made of flat bar iron, which varies in length and thickness in accordance with the age of the patient. Bed-splints required to be 28 to 38 inches long, should have main stems $1\frac{1}{4}$ inch wide by $\frac{1}{4}$ inch thick ; those with stems 18 to 28 inches long, should have main stems $\frac{7}{8}$ wide by $\frac{3}{16}$ inch thick. Splints 15 to 18 inches in length, require main stems $\frac{3}{4}$ wide $\frac{1}{8}$ inch thick. The main stem of a walking hip-splint should be a little stronger than the measurements just given, as these machines have less control over the patient, and are easier distorted by his movements. Walking splints corresponding to 28 to 38 inch bed-hip-splints, require main stems of $1\frac{1}{4}$ wide by $\frac{5}{16}$ inch thick ; sizes to corres-

pond to bed-splints from 18 to 28 inches, would require main stems of 1 inch wide by $\frac{1}{4}$ inch thick. The main stem of the ordinary hip-splint, as fig. 61, is modelled to three forms, the trunk, buttock and limb portions, the correct form is shown from A to D. in fig. 67, incorrect shapes E to J. and K to O. fantastic forms very commonly met with. The trunk portion A. B. should be a line parallel to C D., the limb portion and the buttock bend B. C. should gradually slope at each corner, not be turned so squarely as L. N. or F. H., the buttock portion can, and ought, by the aid of the bifurcated ends of the two wrenches, to be made either shallower or deeper to fit the external form of the patient. The trunk portion of the main stem, just at its junction with the buttock bend, requires a rotation to right or left to be given to it by the hooks of a pair of wrenches, as shown in fig. 68. The arrows there show the direction of force to give the rotation required for the stem of a left side hip-splint. For



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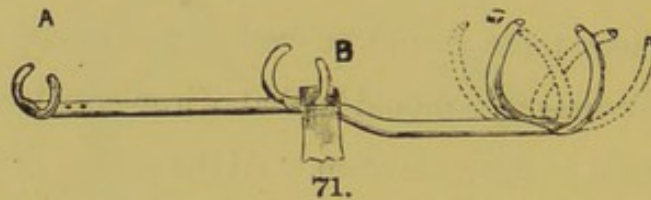


making this alteration of the stem, and adapting the same splint to a right side, the direction of the force of leverage would only have to be reversed. If this rotation is not given to the stem, the splint will not lay centrally behind the popliteal space and calf of the patient's leg, and consequently be an imperfect support, also tend to rotate outwardly. For another reason, to make a good fit, the surgeon is obliged to rotate the main stem, because the pelvis is part of a larger circle than the thorax. In fig. 69, the effect of rotating the main stem is made more obvious, S, showing the inclination of the trunk, S. 2, buttock and S. 3, the limb portions of a splint rotated to fit the left side.* The next step in the construction of the hip appliance, is to rightly fix the three cross

* If the reader turns the volume so that this page is "upside down," the diagram fig. 69, then illustrates a right side application.

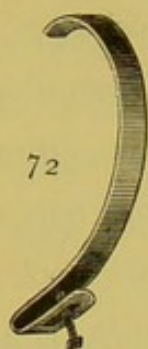
pieces in their correct positions on the main stem. The upper or longest cross-piece on main stems of from 28 to 38 inches long, should be about 3 inches shorter than the main stem, about 2 inches shorter when for stems of from 11 to 28 inches, or still smaller stems, about an inch shorter. At both ends of this cross-piece there should be worked two eyelet holes; the strength of the cross-piece should be that of iron equal in width but half the thickness of the main stem. At the centre of the length of this top cross-piece, it should be attached to the free end of the trunk portion of the main stem, by a rivet and washer. The second cross-piece is to be rivetted below the middle of the whole main stem, just below the buttock bend; for bed-splints of from 28 to 38 inches in length, its place would be about two inches below the middle of the whole stem; for sizes 18 to 28 inches, about $1\frac{1}{4}$ inches; for smaller sizes about an inch below will do. This second cross-bar should be of the same strength as the first or top one, but in length, only equal to the distance between its position and the top cross-bar, that is, equal to the length of the trunk and buttock part combined, which would be a little more than half the length of the main stem. The third cross-bar is to be rivetted to the lower end of the main stem, and in strength is equal to the second, but only $\frac{2}{3}$ of its length. In constructing the cross-bars for a walking-hip-splint the measurements are identical with those of the bed-splint, the length of the third bar excepted, which has to be made equal to that of the second bar. At the lower end of the limb

portion of the main stems of ordinary full length bed-splints, it is well to have drilled two $\frac{1}{4}$ inch holes, one, 2 inches from its end, another, 3 to 4 inches from the end ; a precaution, in readiness, lest at any time, a "nurse," Fig. 70, has to be fixed to the



machine. The walking hip-splints, fig. 64, are worthless for applying to patients under ten years of age, and in nearly all the cases to which they are applicable, they generally require an extra wing, as shown in the illustration, Fig. 64, this splint differs from the bed-model in that half of its limb portion is removed, a portion equal to about one fourth of the whole of the main stem of an ordinary bed-splint.

For the treatment of hip-joint disease accompanied by either abduction or adduction.—To the ordinary hip-splint with three cross-pieces, is added an extra wing, either rivetted to the machine during its construction for a special case, or added afterwards. Abduction and adduction are generally symptoms indicative that the complaint has been present some time. Though the patient may have come under treatment early, even then, if the disease does not rapidly retrogress, abduction or adduction may appear if the patient be wearing a hip-splint not provisioned to meet this deformity. The surgeon, if he possesses an extra wing, as shown in fig. 72, among his stock of appliances, applies it to the trunk portion of the hip-splint.



to which the patient is already fixed, doing so without removing it from the sufferer. It is to be attached to the exact middle of the trunk portion, between A. and B., fig. 67, or another way of calculating its proper position, would be to place it at the point of junction of the upper third, with the lower two thirds of the distance between the top and middle cross-bars of an ordinary bed-hip-splint with three wings properly placed. This extra wing can be brought to bear firmly upon the patient's flank between the lower rib and crest of illium, this is the only part of the trunk upon which force can be firmly exerted, without discomfort. If the "extra wing" is to be applied to correct or thwart a tendency to abduction, it has to be hooked on to the main stem so that the wing crosses the spine, and embraces the patient's flank on the opposite side to the inflamed hip-joint. If the extra wing is required to aid correction of adduction with tendency to genu-valgum, then the wing has to be applied so that it embraces the flank of the same side as the diseased hip, as fig. 62, which shows a left side hip-splint for correction of flexion, adduction and genu-valgum. For specially overcoming the latter deformity, a bar is shown in the illustration, connecting the outer wings of the two lower cross-bars; to this and the limb portion of the main stem, a part of the patient's thigh, the knee and a portion of his leg are bound. The connecting bar shown in illustration fig. 62, though rivetted to each wing, can be attached to them by merely bending the ends of a piece

of light hoop iron, then slipping the hooks thus formed over the ends of the cross-bars, and tying firmly in position. The reader should carefully scan the illustration, fig. 72, from which it is apparent that the retaining screw, after passing through a square and close fitting hole in the body of the moveable wing, afterwards passes through a long slot in the hook part of it, without this slot, which allows the bolt much latitude, it would be very difficult to get the bolt into position for screwing up the nut, which retains the wing in firm position by closing the hook firmly on the main stem. The deformity of adduction is very rarely met with in patients over the age of 10 years. The construction of the splint, fig. 65, for the treatment of double hip or double hip and knee inflammation, is easily understood, from the description just given of the making of a single one. The splint seen in fig. 66, is to meet a difficulty only rarely met with, that is, when numerous sinuses interfere with the application of a main stem along the proper line of the body; this difficulty is got over by applying a single hip-splint to the sound side of the patient and connecting to it a half hip-splint, and to this half fixing the unsound limb, the complete one being bound to the patient's trunk and lower extremity of opposite side, it will be found to be a very efficient plan to employ in suitable cases.

It happens sometimes that the surgeon in attendance upon a case of hip-joint inflammation, unexpectedly observes a tendency of the limb to adduct or abduct; not having an extra wing conveniently by him, some delay must

occur before he can, by an addition to the splint, oppose the deformity. This inconvenience can be surmounted by lowering one of the wings of the upper or thoracic cross-piece on the sound side of the body, until it embraces the patient just below the lower rib as in fig. 73, showing the splint thus altered to correct abduction of right hip.



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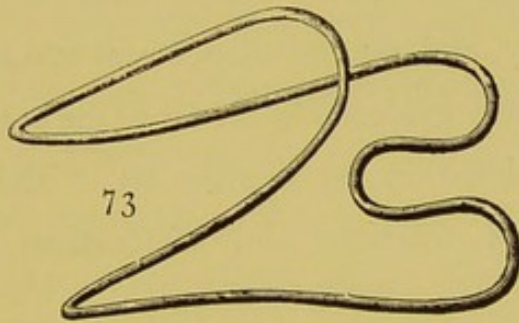
If it be a left hip that is under treatment for abduction, then the right upper wing ought to be lowered. The wing of the cross-piece opposite the diseased side, always to be lowered for abduction; the one on the same side as the affected limb should descend to correct adduction. To temporarily shorten or lengthen a hip appliance, if it be not excessively so either way, is an easy matter; if too short,

the points of the wings of the upper cross pieces should be pushed up towards the collar bones, and those of the two lower cross-pieces should be pushed so as to point downwards. To slightly shorten a hip-splint, just reverse the procedure for lengthening it, that is, push the upper wings so as to make their points look downwards, and force up the two lower ones so that they look upwards. It is well to bear these items in mind, a splint is often delivered to us for use a little too long, but after being in use some months it may become rather short for the case, or if delivered an exact fit, may soon require to be made longer; the dotted wings

of fig. 71, show what I have tried to describe. The "nurse" fig. 70, will be found a very useful supplement to the hip-splint, when the patient cannot have such careful watching as to have the reclining position continuously maintained. In some of the illustrations here given of the hip splint, two dots appear upon the limb portion of the machine, they represent the holes corresponding to those marked at one end of the "nurse," its other end terminating in a scroll, the holes are to receive the $\frac{1}{4}$ inch bolts for connecting the "nurse." It should be made of iron of the same strength as the main stem, long enough, that after being curved to clear the patient's heel, it projects beyond the heel from 4 to 6 inches; the "nurse" is never required except for patients at an age not amenable to reason.

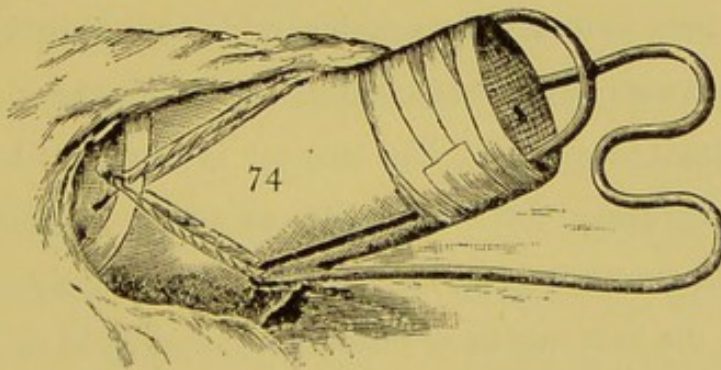
To efficiently apply the various knee and hip instruments which have been described in the preceeding pages, it is absolutely necessary that the surgeon employs a "Vulcan" cutter and fitter, a mallet and a triple acting wrench modified for the work without these tools, the surgeon cannot either comfortably fit his patient, or so apply his splints that the utmost utility is gained from them. Armed with these tools, the surgeon, if he has given him by the instrument maker, or finds at hand, an unsuitable splint, can easily model it into an orthodox form, and obtain from it good assistance. It is unwise to trust to a surgical instrument maker to fit his patient, his training and opinions are too mechanical to qualify him to handle unsound parts. For the surgeon to accept such co-operation, is as unwise as for a physician to acquiesce in

accepting the assistance of a druggist to compose his prescriptions as well as dispense them. We are living in the era of labour saving machinery. The surgical appliances described in this volume, I believe come under the class of "labour saving." All fractures and articular ailments are not curable; amputations are, as yet, in some rare instances indispensable operations. By fig. 73, the reader is introduced to a frame found by me to be "labour saving" in the after treatment of amputations at or above the knee joint; fig. 74. shows its mode of application;



it is constructed of five-sixteenths-inch iron wire, the angle of repose is easily varied by straining apart, or closing, its wings.

Its wide lower wings cover a large area, and do not sink into a soft bed, and on them a weight can be placed to anchor and keep steady the stump.



Fracture of the Patella and its treatment:—In “Contribution” Part vi, page 4, there is the following paragraph: “Perfect rest of a fracture, if it could be maintained without supplemental art interfering with the part, would best permit its repair.” Most fractures do not allow us to follow such a rule of practice, because the necessity that we should control the restoration of symmetry, deters us from strictly carrying out in treatment what is correct in theory; thus some risk and delay of repair must be incurred, to gain the best restoration. However, it happens that fractures of the Patella can be treated upon lines rigidly consistent with theory, and the excellent result which follows such practice is weighty evidence in favour of the correctness of the theory laid down in my treatise on “The principles of the treatment of fractures and dislocations,” Part vi.

Let the surgeon who has a fractured Patella to restore and repair, so arrange his means, that they are applied in strict accordance with the principles pertaining to the repair of fractures in general; his labour will then be lightened, anxiety relieved, and the repair and restoration of the fracture will be so complete, that they can defy reasonable criticism. Why have we made no advance in the treatment of Patellar fractures during the last hundred years? The answer is obvious: because, instead of searching for information as to the circumstances which would favour repair, we have been needlessly anxious concerning the best means of restoration; and so have missed the fact that the shape of the Patella, and the foundation upon

which it rests, in extension of the limb, so far favours restoration of symmetry, that nothing is left for the surgeon to do, but to maintain for a time without interruption the conditions best favouring repair.

The crying evil of our art, in these times, is the fact that much of our surgery is too mechanical, our medical practice too chemical; and there is a hankering to interfere, which thwarts the inherent tendency to recovery possessed by all persons not actually dying. The treatment of these fractures has of late years frequently occupied the attention of surgeons. In 1882, I published my views on the treatment of such fractures, in a short paper contributed to the "Medical Press and Circular," and again repeated them, in the "Provincial Medical Journal," August, 1889. The reader must not suppose that certain means are insisted upon; I am only willing to champion the importance of a special rule, and any method strictly consistent with it. Appliances, the outcome of such a rule, must terminate the present uncertain and almost unanimously condemned practice. Vividly recollecting the anxiety that fractures of the Patella formerly caused me, I feel firmly convinced that the reader is now presented with a final solution of this vexed question; such a solution as must ultimately remove it from the arena of debate. Here is introduced a recent debate, memorial of the views here objected to, taken from the "Lancet," June 1, 1889, and is a report of a discussion at a meeting of the Clinical Society:—

“Mr. MAYO ROBSON related a case of Transverse Fracture of the Patella, which he treated by a new method to secure bony union without opening the joint. The bone was broken just below the middle, as the indirect effect of a fall. He pointed out how unsatisfactory were the results obtained by the methods usually resorted to, and added that although he had never met with an accident in wiring the fragments, yet it was impossible to shut one's eyes to the fact that the patient was exposed to a great risk. He had therefore applied himself to the discovery of a method whereby the advantages of bony union might be secured without incurring the risk of opening the joint. In this case the skin over and around the joint was cleaned and rendered aseptic, and the joint was then aspirated. He then obtained two long steel pins with glass heads, such as ladies use for fastening the bonnet, and having thoroughly purified them, he drew the skin well up over the upper fragment and introduced the needle transversely through the skin and muscle just above the level of the upper fragment, repeating the operation with the other needle at the upper end of the ligamentum patellæ. Gentle traction on the pins then easily brought into apposition. The ends of the pins were then clipped off, leaving about half an inch on either side and the whole covered with antiseptic gauze. This dressing was left undisturbed for three weeks, and when it was removed, there was no redness or other sign of irritation having been caused. The temperature was never above normal, and the patient felt very comfortable all the time. The fragments seemed well united, and the needles were therefore withdrawn, a plaster-of-Paris splint applied, and the patient allowed to go home. He pointed out that the only precaution necessary was to draw up the skin over the upper fragment, in order to avoid undue traction upon it when the fragments were approximated. The integument should be rendered aseptic as well as the pins, and the latter should be stout enough not to bend when drawn upon. If there was much effusion, it would be desirable to aspirate. As union occurred without the throwing out of any amount of provisional callus, it was always well to insist upon the use of a Thomas's splint for some time after. The advantages of the operation were its simplicity, the absence of risk, and the obtaining bony union. He said that this was the second case of the kind upon which he had operated, and more recently he had performed the same operation in a case of fracture of the olecranon, but it was as yet too early to say anything as to the result—Mr. HEATH had examined the case, and thought the union was bony: if it were fibrous union, the distance between the fragments was so short that bony matter would soon develop between them.—Mr. GODLEE thought the procedure a very simple one; he asked how the torn fibrous expansion of the quadriceps aponeurosis

was prevented from becoming tucked between the ends of the broken bone.—Mr. SYMONDS asked whether in the first case operated on good bony union had been obtained. It would be interesting to know what is the condition of the joint three months later. Mr. Lund had passed pins through the bone itself, but he found this difficult to do when the fracture was near the lower end of the bone.—Mr. R. W. PARKER wondered whether there was any real advantage in getting bony union. He related the history of a case where a patient, rather than submit to the tedious waiting necessary to secure bony union of a second fractured patella, refused to come into hospital, and was treated as an out-patient; a widely separated fibrous union resulted, with which the patient was quite contented, being able to walk easily and to earn her living.—Mr. WARRINGTON HAWARD doubted if the union were bony; but, even if not, it was certainly very firm and useful. A medical friend of his sustained a fracture of the patella, and ligamentous union resulted, there being three-quarters of an inch separation; but, notwithstanding this, absolutely no inconvenience followed, and the limb was thoroughly serviceable in every way.—Mr. HEATH said that it was a great thing to avoid tampering with the joint. Few medical men had such confidence in antiseptics as to have their own knee-joints opened and the fragments wired. His own treatment was to aspirate the joint, and to put the limb up in plaster-of-Paris.—Mr. ROBSON, in reply, said that one great advantage of the method was that it was practically unattended with danger. In both cases he aspirated the joint, passed a needle between the fragments, and lifted up any aponeurosis that might be in the way. He had met with a case in a sailor with a fibrous union, who was unable to do his work, though he was quite restored after the fragments had been wired. In the first case he had operated on the splint had been removed too early, and the result was that the union had given way, and there was little separation between the fragments.”

As the preceding reprint represents the present state of surgical opinion, it is not surprising that cases of fractured *Patellæ* are reported as operated upon, before evidence was forthcoming that they could have recovered without, nay, though they had been already successfully treated; as for example, the following taken from the “*Lancet*,” issued August 25th, 1889. The points of interest in this case are the age of the patient

(sixty-three years), and the long period which elapsed between the accident and the operation.

“E—, aged sixty-three, fell on Feb. 14th, 1887, in the City, and fractured one patella. He was conveyed to one of the hospitals. He remained in the hospital about fourteen weeks. When I saw him in June, the whole limb was encased in an apparatus, and there was fibrous union of the patella, the groove between the fragments measuring three-quarters of an inch. On July 10th, I operated in the manner introduced by Sir Joseph Lister. The limb never having been flexed since the accident, as soon as the patient was under the influence of chloroform, I forcibly flexed the limb, thereby breaking dense adhesions with a loud report, and the patella breaking right across through the band of fibrous union. I exposed the patella by a longitudinal incision, and found it split into three pieces, two in the lower and one in the upper part. There were dense adhesions binding the margins of the lines of fracture to the condyles of the femur; these I divided with a knife, causing a good deal of oozing. It struck me as very peculiar for the cartilaginous surfaces to be united by fibrous bands. The fragments were wired together with soft, thick, silver wire, the loose ends of the wire being flattened down on the surface of the patella. Antiseptic precautions, of course, were taken, and the temperature never rose above normal, nor was there at any time pain. It was dressed on the 11th, 14th, and 20th, and finally on Aug. 2nd, when all was healed. Gentle passive movements were begun, and on the 16th, the patient went out on crutches. I saw him when he could bend the knee about half way. I bent it forcibly, and made some adhesions give way inside the joint, as the bony union of the patella was complete. I left the wire sutures in at the patient's request, and after this he went to his usual employment, occasionally using a walking-stick.”

In the *Lancet*, issued February 23rd. 1889, there is a very able paper by Mr. G. Turner, some portion of which is here reproduced, as containing useful knowledge regarding these fractures, and the state of professional opinion at the present date.

“We have from time to time published cases¹ in which primary suture of the patella after simple fracture has proved successful, and recorded the opinion of many eminent authorities in favour of it;² but, whilst the percentage of

deaths on the showing of one of the strongest advocates for its employment³ amounts to 1'4, and the treatment by apparatus involves no risk—even bony union is occasionally obtained⁴—operative measures will be resorted to with reluctance by the majority. There are certainly some which would do better under operative treatment, but no definite rule for the guidance of the surgeon can be drawn from a comparison of the published cases. When, as in this case, the limb is comparatively useless, should the operation be performed? To this the answer will usually be in the affirmative. But what are the results of treatment as compared even with those of recent suture. Söderberg⁵ collected statistics of 81 cases; 41 of these were operated on by primary suture: in 37 there was a good result, in 1 ankylosis followed, in 1 suppuration, in 3 only partial mobility was obtained, and in 1 fibrous union; 38 were cases of long-standing fracture, in which the result obtained by other methods was considered unsatisfactory; in 14 there was a good result, in 8 ankylosis resulted, whilst in 3 the operation was followed by death. The mortality therefore is high. This is confirmed by the statistics of Valaguiers⁶ on the operation in old cases. Out of 45 operations, 22 were successful; in 9 there was partial ankylosis; in 11 complete ankylosis (in 10 of these the joint suppurated); three died. Success or failure will much depend upon the selection of cases, both as regards condition of limb and the presence of any constitutional disease or deterioration of general health—as from addiction to alcohol. It is not that sufficient care is not taken in the use of antiseptics, some of the most careful in this respect having had untoward results. In some it has been found almost impossible to bring together the fragments owing to contraction of the quadriceps muscle, which it has been necessary to divide⁷ in order to obtain success. Von Bergmann in one instance did not divide this muscle, but chiselled off the tubercle of the tibia and then united the fragments, with good result. A vertical incision over the centre of the joint is usually employed in this country, though the fragments have been sutured through a transverse incision.⁸ In some cases no drainage has been used, the object being to obtain primary union throughout. Mr. Turner recorded a case⁹ in which the wires required removal some months after the operation, having been the cause of recent suppuration in the joint. They are, however, commonly left and rarely produce inconvenience. Cecit¹⁰ crosses the wires obliquely, passing them through lateral incisions.”

1 THE LANCET, 1878, vol. i., p. 7. Ibid., Rose, 1879, vol., ii., p. 797. Ibid., Bloxam, 1886, vol. ii., p. 300; 1888 vol. ii., p. 621, &c.

2 Ibid., 1887, vol. ii., p. 317, Cameron and others; 1879, vol. ii., p. 811, &c.

3 Ibid., 1886, vol. ii., p. 82. Dennis, statistics of 187 cases.

4 Ibid., 1886, vol. i., p. 257.

5 Ibid., 1887, vol., p. 331. Ann. Univ. Med. Sc.

6 Archives de Medicine, vol. ii., p. 265.

7 Macnamara, THE LANCET, 1879, vol. ii., p. 811. Tendo patellæ also divided in one Royes Bell, p. 657.

8 Deut. Med. Woch.

9 THE LANCET, 1887, vol. i., p. 572.

10 Deutsche Zeitschrift für Chirurgie &c., vol. xxxiii, p. 289. See also Brumner in the same volume.

On April 1st, 1887, Frederick Harrison, M.D., read before the "West London Medico-Chirurgical Society," a very instructive paper relative to "Transverse fracture of the Patella." He despondingly refers to the treatment up to then as follows :—

"Although not of very frequent occurrence, yet transverse patella fracture is an accident that is sure to happen once or twice in the life of every surgeon who is in practice for any length of time (and probably oftener in the country), and it is an accident which, according as it is well or ill treated, has before now made or marred a practice. This case too has an additional interest to us, for on one of our clinical evenings about three years ago, I had the pleasure of showing the patient here, and you had the opportunity of examining his knee and asking him any questions relative to the accident.

I have mentioned that neither treatment, nor the result of treatment, of transverse fracture of the patella, is usually successful or satisfactory either to patient or surgeon. If it had been successful in the past, I scarcely think such a barbarous method of treatment as that of Malgaigne's hooks would have been adopted, even if invented. I recollect, when a student, seeing three of these in use at one time in the Clayton Accident Ward of the Middlesex Hospital, and, as far as I remember, the result was not very satisfactory. Neither do I think the frequent result of the present treatment of this fracture much more satisfactory, or the practice of cutting down on the bone and suturing directly the fragments would scarcely be recommended."

In the year 1880, Dr. F. H. Hamilton, M.D., N.Y., U.S.A., published a pamphlet entitled "Fractures of the Patella," with a study of 127 cases. This 8vo. pamphlet of 106 pages, commences with an introduction of two pages, which two pages contain more essential information—and much of that new—than is to be found in all the periodicals and text books published during the last century. Professor Hamilton was evidently on the verge of the discovery of a correct theory of treatment. Though he preceded me by two years in publica-

tion, I assure the reader that the Professor in no way influenced the development of my views, as, unfortunately, his able contribution did not come under my observation until the year 1886. That this is correct is proved on perusal of his pamphlet, where he advises a practice which has long ago appeared to me theoretically and practically incorrect.

With the exception of three unimportant paragraphs, I here reproduce the whole of the "Introduction" of Professor Hamilton's pamphlet, which well merits to be widely circulated among surgeons.

"There is no impropriety, however, in my calling the attention of the reader to some of the points which have already attracted my attention. He will note:—1. The large proportion of simple transverse fractures, and the infrequency of comminuted and compound fractures. 2. The frequency of fracture from muscular action. 3. The frequency of early joint effusions. 4. The difficulty which has constantly been experienced in securing and maintaining apposition of the fragments. 5. The great variety of methods which have been adopted, and the frequent changes made in the treatment of the individual cases; either because of their inefficiency, or because of the pain and excoriations or other more serious injuries which they have occasioned; and the equally good results where the attempts to get close union have been less assiduous. 6. The uniformity of a fibrous union, with some separation. 7. The frequency of a re-fracture, and its more serious results. 8. The frequency of ankylosis, and its proportion to the time the limb is kept in splints. 9. The great time which elapses before the functions of the limb are restored. 10. The inadequacy of the ordinary knee-caps while the patients walk about. 11. The remarkable power of restoration of the functions of the limb after a time, where no union of the fragments have taken place, if only the patient continues to use the limb, and thus develops the muscles."

"M. Velpeau asserts that he has seen the functions of the knee joint "completely re-established, with an interval of two or three inches between the fragments of the patella,"

“Such assertions,” says M. Malgaigne, “are, in my opinion, only accounted for by some inaccuracy in examination ; and for my own part, I have never seen the functions of the limb completely restored, even when the separation was limited to one-third of an inch.”

“In reference to the cases contained in this and the subsequent reports as treated at Bellevue Hospital it seems proper to say farther, that the House Surgeons who have had the immediate charge of the cases, are almost without exception young men of the highest qualifications. They secure their positions through a severe concours. They are careful, attentive and ingenious in devices to accomplish their purposes—they have large experience, and will in all respects compare favourably with the best class of surgeons either at home or abroad. What difficulties they have experienced, it is fair to say, therefore, will be experienced by other surgeons ; and where they have failed others will fail also. Of the skill of the distinguished gentlemen who are my colleagues on the visiting staff of Surgeons at Bellevue, it is unnecessary for me to speak, as no one would call it in question. I desire therefore to repeat, that all of the cases reported as having been under their care, represent in their results the highest standard of excellence yet attained in the treatment of this unfortunate class of accidents. The same must be said of the few cases reported as having been treated by Surgeons at other city Hospitals and elsewhere, all of whom are personally known to me as men of skill.”

In the foregoing quotation we are given eleven deductions, conclusions arrived at from observations made during an extensive clinical experience. To illustrate my views, I shall place my own experience in juxtaposition with the corollaries which appear in the Professor’s “Introduction.” †

1. “The large proportion of simple transverse fractures, and the infrequency of comminuted and compound fractures.”

With this I quite agree, further, that where we have comminuted or compound fractures of this bone, defect of restoration is excusable, as with other bones.

† When I dissent from Dr. Hamilton, it must not be supposed that his observations in deductions are questioned by me. From my following a different method of treatment, it is not surprising that diverse observations were made.

2. "The frequency of fracture from muscular action."

I also concur with this. It is in the treatment of these cases that our clients expect, and can have, more than we have hitherto given them.

3. "The frequency of early joint effusions."

I would like to add, that if it be a case of fracture from purely muscular action, they are seldom excessive, or sources of anxiety to the surgeon.

4. "The difficulty which has constantly been experienced in securing and maintaining apposition of the fragments."

*From this I dissent. By employing the ring method of fixing the patella, the fragments were easily, efficiently and comfortably maintained in close apposition. But the method being theoretically incorrect, its efficiency in maintaining the restoration made it equally so in delaying the repair.

5. "The great variety of methods which have been adopted, and the frequent changes made in the treatment of the individual cases; either because of their inefficiency, or because of the pain and excoriations or rather more serious injuries which they have occasioned; and the equally good results where the attempts to get close union have been less assiduous."

This was my conclusion about the year 1878. When I began to carefully diminish my assiduity up to the year 1882, when I had arrived at the "Hands off" the Patella, treatment.

6. "The uniformity of a fibrous union, with some separation."

This is not my experience now, but if it were it would not matter if the repair was so managed, that the connection

* "I am not aware that a detailed account of the "ring" method has ever appeared. It was a hempen spliced rope ring, which was padded by winding round it cotton wadding, within the limits of which ring the fragments were confined to hinder separation, and compressed to stop tilting,

whether short or long, was equal to the thickness of the patella, and of course sound.

7. "The frequency of refracture and its most serious results."

Re-fractures are not rare, but certainly not serious, as they generally recover in one half the time taken by primary ones. As with other bones, they likewise show a little more defect in restoration than follows primary fractures.

8. "The frequency of ankylosis, and its proportion to the time the limb is kept in splints."

My observation has been, that the ankylosis is more in proportion to the advanced age of the patient than the time spent in rigid fixation.

9. "The great time which elapses before the functions of the limbs are restored."

This has appeared also to me to depend upon the age of the sufferer, the aged requiring from one to two years before full use is re-acquired.

10. "The inadequacy of the ordinary knee caps while the patients walk about."

Whether the patient be walking or not, the compression of the patella, inseparable from the wearing of a knee-cap, cannot benefit its wearer.

11. "The remarkable power of restoration of the functions of the limb after a time, where no union of the fragments has taken place, if only the patient continues to use the limb, and thus develops the muscles."

This paragraph (No. 11), in my opinion, does not give us a correct interpretation of that which has been observed, namely,

the resumption of limb function with an extra extended connection—separation of fragments. The explanation is this, that circumstances happen in such cases which favour muscular adaptation, *i.e.*, shortening. This question has been already discussed fully in Part VI. of my “Contributions,” and there is an explanation of why M. Malgaigne contradicted M. Velpeau, who certainly was correct as regards his observation. M. Malgaigne had not the possibility of muscular adaptation in mind when he sent forth the contradiction. Cures with a long extension of the patellar connection only very rarely re-acquire the function of the limb without assistance, they demand that means be specially employed to bring about muscular adaptation, and so re-acquire a power that otherwise they show no signs of regaining. Professor Hamilton concluded his interesting “Introduction” by guaranteeing the skill of his assistants. What is wanted is not great skill in restoration, but a little more consideration, so that we discover what will favour repair, or discourage it.

M. Malgaigne asserted:—“I have never seen the functions of the limb restored, even when the separation was limited to one-third of an inch.” In my opinion, this is quite correct. This eminent surgeon introduced the “hooks” for the treatment of these fractures; he evidently, in a great degree, ignored the condition of the knee-joint, and giving his attention mainly to the fracture, and trusting to his “hooks,” the results, very probably, were that the very inefficient control of the articulation, caused many of his patellar fractures to be repaired

with some unsoundness remaining in the knee-joint, which would delay temporarily or even permanently, if not recognised, the restoration of the joint's function.

Having admitted that Dr. Hamilton has "run me" very closely, it will perhaps interest the reader to see a wood-cut reproduced from the Professor's pamphlet, showing his mode of treatment. Fig. 75 he designates the "single inclined splint."

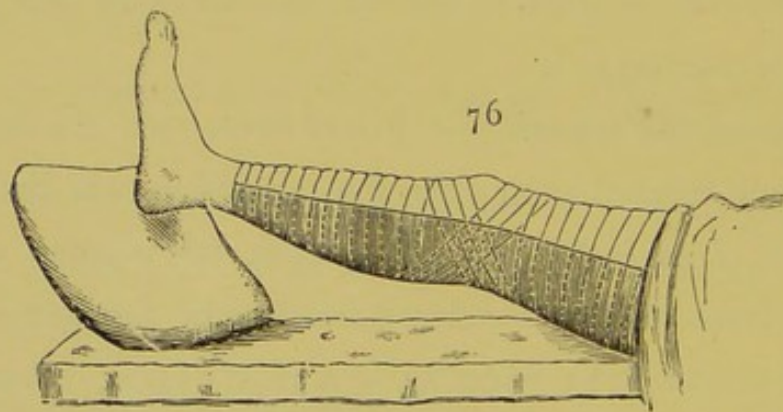
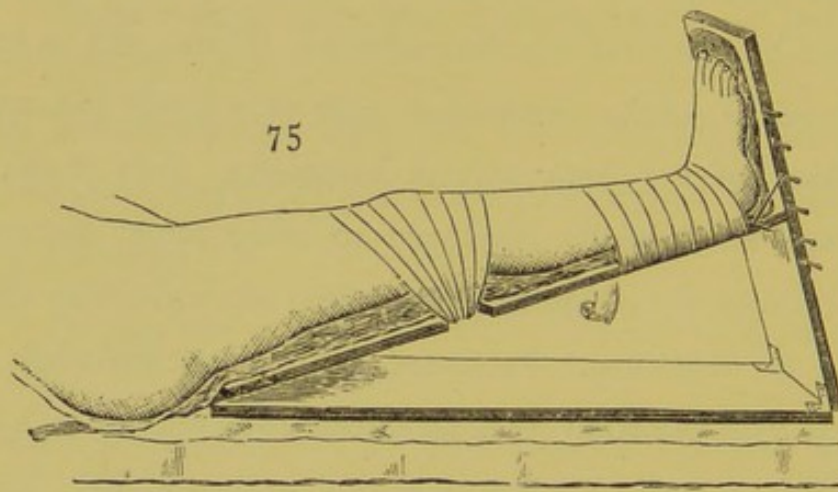


Fig. 76 he designates his "portative or bed dressing." They are examples of the direct method of treatment, which by interfering with the blood supply of the patella, oppose repair.

The pamphlet is illustrated with drawings of appliances devised by Turner, Wyeth and Tieman, mere mechanical devices, excellent for applying to wooden images.

Although neither Drs. Harrison nor Hamilton encourage operative interference by wiring the fragments, still, we must admit that such treatment has benefited many of these injuries. It is my contention that wiring is never required; that wiring the fragments of a fractured patella may be often beneficial, is explicable, not by the fact that a closer apposition is gained, but because the after treatment of such an operation, makes it difficult to apply much compression to the part—delaying repair—as it would be intolerable to the sufferer, so there has resulted a more bulky connection between the fragments after the operation, whether the fragments were in closer contact or not than before it was performed.

What is the condition of the knee-joint, the patella and its surroundings, directly, or very soon after a fracture of the patella caused by muscular action? The articular capsule is filled with fluid, exercising more or less tension, so that the patellar fragments float on the circumference of a fluid hemisphere, the curved surface and tensile condition of which separate the fragments. Until this fluid has become absorbed, it is unreasonable to expect any union between the fragments, as the fluid must intervene no matter how closely they are approximated. The fluid effused into the joint, is in most instances absorbed during a period of from ten to fourteen days. By maintaining the fragments in exact apposition during

the first ten to fourteen days, no obvious advantage is gained. It is here supposed that means are at once employed to stop flexion of the knee, as motion would both delay the absorption of the fluid and part further the fragments. During the days which follow the injury, there is to be noticed the formation of a circumscribing œdema around the knee-joint, which includes the upper surface of the patellar fragments. This condition of the surrounding parts, acts as a very perfectly and evenly modelled encasement, compressing the fracture together horizontally, and as the fluid within the joint diminishes it also exercises a pressure upon the upper surface of the patella fragments. Thus we have a well-balanced, automatically acting force, approximating and compressing the fractured patella into its concave seat, between the condyles of the femur and the head of the tibia. Without straining facts, at furthest from between the second to the fourteenth day the patient is able to walk about under some restraint, that is, flexion of the knee efficiently arrested; but his early resuming the perpendicular posture, discourages the subsidence of the œdema encasing the whole knee joint, so that it remains for a longer period than it would if the sufferer were confined totally to the horizontal position. The parts around the articulation feel, on manipulation, of a brawny hardness not unlike "vulcanised rubber." The foregoing is an outline of the natural method, timely assisted by applied art, of repairing fractures of the patella. It happens in surgery, as well as medicine, that there are actions nature cannot do so well as the artist who may be in charge of the case.

We have an example in fractures of the patella, nature cannot efficiently maintain the limb continuously extended. A surgeon is able to do this, but nature is fully equal to the repair of this injury, especially when supplemented by the aid of the surgeon to maintain fixation. Our motto should be "supplementing not supplanting." Let nature do what she can, we have always the consolation that however efficient a repairer she may be, surgeons will always be better restorers, *i.e.* mechanics. To satisfactorily treat fractures of the patella, surgeons have only for a time to uninterruptedly arrest flexion of the knee-joint, and to neglect the local lesion. That the method here advised to be followed for the treatment of fractured patellas, or any other fractures, can be infallible, is not my contention, rather that it will give better results than any other, with less expenditure of labour by the surgeon, and a saving of time, pecuniary cost and suffering to the patient.

There are some features in common to be observed in fractures of the patella and the neck of the femur, with a very notable difference. Fractures of the femur's neck are very often complicated by some degree of inflammation of the hip-joint, which delays, or if not recognised, may permanently hinder the limb being used again. With fractures of the patella, any threatened permanent inflammation or fractional unsoundness of the knee-joint is very rare, but has undoubtedly been observed, as a cause delaying its resumption of function. Having tried to make lucid to the reader my heterodox views and practice regarding these fractures, which

however are only a strict adherence to the principles applicable to the treatment of fractures in general applied to these injuries, because of the observed fact, that fractures of the patella are intolerant of tactical deviations from theory, deviations which are generally tolerated by other fractures.

Those of my readers who may be further interested, as regards evidence supporting the principles I contend for, will find more matter for digestion in "Contribution" Part VI. August 1, 1889, I gave a second "Contribution" to the discussion of this subject. From the first "Contribution" published in October, 1882, up to the present date there has not appeared in type any confirmatory evidence from other surgeons, though I have positive knowledge that my teaching regarding this matter has been widely spreading since its first publication. My last "Contribution" is here reproduced in full, taken from "The Provincial Medical Journal," of August 1, 1889.

"A reader of our various medical periodicals issued during the last ten years must have noticed the great interest surgeons have taken in the treatment of fractures of the patella. They will have further noticed the frequency with which those who have discussed the subject recommend operative interference, and the dissatisfaction expressed in regard to the efficacy of past treatment. In October, 1882, I contributed an article, which was published in the *Medical Press and Circular* of that date; it was a sketch of a new departure, well tested, in the treatment of fractures of the patella.

Although seven years have since passed, there has not been published any evidence confirmatory of the value of my advice. Seven years of added experience, in addition to that of surgical acquaintances and neighbours, is in favour of the teaching which I laid down in 1882. If the question were put to me: "Of all the important fractures presented to the surgeon for treatment, which of them is the easiest to restore and repair, and least cripples the patient

during treatment?" My answer would be: "Fracture of the patella," and that for the following reasons: If the injury be a simple fracture, the result of muscular action, the patient may return to his work as soon as the surgeon has applied his skill. If it be a simple fracture from direct violence, with much intra-articular effusion, then the sufferer is ready to go about as soon as the effusion has been absorbed. If it be a compound fracture, the case, though still easily restored and repaired, by reason of the cutaneous complication, requires that the patient should rest until the wound has healed; then, whether that period be short or long, the patient leaves bed, and resumes locomotion. This prognosis is made upon the supposition that the surgeon in control of the case practises the indirect method of fixing the knee-joint exactly similar to the plan introduced by me to the notice of surgeons, as proper for the treatment of knee-joint inflammation."

"During the many opportunities I have had of treating these accidents I have gradually attained the conviction that neither position nor nicety of adaptation during treatment is in any way essential to a good result. What we want is a method of treatment which renders nearly certain a recovery of the knee-joint free from defect in function.

Experience has clearly taught me that there are four points hitherto overlooked, which, if attended to, give success. The first is time; the second, non-interference with the circulation around the patella; the third, that no strain in the direction of flexion be allowed during treatment; and lastly, that the temporary stiffness produced by the treatment should be allowed to pass away spontaneously. † In regard to time, I now know that it is necessary to postpone, uninterruptedly, genu-flexion until a period of five or six months has elapsed. This is the time which observation has indicated to me as the safe date at which to suspend control.

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The months of surgical control may be considered as divided into three periods: the first representing the removal of effused fluid; the second during which union is progressing; the third being spent in the consolidation of the uniting medium when it becomes free from inflammation—*i. e.*, healthy. At the end of this third period the connection between the previously separated segments of patella—whether bony or ligamentous—will withstand, if sound, any habitual strain, and whether the two segments have been in close apposition or a perceptible distance apart, is merely important from the point of

† By "temporary stiffness" is not understood here to be the stiffness indicative of the unsoundness of the articulation, which can be diagnosed by observation of the flexion test. See "Inflammations of the knee-joint," in a succeeding chapter.

view of appearance. As an example of the efficiency of the indirect method of treating these fractures, I place before the reader a few short notes of cases :—

Two months ago, on a Sunday evening, I received a message to visit a lady with a fractured patella, at the north end of the town. My reply to the messenger was that the lady should be brought to my surgery. In two hours she arrived in a cab, with great commotion. Several friends assisted the patient into my surgery, where I at once fitted her with a bed knee-splint, then screwed a tube heel-plate to the shoe, and as my blacksmith was not at home, with the aid of my steel "Vulcan" fitter, I cut the bed splint into a calliper to fit into the heel-plate of the boot, completed the fixation in accordance with the indirect method—the whole proceduræ occupied about half an hour ; after which the patient walked out of the house into the cab, and went home. Passing her residence some days afterwards I visited my patient, and found her in the kitchen attending to her household duties. This was a fracture produced by muscular action, and at this date, two months after the accident, the contact of the fragments is perfect, but treatment has not yet been suspended.

Three months ago, on another Sunday evening, I was interviewed by a messenger, who requested me to go to Hill-street and attend to a fractured knee-cap. I instructed him to bring the patient down to my surgery the next day. He was assisted out of the vehicle in which he was brought, but after a delay in my surgery of half an hour, and the application of the indirect method of fixation, he walked home, with the assistance of a walking stick. This was a case of fracture from muscular action."*

"About nine months ago, late in the evening after my hours of consultation, there drove to my door, from Runcorn, a covered waggonette. In a few minutes afterwards, a patient, was carried into my surgery by several men, whom I found to be suffering from a fractured patella, caused by muscular action. Unaided, except by the Vulcan fitter, the fracture was fixed by the indirect method, and in half-an-hour the patient walked out into the waggonette and, with his companions, drove merrily away, and returned in a

* This patient was a Custom House Officer, and the injury was a secondary fracture. For the first fracture he had been under treatment at a suburban hospital, confined to his bed for six weeks ; fragments maintained in apposition with Malgaigne's hooks, the employment of which hinders compression of the patella and parts around, so preventing meddlesome surgery, thus favouring repair. During my treatment of the secondary injury the patient visited me three times, there being an interval of two weeks between each visit, when he informed me that he did not much need my assistance, and was going to Bristol to spend his time more pleasantly among friends. On his return six weeks after, the restraint of flexion was removed.

fortnight for my inspection. Afterwards he came every three or four weeks during a period of five months, at the end of which time the treatment was suspended, and the restoration and repair were found perfect.

Two years ago I proceeded to the Principality to visit a gentleman who had been confined to his room for two or three weeks suffering from a fractured patella. The cause has passed out of my recollection. Assisted by Dr. Owen, of Beaumaris, we fixed the fracture by the indirect method, and at the termination of the operation the surgeon, patient, and myself, went downstairs and enjoyed dinner. From that moment until his recovery he was able to resume his duties, those of commander and navigator of a large steam yacht. The repair in this instance was perfect.

Another illustration : Some two years ago, in consultation with two other surgeons, we examined a gentleman residing about twelve miles out of this city, who suffered from fracture of the patella the result of direct violence. The injury was followed by extreme effusion within the joint, and the surgeons had very wisely, considering the extreme degree of capsular distension, confined the patient to his bed. At the time we examined him the effusion had been nearly all absorbed. We agreed that the next day the fracture should be treated by the indirect method of fixation. After we had carried out this agreement perfect repair followed in due time.

Still more clinical evidence : I assisted Dr. Evans, of Waterloo, to fix, by the indirect method, a fractured patella. A fortnight had elapsed between my visit and the accident. Three days after our consultation the patient did shore duty as assistant steward at the docks. The cause of the accident was muscular action. The result of the treatment was perfect restoration. Nine months after recovery the same man drove up to my house in a cab, having injured his knee by slipping in the street. On examination I found that he had re-fractured the patella. With Dr. Evans' concurrence he was re-fixed according to the indirect method. Again; after being fitted with the appliances, he walked away, and revisited me in about a fortnight's time. After examination I informed him that the knee was progressing favourably ; he replied that he thought so, and added that he believed that he could manage the case himself, and would not call again, which resolution he adhered to, as we did not see him again. This is the only drawback I know that is attached to this method.

Further illustration : Accompanied by a medical friend, I drove eight miles out of town to visit his patient, who suffered from a fractured patella. On being introduced to the patient, I recognised a gentleman whom I had

treated for a similar accident fourteen years previously. He was treated on that occasion according to the then standard method. On the present occasion an innovation was practised ; the "indirect method." After we had finished the operation the patient inquired, "How long do you think I shall be kept away from business?" My reply was that he might leave his residence next day and superintend his business. He appeared surprised, and remarked, "that will never do, I am insured against accidents." I then advised him to be guided by his usual medical adviser. The case resulted in perfect restoration and repair. Five years ago a physician, in this city, requested me to visit one of his patients residing in Upper Parliament-street. On my arrival at the house I found an elderly gentleman, seventy years of age ; he was in bed with a fractured patella. He was at once fixed up by the "indirect method," and the following day got out of bed, and continued to do so daily until he was perfectly restored and repaired.

Last year, a message was delivered to me from Daulby Street, requesting me to visit a gentleman who had broken his knee-cap. Accompanied by Dr. Lewis, of Kansas, U.S.A., I visited the sufferer, whom we found in bed incapacitated by a fracture of the patella, from muscular action. Assisted by Dr. Lewis, and employing the "Vulcan fitter," we converted a knee bed-splint into a calliper, then applied a tube heel-plate, and fixed the fracture by the "indirect" method, and got the patient out of bed. He remained in the house a week, but being an elderly person, over sixty years of age, he seemed to be short of reliance upon his fixture ; nevertheless, at the end of a week, he went daily to business, which he conducted upon the other side of the river. The restoration and repair were perfect. I shall only trouble the reader with one more example. Three years ago, accompanied by a surgeon from Boston, U.S.A., I went to show him a case of fractured patella, which I had fixed by the "indirect" method two days previously. On arriving at the house, we were informed (it was late in the evening) that the patient had not yet returned from his work, which was that of foreman engine-fitter. The history of the case is as follows : two years previously I had attended him for a fracture of the left patella, and treated it by the "indirect" method, with the result of perfect restoration and repair. The second accident was a fracture of the right patella ; both injuries resulted equally satisfactory. During the first injury, he remained in the house a week ; during the second, at my urgent request, he resumed his duties the day after the accident. Such was and is my confidence in the "indirect" method of treating fractures of the patella. The question might reasonably be asked : "What degree of approximation of fragments was apparent after recovery from this injury when treated by the "indirect" method? The correct answer to such a question is this. "A perceptible space is a very exceptional result." During the treatment, especially those cases resulting from direct violence with great tensile effusion within the joint, the surgeon should then enjoin a week or a fortnight's rest in

bed, but at the earliest possible moment the patient should be ordered out of bed and employ his limb in locomotion, so as to produce a tense, brawny œdema external to the joint, the formation of which the "indirect" method generally favours, and upon which œdema the surgeon has to depend *entirely* for maintaining *perfect* apposition of the patella fragments. The surgeon may occasionally be called upon to manage fractures of the patella unavoidably neglected, with much separation of fragments and defective power arising therefrom."

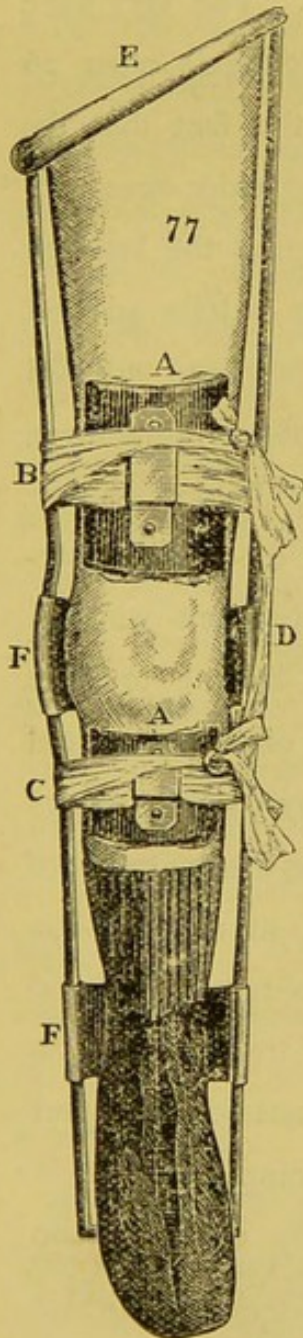
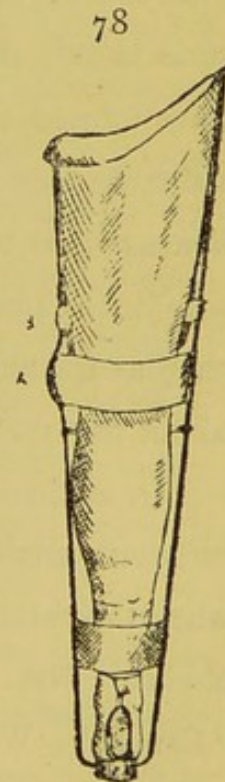


Fig. 77 shows an anterior view of the "Calliper" splint applied for the treatment of a fractured patella, it in no way differs from the manner in which I would apply it to the treatment of a diseased knee-joint; except that for the former, it is made as nearly as possible the exact length or a little shorter, but for the latter it is made a shade too long, so that the patient's heel is at least half an inch from the sole of his boot.

Fig. 78 shows a posterior view, both figures show a plan of the method of indirect fixation. By referring to pages 74—80 the reader will there find all the details pertaining to the fitting of a "Calliper" for the treatment of these fractures. When the "Calliper," after a time, has to be re-



moved, in its place I usually substitute a buckle and strap, two inches wide, which encircles the thigh above the upper half of the patella ; this gives the patient some feeling of confidence, checks any sudden strain upon the patella and delays the return of flexion. The period of time during which the limb is retained in the "Calliper" varies from 18 to 26 weeks. The very aged are seldom detained longer than 18, the youngest often 26 weeks, a difference in policy justified by the fact that the younger patients regain flexion too quickly, the elder ones very slowly. Surgeons must have noticed that during the last ten years the treatment of primary fractures of the patella advised by many, coincides with much of that which has been advised during the last fifty years for delayed and non-union of fractures. By a perusal of "Contribution" Part VI., it will be noticed that after all, my advice for the primary treatment of patellar fractures is only the application of a method of treatment which I have termed the "damming" method, found by me to be a valuable accelerator, where delay or non-union of other fractured bones require treatment. The evidence of my contemporaries who have published their experiences regarding the treatment of patellar fractures, indicates that there appears as much indecision about the management of a patella after its restoration and repair, as there was at the commencement of treatment. The surgeon's anxiety and the patient's danger do not seem to end when the restoration and repair have been completed, this is obvious from the quotation page taken by me from the "Lancet." What would the reader think if there appeared in a

“morning paper” a report “that the fine ship A—— had been sighted off the port, but suddenly foundered in a storm created by her commander?” It would read very ridiculous and highly improbable; yet a reader of our Medical Periodicals during the last ten years, must have frequently read reported cases of fractured patellæ, which if not perfectly restored were well repaired; and where nothing more was required than that the surgeon should have rested from his labour, and allowed the patient to exercise his limb, to surely regain all its functions; yet the report terminates with the information that after “consultation,” violence in the way of flexion, commonly termed “passive motion” was employed with such effect as to wreck the case. Then follows the common proposition, “wire the fragments”; next comes, what is noticeable after all secondary fractures, viz., rapid repair, and the operation obtains the undue credit, being really a secondary injury—and like such injuries of all bones they quickly unite. With confidence I advise that the surgeon gives no attention to the question of the motion of the joint after he is satisfied of having gained a strong repair. Cases occurring in early life regain motion quickly enough, consequently they should be kept fixed a little longer than elderly persons, who regain motion rather slowly, for this reason the latter are released from restraint much earlier.

The Treatment of Injuries to the Neck of the Femur.—In the past while treating fractures of the femur’s neck, we have made theoretical errors similar to those committed by us when

treating fractures of the patella ; devoting our energies and thought to the question of their restoration, ignoring that of repair. As with patellar fractures, to improve our results we want knowledge that will aid repair, not better mechanics to gain restoration. The treatment of these fractures has not materially progressed since the days of Sir Astley Cooper. Surgeons have not since then given this lesion much consideration. To show that this is a fair view of the situation, and not merely my opinion, an editorial on the subject is here reproduced from "The Lancet," issued August 31st, 1889.

12
"The surgery of fractures of the neck of the femur cannot be said to be in a satisfactory state. These injuries are very common, and their results are serious. Not uncommonly life itself is lost, and permanent weakness and lameness are a usual result. The progress noted in other departments of surgery has not reached this, and the want of special interest in the subject has no doubt been due to the difficulties besetting exact diagnosis and really successful treatment. The old classification of all fractures of the neck of the femur into intra-capsular and extra-capsular has been pretty generally given up. It is now recognised that, while such a classification may represent the actual facts in a minority of cases, it is inaccurate in the majority; and, further still, it fails to indicate the important and essential differences met with in these fractures. Instead of concentrating attention on the relation of the fracture to the capsule of the joint, the impaction of non-impaction of the fragments is now laid stress on, and this for an important clinical reason. Impacted fractures, unless becoming unimpacted, are found to unite by bone, and so to be attended with less serious results than the other kind. The great thing to avoid in such a case is any manipulation which can separate the two fragments, and therefore examination of the injured part should always be conducted in such a way that this accident cannot happen. Latterly Dr. SENN of Chicago has been trying to apply this knowledge to cases of unimpacted fractures. He first of all resorted to some experiments on animals. Having made subcutaneous fractures of the neck of the femur within the capsule, he drilled the fragments and fixed them in direct apposition by a steel

pin and a bone nail. When this was done firm bony union was obtained. The attempt to apply this treatment to human subjects was felt to be an extreme measure, ill-adapted to the old and feeble patients in whom this accident is generally met; and it has now been shown to be wholly unnecessary, for the same end can be obtained by simpler and milder measures, to which no objection on the score of severity can be urged. The object aimed at is to reduce completely all unimpacted fractures, and to hold the fragments in such firm contact that a kind of slight impaction is produced and bony union obtained. For this purpose he fixes the limb in its corrected position by a plaster-of-Paris splint carried from the toes up the limb and the trunk as high as the eighth rib, and down the opposite thigh as far as the knee. An interval is left in the plaster case over the great trochanter, and a pad worked by a screw on a steel arch attached to the splint is applied over this interval. When the plaster is set, pressure is made in the line of the neck of the femur by screwing down this pad. By this pressure the two fragments, which by the perfect reduction of the fracture have been brought into apposition, are pressed together, and are held as securely as if they were transfixed by a pin. In the *Journal of the American Medical Association* for August, Dr. SENN describes fully this mode of treatment, and he details several cases in which he has applied it. He recommends that the same means should be employed when the fracture is impacted, as a security against disimpaction under the influence of the rarefying osteitis which accompanies union. Only, in cases of impaction no manipulation should be made to separate the fragments, and no efforts made to restore the length of or the position of the limb. By this treatment it is stated that bony union can be confidently anticipated, that patients can be got up within a few days of their injury and so avoid all risk of hypostatic pneumonia, and that in many cases complete restoration of the function of the limb can be secured in the minimum of time. In its present form it seems to be a method that deserves careful trial, and if in other hands it is found as practicable and as successful as in Dr. SENN'S, that enterprising surgeon will have conferred a great benefit upon a large class of aged sufferers for whom surgery has hitherto done but little."

This "editorial" is a fair statement of the situation and present prospect; but as I differ materially therefrom, in the following pages the "editorial" will be analysed, each paragraph consecutively, viewed by light taken from my own experience.

1 "The surgery of fractures of the neck of the femur cannot be said to be in

a satisfactory state. These injuries are very common, and their results are serious. Not uncommonly life itself is lost, and permanent weakness and lameness are a usual result.

It is very obvious to me why weakness is here catalogued as an opprobrium to us. But why lameness is so classed is not clear, especially now that we are advised never to reduce impacted fractures of this bone. Weakness is a defect that can be corrected, if not caused by mere lameness *i.e.* a lameness which corresponds to the condition known in other bones as non-union; but a weakness not caused by lameness corresponds to the condition known as an unsound articulation, and is amendable.

2 "The progress noted in other departments of surgery has not reached this, and the want of special interest in the subject has no doubt been due to the difficulties besetting exact diagnosis and really successful treatment."

With this I agree. A diagnosis of the impediment to repair, has been the weak point in treatment.

3. "The old classification of all fractures of the neck of the femur into intra-capsular and extra-capsular has been pretty generally given up. It is now recognised that, while such a classification may represent the actual facts in a minority of cases, it is inaccurate in the majority; and, further still, it fails to indicate the important and essential differences met with in these fractures."

The old classification did not help us, nor will the new one here referred to.

4. "Instead of concentrating attention on the relation of the fracture to the capsule of the joint, the impaction or non-impaction of the fragments is now laid stress on, and this for an important clinical reason. Impacted fractures, unless becoming unimpacted, are found to unite by bone, and so to be attended with less serious results than the other kind."

This is the new classification. If we are to judge lameness as a blameable defect, how is it to be avoided if non-reduction of impaction is to be the end of practice, neither is an impacted fracture less serious than the other form.

5. "The great thing to avoid in such a case is any manipulation which can separate the two fragments, and therefore examination of the injured part should always be conducted in such a way that this accident cannot happen. Latterly Dr. Senn, of Chicogo, has been trying to apply this knowledge to cases of unimpacted fractures. He first of all resorted to some experiments on animals. Having made subcutaneous fractures of the neck of the femur within the capsule, he drilled the fragments and fixed them in direct apposition by a steel pin and a bone nail. When this was done firm bony union was obtained. The attempt to apply this treatment to human subjects was felt to be an extreme measure, ill-adapted to the old and feeble patients in whom this accident is generally met; and it has now been shown to be wholly unnecessary, for the same end can be obtained by simpler and milder measures, to which no objection on the score of severity can be urged. The object aimed at is to reduce completely all unimpacted fractures, and to hold the fragments in such firm contact that a kind of slight impaction is produced and bony union obtained."

The experiments referred to in the foregoing quotation, convey no new or useful information. Sir J. Lister has performed such an operation upon the human subject. These are experiments in the field of restoration, but the hitch is in that of repair, and Dr. Senn's interpretation of the several cases treated is incorrect.

"For this purpose he fixes the limb in its corrected position by a plaster-of-Paris splint carried from the toes up the limb and the trunk as high as the eighth rib, and down the opposite thigh as far as the knee. An interval is left in the plaster case over the great trochanter, and a pad worked by a screw on a steel arch attached to the splint is applied over this interval. When the plaster is set, pressure is made in the line of the neck of the femur by screwing down this pad. By this pressure the two fragments, which by the perfect reduction of the fracture have been brought into apposition, are pressed together, and are held as securely as if they were transfixed by a pin."

As we have mostly elderly persons to treat for this lesion, it becomes very important that means are used which least hamper them, and that we refrain as much as possible from all purposeless restraint. What benefit can "a plaster-of-Paris" splint carried from the toes as high as the eighth rib serve, more than such means would attain if applied from the knee to the eighth rib? The fracture is at the hip-joint, if the splint extended a thousand inches below the joint, without extending the same distance above, it would only be material wasted in one direction, and inoperative in the case of a fractured neck of the femur, a purposeless hampering of the sufferer. Further, why subject "the old and feeble" to be hampered by the "steel arch" tackle, when the same effect, if it was worth gaining, could be gotten by a wide calico pelvic band?

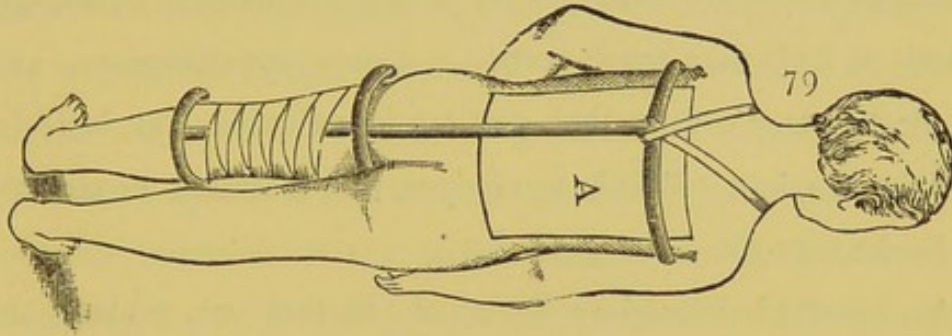
7. "In the *Journal of the American Medical Association* for August, Dr. Senn describes fully this mode of treatment, and he details several cases in which he has applied it. He recommends that the same means should be employed when the fracture is impacted, as a security against disimpaction under the influence of the rarefying osteitis which accompanies union. Only, in cases of impaction no manipulation should be made to separate the fragments, and no efforts made to restore the length or the position of the limb. By this treatment it is stated that bony union can be confidently anticipated, that patients can be got up within a few days of their injury and so avoid all risk of hypostatic pneumonia, and that in many cases complete restoration of the function of the limb can be secured in the minimum of time. In its present form it seems to be a method that deserves careful trial, and if in other hands it is found as practicable and as successful as in Dr. Senn's, that enterprising surgeon will have conferred a great benefit upon a large class of aged sufferers for whom surgery has hitherto done but little."

"Several cases!" As in medicine so in surgery, even a discerning practitioner often finds it difficult to satisfy himself, whether

the patient got well with his assistance or despite his interference. The treatment advised in the above paragraph is essentially a method by fixation, its real merit; though to the jamming of the fractured fragments is given the greater prominence, which in my opinion is of no importance whatever; in support of which judgment reasons and clinical facts will be given by me further on. The practice of jamming the fragments, will ere long, be found not to be any advance upon the practice of the past. What we want is such a rule of treatment, that the surgeon having it in his memory, when called to treat a person suffering from this injury, can, conditionally, prognose always a useful repair and a probable restoration. We want a rule of treatment, that will reduce the number of failures of repair, down to the average failures attendant upon the treatment of other bones. These injuries happen mostly to "patients who are past the prime of life." I fail to perceive the advantage of compelling them early to assume the perpendicular position, which they can maintain but a short time, and so would have frequently to recline upon a couch, a lesser luxury than reclining upon a bed. There is the further objection, that assuming the perpendicular position early, must put off the advent of cure—a serious deprivation to patients whose balance of years have nearly run out. Of course if the patient were in the prime of life—a rare occurrence—much extending the term of treatment would be of less importance. The surgeon, if called to treat a fracture of the femur's neck, has first to take into consideration the patient's age,

whether under or over the prime of life ; if under, or even at his prime period, it becomes the surgeon's duty, except some exceptional circumstances contra-indicate, to apply the full details of treatment, as he would generally treat other fractures; aiming at the best restoration of symmetry and repair of the fracture that is, correcting any shortening impacted or not, and hindering uninterruptedly any deviation from the normal line ; as the patient's age and vigour tolerate the surgeon's active intervention, and the material is worth the utmost skill and the extra time required for treatment. But should the surgeon be called to treat a patient who has started upon the declining period of life, it becomes his duty to take into consideration the probable balance of years due to the sufferer, and aim at curtailing the period of treatment as closely as is consistent with a certainty of a useful cure, even at the expense of a defective-restoration. The surgeon may find it advisable in some cases, to ignore any shortening, whether from impaction or not, devoting his energies only to early repair. No matter how young or old the patient may be, if the surgeon decides upon actively intervening, the hip joint must be locked, so that for a time its flexion, even momentarily, is impossible, otherwise it would be very unreasonable to expect any union of the fracture. We do not expect union of other bones if motion of the fragments is permitted? In my practice the hip splint, figured on page 90, is employed for the treatment of fracture of the femur's neck, also fractures of this bone, just below the trochanter. The splint is identically similar to that used for ordinary cases of hip-joint

disease. If it has to be applied to elderly patients, then between the appliance and the trunk is placed an imitation of a small mattress, formed of about six or eight folds of soft linen or calico bed sheeting as A, shown in Fig. 79. The rules



for applying the splint, forming its bends and twists are given at pages 87 to 95. When it is decided to apply the hip-splint to fractures just below the trochanter, then the buttock bend B. C. to be seen in Figure 67 is nearly obliterated, so that the machine is almost a straight line from the top to the bottom wing. The essentials of treatment are :—

Firstly :—To uninterruptedly and as effectually as possible arrest flexion of the hip-joint.

Secondly :—To continue the treatment until the symptoms of genuine repair and soundness of the joint are diagnosed. As with patella fractures, so with these, the younger the patient the longer the period of restraint.

Thirdly :—To obtain the best possible restoration circumstances permit, so that no lameness attributable to flexion be a permanent remainder of treatment.

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As regards the first, the appliance for arresting flexion of the hip-joint should extend from the axilla to a point on the lower extremity; which point should be the same distance from the hip-joint as the axilla is from the joint, so that the hip-joint corresponds to the centre of the length of the appliance. A greater length of limb than trunk-portion is a mere incumbrance, and a shorter trunk than limb-portion is valuable aid lost for stopping flexion. This is so obvious, that attention needs only to be drawn to it.

An equally balanced appliance of full measure, enables the patient to be comfortably moved about the bed, and the necessary acts of nature performed with very little distress.

Concerning the second. To make sure of a useful result to our treatment, the patient should feel free from all discomfort on removal of restraint, and respond satisfactorily to the flexion test.

Regarding the third. Circumstances do not always permit of the surgeon's actively interfering. He may have to delay interference for some time after the accident, yet this period need not be wasted, as the patient can be advised to so comport himself that, even when the time arrives, when the surgeon would be justified in actively interfering, his services may not be required.

In the earlier part of this chapter upon fractures of the neck of the thigh bone, attention was drawn to the parallelism of conditions with fractures of the patella; but deviating notably in the fact that, in fractures of the patella, the knee-joint is very seldom barred from use by unsoundness, whereas fractures of the hip-

joint are frequently permanently debarred from use by this defect. This is a very important clinical fact, although hitherto an unrecognised one, yet its non-recognition has been the main cause of our failure in treatment. It is a fact so easy to demonstrate beyond question, that, in the subsequent portion of my argument, I shall assume it to be generally recognised, and will now put to myself the question: "How do you explain the disparity of the sequelæ sometimes following the treatment of fractures of the patella and neck of the femur, if these injuries are so analogous?" A comparison of the mechanical treatment of the two injuries supplies us with the explanation, and teaches us, that in the future we shall have a perfect parallel between them. Our present deficiency in the treatment of fractures of the neck of femur is the cause of the exceptional frequency of unsoundness of the hip-joint following the injury. A fractured patella always involves the knee-joint more or less in the disaster, a surgeon in treating it maintains the joint in the condition of extreme extension for a long period, so long a time, that the unsoundness of the joint being only of traumatic origin, has become sound long before the restraint is removed, further, the usual means of restraint are very efficient, at least 75 per cent of the whole limb; and if the means devised by me are used, the splice is equal to the whole limb, 100 per cent, the result is, that during the whole treatment, friction of the joint while unsound, is thoroughly arrested. The value of all this the reader will perceive. Fractures of the neck of the femur and

consequent damage to the joint, sometimes receive no methodical treatment or such mechanical assistance which ineffectually arrests tremor and motion of the articulation. Take for instance, the last "edition" of treatment, referred to by the editor of the "Lancet," the "Senn" method, by it can be gained only 33 per cent of mechanical fixation—taking the trunk and lower limb as a "standard," and by my method only 66 per cent, and as the deficiency in both methods is at the best points of effect, the ends of the lever, so the extra 30 per cent to be gained by my hip appliance doubles our power of fixation. If we could get the 100 per cent of fixation for the hip, as we can for the knee, then we could get our patient out of bed probably the day after the injury. To gain 100 per cent towards fixing the hip-joint as effectually as the knee-joint, the sufferer would have to be entirely confined. The foregoing are my reasons for holding the opinion, that the difference in efficiency of mechanical fixation between patellar fractures and those of the neck of the femur, explain the fact, that imperfect results so frequently follow the treatment of fracture of the neck of the thigh bone, and point out to us, that the inefficiency of our means necessitates a longer period of retentive treatment.

As regards the diagnosis and prognosis, of injury to the neck of the femur, here will only be discussed types which the surgeon has generally brought under his observation: the symptoms attendant upon each are nearly always complicated by the concurrent signs of injury to the hip joint, the latter sometimes appear early, but usually later on and gradually overshadow the

symptoms of the former. If the patient has merely strained the whole joint, the signs of this, felt by the patient but not obvious to the surgeon, except by the flexion test, make any injury to the whole joint apparent early, but where fracture exists it intensely affects the patient and occupies the surgeon's attention, early overshadowing the articular injury, it is only when the irritation attendant upon the fracture has much subsided that the milder but more persistent symptoms of joint injury are noticed and their meaning interpreted correctly or perhaps incorrectly. The error of interpretation is often made after the lapse of some weeks or months, that of supposing there primarily must have been a fracture, which chronic injury to the joint much simulates, giving rise to difference of opinion among the surgeons who may be consulted, those first consulted maintaining that there was no fracture to be detected, but those consulted some months later greatly suspecting a fracture, from the deformity present and account for the delay of cure. To specially diagnose whether the fracture be impacted or not, extra or intra-capsular, is no aid to treatment, no matter which of them the surgeon may have to treat, if the condition of the patient before referred to permits, the whole details of treatment ought to be employed. If a fracture exists which the surgeon fails to detect he ought to be on the alert for signs of mere injury to the joint. Although fractures of the neck of the femur frequently happen during infancy, as well as the declining period of life, if detected early, a very rare occurrence during early life, their treatment presents no difficulty.

My first contribution to the literature of this subject appeared in the "Medical Press and Circular," January 23, 1884, at that date my opinion was expressed with the same confidence as now, for long before its publication it had been subjected during many years to frequent clinical testing. Here is reproduced the "article" in full, the reader will notice that in it like the "editorial" complaint is laid against the surgery of the past.

"In the number of this Journal issued Oct. 12th, 1882, my views and experience regarding the principles which ought to guide surgeons, in their treatment of fracture of the patella, were given to your readers. Since that time the subject has been much debated before several of our societies and discussed in our periodicals. The information supplied me from this source only shows the general poverty of knowledge in relation to the treatment of fractures of the patella, for, of all the gentlemen who joined in the debates or contributed to the literature of the subject, not one was able to confidently recommend a rational and trustworthy method of treatment; so it is not surprising to find the majority of those who expressed their opinions, hailing with undisguised delight the proposition that patellar fractures, whether they be simple or compound, should be treated by the knife and drill.

It would be interesting to know, if it were possible, how many of those, who so readily approved of this proposal, would if suffering from the accident, submit themselves to such treatment. I have of late years maintained, and, from my

“experience up to this date, am more than ever convinced that, whether the fractured patella be complicated by a wound or not, interference by knife and wiring will not give as good and safe results as can be gotten by a natural method of cure, if the surgeon knows how to aid or at least not thwart it. There are principles of treatment which, if carried out in practice, will enable the surgeon to dismiss his patient with, at least, a useful limb and in the majority of cases with a faultless cure.

The evils which our past and present practice up to this time have failed to avoid, are these: the patient might after treatment be unable to extend his leg properly, or, when standing, to maintain his thigh rigidly in a line with the leg, from excess of mobility with deficiency of power. These remains of the accident can be avoided, as I have shown in the paper mentioned above.

This contribution to the treatment of fractures at the neck of the femur has been prefaced by the foregoing remarks relative to the patellar fractures, because, in giving my views of the theory of treatment, proper to fractures at the neck of the femur, reference must be made to principles which, I maintain, apply equally to the treatment of fractures either of the patella, neck of the femur or of the olecranon, and here are repeated the views, given in my former paper in this journal, that the treatment either of these or any other fractures, or of diseased joints, is not mainly a question of mechanics. It is time enough to begin inventing splints when we know with some certainty what we require in order to gain our purpose, then we shall be better

“able to decide upon the best form of mechanical aid to treatment. That some of the machines usually employed in treatment, have advantages which aid us in carrying out certain principles, is as obvious as the fact, that other machines may be positively injurious, if these same principles ought to guide us during treatment. Of late years, there has been a surfeit of inventions, the construction of which demonstrates that their inventors had no knowledge of the treatment required: mechanical ingenuity cannot supply the place of intelligence. It is my contention that there is a rational treatment which, if adopted, leads to success in fractures of either the patella, olecranon or neck of femur, though the mode of application must vary only to suit the variation in form of the three different parts.

In the treatment of fractures of the olecranon, the mode of carrying out the principles of practice here recommended is very simple, as no special appliance is required to gain our purpose. The limb has merely to be maintained extended, or nearly so, by any method that does not involve, in its application, compression on any part within about two inches either above or below the elbow-joint, during treatment. The only exceptions to this rule are those cases, where the fracture of the olecranon is compound and invading the elbow-joint, when the position of flexion, theoretically questionable, ought to be maintained during treatment, lest the injury may run a course ending in the loss of motion at the joint; this risk of the lesion being cured with some defect of symmetry, must be incurred in order to make certain of

“gaining a useful result. Olecranon fractures do not cause the surgeon so much anxiety as those of either the patella or neck of femur. Fractures of the patella happen most frequently during the prime of life, when the sufferer can ill afford to be crippled; whilst fractures of the neck of the femur most frequently occur to children and in the decline of life; it is a very pitiful event, if the sufferer must forego the enjoyments of what he had secured for himself in earlier years, by being either constrained always to use crutches, or remain in seclusion, with in most instances his repose at night interrupted by pain, which must also somewhat curtail the duration of his life. Can any treatment not generally known help us to avoid these evils? Certainly.

Those of my readers, who have not passed many years in the profession, may perhaps think this picture, representing the imperfections of our past treatment of fractures at the neck of femur, as being much overcoloured; but those surgeons, who have had many opportunities of observing these injuries, must know that the evils here detailed are not exceptional terminations when the hip-joint has been subjected to injury, even though there be no fracture. I am not ignorant of the fact, that some cases of fractures of the patella, olecranon and *neck of femur* sometimes recover perfectly, without any treatment whatever. Such cases indeed go conclusively to show us, if we knew why they did so, all could be made to recover. If none of these fractures had ever been known to recover spontaneously, then we should be justified in concluding that there was with these injuries no inherent tendency to such repair, and any experi-

“ment of direct interference would be excusable. The unprofitable results observed after the treatment of these three fractures, are only similar to unfortuate results which sometimes follow, even after the treatment of other bones, which are known as delayed and non-union. Our indifferent success in the treatment of the three forms of fracture here referred to, partly arises from the fact, that they are more prone than others to have the development of consolidation arrested and surgeons have not hitherto allowed enough in view of this fact, and directed their treatment so as to physiologically favour the formation of a sufficient amount of sound connective material between the separated parts. Our failures ought to be credited to, and can be shown to arise partly from, defective treatment.

For the guidance of the surgeon in the treatment of fracture of the neck of femur and of simulated fracture, the last mere injury to the joint, the following rules are trustworthy, and the practitioner can in all cases promise his patient, that he will recover so as to be able to indulge in walking exercise without artificial assistance, and be free from pain.

That my readers may better understand the principles and practice here advocated, they may require an explanation of my statement. “For the guidance of the surgeon in the treatment of fracture and SIMULATED fracture of the neck of the femur the last mere injury to the joint.” This refers to two forms of injury to the hip-joint, one in which fracture of the neck of the femur exists, and can be diagnosed immediatly or soon after the injury, the other is that following an accident, and where there is not

“a fracture, but after the lapse of some time—generally after the second week—many of the signs of fracture appear; shortening, eversion of the limb, limited motion, and deformity evident by the flexion test. These differ in no manner from the signs of simple inflamed hip-joint, and can be diagnosed as not a fracture of the neck of the femur, by the surgeon placing simultaneously the palms of his hands upon the patient's trochanters he will notice that, in fractures, the trochanter of the defective limb is slightly or distinctly prominent, and sometimes higher up than that of the sound side, this differential diagnosis is not of much practical value, as the details of treatment are nearly alike, whether there be fracture or not. If there be no fracture, the omission of a retentive extension is not a fault, indeed where fracture exists, it is not always possible to safely apply any extension.

When called to a patient, the surgeon should at once fix the joint in a line with the trunk, as immovably as possible, to minimise the coming or present irritation of the joint, then apply any form of retention which will keep the limb at, or as nearly as possible at its normal length, and let any bandaging that may be employed be wound in a direction the reverse of the external rotation observed in these fractures. The patient must be limited to a diet with the least possible ingesta lest the injured limb be disturbed during a movement of the bowels in the period of greatest pain, and when he is utterly helpless. The bowels will infallibly act spontaneously, if the diet has been properly selected (milk especially being excluded), at or

“before the termination of the third week, and at this time the patient will be able to assist his nurse, and movement is less injurious and painful to him. The limitation of diet need not continue after the second spontaneous action of the bowels.

The mechanical treatment must be continued, in patients beyond the age of 70, for six weeks after the *total cessation of night pain*, when the patient may spend a further period of four weeks in bed without *any control or treatment whatever*. In patients beyond the age of 60, but under 70 years of age, the mechanical control should be continued for eight weeks after the *total cessation of night pain*, and there must be another four weeks of reclination in bed without surgical restraint. The younger the patient the longer must the mechanical control be continued. The duration of the periods of surgical control here laid down may appear rather indefinite and long ; but the game here is always worth the candle. Some cases may recover with less control, but what best conduces to make the surgeon's reputation is, not a report of isolated instances of rapid recovery, but, that he has always been able to benefit his patients. Fractures at the neck of the thigh bone are extremely rare in the mid-period of life, but they have been noticed in the period of childhood, and when recognised, should be treated as a mild case of inflamed hip-joint. If an adult delays resorting to proper treatment, as the surgeon is not always called to the patient's assistance immediately after the accident, the average period of each stage of treatment, here laid down, ought to be somewhat prolonged. Should there have been even

“two or three years delay, the surgeon can, by following the rules here enunciated make the limb painless and useful.

The minutiae of practice, which I employ, can best be detailed by a sketch of a few suppositious cases, which, nevertheless, are counterparts of actual ones.

Case A., aged seventy, makes a false step, when coming down the stairs of his house, and falls on his right side, immediately feels intense pain in the groin and down the thigh, is incapable of recovering the perpendicular position, and objects to his attendants making any attempt to remove him to bed.

On the surgeon's arrival, an examination of the region of the hip-joint and of the lower limb convinces him that there is a fracture of the femur at its neck, he requests that the patient be left where he was found after the accident, while were fetched suitable appliances; these were the posterior support hip-appliance always adopted by him in the treatment of diseased hip-joints and of fractures at or immediately below the trochanter. As soon as these were at hand, the patient was carefully undressed, the splint fitted, without the shoulder straps, and the retentive extension attached above the knee and tied to the lower horns of the hip appliance. The knee, and thigh are now bound to the upright of the hip splint, the bandage being wound round in the direction of inversion, and the top ring of the saddle is fitted and tied, after which the patient was removed to bed, on a first floor, though, when all this has been done, it was easy to take him to a higher floor without causing much pain. This was done by one attendant placing, in the case of the right limb being the injured one, his left hand under the upright of the saddle just below the knee, while with his right hand he grasped the left leg of the patient, a second attendant supported the sacrum, and a third grasped the top ring of the saddle opposite the sternum and carried the trunk portion of the patient, who was now placed in bed—a feather one or one made of some material that did not form a very hard mattress. After this the person who was to nurse the patient was shown how to apply the bed-pan when required, so that the patient would not be much pained nor further injured—when there is occasion for the use of the utensil, the mode of assisting the patient is thus:—the attendant stands by the bedside and, passing an arm under the lower end of the hip-appliance and a corresponding part of the sound limb, raises the lower extremities and pelvis of the sufferer to any height that permits of the bed-pan being slipped under. This position, which is that of an incline from the feet to the head, if in any way advantageous, can be easily maintained until the

“act of nature is complete. After *practically* demonstrating this to the attendant, the surgeon gave some instructions relative to the quality of the patient's food, and that he must be inspected occasionally to avoid bed-sores, by rolling him over ; further, should the linen under the patient become moistened or stained by excretions, that any such offence can be removed by the method used to pass the bed-pan under the patient. The same plan can also be resorted to when dressing any bed-sores that should form. The parts where bed-sores are prone to appear are over the sacrum and at the upper ring of the saddle ; if they appear at the latter part, then they can be dressed by rolling the patient over on the sound side, by grasping well the hip-appliance and limb between the two lower rings with one hand, and the *patient's shoulder* with the other hand, when the operator has complete power to roll the whole body, which enables him to turn the patient over without twisting tendency, as the lower extremity and the trunk go over in line, and thus any damage to the fracture is avoided. In this case A, the appliance was put on while the patient lay just where he was found after the accident, for had he been carried unprotected by surgical fixation of the part, it would almost certainly have been more injured.

A. is a typical case, but there are to be met with cases presenting special difficulties, yet they are no bar to useful recovery, but may make recovery with no defect impossible. For instance—B.—Suffering from fracture of the neck of femur. When the surgeon examines the limb he finds it closely mapped out with varicose veins ; in such a case it is not safe to trouble about the length of the limb, as aged people, with this defect, are very intolerant of the means used to form a retentive extension dressing. In such a case, the shoulder brace must be substituted, otherwise the machine would slip downwards. The treatment of recent fractures of the neck of the femur does not present any difficulty to those surgeons who can fit a hip-apparatus suitable for the treatment of inflammation of this joint, but when the surgeon is called upon to treat cases of fractures that have failed to recover, and are both painful and useless—

“cases that may have been in an unsound condition one or more years—then the attempt made by the surgeon to rectify the part, requires some care for the first three weeks, the patient having really to undergo *the process of the reduction of deformity*, as though there had been no fracture originally, treated as if it had been primarily one of simulated fracture of the neck of the femur, ignoring the length of the limb. During these three weeks the patient suffers some aggravation of pain, but it rapidly passes away as soon as the limb is in line with the trunk; to avoid much pain and not dispirit the patient, the reduction should be allowed to progress slowly, as success is certain. The cases of simulated fracture of the neck of the femur require the same details of treatment as fractures of this part, with this exception, that retentive extension is not used, but in its place I employ the shoulder-brace. Cases of injury simulating fractures at the hip-joint, are very frequently misinterpreted, and are rarely relieved except by mechanical treatment.

Case C., while passing along a street, the parapet of which was rather narrow, was knocked down by a youth (who careered against him), and fell on his left side; with some effort and pain he rose up, but found he could not proceed home without help. A sympathizer hailed a cab, in which he proceeded home, where he had to be assisted to undress and helped into bed, and his medical attendant was sent for. On examination of his joint and limb, it was found that there was no shortening, despite the efforts he had made since the accident, slight eversion, pain both on pressure of the groin and on rotating the limb, the power of eversion and rotation was only diminished. An opiate is prescribed, and the patient is directed to remain quiet, no local application. On the second day no variation of the sensational or obvious symptoms, a cloth damped in cold water is applied over the hip and groin. The patient was watched for nearly two weeks, when he began to complain of rheumatism

“in the joint at night ; the joint was now tested by the flexion test and a deformity noticed. — Now the proper interpretation of the feeling which the patient attributed to rheumatism was given to him, and the importance of so treating the lesion that the condition resulting from the accident might not become permanent. About the fourteenth day after the accident a posterior hip-appliance was fitted, which, for the first forty-eight hours, rather increased the symptoms and also caused some amount of lumbar pain—all of which gradually wore off. The surgical restraint was continued six weeks after the cessation of night pain, in all eight weeks, and then removed, but the patient remained four weeks longer in bed, after which he got up, and with the aid of moderate exercise, taken by the use of crutches, was perfectly well in about eight months.

It has often occurred that uncured cases of simulated fracture of the neck of the thigh-bone, have led to diversity of opinion among the surgeons whom such sufferers from “time to time” have consulted, the difference of opinion arising as to the primary nature of the lesion. The opinions of those consulted later on being seldom in accord with the diagnosis of the surgeon called to the sufferer immediately after the accident, who fails to find a fracture which does not exist, but the other surgeons, afterwards finding some symptoms which follow fracture in connection with the hip-joint, generally suppose the delayed recovery to be due to non-union of a fractured bone.

The cause of our failures to succeed in producing useful cures after fractures of the patella, olecranon and neck of femur are ; (a) that, even when the treatment has been correct it has been suspended before the parts immediately and secondarily affected have regained health and its accompaniment strength, so as to be equal to the strain of use ; (b) that the practice of compressing the seat of injury interferes with its

nutrition; the mistaken notions founded on the pathology of the parts after the past time treatment, have dispirited surgeons from striving for better results."

At page 140 there is the assertion: "Should there have been even two or three years' delay, the surgeon can, by following the rules here laid down, make the limb painless and useful;" this is not strictly correct, inasmuch as the time mentioned is too limited. I have often succeeded after a delay so long as ten years, and on two occasions reduced a moderate amount of deformity and unsoundness, regaining for the patients painless and useful limbs; though the delay of mechanical treatment extended over twenty years. One of these patients resided in a street leading out of Mount Vernon, and had been under the treatment of my father. The other was a fisherman, residing at St. Mary's, Isle-of-Man, he informed me that primarily, in conjunction with my father, I had attended him. I will now relate the circumstances of a case in illustration of the preceding remarks.

Case D.—In March, 1887, I was requested to visit a patient staying in Upper Parliament Street. On arriving there, I was introduced to a lady, apparently in the prime of life, certainly not over 40 years of age, who was the wife of Captain P——, Seareport, Maine, U.S.A. The history of her case was, that three years previously she was on a rail-journey from Liverpool to London, and when alighting from the train at Crewe Station to procure some refreshments, she fell on to the platform, injuring the left thigh-bone, then was carried to the Hotel, and the Railway Surgeon was sent for. She was under his care some few weeks only, when, becoming impatient and expressing this feeling to one of the "Railway Magnates," he sent for a late well-known London manipulator who had made a colossal reputation by the successful treatment of convalescent and imaginary lesions. This practitioner, while the

patient was under ether, performed some cabalistic movements with the limb and ordered the patient to rise from bed, and unfortunately, next day she was placed in a bath-chair, from this time the patient was supposed to be gradually improving. However, it was not so; the limb remained shortened, painful and useless; from time to time, several surgeons were consulted but with no relief from pain or any apparent benefit; the last consulted was the American surgeon who has given us the most complete monograph known upon the mechanism of the hip-joint; this gentleman pronounced it a case of hysteria. On the patient returning to the hotel after consultation with this eminent surgeon, she met there a medical gentleman to whom she related the particulars of the consultation. This gentleman expressed a wish to examine her. After examination he gave the opinion that the lady's symptoms were mainly due to an inflammatory condition of the hip-joint; seven medical men had previously been consulted, and as none of their opinions coincided, combined with the fact that this gentleman was not specially recommended, caused the diagnosis of the stranger to be ignored. Having listened to the foregoing history, I examined the patient and found the lady's hip-joint painfully intolerant at my attempt to perform any rotation of the limb, and the slightest jar of the limb also gave pain; no motion was perceptible by the moderate manipulations I made. On applying my hand to the prominences of the trochanters of both limbs, the left trochanter was felt to be more prominent and higher up upon the pelvis than the right one, suggesting the probability of an inch of shortening and an extra-capsular fracture. On applying the flexion test, there was very evident flexion of a moderate degree—the extreme degrees of flexion being rare in adults,—the patient could not go about, except with crutches, and then only with great circumspection to avoid pain. Her sleep was delayed, interrupted by pain, but her general health was good. Having gained all the foregoing information, the opinion was expressed by me that the patient had fractured the neck of the thigh-bone, but that the delay of perfect recovery arose from an inflammatory condition of the hip-joint. Now the following dialogue took place between myself and Captain P—: :
“ I perceive you are of the same opinion as the strange doctor we met at the Hotel, in B—, U. S. A.” ? “ Yes ! ” Capt. P—: : “ Mr. Thomas, we only wanted your opinion, and did not intend that you should treat the case; you are the ninth surgeon we have consulted, and there has been no neglect on our part, but I should like to know from you, whether the patient is likely to get well ” ? “ Yes, she will get well, and will have quite recovered in about five years hence, and the mode of recovery will be thus: During my examination I demonstrated to you the amount of deformity, fixed flexion

present now, by non-interference this will gradually increase in the course of time, and will diminish the concussion of the limb with the ground, further, the muscles will become more and more fixed, and will steady the limb more, thus bringing about a healthier condition of the joint, so probably at the end of five years, pain will be gone, the limb will feel strong but more deformed apparently and practically more shortened, so that probably one crutch would always be required." Capt. P— : "But do you think that something could be done to get her well in a shorter time, also to avoid these defects"? "Yes, the time could be curtailed, and much of the deformity now present can be corrected." Capt. P— : "We are only staying here six weeks, how long a time would you require her to be under your care"? "Twelve months, at the very least, but the treatment could be commenced now and continued in your own country, but, would advise that you did not submit to treatment until you have well considered the matter and are prepared to promise and faithfully fulfil, one of the conditions to be imposed by me before commencing treatment : that you give me your promise not to suspend treatment without my consent." Capt. P— : "Well Doctor, we will consider the matter and let you know." Thus terminated our Sunday afternoon consultation. About ten days after, Captain P— called at my house and requested me to visit the patient without further delay, as they would only be 28 or to the utmost, 30 days in England. Without further delay the sufferer's left hip-joint was fixed by the application of the full-length hip-splint, as shown in Fig. 61, and she was informed of the prospective symptoms, namely, that during the next few days she would feel much lumbar pain, the left side of the abdomen might become slightly painful, and all the pre-existing distressing symptoms would be much aggravated, but all these signs of aggravation of the complaint would pass away gradually, as soon as the reducible deformity was corrected. The patient was visited daily during the first few days; as was anticipated, the condition of the patient as regards pain was made much worse, and she had a mild attack of what I suppose to be pericolicitis. To tide the patient safely over the latter complication the dietary was restricted in quality. As was prognosed, it was found at the termination of the third week that all the signs of aggravation of the lesion ceased to be obvious, and the deformity was proved, by the flexion test, to have been corrected. By the end of the fourth week the part under treatment had so far improved that it required very rough jarring of the hip-joint to cause any pain to be felt. As the patient was now obliged to leave this country, or remain here a very long period, it became a question whether she was fit to go, and if so, whether it was advisable for her to do so and be debarred from having my supervision of the case,

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By my advice, it was decided that the patient should proceed with Captain P—, in his sailing ship. After this decision had been arrived at, there was substituted for the long hip splint, a strong short one with extra wing and body-belt, as shown in Fig. 64 ; this was well fitted, and observed for ten days to make certain that its efficiency would last; after which the patient sailed for the United States. From time to time, I was informed by letter of the condition of my patient, but the contents of the epistles did not enable me to learn with any approach to certainty, how the patient was progressing. The correspondence was mainly devoted to combating the arguments of friends, who thought the treatment was unreasonable, and the prospect hopeless. I however, insisted upon my bargain, that the treatment was not to be suspended until the limb had been inspected by me, and that the time of inspection was to be put off as long as possible. About the commencement of this year, 1889, I received a note informing me that Captain P— was about to leave California for Liverpool, and that my patient would come with him. In May, this year, 1889, Captain P— appeared at my house, after an absence of two years and three months, and informed me that his vessel was in a dock-berth that day, and requested me to visit the ship, to inspect my patient. This summons was promptly attended to ; on entering the ship's cabin I saw the patient going about with a pair of crutches. She informed me that I would, on examination, perceive that my instructions had been strictly adhered to, that she had, as per permission forwarded in one of my late letters, been going about on crutches. I now made a careful examination of the hip-joint, and found by the use of the flexion test no trace of deformity, and that the joint, which two years and three months previously was intensely painful and stiff, had become painless and supple, though the whole time confined by an inflexible iron rod. Further, that the patient suffered from nothing more than from the splint, which had become a purposeless encumbrance. It was directly removed, crutches thrown away, and during the four weeks the lady remained in Liverpool, before again returning to the United States, the limb was well tested by walking exercise, which only confirmed our previous conclusion that a perfect recovery had been secured, with less than an inch of shortening, a sequence of the primary fracture.* After a conversation with this patient relative to the progress of her cure, I came to the conclusion that she had recovered twelve months before this, her last visit to me.

* I regret that having forgotten his name, it is impossible for me to pointedly thank the family physician of this lady, who, despite the advice of many around, advised her to continue the treatment; to this fortuitous circumstance perhaps we are indebted for a success.

The patient's hip, in the case just reported, was fixed while stiff, and after two and a quarter years of uninterrupted arrest of flexion, came out of the fixture supple. It was a case of extra capsular fracture, united, but debarred from use by unsoundness of the hip-joint. Was the unsoundness caused at the time of the fracture, or by the skill of a manipulator? A joint that is only unsound and not destroyed, becomes more and more supple and sound while held uninterruptedly stiff. A joint that is destroyed, if unsound may be supple, but if held stiffly, becomes more stiff and sound.

At page 130, is enunciated this rule: "Circumstances do not always permit of the surgeon's actively interfering"; here are reported such occurrences.

This year, 1889, in conjunction with Dr. Stansfield, of Birkenhead, I examined an aged lady, suffering from fracture of the neck of the femur. After consultation, we both agreed that in consideration of her extreme age, emaciated condition and delicacy of health, that it was not advisable to employ mechanical aid to maintain the lower limb fixed in line with the trunk, and in place of it: the patient was instructed to refrain from attempting the sitting posture; her nurse was instructed to either turn her over or raise the pelvis, when there was occasion to either inspect her back, or pass an utensil under the patient; and that the horizontal position was not to be deviated from, upon any excuse. This advice was successful. During this year another case was also successfully treated by Dr. Green, of Birkenhead, and myself. We instructed the patient and the nurse in the manner with which she should "comport" herself, so as to avoid deviating from the straight line of the limb with the trunk.

The foregoing are examples of the mode of treatment sometimes, for special reasons, advised by me. Such advice is seldom justifiable, and when justifiable, is not always successful, so that mechanical treatment has to be finally adopted; still nothing is

lost by delay, as the patient has ceased to dread being handled by the surgeon and nurse ; and the shock of the accident, no small drawback to an aged sufferer, has passed off.

This year, I was called to an aged and very frail woman who had fractured the neck of the femur, by falling while descending from a tram-car. She was a very uninviting subject for mechanical treatment, and so was advised how to "comport" herself during confinement to bed. After ten weeks' reclination she appeared utterly free from any trace of injury, and was permitted on the twelfth week to leave her bed, but on my inspection of her four weeks afterwards, I found by the flexion test and the symptoms complained of, that my advice had totally failed to bring about a cure ; consequently, the patient was placed in bed, and mechanical treatment employed.

I can remember other cases :—Some years ago, being called to one of the bye-streets out of Gt. Howard Street, to see a female patient, about 60 years of age, her condition was uninviting to treatment, and the surroundings discouraging to me,—accustomed as I am to surgical practice in the "ways and bye-ways" of this town. In this instance I ventured upon giving advice in order to avoid mechanical treatment. Three months' trial was given, but no progress made ; mechanical fixation was then applied, and the case rapidly progressed to complete repair.

About three years ago, being invited by a lady, who was a teacher in the School of Cookery here, to call at her residence and examine her mother. On arriving there I found the patient to be a person 74 years of age ; she was sitting by the fire-side, and gave as a history of her case, that she had fallen, about eighteen months previously, and injured her thigh bone. During the first twelve months, she had been under the care of two surgeons, and was only able to get about painfully with the aid of crutches ; her sleep was also much interrupted by pain, and the limb was powerless. At a suitable opportunity having examined her, I detected a fracture at the neck of the femur, unsoundness of the joint and consequent deformity. This case, though not favourable for mechanical treatment, was subjected to it. After sixteen weeks' fixation, the symptoms of the lesion had disappeared. The fixtures were then removed, and the patient lay in bed fully sixteen weeks more, before she had gained any control of the limb, so as to leave her bed. On getting up she resorted, for a short time only, to the use of crutches ; her treatment and recovery from the stiffness, consequent upon that treatment, occupied a period of about fifteen months.

Is it essential that the limb should be in line with the trunk during treatment? No, if mere repair and restoration, irrespective of time expended, satisfy us; yes, if economy of time and a certainty that the limb may early resume its function is desired; according to the following rule, which I have elsewhere laid down:—"It was the application of a principle, suitable to all articular defects, to place a limb which is under treatment in such a position that, of the muscles controlling the defective part the weaker shall be favoured; any position would suit if a mere cure, without reference to utility, was the aim of the surgeon."

Before closing my record of clinical experience in the treatment of injury to the neck of the femur, I will give my views regarding the question of non-union of these fractures.

In my opinion, the supposed frequency of non-union following these fractures has been too readily accepted. Guided solely by my own observation, it inclines me to believe, that non-union following these injuries, is rare, certainly not the rule; hitherto lameness has generally been credited solely to non-union, whereas lameness may arise from real shortening with union, or from deformity and its attendant unsoundness of the joint with union of the bone. Granting that my views are correct, this question arises and demands solution. Supposing that a patient presents himself for treatment, having a fracture of the femur and injury to the hip-joint, and that the surgeon has by well applied mechanical treatment, succeeded in so far curing his patient, that he is free from any pain, and the limb answers satisfactorily to the flexion test, yet there remains undoubted evi-

dence of non-union of the fracture ; does this defect detain the sufferer from using his limb? Instructed by observations, which have been made over a wide clinical field, my answer is that non-union does not detain the sufferer from using his limb without supplemental assistance, but of course he would be lame though fairly strong. These cases are parallel with fractures of the patella when we have strong and useful union by ligament with only this difference, ligamentous union of the parts of the patella does not shorten the limb, and we do not observe the patients to roll in their gait, as we notice with the femur fracture when cured un-united.

I will here give brief notes of seven cases of non-union,—my memory will not help me to more. Supposing that seven more have passed out of my recollection, even fourteen cases in thirty years of experience bring the number of cases of non-union to a **very** low percentage.

The first case recollected is that of a young man, a fellow countryman, who was injured at a now extinct Iron Foundry, in Garston. The occurrence dates back about 24 years. The patient was treated by fixation with a long splint ; two years after treatment, it was evident that union of the fracture had not taken place. During progression, on placing my hand upon the trochanter, dull crepitation was very evident, the patient also rolled in his gait ; yet the limb felt strong, free from pain, and was thoroughly useful without supplemental assistance.

The second case was that of a lady about 65 years of age, the mother of a personal friend, she was treated by me for fracture of the neck of the femur, by posterior fixation ; this case also terminated in non-union, nevertheless, she has no more defect than the first case.

The third case was that of an elderly lady, housekeeper to a Roman Catholic Priest. I examined her six weeks after the injury, and found fracture of the neck of thigh-bone, with no progress towards union. As the

patient was free from pain and responded satisfactorily to the flexion test, I advised no treatment beyond six weeks further reclination. Eight weeks after, she was examined by me, finding at this time also that although the patient had been attempting to walk for about two weeks and the limb still answered satisfactorily to the flexion test, no special treatment was advised; the patient was informed that though there would be some permanent lameness, still she would have a useful limb equal to the performance of its portion of duty in progression. This Fabian policy did not seem to please the patient, and she consulted my friend, Prof. R. Parker, with whom I had the pleasure of a conversation regarding the case and the subject of non-union of these fractures, without this incident I should not have given special attention to this question in the present volume.

The fourth case was that of a lady whom I examined in conjunction with Dr. Kisch. It was a case of non-union of fracture of neck of femur. Four years have elapsed since I saw the patient, and have no knowledge of her present condition.

Fifth, that of a lady, wife of a civil engineer, residing near St. Helens, who consulted me some eighteen years ago, suffering from purely non-union of fracture of neck of femur. The limb was very weak, to aid consolidation of the connection, or of adaptation of the muscles around the joint as in patella fracture, and to take the weight of the trunk off the limb the patient was fitted with a "Calliper" splint, which she wore for many months with such benefit that the limb eventually became strong.

The sixth case occurred some seven years ago, the patient was a traveller in the wine trade, he was hampered by non-union following fracture of neck of thigh-bone. As he was very anxious to resume his employment early, I fitted him with a "Calliper," and he at once resumed his employment; he wore the "Calliper" two years, since then I have frequently seen him vigorously walking in the street, but with a slight halt. His primary treatment I cannot recollect.

Seventh case was that of a boilermaker, sent this year to consult me by the Central office, at Newcastle. I found him to be suffering from non-union of fracture of femur's neck, and as he was also anxious to resume some employment as soon as practicable; he was fitted with a "Calliper" to take the weight of the trunk and qualify him for some immediate employment.

I suspect that most cases of non-union after these fractures belong to the class of intra-capsular fracture; but I know that

like non-symmetrical restorations of the patella, purely non-union of a fractured neck of femur does not permanently debar the limb from use. In the past it has not generally been non-union which has discredited the surgeon and hampered the patient, but the oversight in treatment of not testing the condition of the joint as well as the fracture.

Notes on Fractures of the Femur's Shaft.—If Æsculapius could be again induced to preside over our art, it is my opinion that, his divinity would not enable him to be always a faultless artist, when he had fractures to treat. During the last century, our means towards restoring fractures have been greatly improved; but the ability to always succeed is nearly as far off as our ability to prolong life indefinitely. Some two years ago, when having luncheon in this town with an eminent surgeon of New York, U.S.A., during conversation we drifted on to the question of extension in the treatment of fractures of the femur, he maintaining that neither lateral deviation nor shortening could possibly occur if extension was well maintained, my contention was that generally extension purely, without lateral support, was not trustworthy control over lateral deviation, and that instances would, though rarely, occur where no amount of extension enabled us even to avoid some little shortening. We parted, each holding his original opinion, but circumstances occurred unforeseen by us, which decided the question as between ourselves. A fractured femur was presented for treatment primarily to my friend, and secondarily to myself, sixteen weeks after

the injury, with decided shortening and non-consolidation, although the fracture was at the junction of the second and lower third of the femur, a favourable situation for efficient mechanical treatment.

Fractures of the femur above the middle third often sorely tax the surgeon's skill to restore without defect remaining. When the fracture has been very high up, I have often been perplexed to decide whether to employ the method as shown at Fig. 35, or after obliterating the buttock bend to resort to the hip-appliance shown at Fig. 61, combining with it James' method of extension by weight and pulley, or retentive extension from the patient's limb to the lower wing of the hip machine, and obtaining my counter-pressure from the inner horn of the middle wing of the appliance—this being purposely well padded. On several occasions, during an experience extending over thirty-two years, it has been my lot to fail in perfectly "restoring" several fractures of the femur close to the trochanter, although there were employed in combination with fixed extension, a supplement by weight and pulley, and inclination of bed. These patients generally survive the accident and so we can only surmise that comminution is the impediment to successful restoration despite the use of extra means.

Delayed and non-union of Fractures of the Femur.—The "New York Medical Journal," issued February 6th, 1886, contains an "original communication by Dr. Geo. R. Fowler, of Brooklyn, on the subject of non-union of fractures in general." It is a succinct statement of our present practice. The causes, con-

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stitutional and local, and the numerous methods for correcting non-union, are tersely placed before the reader; among them he refers to the method by percussion and its very necessary supplement "damming" introduced by me to the notice of surgeons in 1876. Among the causes he has not given us one, which is unsuspectedly frequent, yet excusable; that is, the diligence of the surgeon to secure the best restoration, the dressings being necessarily tight, consequently impeding the nutrition of the part.* For instance from Dr. Fowler's paper is here extracted an example:—

"In the first stage of un-united fracture, or that of simple delayed union, the application of an accurately fitting fixed dressing—such as, for instance, a Plaster-of-Paris bandage or splint—will be indicated."

In my opinion to apply "an accurately fitting fixed dressing, such as, for instance, a Plaster-of-Paris bandage" is only to further delay the union and leave the restoration to chance. During my earlier practice, I was zealous in resorting to direct operative interference by knife, saw, screws, pegs and rasps, but by the expenditure of more patience and the employment of percussion and "damming" with indirect fixation of the part, the necessity with me for employing operative interference has become very rare; further, percussion and "damming" have succeeded in my hands after operative interference by others had failed. The case alluded to at page 111, was such an instance; it had been operated upon for non-union unsuccessfully. When it came

* This very evil has been recommended amongst the non-operative methods of treatment, for instance: Surgeons must have noticed that at times, a well-restored Colles' fracture of the radius, and Pott's fracture of the leg become deformed after weeks of apparent restoration. The diligent compressive fixation by the surgeon, having retained during treatment the part imperfectly supplied with blood and hindered the formation of a genuine repair, as the carpenter would say "the joint is fast but not set."

under my care, I immediately removed a huge Plaster-of-Paris dressing which partly "Esmarched" the whole limb, and in lieu thereof fixed the fracture "indirectly," in the manner delineated in Fig. 80, by a comparison of which fig. with Fig. 77, the reader will perceive that although they are practically different

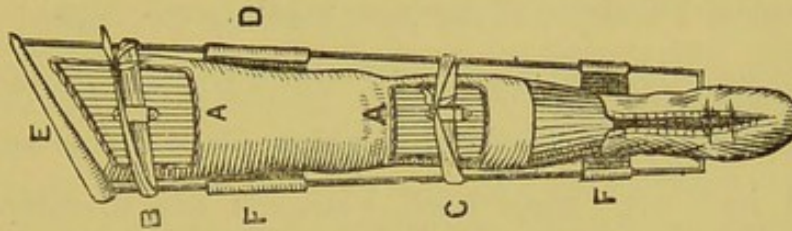


Fig. 80.

in plan they are theoretically alike. In Fig. 77, the back support F.D. is placed behind the knee, the part injured; in fig. 80, it is placed behind the mid and lower third of the thigh, the locality of fracture. Again in fig. 77, the counter-pressure A.B. is placed just above the knee clear of the injury; in fig. 80, the counter-pressure is placed on the upper third of the thigh, so that as in fig. 77, the nutritive changes around the injured locality are not interfered with. The treatment of non-union by "damming" is nothing more than the application to the "repair" of this abnormality, of the plan which is so essential for the repairing of diseased joints, that is, so applying our fixtures that they favour rather than hinder the nutrition of the part. This is the indirect method.

Up to this date the preceeding case was the last of my successes in this line, the previous one was:—

That of an elderly man in the employ of one of the Manchester Railway Companies; he consulted me for non-union of a fracture of the middle of femur; he had been dismissed as permanently disabled, and his employers, with laud-

able liberality, had provided for him an expensive, elegant and useless fixture for the fractured limb; he was fitted by me with an extra long "Calliper" splint, and thus was enabled to dispense with his crutches and his other fixtures. After wearing the "Calliper" for twelve months, it was removed, consolidation being perfect.*

Just as the foregoing case had become a success, an engineer in the employ, I believe, of the same Railway Co., called upon me for advice. He had been under treatment for fracture of femur just below the trochanter, which after many months treatment had not consolidated, I advised him to submit to treatment by the interrupted method of continuous fixation, that is, "damming." To this he consented, and continued under the treatment for a short time only, as the Railway Co's. surgeon did not concur with my advice, urging excision of the fractured part. To this I demurred, for two reasons: experience had taught me that excisions close to either ends of the humerus and the upper ends of the femur were seldom successful; again non-union at these sites does not seriously cripple the patient, the femur injury in particular. My advice, it appears, was not heeded as will be seen on perusal of the following letter, which I received from F. N. this year, 1889.

Engineers Barracks,
Croft Street, Preston.

DEAR SIR, —

I received your letter and got a bottle according to prescription, but I find that it is not the same as you gave me when my foot was bad. It did me more good than anything I could get; if you would send me a bottle of

*Rather than burden the volume with further cases illustrative of this subject, it will be preferable to refer the reader to former contributions, "Principles of the treatment of Fractures," and "Liverpool and Manchester Medical and Surgical Reports 1876."

this I should esteem it a great favour. I have suffered so much since I saw you last, I made up my mind that I would undergo an operation; I gave you the opportunity of performing it, and you thought it best that I should not undergo it, and I wish I had taken your advice. But anyway, I went to L.—G.—I.—, under Dr. — and I was a patient there 11 months, never out of bed all the time. The Dr. took some four inches of bone from my thigh; he operated twice, 23rd March, and the 27 August 1888. The first operation was a complete failure, and the second was not much better, the two bones were left in a good position and spliced with strong wire, but very little union took place; so I came home in the splint you made for me, and am happy to inform you that my leg is much stronger than when I left the Infirmary, so I am expecting having a good, useful leg again. I might tell you that the Dr. wanted to operate on me again, grafting some bone in my thigh, but I thought I had suffered enough. Thanking you for past kindness.

I remain, yours truly,

F———— N————

It is obvious that the end of this excision case was, that the patient was obliged after all, to follow my advice, but under greater disadvantage for gaining a useful limb.

The mechanical treatment of Sequelæ to paralytic lesions affecting the lower limbs.—Much can be done to make these limbs really useful. In previous pages, the operative and mechanical treatment of the non-congenital forms of talipes have been reviewed; among other items of treatment reference was made to the mode of preventing the over-correction of talipes equinus—also reference was made to “barring” the shoe for the prevention, sometimes noticeable, of a tendency, even after operation and excellent correction, to a return of the primary defect. Should the surgeon not find the bar shoe to be sufficient leverage towards hindering the return of the defect; then by locking the knee-joint with a “Calliper Splint,” very much more leverage power is brought to bear upon the tendo Achillis.

Paralysis

The "Calliper Splint" will also be found to be a useful aid for the surgeon in his treatment of paralysis of those muscles of the thigh controlling the leg. By its use the nutrition of the lower limb is greatly improved, evidenced by increase of the muscular, adipose tissue and temperature of the whole limb, partly attributable to the splint maintaining the limb perpendicular, and by its enabling the patient to employ in walking a limb previously useless except crutches were used.

There are two types of palsy of the lower limbs, generally presented to the Orthopedist for treatment, the flaccid and spastic condition of the muscles. When employing the "Calliper Splint" for the mechanical treatment of paralytic lesions of the lower limbs, it is my rule to retain it on the limb night and day—only every two or three weeks removing for cleanliness—until the patient has regained the power, by the exercise of his will, of maintaining the leg extended in a line with the thigh; after which sign of progress, the Calliper is worn only during the day time, for use when walking.

flaccid

When commencing to treat the "flaccid" phase of muscular palsy of the lower extremities, it is my practice after fitting the Calliper to direct that during the first fourteen days it should be removed at night and replaced in the morning, after the expiration of that time, the appliance is directed to be worn night and day, in fact, the first fourteen days are spent in merely allowing the patient to become accustomed to restraint, it is a pleasanter introduction to treatment and saves the surgeon some trouble.

"spastic"

When beginning to correct the "spastic" form of palsy of the lower limbs, the fourteen days' grace cannot be conceded; as, from the initial moment of treatment the characteristic persistent flexion must be steadily opposed, until all the spring or tendency to recurrence ceases, and it is only when this tendency has been overcome and the patient, even by the exercise of his will has lost—temporarily—the power of flexing the knee, that it is advisable to intermit the mechanical treatment, by removing the "Calliper" at night. The foregoing rules, frequently tested by me, can be confidently depended upon to bring about, in the majority of cases, a useful gain to the patient. After a few months treatment, the patient aided by the "Calliper," can use the limb.

The treatment of ailments affecting the Knee-joint.—As it is my purpose to limit this part of the "contribution" mainly to the mechanical treatment of lesions of this articulation, it will be my excuse for classifying its abnormalities in accordance with the theory of the application of our means. As with other joints, so with this, some of its lesions are correctly treated by the direct method; another class permit the use of the direct, but only on sufferance, as the indirect is the strictly proper one to apply; a third class tolerates the employment of the indirect method only.

Those lesions of the Knee-joint to which the direct method of treatment should be applied, are such as mere accumulation of fluid within the joint, with no present evidence of inflammation; temporary recurrent displacement of

semilunar cartilages ; injury to either internal or external lateral ligaments. To the mechanics of the direct method there is no need of any subtraction or addition ; knowledge only is wanted, to enable us to discriminate and apply our means to cases which this method cannot injure, so that we may avoid the errors committed in the past. For the practice of the direct method, there is only required a bandage and some suitable rigid material, often a bandage alone suffices. For example, a simple accumulation of fluid within the knee-joint, remaining as a sequela to rheumatism, strain, or temporary over exertion, these cases are easily corrected, by firm bandaging with a band long enough, by its repeated encircling, to exert comfortable compression, wide enough both to slightly limit motion of the knee and to avoid much impeding the return of blood from the leg. It is my opinion, that a band shorter than three yards and narrower than 4 inches, is almost worthless for the purpose of applying the direct method, for the treatment of these lesions. The direct method, we suppose, acts successfully in these cases by diminishing the blood supply to the part. In cases of temporary recurrent displacement of semilunar cartilages, the direct method is proper ; this injury I hold to be analogous to recurrent dislocation of the shoulder joint, and like that, the subject of this accident should be instructed, to employ the articulation, as much as possible, so as to delay the resolution of the irritation attendant upon the accident and gain a permanent but slight limitation of the joint's motion. A limitation which the patient will not be conscious of, any more than that

he has been relieved from the occasional locking of his joint ; the surgeon is, by observing the case from time to time, to regulate the amount of limitation. For example, the surgeon advising the immediate use of the joint subsequent to a second, third or fourth accident,—not to be advised after a primary one—should he observe a steady decrease of the patient's ability to fully extend and flex the limb, then he ought to advise abstinence from use for a time, lest the irritation set up gives more limitation than is required.

Traumatic injuries of the knee-joint, usually “permit of the use of the direct method on sufferance,” but it has occasionally to be abandoned for the indirect, to gain any progress to repair.

Inflammation of the knee-joint, primarily affecting its synovial membrane, cartilages, or secondarily affecting them from osteitis, of all, or some, of the bones of the articulation, tolerates only the employment of the indirect method of mechanical treatment. The cause of our very limited success in the treatment of disease of the knee and other articulations in past time, arose not so much from our mechanics being deficient, as from our not having divined the necessity of making a selection of our cases; not making a distinction between those tolerating or not, the application of direct interference ; the knee and elbow are the joints which have suffered most from this error of judgement, and have consequently been rich fields for “excisionists.”

In diagnosing the condition of the knee-joint, the flexion test is a valuable aid, it points out the cases suitable for

? what is
flexion test
see page 168

either the direct or indirect mechanical treatment, and enables us to know, with almost a certainty, whether either the synovial membrane or the articular cartilages have become affected by inflammatory action, no matter whether the cause be a primary or a secondary one. If the disease has primarily affected the membrane or cartilages then the flexion test gives us early information, but if they are to become secondarily affected, the flexion test does not always show, during the primary action of a cause about to secondarily affect the interior of a joint.

The direct method of treating knee-joint ailments may succeed, and has done so, when the sufferer possesses the average tendency to recuperation ; but the indirect method is the one destined to be recognized, as proper to apply to the relief of lesions of the knee, whether traumatic or not, if the sufferer is known or observed not to have the usual recuperative power to free him from the induced disease. The indirect method is convertible into the term "surgical rest," it is the "hands off" treatment ; with it, the surgeon stands by as a sentinel on watch, and the patient is protected from voluntary and involuntary indiscretions. The surgeon who fails to perceive the vast difference which exists between the two methods, cannot designedly advise so as to give the injured locality "surgical rest."

An example of an error in discernment is here reprinted from a paper on "rest."

"In knee arthritis which is osseous in its origin, and when the joint is undergoing pulpy or fungous degeneration, when good position has been secured, and when ankylosis is to be desired, then, the complete encasement of thigh and leg is better than posterior splints."*

* Willard "joint disease," treated by rest and fixation,—*NEW YORK MEDICAL JOURNAL*, December 5th, 1885.

In this quotation, knee arthritis arising from a primary cause secondarily involving a joint, is advised to be treated by the direct method, by which plan "surgical rest" is not gained, still the author is correct in adopting the direct method "when ankylosis is to be desired," that is, the joint is to be destroyed and by such treatment the ankylosis would probably remain an unsound or false one.* It is better practice to aim at gaining sound recovery, with motion if possible, but health first, deformity of the joint last.

Here is another example of erroneous practice based upon false principles, by an advocate of rest for joint disease. †

"The wrists and elbow-joints can be surrounded by splints, so as to secure absolute local rest while the patient moves about."

This error of practice was made by the great British apostle of "surgical rest," John Hilton. At page 447 of his volume on "Rest and Pain," second edition, there is to be found the following description of his practice in treating a case of chronic disease of knee, with such an amount of tendency to a progression of the disease, that it passed into the suppurative stage.

"Steady pressure upon the joint, by strapping it with soap plaster, and perfect rest to the joint by the splint."

Here we have the "soap plaster" acting for an evil, but the splint for a good purpose.

This was Dr. Hilton's practice, in treating a joint which ultimately suppurated; subjoined is his report:—

"There was obviously defined fluctuation above the knee, as well as in the popliteal region."

* A definition of the meaning I attach to the terms true and false ankylosis is given in "The Principles of the treatment of diseased joints."

† Disease of the joint by David Prince, M.D.—"AMERICAN PRACTITIONER," February 1887.

From the above we may fairly conclude that he employed the "direct method" indiscriminately, as the majority of surgeons do now; consequently, he had not grasped the true meaning of "rest" in its surgical significance.

M. David in his memoir, on "motion and rest in relation to surgery," to which was awarded the prize for the year 1778, by the Royal Academy of Surgery of Paris, contains, as regards the treatment of articular disease, all the theoretical views taught by Hilton and laid down with equal confidence; but a perusal of M. David's essay on "Counter Strokes" informs us that in practice he also vitiated his remedy by employing the direct method indiscriminately.

If the latest published monograph on the subject of disease of the joints, is consulted, the same error of practice will be found.

In it, articulations in a state of chronic disease are advised to be treated by the direct method, for example:—*

"At the earliest moment at which disease is detected, the joint should be enclosed in a pair of well fitting rectangular splints."

It is true that, in it, every diseased joint is not advised to be treated by the direct method, but the reason why some joints, as the wrist, elbow, knee and ankle, are directed to be treated so, is obvious; the direct method is easily applied to them; but it is almost impossible to apply it to the other main joints, the shoulder and hip; so they usually escape this maltreatment.

* H. Marsh, F. R. C. S., disease of joints, CASSELL & Co., London 1886.

This year there has been published in the United States and this country, an important voluminous Encyclopædia entitled "The Reference Handbook of Medical Science." In the article on "Joints" synovitis is advised to be treated by the direct method.

"In chronic synovitis with serious effusion, the treatment is primarily to cause absorption of the fluid by means of compression and fixation."

Nowhere in this able article on "Joints," is there made the discrimination I believe so essential to the successful treatment of diseased articulations.

Errors in relation to principles, lead to mistakes in practice: for instance, during late years since my intrusion into this field of surgery, some practitioners on the principle of not omitting any part of their programme of treatment, have commenced to treat cases of chronic inflammation of the knee by the direct and indirect method combined,—a rest and no rest plan. *

To employ a combination of the "direct" and "indirect" methods is in some cases needless restraint; in others, it is the addition of an injurious interference, to escape from which the patient must have a special tendency to recovery from disease.

No studied attempt will be made in this "contribution," to justify the commendatory introduction with which the indirect method is introduced to the reader, as it is my opinion that the distinction between the two methods is so obvious that it need only be pointed out to be perceived.

* See A. B. Judson; M.D., *New York Medical Journal*, June 5, 1886. V. P. Gibney, M.D., *Archives of Pediatrics*, 1889. L. Sayre, M.D., *Medical News*, February 23, 1884. H. Marsh, "Disease of joints." (Cassell & Co., London 1886.) Page 440.

I will now give the reader a few memoranda relating to the diagnosis, reduction of the deformity and subsequent treatment—local and constitutional—of inflamed knee joints.

As regards diagnosis, it will be noticed that my omissions are not a few ; but the reader is requested to bear in mind that it is not my purpose to compose a manual of the art, but rather to try and add to our stock of knowledge. As with other joints, a correct interpretation placed upon the deportment of the knee, is the best basis upon which to decide whether an abnormal knee joint requires controlling or not. An unrestrained knee joint, the radius of the action of which is becoming more and more limited, is the subject of a primarily, or a secondarily caused inflammation of either its synovial membrane, cartilages, or bones. A knee-joint unrestrained, having when presented to the surgeon an abnormally limited range of action, if this range of motion spontaneously increase, this fact is proof that the joint has now recovered from the diseased condition ; this is the flexion test of disease and recovery. A diseased and stiff joint, which despite its being continuously held fixed, is becoming slacker and slacker, should be judged as recovering.

Of late years, the physical signs accompanying diseases of joints have been attributed to liquid distension of their capsules ; from this theory I have always dissented, at the same time not doubting the post-mortem experiments advanced in support of it. Though the experiments were post-mortem, they have been accepted by some surgeons as conclusive explanations of certain physical signs in living subjects, probably because their

experience had been in a clinical field too restricted in time or opportunity. In practice, we meet with knee joints containing much fluid but no limitation of their movements, others with but little or no fluid, that can be detected, nevertheless the motion of the articulation has become limited, with the flexion sign of disease observable. The local intelligence of the nerves distributed to a joint, are sensitive enough to convey impressions from the parts inflamed, without the extra stimulus of hyper-distension of the articular capsule with fluid. Should fluid accumulate under tension no doubt this would add to the impressions conveyed centrally, but extreme tension with fluid is not common in chronic cases. An inflamed knee treated up to the time of a cure, in any position not that of extreme extension, necessarily slowly regains its normal range of action. Some knee joints treated while flexed, refuse to resume duty until they have had a period of health and repose in the position of extreme extension; so as to get an adaptation of the over drawn and set extensor muscles of the leg, according to the rule "to place a limb which is under treatment in such a position that, of the muscles controlling the joint the weaker shall be favoured." Having decided that a knee-joint demands treatment by the indirect method, then according to the foregoing rule—previously referred to at page 151—the knee joint is placed for treatment in the form of full extension; this is the preface to the essential part of treatment, which is, the arrest of friction; lastly we have

* Cases cured, but in malposition, may be the cases reported as improved by tearing adhesions, &c., though this I doubt.

the supplement, which is only slightly of more importance than the preface; this is to diminish concussion. In practice the total avoidance of concussion is often gained only by a subtraction from either the preface or essential part of treatment, the gain and loss must be weighed and our practice trimmed to secure the best effect. Since my first publication, on the subject of knee-joint diseases in 1875, my theoretical opinions have not varied "a straw's breadth," but my practice has varied a little; yet it remains as equally consistent with principles as my earlier method. The mechanical part of the earlier method is shown at page 48, now only used by me in the treatment of ankle joint disease; at page 119 is shown a front and back view of the mechanical mode now practised by me, to maintain the knee in a position of extension, when arresting friction and diminishing concussion of this joint, affected by chronic disease. The arrangement is very simple, not expensive and is thoroughly equal to performing the requirements of the theory of treatment.* It is not always that the surgeon can early diagnose, that a knee-joint lesion specially demands the indirect method of treatment, or it may happen that the case is presented to him at an advanced stage of the disease and he may have to preface his treatment by the reduction of a flexion. Those crotchety practitioners, the "extensionists," expend as much time in merely reducing their deformities as would be sufficient to half cure some cases, defend-

*As showing its efficiency and easy application, this day November 26, 1889, I left home to visit Dr. Symons, of Ormskirk, he had fractured a patella the previous day; on my arrival at his house, 3-15 p.m., my various appliances described pages 70-85 had to be unpacked, heel plate screwed, boot tied, a bed-splint converted into calliper, then placed in position, and the patient got out of bed and walked in his room in 15 minutes after my arrival. I was able to leave by the 3-55 p.m. train.

ing their procedure by objections to leverage, which practice does not confirm. It would be just as reasonable to expend seven days in amputating a leg; this no doubt could be done insiduously, but as it would not be of any advantage to the sufferer, it is a method that will not probably come into practice. The reduction of deformity is merely prefatory practice, and the sooner it is completed the better for the patient, as it is only afterwards that he starts on the road to recovery. Aggravation of the disease always takes place during reduction, a contra opinion, that this can be avoided, is maintained by some surgeons, for instance:—

“In many cases a cautious surgeon can gain considerable time by straightening the limb during anæsthesia, but such a procedure requires the utmost caution lest new inflammation be excited. Tenotomy and aspiration are often advantageous.”

My opinion would read thus:—

In all cases a surgeon anxious to gain time may straighten a limb during anæsthesia, the greater aggravation of inflammation passing off quickly. Tenotomy is only an unnecessary interference, adding to the loss of time.

The quicker the reduction takes place, the sooner the irritation consequent upon the operation subsides. The reduction should be as continuous as possible, if not completed at once; the aggravation of the inflammation being a desired factor, which enables us to obtain a quicker reduction and less opposing force to contend with. *

The more active the disease, the easier the reduction of

* This paragraph will be found to be not quite consistent with my earlier practice; the divergence of my former practice from strict principles was pointed out to me by Dr. Judson in his “reprint from the St. Louis Courier of Medicine,” May 1884, last paragraph page 5. This gentleman like Dr. Hutchinson, has accepted the whole of my theory, which he trenchantly enunciates but like other extensionists does not carry out in practice.

deformity; sound structures give more opposition, otherwise our bodies would be liable to vary greatly according to the habits of the individual. This cannot be a generally recognized doctrine or such as follows would not be proclaimed.*

“In instances in which a joint has become ankylosed by fibrous adhesions in a position of deformity, it is often advisable, when all disease has come to an end, to use forcible movements for the purpose of placing the limb in a more serviceable posture.”

The “when all disease has come to an end,” event is a regrettable one, in view of improving the form of the joint, more force and time being required, and there is also more suffering. Indeed, the reduction of the simple set flexion attendant upon palsy of the lower limbs causes some degree of irritation of the knee joint, accompanied by effusion, but needs no special attention as both subside as soon as the required form of the joint has been gained, and the articulation stopped from further alteration of form. The rule is that, when we require to alter sound structures, by making them unsound and continuing it without interruption, we can succeed where immediate force fails; the already unsound joints are always in a favourable condition for easy and rapid alteration of form. What is meant by deformity? Commonly this word expresses a deviation from normal symmetry, but in surgery this definition is neither a fair nor a correct one. In surgery the word deformity, strictly speaking, implies a defect of use with or without a deviation from symmetry; as the part may appear symmetrical, but for all that, almost useless for its purpose. If the

* H. Marsh, Disease of Joints, page 296, London, 1886.

foregoing definition of surgical deformity be justifiable, it follows, that a form which is most useful in the upper extremity, may be one from which it is difficult to gain any use in the lower extremity. By a study of the various usefully ankylosed forms of joints, we perceive that the same forms are identical with those in which all joints should be treated, as from these forms the joints best regain their motion after the disease has receded, earliest, easiest and without physical aid more than ordinary use. So the rule referred to at page 151 is further confirmed and its adoption justified. In connection with the question of the pose during the treatment of joints, some errors prevail; for instance, referring to intra-articular pressure, the foremost advocate of extension in this country teaches thus:—

“Yet there are some points which require to be insisted upon, in order that the principle may be adequately carried out. The first relates to reflex contraction of the surrounding muscles. This condition is present in all cases. In the majority, however, it is only slight, and sufficient merely to secure more or less fixation and protection of the affected joint. Neither in the shoulder, the elbow, the wrist, nor the ankle does it become excessive, so as to lead either to deformity or excessive pain. All these joints when first attacked are placed in their respective positions of greatest ease, and these positions are maintained undisturbed by muscular spasm through even long periods of active disease. In disease of the shoulder the arm remains at the side: the elbow is kept at an angle of about 120° , the wrist is slightly dropped, the angle is fixed in a position of slight equinus.”*

According to the previously laid down rules, which are easy to prove, an elbow at an angle of 120° , if permanent, is a deformity and an improper form in which to treat the articulation; so is a wrist “slightly dropped” as it ought to be slightly raised. Frequently in other “Contributions” I

* H. Marsh, F.R.C.S., Disease of Joints,

have drawn attention to the fact that any position is one of "greatest ease," so long as it does not vary. It is not so much this or that position, but its invariability during treatment which gives ease; joints if inflamed assume certain forms, and these indicate the angles, at which the joints are under a nearly balanced control of the muscles and dependant weight: if we favour the weaker muscles by our appliances, we can make any position that of equilibrium and become also one of "greatest ease;" consequently the surgeon can decide upon giving to the knee or any other joint, the form he judges best in consideration of the future and make the position he selects one of "greatest ease" attainable, if his means give him a hundred per cent of fixative power, as a "calliper" will give to the knee joint.

Cases of either acute inflammation or the chronic type of knee joint disease, if only a few weeks existant, then the symptomatic deformity is easily corrected by a few hours of fixed extension without perceptible leverage.* Cases of obvious knee joint disease which may have existed many months or years, require the employment of the fixed extension, fixation and leverage during a period of from one to seven days. Cases with knee-joint deformity, but healthy, generally require the treatment for reduction to be commenced with the employment of some force to the articulation, with or without the employment of an anæsthetic, just as the patient may decide. Of knee joint

* "Perceptible leverage":—In all methods of reducing deformity there is some unavoidable leverage, the surgeons who object to my practice merely differ with me as regards the dose of leverage.

deformities, for their reduction, it is my practice to employ either a bed-knee splint or calliper-splint described in pages 68—85, by them is to be gained the greatest attainable power of extension, —if required,—fixation, length of levers and the fulcra are upon areas not diseased, also at efficient points.

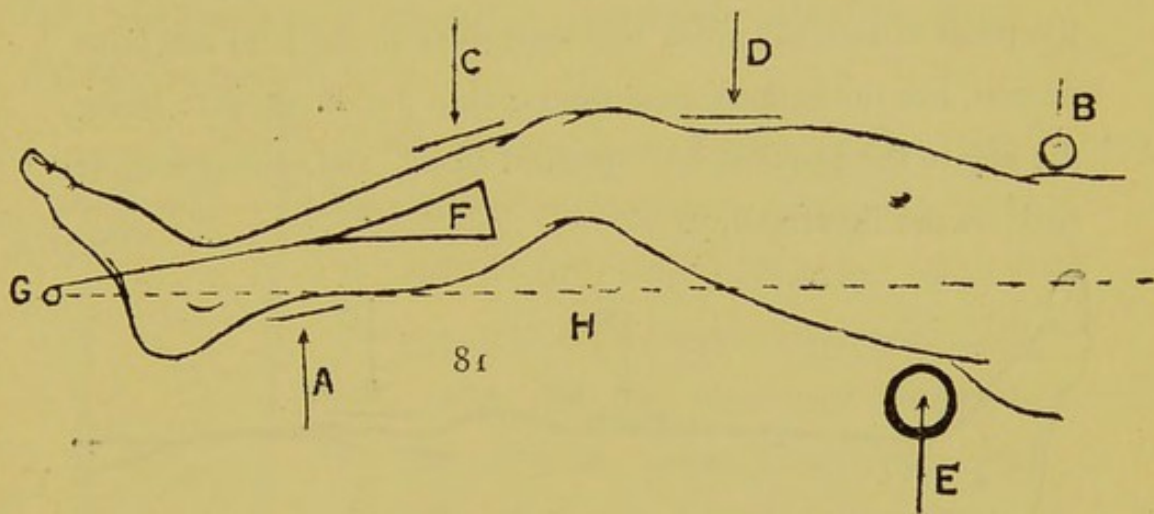
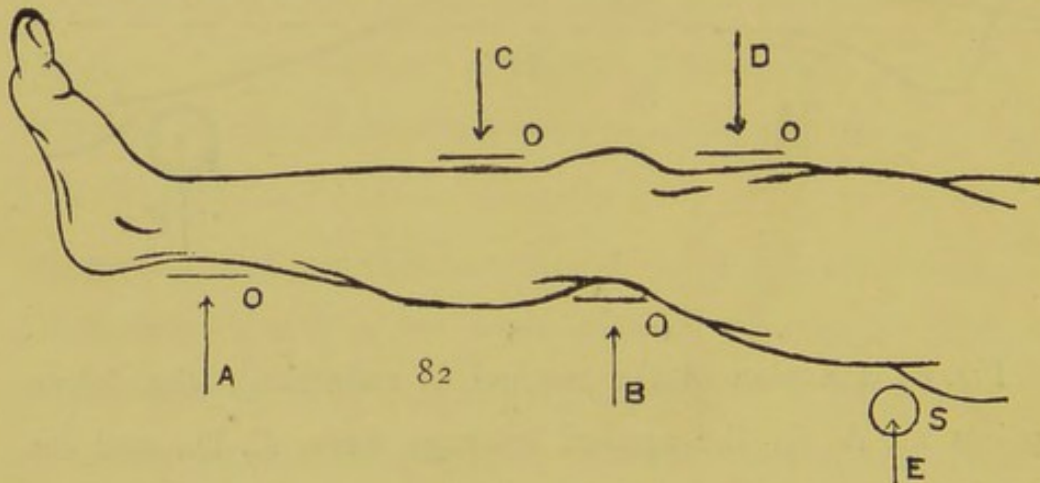


Fig. 81 is a plan of the method of reduction; the fulcra points are A. E., the applied leverage force, C. D., and the fixed extension is shown at G; F. being the adhesive gaiter with cord attached to G, a sectional view of the lower end of a bed-splint, just as A. is such a view of the lower supporting leather; E. and B. are also sectional views of the groin ring of a bed-splint, the B. part having no duty to perform, as all leverage is gained by the resistance at A. and E. to the force C. D.; the dotted line is the supposed external rod of a bed-splint. C. D. are the reversible pads, which are the points of application of force.

Fig. 82 shows reduction effected and the joint arrested by B. from descending beyond strict extension. In both diagrams the direction of the travel of the arrow points, indicates the direction of force. In Fig. 81, the popliteal support B. is absent, consequently the joint descends by the employment of force at the points C. D., until the popliteal space comes in contact with the point of rest, the cross mid-leather at B, the joint can have no rest, nor the sufferer ease from pain, the B. support being the key to the position of "greatest ease," and the reversible pads secure invariability.



Having effected the reduction of the deformity, the knee is fixed and the whole limb is in repose; the muscles finding their conservative efforts needless, cease their action. The "Calliper" at "first sight" does not seem to have the merits which the "patten" knee-splint had, the latter seemed to afford more protection from concussion, in practice however the "Calliper" "carries the palm" the reduction of deformity is both easier performed and the new position of the limb is better maintained, and the control which this splint has over the foot does away with

all flailness of the foot and consequent conveyance of tremor to the knee through the leg. Concussion is sufficiently neutralized, if notwithstanding any efforts on the part of the patient, he fails to bring his heel nearer than an inch from the sole of his boot.

The avoidance of concussion and arrest of friction in many cases will not avail, if secured in conjunction with the "direct mechanical method."

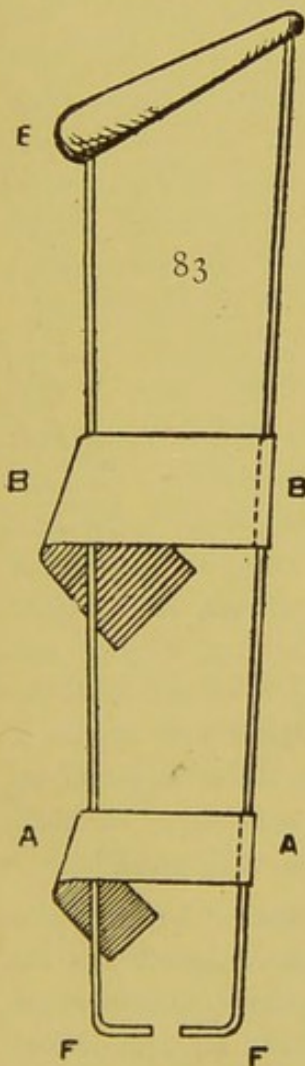


Fig. 83 shows a 'calliper' ready for application, the two supporting leathers, A. and B. are stitched only to one rod of the calliper, so that the surgeon having applied the splint to the limb and inserted its ends into the patient's boot-heel, can draw the leathers A. B. then fix them with blanket pins, until he has been satisfied with the reduction, when he may have to re-adjust the leathers, and permanently fix them, making the lower one tight and regulating the tension of the mid-one, then to call for a saddler, or if he prefers, himself stitch the leathers on to the other rod. To illustrate the variations of procedure in my practice, when reducing voluntary flexion of the knee into that of involuntary

mechanical extension, the reader is invited to the surgery, and we will describe the operations as there observed.

Case A.—Child is brought in for examination, and we perceive that the knee is flexed to an angle of 120 degrees, its parent informs the surgeon that it is four years of age; that about seven months ago it had a fall, and had progressively become lamer ever since; that the knee had steadily increased in size and pain; further, the child can make no use of his limb, was going about with the aid of a pair of crutches. The surgeon, after a minute's manipulation, informed the parent that the knee is suffering from chronic inflammation, the parent answered, "only inflammation"? and asked, "are the bones in their proper places." The surgeon replied, "yes, but they are in a worse plight than being displaced, they are ill." "Indeed," replied the parent "I suppose they are not diseased, decayed, or dead bones?" The surgeon answered, "No, but if suitable treatment is not adopted, such cases terminate in bone decay." The parent remarked, "Well doctor, we have done our best for the child, and have sought good advice, now, if you think you can cure him, please do your best, cost what it may, but do not punish him, he has had enough pain already." While the surgeon fetched his dressings, we examined the knee by manipulation, very slight motion was perceptible, and of fluctuation within the capsule there was none to be felt. Just as we finished our examination, the operator appeared, who applied an extension gaiter to the child's calf, then slipped over the child's leg a Thomas's bed-knee splint, and tightly pinned the loose end of the lower leather across the lower end of the splint A. Fig. 83, then with one hand taking hold of the ankle of the diseased limb, and with the other grasping the lower end of the splint, the surgeon drew the limb down forcibly, and with equal force pushed the groin ring of the splint into its place up against the pubic bone, the operator now asked an assistant to place his hand just above the patella, and exert steady pressure, after which, we noticed a complete reduction of the deformity, and that the surgeon had relaxed his grasp of the ankle, allowing the posterior aspect of the ankle A. Fig. 82, to rest on the lower leather, A. The surgeon now applied a reversible pad above and below the knee, and finished the arrangement by securing his means of extension to the lower end of the bed-splint. The child was dismissed and requested to return in two days, to be "Callipered."

Case B.—The knee of a child of about three years of age, was next examined, and its condition was almost identical with that of Case A. but the surgeon varied his plan of operation, for after applying the extension to the leg, the child's boot was manipulated, slit up to the toe and sufficient leather removed from the back of the boot to expose the patient's heel and part of the tendo Achillis, see pages 75 and 80, and a hole was drilled through the boot's heel, see page 81. The bed-splint was first tried upon the sound limb

and while that limb was fully extended and the bed-splint well up in position, a mark was chalked on the inner and outer rods, corresponding to the centre of the heel's length and thickness, which mark would be opposite to the hole drilled in the heel of the boot belonging to the unsound limb; then with the Vulcan fitter, the bed-splint was converted into a Calliper, as seen in Fig. 83. All this being done, the Calliper was slipped over the unsound limb, then the converted boot was placed on the foot, and forcible extension with leverage made as before, the lower leather only was pinned and reversible pads applied to secure the amount of extension gained, and the cords of the leg-fixed-extension were passed under the arch of the boot to meet and be tied there; the reduction of flexion was however, not complete, only much reduced. The parents of the child were informed that the dressing of the limb would be finished after a delay of two hours, at the expiration of that time, the reversible pads, A. A., Fig. 77, identical with C. D., Figs. 81 and 82, had become slack from lessened flexion of the joint, consequently the pads were tightened, and the check string, Fig. 77 D, added to connect them, finally, the tension of the mid-posterior piece of leather, B. Fig. 82, was arranged so that the joint could descend to full extension.* The patient was now dismissed, with a request to return in a week, the surgeon at the same time warning the parents, that until the posterior aspect of the joint had descended so as to thoroughly rest on the mid-leather, the patient would be in pain, but to this he was to give no heed, but to maintain the calico bands of the two compressing pads, moderately tight. The patient was not a resident of Liverpool, this, the surgeon gave as his reason for "callipering" the limb, and for the two hours delay in finally adjusting the appliance, remarking that "Callipering" the limb was preferable to applying a bed-splint, when the patient would only be inspected at long intervals; as a calliper had a better control over the limb, notably in hindering the limb from rotating on its points of repose, A., B., and E. Fig. 82, thus there would always be a greater tendency of the limb to extend, and by its own weight unfold the acquired fixed flexion. The surgeon remarked, that when the patient returned for inspection the extension would be complete and so set, that the extension gaiter would be dispensed with, and the calliper could be taken off for a few minutes, if found not to be such a length that, the patient was hindered from bringing down his heel into contact with the boot sole. The inspection for deciding length of machine, could be made by passing the finger through the fenestra, which the surgeon should make in the posterior aspect of the heel part of the boots upper, as Fig. 48.

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Case C, was that of an adult who had chronic disease of the knee-joint of nine months' duration ; there was limited flexion and extension, the extension being arrested at about 60 degrees from a straight line, there was no effusion perceptible anteriorly. The surgeon ordered the patient to bed in his private hospital, then applied the ordinary James' extension gaiters to the leg of the unsound limb, a bed-splint was slipped up to the groin, the lower leather, as shown Fig. 57, identical with A. Fig. 82, and A. Fig. 83, was pinned tightly across the rods, and the extension brace fastened to the W end of the splint ; a couple of reversible pads were then placed, one above and one below the knee, the mid-leather, Fig. 82, being omitted as in Fig. 81. In ten hours the flexion was nearly gone, the extension brace and reversible pads were tightened, and the mid-leather put in position, ready to receive contact work and give support to the popliteal space. At the expiration of another ten hours, the limb was fully extended, and reposing on the three points of repose, A., B., and E. fig. 82 ; an inspection of the joint on the third day, showed some effusion, but the pain which was induced by reduction of flexion had much subsided, being only perceptible on jarring the limb. On the fourth day from the commencement of the correction of the deformity, the bed-splint used for that purpose was converted into a calliper, without being removed from its attachment to the limb, in the manner described, pages 74--84

Case D.—That of a man, about 28 years of age, just returned from Australia, he had been in the employ of the Liverpool Post Office, in-door department. Dating back two years, he commenced to suffer from periosteal inflammation of the lower end of the femur, and his general health being in an unsatisfactory state, he had undertaken a sanitation voyage, during which time the knee-joint had become secondarily affected, causing a flexion of about 120 degrees, so that the limb was almost useless for the purpose of progression. There was also superficial necrosis of the femur, with several sinuses leading into the popliteal space. As preliminary treatment, it was decided to reduce the flexion and place the limb in a Calliper. The patient being taken into a private hospital, there æther was given and the limb examined while the patient was under its influence, no motion was perceptible at the knee-joint, it was decided to use force and rapidly overcome the deformity. With the aid of three assistants a moderate amount of force was applied, but before much violence was done, slight bleeding appeared from the sinuses, and it was thought not advisable to carry out the original intention ; consequently the æther was discontinued and a method identical with that followed in Case C,

*The check-string, without which the upper reversible pad would slip up and the lower one descend, is best seen in Fig. 84 H.

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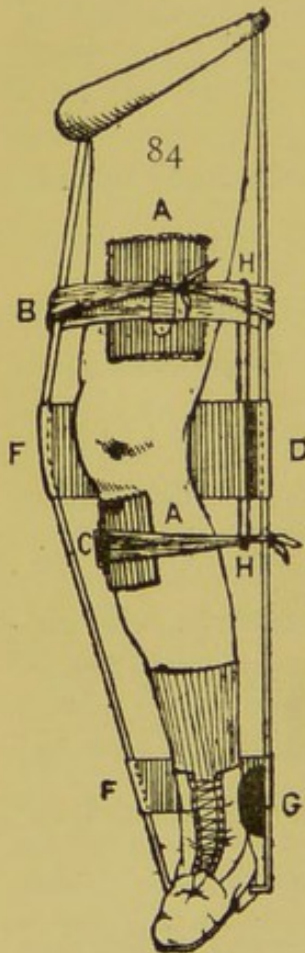
was adopted, with equally successful result, but the time expended in reduction was three weeks.

Case E.—A gentleman about thirty years of age, presented himself with a true, that is sound, ankylosis of the knee-joint, flexed at an angle of about 120 degrees, remaining after an acute attack of gonorrhœal rheumatism. The patient desired the restoration of motion, if possible, otherwise a correction of the deformity, so as to have a useful limb. As the best introduction to the regaining of the first, would be the correction of the latter; the patient was placed in hospital, æther administered, then with the aid of assistants and mechanical leverage power, forcible reduction of the flexion was attempted, and though much leverage was used, only partial correction resulted while the patient was under the anæsthetic. The violence used however, had made the parts unsound, consequently the limb was placed in a calliper with a bottom leather as A, fig. 81, two reversible pads, C. D., fig. 81, and retention garter F, and force in the direction of the arrows C. D. continuously maintained for three weeks with success; gradual force accomplishing a correction impossible by immediate violence*

It obviously follows that if the conditions maintained by me, as favouring or hindering the reduction of deformity, be facts, then the amount of deformity is no guide to the degree of force or time that may be required to be expended in reduction; it being mainly a question of the quality of the structures: so that a very unsound joint, though greatly deformed, is much easier corrected than one far advanced to, or that has actually recovered, with only a small degree of deformity. Having reduced the deformity of flexion, in such cases as A. B. C. D. or E, the surgeon, may even then find occasionally, both in youths and adult life, that he has another deformity remaining, either a posterior luxation of the tibia or a "knock-knee." As regards the tibial luxation, it is my practice never to give this de-

*Cases A. B. C. are ideal cases, illustrative of the procedure for the reduction of deformity. D. and E. are reports of real incidents.

formity any attention, it is only a deviation from symmetry, not from the limb's utility. It is a prevalent error of opinion amongst us, to suppose that the reduction of the fixed flexion of the knee sometimes causes tibial luxation, this is not my opinion: it is forgotten, that an already formed moderate degree of tibial luxation is not perceptible when the knee is much flexed, becoming noticeable only after the correction of flexion. As regards the "knock-knee" complication, we know this to be like a "bent reed," a source of weakness and shortening, and if we trouble to reduce the shortening attendant upon flexion, then



that which may follow, genu valgum, equally needs our attention. When "Knock-knee" is observed following the reduction of flexion, it is my practice to seize upon the advantageous condition, which the violence attendant upon reducing flexion has brought about, to immediately commence the amending of the genu valgum, which is done with an ease, proportionately, corresponding to the amount of unsoundness present at the moment of rectification of the antecedent flexion. Fig. 84 gives a plan of the method of using the Calliper, so as to continuously maintain fixed extension, arrest friction, diminish concussion and reduce the "knock-knee"

defect. An inspection, of fig. 84, shows that the surgeon, before "converting" the bed-splint in which the knee flexion was

corrected, has used the "Bend-maker," see page 84, and bent the inner rod out of line, to make a space for the inprojecting knee, this is the first deviation from the plan of Callipering the lower limb, shown in fig. 77, but there are two more; the binder of the pad at C. fig. 84, is not reversed but tied only to the outer rod, and a soft counter pad is placed at A, the action of the pad and band at C. causing the leg to bear against the pad G, on the cross leather F and outside of groin ring: these in action soon reduce the valgum and the surgeon then restores the inner rod to the form as seen F, fig. 77, now the rod becomes too long to re-enter the hole in the heel of the boot, so the extra length is cut away and rebent to a hook shape, with the pillars of the "Vulcan Cutter." When all tendency to the recurrence of the valgum has ceased, the binder of the pad C is reversed, as seen A, fig. 77. H fig. 84 is a piece of twine connecting the pads A. A. fig. 84, without this connection the lower pad would slip down, and the upper pad slide upwards, it is not so well seen in fig. 77 D. but is a very necessary part of the arrangement.

In amending deformity of the knee-joint, the performance of tenotomy is only an extra risk and delay of time further it is an interference, which surgeons, who have understood the law to which reductions are always subservient, need never resort to in correcting flexion of the knee or any of the main joints.

Occasionally the patella is found ankylosed to the femur, at such a position on it, that appears an impediment to ultimate correction, that is, impedes the progress of prefatory treat-

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11.
patella
ankylosis

ment, during which, whether an anæsthetic has been employed or not, the flexion is utterly obliterated. When the patella is impeding the ultimate phase of the reduction, it is safe practice, to take a wooden mallet and give the bone a sharp lateral knock, which generally releases it. The patella should be covered with a piece of leather to guard against the mallet lest it glances slightly and brings away a little of the skin.

In cases of true ankylosis of deformed knee-joints, osteotomy may have to be performed, when sufficient safe force to bring the law regulating the reduction of deformities cannot be brought into operation.

In the reduction of deformity of the knee and other joints, my rule is to get an initial impetus, by the employment of a safe amount of force, accepting all I can get at the time and by perseverance gain the remainder. The quicker the evil is done, the sooner it is mended. In my volume of 1875, it is obvious that my inclination was, to slowly as possible reduce my deformities; that was my practice, but a better understanding of the circumstances in the interest of the lesion and of the patient's health, brought about a valuable modification in practice. To-day I feel convinced, that my slow process of correcting deformities was followed, by an equally slow progress to recovery from the injury inseparable from the procedure and tending to unnecessary reclination. The surgeon should bear in mind that once he has started upon the journey of reduction, should he permit interruption, the damage done is much increased; its progress should be steadily forward to full extension, but better rather too slowly,

than so quickly, as to cause sloughs at the fulcra and points of exerting force. As showing that the leverage by itself, is not a serious injury to a joint, a case is here related.

“A gentleman from Sheffield, brought here his boy, about 11 years of age, suffering from chronic disease of the knee, falsely, that is unsoundly ankylosed at an angle of about 120° there was a great measure of liquid within the capsule, but not under tension, by manipulation of this accumulation, it felt superficial at the upper and inner aspect of the joint. Taking into consideration all the circumstances observed and related to me, I concluded that there was pus in the joint, and decided to follow my usual practice, not to trouble about the contents of the knee, until deformity had been well reduced, friction arrested and concussion provided against. I had hoped to have reduced the flexion in two or three days, but it occupied about a week at which time the liquid within the joint remained unchanged in bulk; just as the reduction was being completed—gradually there appeared an extreme valgum, and at once provision was made to correct it, we succeeded in six weeks, but to my astonishment, during the reduction of the secondary deformity the liquid within the joint gradually disappeared, the case did extremely well.—Its history was, that the parent had been lavish enough of surgical aid for the boy, but specially, he had taken him to London to be manipulated by one of the manipulators so highly recommended by surgeons who, nevertheless in theory, are loud in their praise of rest for the treatment of articular disease.”

It is noteworthy that, in the foregoing instance, although a tedious leverage was employed during six weeks to amend the valgum, yet the contents of the capsule were absorbed. This case finishes my contribution to the prefatory part of the mechanical treatment of lesions of the knee-joint, and brings me to an important item—the arrest of friction.

The arrest of friction is the most important component of the term “surgical rest,” the avoidance of compression coming next,—and the neutralizing of concussion being the least in value. A glance at the arrangement shown in fig. 77, informs

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the observer, that a little more than the whole lower limb is within the limits of the calliper splint. Fig. 78 is a posterior view of fig. 77, from which it is to be noticed, that the limb reposes upon three parts, the posterior portion of the groin ring and two leathers stretched across the rods of the calliper, the lower leather drawn tightly across, the mid-leather always fitted last and drawn up so as to touch the popliteal space, when the knee joint is in complete extension. These leathers correspond to F. F. fig 77. The limb being in repose as described, is fixed by the binders attached to the two reversible pads A. A. Fig. 77, this interlocking is an effective mode of fixation. To gain good effect, the reversible pads A. A. should be worn as close to the knee as possible and to check the tendency of the upper one to ascend and the lower one to descend, the two binders which run through the two staples in the pads A. A. should be connected by a piece of twine, see H Fig. 84. This arrangement leaves very little opportunity for accidental friction, if the patient is attentive to maintain the bands tight. If there is any draw-back attendant upon this mode of arresting friction, it is beyond my perception. Often, patients after being fitted, returned with this complaint: "my knee is much more swollen since you fitted this on my limb," however, on examination, the fluid within the joint was found less or gone and in place an œdema outside, an advantage rather than otherwise. As a mere swollen limb is not worth notice at the cost of a diminished efficiency of the means we may be employing to assist a diseased knee. Having explained my plan of

reducing deformity, avoiding compression and arresting friction of the knee, there only remains to discuss one other item, the neutralization of concussion : this is done, by making the machine so long, that when inserted into the heel of the patient's boot, its length hinders him, from even by chance or wish, pushing his heel into contact with the heel of the boot ; the Calliper should be so long, that when the patient stands and the surgeon inserts his finger through the posterior opening in the boot's upper, he can feel an inch of space between the patient's heel and the boot's heel. If the patient be in the years of growth, the Calliper, if worn a long time, may require the rods to be lengthened by "drawing in the fire" or "pieced on." The arrangement for neutralizing concussion of the knee-joint, now introduced to the reader, is a modification of the plan employed by me up to some ten years ago, shown in page 48, the present described "Calliper" is a simplified, yet a much more efficient and even less expensive instrument, than the original two rod patten knee splint, or the three rod one. Not only is the fixation by interlocking, a great improvement, but the Calliper by its length, still keeping the limb from concussion, while seizing the patient's foot by a grip of his boot heel, there is gained another item to aid in the diminution of the tremor attendant upon concussion ; another mode of friction. All these items are valuable assistance to the joint to recover its lost health.

As showing the efficiency of the Calliper to do the work for which it is here recommended :—Here follows a case of malig-

nant disease of the knee-joint; the reporter is my friend Dr. Taylor, of Chester. The patient had been originally under my care; when he first consulted me, malignant disease was suspected, but he became so free from pain, and for a time there were no signs of the progress of such a complaint, consequently it was supposed that my first prognosis was incorrect, ultimately the symptoms became more pronounced, and as it was more convenient for the patient, he wisely elected that Dr. Taylor should amputate the limb, who afterwards favoured me with the following interesting report, in favour of the efficiency of the Calliper to do its duty under very adverse circumstances:

“J. F. was admitted to the Chester General Infirmary at the end of December, 1881. The lower end of the right thigh was much enlarged and swollen. The swelling had first appeared about 14 months before, and at that time he had some pain; the pain and swelling increased. About April last, Mr. Thomas, of Liverpool, applied his knee splint, since then, he had no pain whatever, but the swelling has gradually increased. This appears to be chiefly on the inner side of the knee. On the 21st December, I amputated the thigh at the upper third. He made a rapid recovery, and was discharged cured in five weeks. On examining the limb afterwards, it was found to be a good example of myeloid growth of the femur, a thin shell of bone could be found at isolated places on the inner side of the tumour—there was also bone on the outer side, about $\frac{1}{3}$ of an inch in thickness only—this was all that remained of the original bone. Under the microscope were found giant cells in abundance; the most interesting part, however, was the condition of the knee-joint, this was much extended, both antero-posteriorly and laterally, but perfectly smooth everywhere. the cartilage over a great part of the lower surface of the tumour had the appearance of health, and the finger could be passed between the growth and the layer of cartilage, there was here no bone to be found; where the growth was not covered by cartilage, it was covered by a smooth thin membrane. The upper end of the tibia appeared to be perfectly healthy, but was considerably expanded, especially laterally. The freedom from movement insured by the splint had undoubtedly preserved the articular surface of the cartilage and the joint in an extraordinary manner.”

J. TAYLOR.

Having efficiently fitted the limb with a Calliper, which precludes, by its length, the wearer from bringing his heel into contact, such a contrivance must give its wearer, a very evident degree of "list", with its discomfort; this is corrected by proportionately increasing the thickness of the heel and sole of the boot, worn on the foot of the sound limb, until the "list" disappears as shown in Fig. 85.



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Efficiently applied, the Calliper splint is a splendid inhibitor of the prominent symptoms, constitutional and local, felt and observed in connection with progressive diseases of the knee-joint. Pre-supposing having applied the instrument, it is worn almost uninterruptedly until recovery; it is my practice

to change the sock only about once every two or three months, sometimes it remains on the foot even longer; further, this temporary interference is always personally superintended by me: the patient's boot being always slit open to the toe, enables us to drop it posteriorly attached to the Calliper, to change the sock without disturbing the cross-leathers; once these have been drawn across the rods and firmly stitched in their place, it is of great importance that they are seldom, if or possible never varied, otherwise the form of the joint must also vary; an injury best guarded against, by watching and repairing the stitching of the cross-leathers when beginning to "give way".

There is another reason why the mechanical appliance should be worn without interruption or variation of the points of

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my own
in 2-3 mo*

repose,—cross-leathers and groin ring. Inflammation in the knee-joint, in many cases, as with the great serous sacs of the abdomen and thorax, tends to become limited, so that even if suppuration takes place, the thus localised product of disease may ulcerate its way out harmlessly and become spontaneously discharged; a slight, though only occasional motion of the diseased joint, would disturb any formed limitation of the disease product. Observation inclines me to the opinion, that like collections of pus ulcerating their way from the hip-joint, such collections within the knee-joint, sometimes cease to be connected with the articulation long before they ulcerate the skin. The foregoing reasons, conclusions after frequent observations, if true, are weighty facts recommending the avoidance, of the least possible variation of our points of repose and the nearest possible approach to an unvarying form, for the knee-joint, as long as treatment is necessary.

That portion of the calliper splint, here referred to as the groin ring is its most distinctive feature,—about the year 1875 Prof. R. Parker foresaw that it could be added to artificial limbs made for lost lower extremities, he first and myself concurring, judged it would enable the maimed wearer to better sustain his own or superadded weight,—but he never discerned that it would also greatly free the stump from compression, increase its vitality and arrest its hitherto noticed tendency to atrophy. Furthermore, it enables a surgeon to select any convenient position for amputation or style of flaps, the position of the cicatrix being no longer of

consequence. The groin ring is destined to be added to every artificial limb of the future, made in place of lost lower extremities.

“I have often during years past intended to send a note to the JOURNAL upon an important detail in the construction and comfort of artificial legs and my intention was strengthened by the illustration and advocacy by Mr. Barwell of what is called his modified Beaufort leg in the Journal of January 10th, 1885. This leg, and others that I have seen, are secured by straps that tightly encircle the thigh, and quickly cause wasting of the soft parts round the femur, to the great discomfort of the patient.”

“Some 12 years or more ago, I made use of Thomas’s knee splint with or without a boot attached to the lower end, as a comfortable, durable, and light form of stiff artificial leg, that can be procured for from ten to twenty shillings. The patient sits upon the perineal edge of the padded ring, and the unconstricted thigh fattens on the amputated side equally with that on the other.

“Mr. J. Critchley, 88, Upper Pitt Street, Liverpool, has since adapted to his artificial legs, for use after amputation above, through, or below knee, the padded ring of rod-iron exactly as used for the upper end of Thomas’s knee-splints. The advantage of this is incalculable, very many working-men have thrown away the artificial leg of ordinary pattern, presented to them by railway companies or by private subscription, in favour of a leg made by Critchley, purchased at the patient’s own cost, simply because the constricting thigh attachment of the former caused intolerable discomfort and wasting that entirely disappeared on wearing the latter.”

“A glance at the diagram (Fig. 8), will explain the appearance of this important improvement in the attachment and upper end of the legs, the practical value of which can be understood by those familiar with the use of Thomas’s splints. For other particulars I must refer the reader to Mr. Critchley’s trade advertisement and prospectuses. His cheapest artificial legs are not so low in price as the one described by Mr. Barwell, but they are beyond all comparison superior in practical utility, and are more comfortable and durable than many others. They are well-known and highly approved by the hospital surgeons of Liverpool, for whose poorer deserving patients the cost is without difficulty raised by private subscription.”

“Critchley’s best artificial legs, with springs and joints for knee and ankle. are superior in my opinion to the most exquisite articles of other make, by reason of their physiological and rational fitness, while far below them in cost.*

RUSHTON PARKER.

“Professor of Surgery in University College, Liverpool.

The diagnosis of and recovery from knee-joint disease.—This is done as follows: When the surgeon fails either to observe or the patient to feel conscious, of the neurotic signs of the disease and that within a permissible radius, the motion of the joint is steadily increasing, it may be suspected that, the joint might be sound only then is it justifiable to give it the test of use and note, whether the reversed physical signs of progress of the disease appear: that is, that by use, the motion of the joint increases from and to, the position in which it was treated; if the joint be still in any degree unsound, the motion may increase from the position of treatment, but refuse voluntarily to return to the exact form in which the joint reposed during treatment. The foregoing test of imperfect or total recovery is most simple, and as trustworthy as simple, but it is not applicable to cases where ankylosis has been unavoidable. In trying to diagnose the advent of true ankylosis, great circumspection has to be used; great caution ought to be exercised, inasmuch that if we subject the joint to the test of use, and it happens to be fractionally unsound, it is sure to respond to the usual test, applicable to all cases with conserved motion, that is, its form, by use becomes varied from the position of repose during treatment and if it has advanced closely up to the condition of soundness, the correction of the

* British Medical Journal, March 31st, 1888.

flexion unfortunately acquired by testing, though small, becomes extremely difficult of reduction, especially so with the hip-joint. Too early testing of very unsound ankylosis is not a serious error, as the greater unsoundness enables us to correct our errors of practice easier.

To test a joint, which will be unavoidably ankylosed, we must use a purely neurotic test, that is, the patient ought to feel free from discomfort and his limb strong. Further, as no motion is supposed to be possible, the ankylosed part should be equal to sustaining an amount of jar, which an ordinary lower extremity could stand without discomfort; this test of jarring does not apply to cases about to recover with motion, as the leg, with the limited motion already possessed by the joint, would painfully strain the structures which only partially and temporarily limit the motion. Jarring with motion, being a greater tax on structures, than so doing when no motion exists.

It may be stated as a rule, that articulations secondarily affected, lose their range of action exceptionally slowly, generally are less limited in their range of action, than joints directly affected; an explanation of which exceptional phenomena I am not prepared to offer.

The local treatment of disease of the knee-joint.—It is my conviction, that the best management of asthenically inflamed joints not compounded by discharging sinuses, is not to practice any local interference: this is only a re-statement of the views of treatment formulated by me, some fifteen years ago. Knee-joint abnormalities tolerant of the direct method of mechanical

treatment, I know, are in many ways equally as tolerant of local interference, as cases to which the indirect method should be applied are intolerant of such peddling.

During the condition of inflammation of a knee or other joint, the liquid secreted by its synovial lining, is at some period abnormal in quantity or quality; indeed whether the exciting cause is acting, or has ceased to do so, even then, this liquid product of inflammation may at times not become absorbed. It is my opinion, that where we have liquid effusion within diseased joints, the arrest of friction in that joint is the important "one thing" first needful, and that the second is, to give the first sufficient time to have one of its possible effects, absorption of the liquid; third, that failing absorption, aspiration should be tried; or a fourth course that is, the contents of the joint be allowed to ulcerate their way for discharge through the skin. For obvious reasons, during my earlier experience, I very rarely observed the absorption of effusion within joints chronically diseased. Why? Because a reasonable period of grace after thorough fixation, was not allowed the articulation.

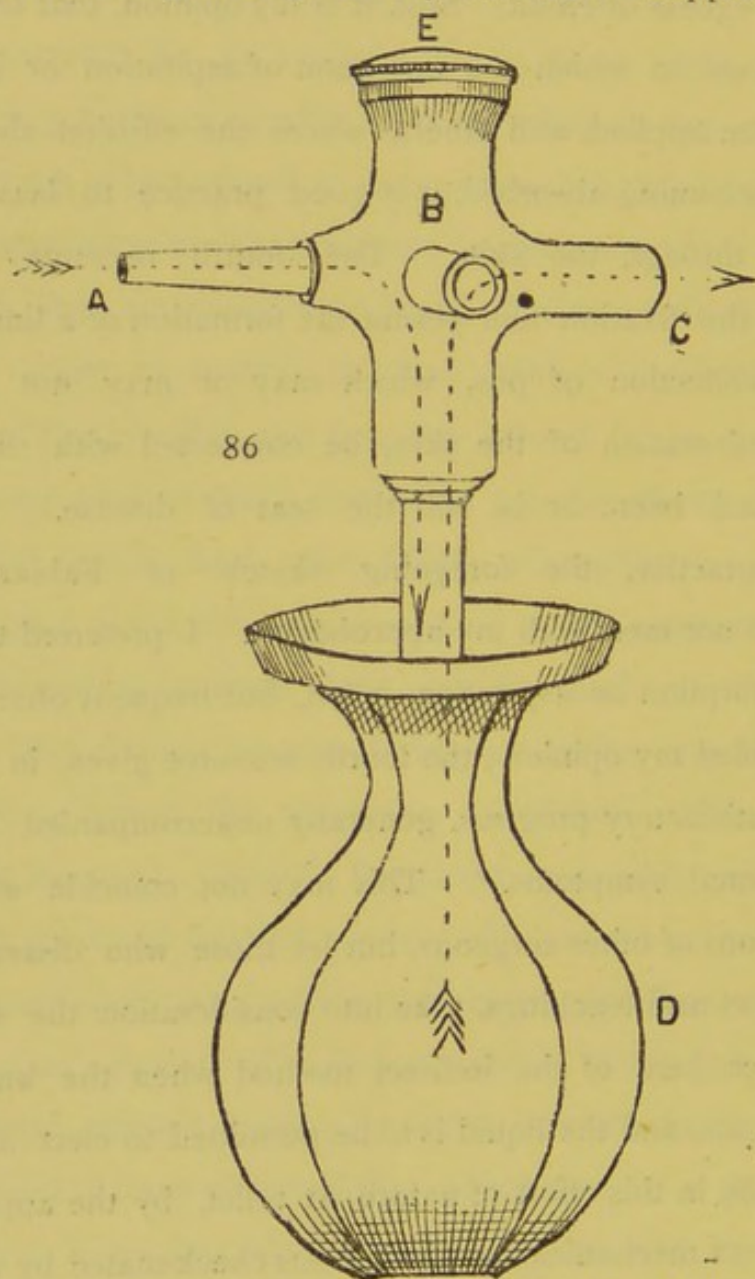
Some years back, my practice was more meddlesome than now, being an advocate of early aspiration or incision; but with gaining more efficient fixation for joints, from my means being better applied, I have observed that absorption is a probable event, that is, if the first thing needful is gained and its necessary accompaniment the "indirect method." Again: by the exercise of more patience, my views have altered regarding the absorption of fluid within joints and it has also modified my

views as regards their aspiration. In my earlier practice, many articulations were aspirated, when had time been allowed, the liquid would have been absorbed, hence to aspiration was given an excess of credit. Still, it is my opinion, that there are many cases to which the operation of aspiration or incision ought to be applied, and others, where the effusion shows no signs of becoming absorbed, it is good practice to leave it to ulcerate through the skin. The fourth resource is to continue the fixation and permit the formation of a limited or residual collection of pus, which may or may not at the time of ulceration of the skin, be connected with the part which had been, or is still the seat of disease. In my earlier practice, the foregoing sketch of Fabian treatment did not meet with my approbation. I preferred to incise when absorption or aspiration failed, but frequent observation has modified my opinion; the fourth resource gives, in suitable cases, satisfactory progress, generally unaccompanied by any constitutional symptoms.* This may not coincide with the observations of other surgeons, but let those who dissent from these views and teachings, take into consideration the extreme importance here of the indirect method when the knee-joint contains pus, and the liquid is to be permitted to elect its route to the skin, in this effort of nature at relief, by the application of the direct mechanical method, she is check-mated by surgery

* It was by accident that my practice became modified thus, many patients were brought who resided at a distance, and so it was not convenient to incise, and afterwards, for them to immediately return home. Gradually I noticed that my out-of-town patients progressed to recovery quicker, and with less suffering, than those living close to me.

and like a closely besieged town, is destroyed by self-consumption.

When giving special attention to the liquid effusions within joints, the following rules guide my conduct:—Supposing that



evident progress to absorption is not noticeable, if the liquid is not increasing in bulk, no matter where situated, or if varying its form or position, then waiting is my decision. As regards the

knee-joint, the liquid effused often becomes apparently all absorbed, but finally re-appears as a small abscess not discharging itself of more than a dram or two of pus ; at other times, the contents of the joint become condensed, still, finally ulcerating to the surface and remain for some time extra articular, before discharging by sinus. If it be noticed that the liquid collection, whether varying in form or position, is evidently increasing in bulk, then my decision is to try aspiration ; failing this, to incise. The aspirator employed is shown in Fig. 86.

It is merely a brass tap, with a three-way plug, to which is attached an india-rubber ball, for making either a vacuum for suction, or for being distended with fluid for injection ; suction can be performed, or the injection of fluid can be passed through it without intermission, for the purpose of aspirating cavities, giving an enema, or washing out a viscus, and during its employment, the left hand of the operator is at liberty to assist him, by manipulation of the part, and gain information. The centre one B of the three nibs is always discharging when aspiration is performed, but receiving when injection is made and during the latter action, a rubber tube is slipped on to it, to elongate it sufficiently, so as to reach the fluid to be injected. The nib A on the left, in Fig. 86 is to receive the boss of the aspirating needle, the right-side nib is to receive another rubber tube for the administration of enemata, washing out the stomach or bladder and other such purposes. After performing many thousands of aspirations during the last twenty years, it is my belief, that the needle should not be less in diameter

than a No. 5 or 6 catheter to secure a fair chance of success in all cases. By the employment of a large needle, we can often succeed with flaky collections of liquid, and there is another advantage, if perchance our interference causes the liquid collection to become septic and it suddenly begins to exercise hyperdistension of the joint; if a fine needle has been employed, no leakage happens in the track of the needle, consequently local and constitutional evil may supervene before the surgeon again sees the case, though he is absent only a few hours. If a large sized needle has been employed and unsuccessfully, then any degree of hyperdistension will probably cause the track of the larger needle to leak and local and constitutional ills may be totally avoided. In cases that are about to be successfully aspirated, it will be noticed, that as the operation is repeated, although the liquid re-accumulates, the time of re-formation increases. When a case appears likely to be successfully aspirated it is well to avoid previous needle tracks during subsequent operations; but should it be noticed after two or three aspirations that the liquid, in regard to time, rapidly re-accumulates with no increase of time between the aspirations—an indication that the operation will probably not succeed—then it is proper to make repeated daily use of one needle track, to convert that into a sinus; as all liquid accumulations which we fail to successfully aspirate are not always flaky and require only a more constant drainage than aspiration gives, this formation of an artificial sinus often answers very well, continuously draining, while the abscess remains aseptic until cured. If I ask the

question. Suppose you suffered from chronic joint disease with effusion, failing spontaneous absorption, which of these modes of relieving joints, would you select for the removal of non-absorbable liquid within your joint; an artificial sinus, a natural one, or an incision? I would choose to wait the formation of a natural sinus, as it has advantages, being shorter and funnel shaped by ulceration from within outwards and so drains itself best. I would not elect to wait the formation of a natural sinus, if the conditions were unfavourable, that is, the fluid collection enlarging, as my selection would be either aspiration, failing that, an artificial sinus, or an incision.

When chronic knee-joint or other joint disease, becomes compounded by the formation of serous or pus discharging sinuses, a local application can seldom be dispensed with and we have to guard against converting the application into a direct interference: with the aid of the protecting inner and outer rods of the "Calliper," local dressing can be applied without exercising any pressure, so that the direct method with its evils is avoided. My experience inclines me strongly to the belief, that chronic disease of joints is intolerant of cold, but accepts warmth, as for instance, medicated wood sawdust which, just before applying, has been heated over a fire on a frying pan and changed two or three times a day.* If this cannot be conveniently used, then in its place, some warm, moist, porous, and absorbant fabric medicated, is a fitting substitute.

*The medicated wood sawdust is much used by me in the treatment of articular disease and fractures. It is prepared thus, a sackful of pine wood sawdust, which has to be coarsely sieved, then medicated with the following mixture: two buckets of water charged with oil of tar two pints, Hyd. Perchlor, one dram; amm. mur. one dram.

*Medicated
Wood
Sawdust*

Excision of the Knee-joint.—It has always been my conviction, that a joint which recovers so as to be permanently sound after an excision, can do so without this operation and that there are very many cases after excision, now existant, destined never to become sound, but had they not have been operated upon would have recovered health long ago. In my opinion, it is always a question of either amputation or full conservation of the part and am confident enough to venture upon the role of prophet and assert, that when we acknowledge the importance of "surgical rest" and acquire the skill for securing its application, only then will surgeons come over to my view. A change of practice may even not be so far off, for example, if my reader will consult the *Lancet*, July 27, 1889, he will find three lectures by Mr. Howard Marsh, F.R.C.S., on "Tuberculosis in some of its surgical aspects." A better title would have been, "A protest against the excision of any Joint." It is a splendid statement of the question and a trenchant reply to those who during the last thirty years, have advocated excision of every joint. These three lectures owe their vigour, to the fact that the lecturer has had time, opportunity and patience enough, to allow the recuperative power of the patient to do all it can; like myself, it happened that Mr. Marsh found that the time and patience was not lost. In a subsequent number of the *Lancet*, there appeared a reply to Mr. Marsh: Lectures of a clinical type as these were, are easily refuted by surgeons, who have had neither time—this often means also opportunity—nor patience to clinically test a disputed point. Mr. Marsh is not

a recent convert from excision of the hip-joint; the same views are recorded in his "Manual," but strangely, in that volume he excepts all other joints from the benefit of the arguments contained in the lectures. Why is a joint—for which we cannot get conveniently more than 66 % of fixational rest, through the most critical part of treatment, though the lecturer is satisfied with 10 %, the extension treatment—not advised to be allowed the chance of conservation, while other joints to which we can apply easily 100 % of fixation, are advised to be debarred. To place the question before the reader in another light ; why should one evil, of several others, apparently the greater when surgically weighed, be judged to be the least of them? The answer is obvious, to the other joints, that bane of our past practice, the direct method is applied and it generally in the cases we are discussing, tuberculosis, it utterly neutralizes the benefit striven for by the arrest of friction. The hip-joint is so deeply situated and so well protected by soft structures, that it is beyond the reach of the direct method and severe counter-irritants. The arguments which are weighty against excision of the hip, are trebly so in regard to other joints as soon as we give them 'surgical rest,' by refraining from applying to them the direct method of treatment.

As regards strumous disease of joints, it has fallen to my lot to observe articulations suffering from the disease completely recover from a very unpromising condition, yet the disease progressed in a vital part, to which the patient ultimately succumbed. In my earlier practice in such a case, I resorted

to amputation under the supposition that a fatal termination would thus be avoided, by the removal of the supposed focus of origin of the disease, such practice in most cases, much accelerated the disease already present in other parts and shortened the patient's life.

The reduction of dorsal dislocations of the head of the femur.—Dr. Henry J. Biglow of Boston, U.S.A., has so thoroughly demonstrated the dislocations common to the hip-joint, that there appears to me but little left to be done by any successor. The operation of reducing a dorsal dislocation of the hip-joint by the manipulations of flexion, rotation, abduction, finishing with extension, was, I believe first described for us, since the days of Hippocrates, by Charles Brandon Trye, Surgeon, of London, in his volume entitled “Illustrations of some of the injuries to which the lower limbs are exposed,” printed by Murray and Highley, Fleet Street, London, 1802.

In this interesting relic of past surgery here republished, the operation is described with accompanying case.

“One principle, however, I think may be laid down, viz: to fix the pelvis firmly, whenever extension of the limb is to be made.—In a strong muscular man, whose thigh had been dislocated upwards and outwards, after fruitlessly trying other methods the following process succeeded. He was laid prone upon a bed; a sheet was passed between his thighs, and held firmly by two assistants.—I then *knelt upon the pelvis*, in order to keep it steady, and resist its being raised up when the extension should be made. Three men then pulled at a towel, fastened round the thigh, above the knee, and drew it in such a direction as to carry the thigh upwards, that is, in relation to the trunk, backwards. I then rested my two hands on the head of the bone, and pushed it downwards and forwards with all my strength; and after a short exertion of our powers in this manner, I directed a Gentlemen who held the leg, to twist the toes suddenly outwards, upon which the head rushed into the acetabulum with a loud noise.”

In Mr. Trye's volume other cases are also related. Dr. Nathan R. Smith in 1831, and Dr. W. Reid in 1852, both of the United States, published the details of Trye, and later Dr. Biglow of the United States, presented us with his exhaustive demonstration on the "mechanism" of this dislocation and its reduction. Now, my excuse for venturing to try and add to the store resulting from Dr. Biglow's labours, at page 31 of his volume is to be found in the following advice.

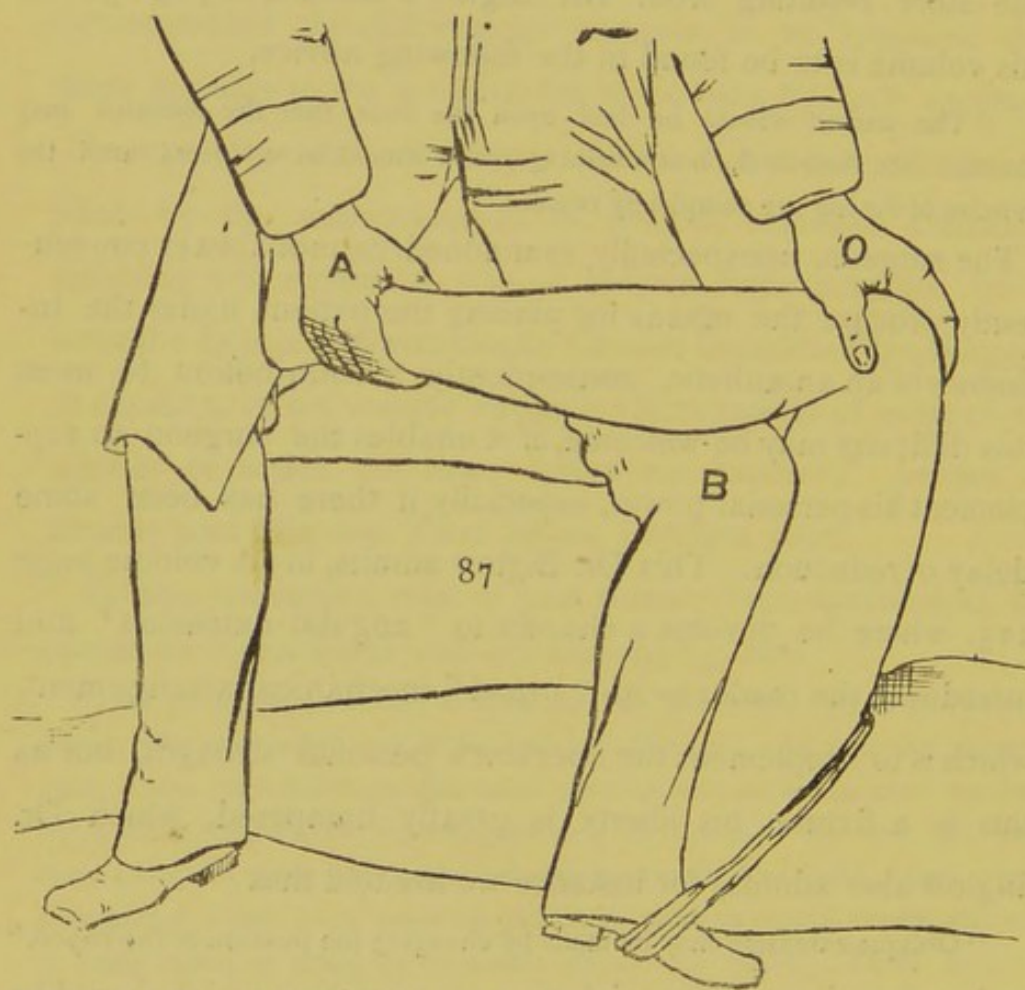
"The patient should be laid upon the floor, that the operator may command the limb to the best advantage, and should be etherized until the muscles of the hip are completely relaxed."

The surgeon, unexpectedly summoned, cannot always conveniently procure the means for placing the patient under the influence of an anæsthetic, consequently a contribution to meet this difficulty may be welcome, if it enables the surgeon to supplement his personal power, especially if there has been some delay of reduction. This Dr. Biglow admits, in his volume page 115, where he devotes a chapter to "angular extension" and introduces the reader to his "tripod" mechanical arrangement, which is to supplement the operator's personal strength, but as this is a fixture, his liberty is greatly hampered, which Dr. Biglow also admits, for instance we are told that

"Oblique extension may be made by changing the position of the tripod."

A serious interruption, delaying an operation which should be proceeded with through all its stages continuously if possible, whether it be a recent or old dislocation. My general method of reduction is shown in sketch by Fig. 87, by a glance at that figure, the reader will perceive that the pelvis is fixed to the

ground by a looped towel, passing over the patient's groin and under the arch of the operator's foot, while the flexed knee of the patient is drawn over the operator's thigh, who, grasping the patient's leg flexes the knee more, also using the leg as a lever, to strain the fixed point, the groin towel. By this arrangement the operator is personally able to apply an



amount of force approaching that to be gained by the use of the "tripod" which is probably seldom procurable. By this plan the operator is free, though aided by extra force, to perform his flexion, rotation, abduction and sudden extension without interruption. It may happen that the patient to be operated upon may

be a very tall man and the operator a short person, the disparity between their respective limbs would much lessen the leverage, —extending power of the operator—this hitch can be easily arranged, the operator should pack the upper surface of his thigh, the fulcrum point, this act practically lengthens his leg for the purpose intended. The “Tyre” method of reducing dislocations of the femur from the dorsum of the illium, is merely the practical application of a law which I have drawn attention to in another “Contribution.”*

The hip-joint, inflamed or hampered by deformity.—Is there any peculiarity pertaining to this joint, so that the principles of diagnosis and treatment proper for other diseased articulations, are inapplicable? Certainly not. Then how, in relation to this joint, can we account for the existence of so many surgical sectaries, each with a plan of treatment and all theoretically in opposition, such as extensionists, posterior fixationists, anti-concussionists, distractionists, the plaster of Parisists, the profrictionists and do-nothingists. My explanation of the growth and continued multiplication of these sects is this: First, their members are ignorant of an indispensable test for the discovery of disease and its resolution. Second, they have been too much influenced by observation, derived from mere symptomatic treatment and modification of deformity; it has been supposed, that ease of pain must indicate gain, that aggravation of pain, even temporarily cannot point to any ultimate benefit. Symptomatic treatment is only justifiable in the absence of a

* Principles of the treatment of dislocations and fractures, page 26.

guiding precept—it has always been my contention, that the principle of diagnosis and treatment, must not vary with the locality; it pertains to all joints alike—whereas the before mentioned sectaries, judging from their practice, have a special principle for nearly every articulation: the hip with them having not merely one, but many principles guiding its treatment; of late a new one has been introduced, termed “distraction,” an addition further distracting the whole question. It has always been a puzzling question to me: why the surgeons, who so assiduously extend, distract hips, &c., do not apply such practice to other joints, to some of which, the treatment is both easier of application and looks suitable; instead of persistently keeping up a haul on the femur, providentially hooked into the acetabulum to successfully resist them. The hip-joint is the arena, in which the question of the principles of diagnosis and treatment of all joints, will continue to be disputed until decided. If the election of a site for the dispute had been left to my choosing, my selection would have been the elbow, as the demonstration would be on a joint more exposed to view and manipulation; further, it is one with which excellent artificial articulations—simulated reductions—can be formed, and bear witness to the truth by behaving in accord with the law regulating normal articulations.

The diagnosis of hip-joint inflammation.—In 1875, my views were published regarding a diagnostic mode and its value in estimating the degree of flexion attendant upon disease of this joint. Critics immediately remarked that a test of the sort

was already known, that of placing the sufferer to recline upon a plane and observing the arched spine, during an effort to extend the lower limbs. That sooner or later, fixed flexion accompanies neglected hip-joint inflammation, has been obvious since the period when man became a biped, all of us must admit; it was not mere obvious flexion on reclining, that was specially referred to by me, but to an amount of flexion not demonstrable by any other method but by the one here again introduced to the notice of the profession, it also gives us a mode of more correctly estimating the amount of mere obvious flexion during reclination. It is not possible to judge, so as to correctly compile statistics, regarding the presence or absence of deformity before or after treatment without a thorough knowledge of the application of the flexion test; as a case of hip disease after sound recovery may appear free from defect, but by this test there may be shown some remaining flexion. It is a test method which indicates the existence of inflammation, immediately after its accession. A test trustworthy beyond all others and at times it may happen that the only sign of hip mischief will be that emanating from this test. The flexion test is one that becomes more pronounced as the disease progresses, ceasing to increase only when the lower extremity is influenced by a balanced muscular control, this is a rule that pertains to all articulations.

The reader must not suppose, from the prominence here given to the flexion test, that my practice is to utterly ignore other signs, still such a supposition would not be far

from the truth, as the behaviour of the joint tested in the manner I am about to describe, so superiorly indicates the condition of the part and moreover is, at times, the only sign that can be elicited, that it fully justifies my preference and confidence. This test is no more than the employment of mechanical power to demonstrate more accurately, a physiological condition of the muscles controlling the joint. The minor symptoms, such as pain, atrophy and others, are, when present, useful as aids to differential diagnosis. A consultee may have pain in connection with the hip, but there may be no disease—there may be no pain, yet disease may exist,—there may be lameness, yet no disease,—there may be no lameness and yet disease,—there may be atrophy of the parts about the joint, yet no disease,—there may be atrophy and yet disease,—there may be shortening of the lower extremity by tilting of the pelvis with disease, and the same may be observed where no disease is, or ever was. By the flexion test and no other can the foregoing assertions be demonstrated to be clinical occurrences. When applying the flexion test, especially to the detection of early disease of the hip-joint, we have to exercise caution, that the test is not strained, an error in manipulation easily committed, from the flexibility of the spine making our control of the pelvis difficult. The test may be described as the controlling of one limb, then observing the conduct of the other uncontrolled one, pre-supposing the condition to be that antecedent to any treatment. The controlled limb is generally the sound one, the uncontrolled, the suspected one, but if the

surgeon is not able by sight to select the suspected one, the test must necessarily be applied to the extremities alternately. By not straining the test, is meant to avoid using so much power, on the controlled limb as a lever, that the pelvis is tilted from the horizontal plane, so that a spinal curve, just the reverse of that concomitant with hip disease, is produced; so straining the test in some cases may show a deficiency of extension of the uncontrolled limb, though no disease exists. The explanation of this is, that a certain per centage of persons have normally a shorter range of extension and flexion in comparison with the rest of the population. In a preceding paragraph, there appears this qualifying clause, "Presupposing the condition to be that antecedent to any treatment." For once the patient has been efficiently controlled, by posterior fixation modelled to normal symmetry, the test by controlling the sound limb becomes useless, as the unsound one is controlled, when it is not advisable to interrupt treatment by releasing it. This unadvisable trouble however can be avoided and the desired information gained, by reversing the manipulations of the test, that is, leaving under control the unsound limb and observing the conduct of the sound one uncontrolled. This is the reversing of the test, so as to find whether our fixative has reduced minute flexion and brought us through prefatory treatment, to enter upon the path of resolution, from which time if the capsule be not tending to rupture, relief of pain is to be expected, if the patient is quiescent. The test here under discussion is almost infallible for the detection of disease, and is infallible for demonstrating

recovery. The application of this test for the recognition of the cure of an unsound hip-joint, needs no special knowledge more than other joints, its application is common and as a test for cure with or without motion of the joint, it has been repeatedly described by me, so that a further repetition is needless.

Hitherto, my discussion has been as to the value of the flexion test applied to hip-joints singly inflamed, but it is also applicable to the detection of the existence of double joint inflammation, or of any trace of deformity left after double hip disease; but testing for double hip inflammation is not easy. To acquire this skill, the surgeon must thoroughly theoretically, and practically, have mastered the art of applying the flexion test to cases of single hip-joint inflammation, otherwise when testing without previous prompting as to the suspected hip, he may suppose that the test has failed. Double hip inflammation is not uncommon and generally is easily diagnosed without the flexion test, but it will happen at times that the surgeon is consulted regarding some obscure ailment of one hip, whereas both are suffering and to be able to demonstrate this, must strengthen the patient's confidence in the consulted and perhaps aid him in advising. Inflammation initially trochanteric—secondarily affecting the hip—with this disease another exceptional phase is to be noticed, that is, there is a less degree of hampering deformity, the limb being held only slightly flexed from the line of perfect extension; this is explicable only, in my opinion, upon the supposition, that in the secondarily affected hip, there may be muscles not excited to action, which come into

action in primarily affected hip-joints. Again, these cases are nearly always accompanied by outward rotation, this fact has inclined me to the belief, that in hip-joint inflammation primarily arising within the joint, the observed symptoms of abduction and outward rotation, point to the head of the femur as the original site of the malaise, and that inversion of the limb points to the acetabulum as the initial area of disease.

Although the test is termed a flexion one, it is a questionable designation, as the defect is mostly one of extension and limitation of flexion co-existing, though generally not so marked in hip disease, the degree of limitation of flexion and extension varying with the localities affected, influenced by circumstances other than muscular effort; at the elbow, gravity aids the extensors, at the hip, flexion of the knee aids the flexors. The flexion test is also trustworthy for differentiating hip disease from hysteria, the flexion attendant upon typhlitis, collitis, spinal caries, infantile palsy, congenital and non-congenital injury to the hip. In hysteria, the flexion test will show, that an apparent flexion is not actually so. In typhlitis, collitis and spinal caries, the spinal compensative curve, attendant upon hip disease, not being present, the flexion test will not influence the form of the spine. In infantile palsy, there is no response to this test. My experience informs me, that specialists in the treatment of hip affections, frequently commit the error of judging congenital defects of the hip joint to be examples of hip disease. This is an error easily avoided, as such cases satisfactorily respond to the test, indicating soundness and good range of action, as do all sound, normal and artificially formed articulations, whether they be congenital or not. During the existence of the articular malaise, now known as "Charcot's

why?
disease," the flexion test is inoperative, as the sufferer, through his muscles, shows no locally reflected knowledge of the disease this fact points to an item in its pathology, a sentient nerve lesion, the joint suffering secondarily. The flexion test is destined to make a revolution of the treatment of articular affections, and to become a guide to enable us to successfully imitate reductions of dislocations, and guarantee the soundness and usefulness of excisions. As soon as this test becomes generally known, the wordy war about principles and methods will surely cease.

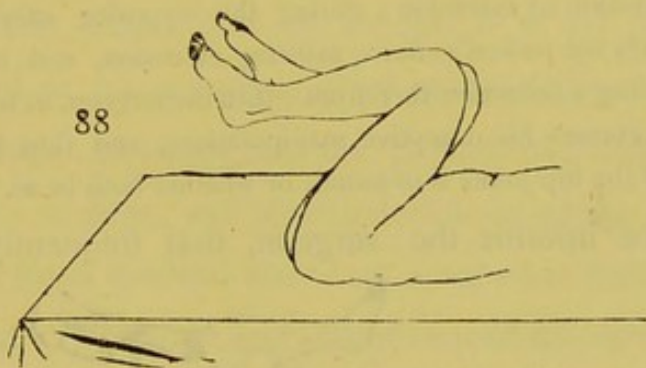
Good
Much as I have dwelt upon the importance of the flexion test—which is the limitation of extension indicating disease in the hip—it is not forgotten by me, that limited flexion at an early period may co-exist with it, though not generally so demonstrable as the limitation of extension; yet in some exceptional instances, at a very early period, even flexion and extension are about equally limited. In the succeeding pages, an attempt will be made by text and diagrams, to explain the mode of applying the flexion test to the detection of disease and its resolution.

In practice it will be noticed, that the difficulty of applying the flexion test, decreases with an increase of the age of the person to be examined. Infants require extreme tact in its application. Subjects in the period of youth demand less skill, and adults, least, from the latter giving the surgeon willing assistance.

No matter how seductively the surgeon approaches some infants, under the age of three years, they will strenuously reject his studied attempts to ingratiate himself into their confidence: consequently, the ordinarily applied test becomes confused with

the infant's muscular expression of disgust at being examined. To get over this difficulty by administering æther would be to make the test give a less response. Again, the patient is not always ready to take an anæsthetic without preparation; again if æther was given, the surgeon would be more liable to strain his test and time would be lost. The game of giving æther is not worth the candle, especially as it can be played without one.

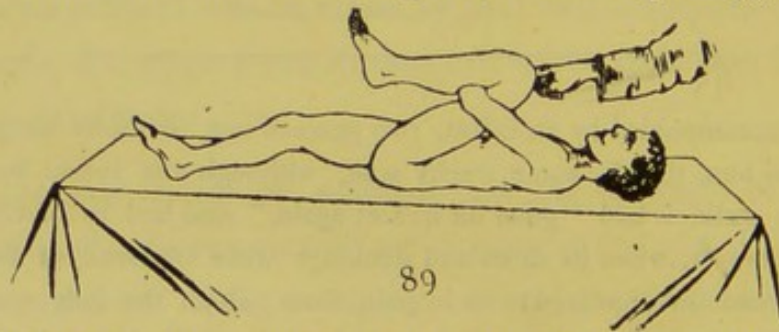
If the reader scans fig. 88, he will see depicted the initial action of the single ordinary test; it is also the primary proceeding for testing an unruly infant purely by manipulations. The process will be here described, by the introduction of an ideal case:—



A lady, accompanied by an infant, two years of age, consults surgeon B., and informs him, that for some weeks past, although the infant had commenced to walk, it had "gone off its feet again," and had to be constantly nursed, moreover, when its shoes and stockings were removed or being replaced, it cried and appeared to be in pain, from which the lady concluded, that there was something wrong with the infant's lower limbs. She was not certain whether both limbs were affected or only one—she suspected the the left one; the infant's grandmother, however, suggested that it might be some injury to the spine. The surgeon having listened to this rather unedifying history of the case, requested the lady to totally undress the infant, and it was placed upon a table, on which was spread a warm rug. The infant being now on a plane, horizontal surface, the surgeon poses the struggling infant perfectly supine and requests the lady to hold it so, by grasping both

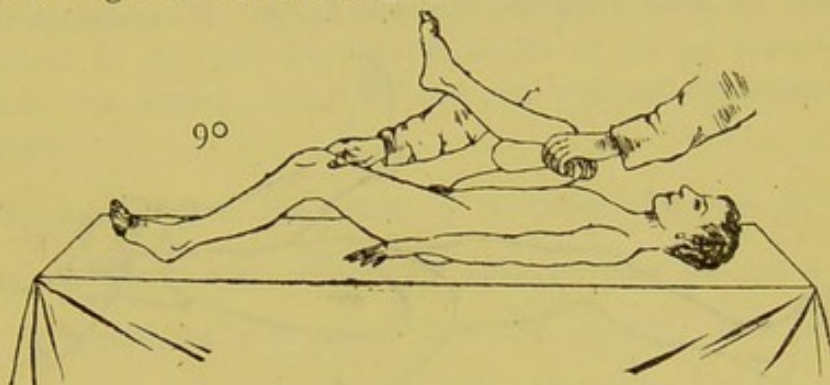
shoulder joints, to control and maintain supinely the cantankerous patient. Now, the surgeon grasping the infant's knees with his hands, allows it to struggle freely for a few moments, then being on the alert, and trusting to tactical information conveyed from the patient through his hands, he is prepared when the infant, during its limb struggles, happens to flex the right thigh on to the trunk, to suddenly, with his grasp of the infant's flexed knee, capture and maintain the accidental flexion of the hip. If the surgeon finds that no accidental flexion, suitable to his purpose is happening, then let him control the limb which he wishes to have flexed, in the direction of extension, conveying to the infant a false impression, when it will resist extension in the direction of flexion—the surgeon has then only to second the infant's efforts, and instantly complete flexion takes place, which the surgeon captures and now maintains. Although the surgeon has just practised a deception upon his turbulent patient, the sufferer in his excited state has not noticed it, and so the operator prepares to complete the test by committing further deceit, indeed, he is able unawares to the infant to repeat the test several times so as to confirm the diagnosis. The surgeon now grasps the uncaptured limb, and makes a gentle but deceptive effort to flex this; the infant is sure to determinedly resist in the direction of extension; during this opposing effort, the surgeon suddenly seconds the patient's efforts, assisting extension, and takes note of its extent, making a deduction therefrom—then the surgeon, to make certain of his diagnosis, reverses his deceptive manipulations, and thus he is able to detect which of the hip-joints is unsound, or whether both be so.

Experience informs the surgeon, that frequently, children



from three to ten years of age are sometimes as ill-mannered and turbulent as infants, when the surgeon may find it by no means easy, to steadily and without overstrain control the limb. This difficulty can be surmounted by passing the flexed arm of the patient under the knee-joint, interlocking the upper

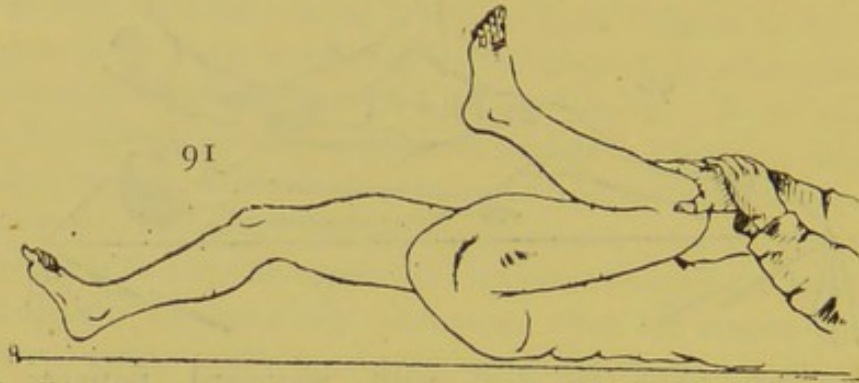
and lower extremity, as shown in illustration, fig. 89 and fig. 90, which are right and left testings.



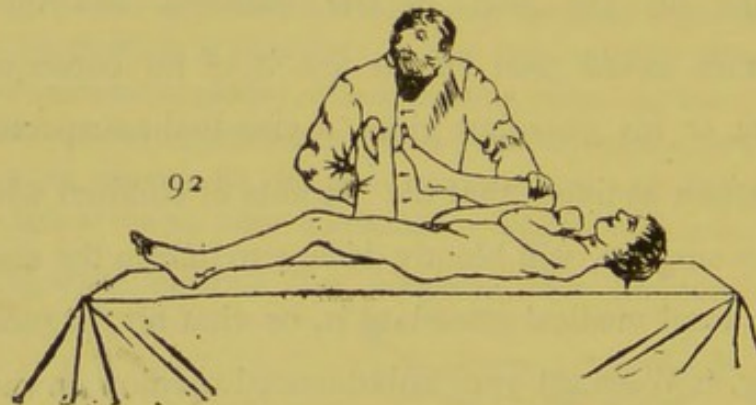
When we have to deal with wayward patients, we cannot apply the usual initial test, as shown in fig. 88, which requires gentle and careful manipulation, as well as concurrence on the part of the patient; but the omission of this initial part of the test is of no consequence, if the patient, or his guardian gives a clue to the suspected limb. It will happen at times, that the parents of children when consulting the surgeon, will bluntly decline to inform the consulted, who their usual medical attendant is, or what his diagnosis was, remarking, "We want your uninfluenced opinion on the case," so that the surgeon is expected to make a diagnosis without a clue to the suspected limb, when he must naturally feel, under the circumstances, that his diagnostic skill is being put to a severe test, but the surgeon, may make the attempt, and can succeed in forming a correct diagnosis. The procedure under the foregoing described disadvantage is as follows:—

A youth, about 7 years of age, was placed upon a rug-covered table, and the surgeon placing his hands over both trochanters, was conscious that the left one felt a shade thicker and more prominent than the right, whether from atrophy of the parts around or enlargement, was questionable. By sighting,

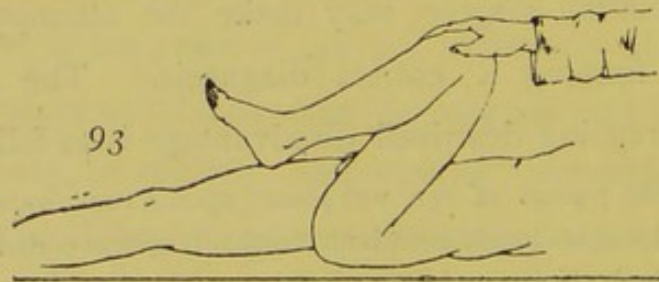
no difference was discernible. Now the surgeon—the patient concurring—gently flexed both hips as far as they would comfortably go, as Fig. 88, watching the Ischia, to avoid overstrain, as seen in fig. 91. It was noticed, that the



left hip did not flex quite as much as the right one, as fig. 88, the surgeon now, carefully avoiding over-strain, captures, that is fixes, the flexed right hip showing the greater range of flexion, and requests the patient to extend the left limb, as fig. 92, which he does, but not very rapidly, and the surgeon



notices the boy's inability to fully extend the left limb. The surgeon is now convinced that the left limb is affected, but this knowledge, he as yet reserves to himself, and he next subjects the youth to a double test, Fig. 93. testing by flexion of an unsound limb and extending the other. The youth



is requested to again flex both hips and the left limb captured, that is main-

tained at its abnormally limited point of flexion. Then the operator requested the youth to extend his right lower extremity, which he did smartly to full extension. The surgeon then requested the boy to be clothed, and announced his diagnosis—slight inflammation of the left hip-joint. The diagnosis was correct, though all clue was withheld and no lameness was observable.

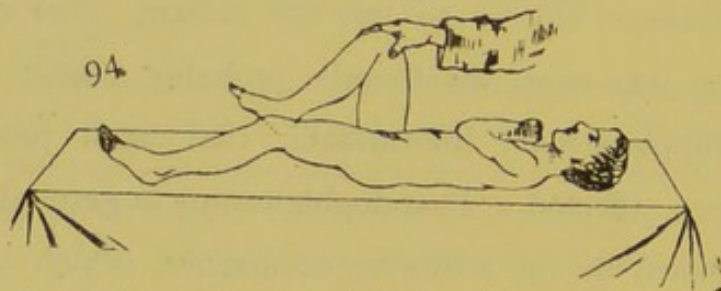
The foregoing is the report of a case, one out of several actual occurrences:—When the surgeon was put to a crucial test, it stimulated him to so test the patient, that when the examination was over, his friends probably could not give him the supplementary information, that both joints were, or had been affected. That double testing is generally advisable, is shown by the following occurrence, which happened this year:—

The surgeon was consulted by a man, about 22 years of age, accompanied by his sister, a Glasgow District Nurse. The consulted specially requested the patient and his attendant, not to give him any clue, as to which of the two hips was the affected joint. The patient was placed supine, the surgeon's usual single test applied and he announced his diagnosis, as inflammation of the right hip joint. The patient and his attendant immediately contradicted him, maintaining that it was the left one. The surgeon then modified his diagnosis, without total recantation, and stoutly maintained that in the past there had been inflammation of the right hip. The surgeon was now conscious, that he had missed an opportunity for a display of his acumen by omitting to doubly test the patient. He now proceeded to do so, and was able to affirm the patient's asseveration, that the left hip was affected. By further conversation with the party, the following information was gained, that the patient was a tailor by trade, and that for several years he had been unable to cross the right thigh with the left in the manner of tailors. The actual condition of the patient was, slight flexion and limitation of motion of both hip joints, from a secondary cause—trochanteric inflammation.

The foregoing incident is truly typical of the omissions we are apt to make, and it brings to my memory many cases,

where the omission described was not committed by me, and so the patient's confidence was gained early. I will now describe the details of double hip testing, figs. 93, and 94.

The single hip test having satisfied the surgeon, that one of two joints is or has been affected, he releases the untested limb from the flexed position in which it was held while testing the suspected and detected one, then flexes the detected one as far as it will go without tilting the pelvis—that is overstraining the test,—as shown in fig. 94, where it is obvious the flexed thigh

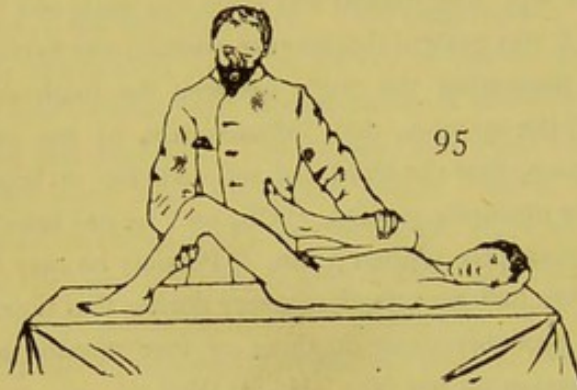


there shown does not go to the normal degree without tilting the pelvis. Then the surgeon, steadily fixing the abnormally limited flexed limb, instructs the patient to extend the uncontrolled one, now if that, is or has been affected—and never undergone treatment—there will be noticed some limitation of its extension; this constitutes double testing, Fig. 94 is the act of testing a left hip, both joints affected. Fig. 93, the testing of a right one, the left only being found diseased.

In Fig. 94, the flexed limb is shown limited in flexion, and maintained so by the surgeon at about a right angle with the trunk. This angle in relation to the trunk could be lessened, by overstraining the test and so making it valueless, as in Fig. 91, by tilting, with the thigh as a lever, the pelvis from the plane.

The flexion test has another phase of some utility, it enables us to approximately point to the duration of the disease, whether it may have lasted from one to thirty days, or from one to twelve months; but I do not affirm this knowledge to be indispensable

to successful treatment, but rather as useful in forming a prognosis, and gaining the confidence of our consultees. During disease of the hip-joint, mechanically uncontrolled, the angle of flexion varies between about 170° and 90° with the trunk, and this variation generally is a key to the time and intensity of the



disease. After a little experience, the surgeon begins to learn the art of reckoning time by flexion and so nearly accurate, that very frequently he is able to correct the sufferer or his guardian, and be confirmed by their admission. I will now relate an ideal and a real case :—

A lady and gentleman consult the surgeon, regarding a youth about 10 years of age. From a conversation with them, the surgeon was informed that they suspected hip disease. The youth having been undressed, and placed to recline upon a suitable surface, the surgeon submitted the joints to the flexion test, and found that the right thigh was limited in extension, so that it, in relation to the trunk, formed an angle of about 140 degrees as illustration fig. 95. The surgeon expressed his opinion in concurrence, that hip joint disease did exist, and had occupied the joint for at least three or four months. Those however in charge of the youth, said, "Oh ; dear no ! We have only had him from school six weeks." The surgeon dissented, while admitting, that he might perhaps have been removed from school, on account of lameness about six weeks ago, yet that from the amount of flexion present, the complaint must have existed a long period. The conversation ended in the lady and gentleman admitting, that some three or four months back, the

boy had complained of feeling the limb weary in the evening, and aching at night, but these symptoms they had attributed to "growing pains."

An actual occurrence, like the foregoing ideal one, not at all uncommon in practice of the flexion test:—

A lady from Oldham, consulted the surgeon regarding her boy, who had some defect of the left hip. The patient was about five years old. On applying the single flexion test, it was evident that disease existed; the flexion was about 130 to 140 degrees, measuring the angle between the thigh and trunk. The surgeon expressed the opinion, that inflammation of the joint existed and added the information, that the child had suffered for at least three or four months. The lady promptly replied, "Oh, no! he has been bad two years." The surgeon as promptly replied again, "Possibly he may have suffered for two years, but he has had periods of recovery during that time, and this is the last attack, which probably came on three or four months ago. The lady, with evident satisfaction on her face, said, "Well sir, you are right."

Another actual case:—

Some two years ago, Surgeon T. repeatedly examined the child of Mrs. E. for hip disease, by the flexion test. The mother had occasionally observed slight lameness, but on no occasion, when examined by the flexion test, was deformity or lameness to be observed. At the end of nine months, Surgeon T., in connection with Dr. C., again examined the child, a girl about eight years, but no trace of lameness or deformity was to be detected. After this Surgeon B., a university teacher, examined the girl, but his diagnosis was also against the existence of any disease. The girl now remained under the observation of her usual medical attendant, until the lapse of eighteen months, since the first consultation with Surgeon T. At this juncture, Surgeon T., accompanied by Dr. C., visited the residence of Mrs. E., to again examine the child. Now, on applying the flexion test, there was evidence of inflammation of the joint, which must have existed not less than three months. Mrs. E., on being informed of this diagnosis, confirmed the time estimated by remarking, "You are right, Doctor; she had a severe fall at school three months ago," so that by the flexion test, the time was correctly estimated.

As a good example of double testing, I present the reader with the following, more especially as the case illustrates a phase I have not referred to, testing one joint with motion, the other joint

anchylosed. Indeed, up to the time of this accident, I had overlooked the possibility of such a complication, a test of "the test."

On Sunday, March 20th, 1890, while doing clinical work, assisted by Dr. Adela M. Knight, of Australia, a patient presented herself for examination suspecting disease of the right hip joint. Our examination revealed that the left hip joint was anchylosed from the effects of disease at an angle of 175 degrees more or less; under these circumstances, a modification of the usual manner of testing was required. The patient being placed upon a rug on the floor, I placed my open hand under the lumbar region of the back while Miss Knight placed one hand under the popliteal space of the patient's left knee, and raised the knee, arresting it at such a height, that I felt that the compensative curve due to the thigh flexion—175 degrees—was obliterated. Now the patient's right hip was tested for extension, and not the slightest trace was noticed; the patient was informed that no disease existed. This the patient confirmed, adding that some lumbar pains had alarmed her and she had merely consulted us to make certain that no disease existed.

By the flexion test, inflammation of the hip can be early diagnosed, whether affecting one or both hips, and the time it may have existed can be estimated, but the foregoing does not empty my "lap." This test enables the surgeon to avoid undertaking the treatment of cases, that can recover without any fixation, yet without defect remaining. Thus needless treatment pointed out in the following quotation is not practised:

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"The plan of fixing the affected hip-joint by securing the thigh to an iron rod, fastened into an iron crosspiece, bent so as to inclose the chest, introduced by Mr. Thomas, of Liverpool, gives better fixation than can be given in any other way compatible with locomotion, which becomes possible by the help of crutches and a high shoe. Since Dr. Hutchinson's cases have been published, those reported by Mr. Thomas, as cured by his method have less value as evidence, as the suggestion is inevitable that many of the cases might have recovered without the use of mechanical fixation. Whether this latter is necessary, and when it is necessary, are questions which can be determined

only by further observation. In rejecting extension, except that given by the weight of the limb, Mr. Thomas certainly deprives himself of a valuable aid in treating hip diseases, although he may have been successful without it.”*

In mild cases of hip-joint inflammation, such as those with an angle, in relation with the thigh and trunk, of 170° , it has been my practice not to immediately resort to any mechanical treatment but to examine the case weekly for at least two or three weeks. If it be noticed, that the limited flexion is diminishing and the area of extension increasing, my decision is always to withhold mechanical treatment, knowing the great probability, that it may never be required. Conversely, if the examination proved, that the amount of motion “grows less as time goes by,” the adoption of mechanical treatment is decided upon.* I have now exhausted the enumeration of the merits of the flexion test. This test will ultimately slaughter the various devices for extending, portating, distracting, encasing, and compressing by encasing various joints. As an example of the need of this test. I will give a quotation from a contribution to Orthopedics by an eminent specialist, it is as follows:—

“The amount of motion in the joint, when the disease is arrested, and the apparatus removed, is very apt to diminish somewhat with the course of years. Examination proved, that the amount of motion grows less, as the time goes by. †

Here we have it taught, that the arrest of disease in a joint is followed by diminished motion. What would be thought of a teacher in medicine, who informed his class, that the function

*As I never undertake to apply mechanical treatment to the inflamed hip joint if it is recent, rather testing for the progression of the disease so I have avoided the error referred to by Dr. E. Bradford, “Treatment of hip disease,” Boston, Medical and Surgical Journal, November 1880:—

†Dr. Schaffer, “New York Medical Journal,” May 21st, 1887.

of the part is very apt to diminish on the return of health. I could choose other examples, but have selected this, from the fact that its author refers to experimental tests. Whatever tests they may be, they are experimental only, not useful, otherwise in the same publication, we should not have had this confession of aborted practice:—

“At the time of discharge, several of these patients had a certain recorded degree of motion of the affected articulation. This motion entirely disappeared a few years later.”

Just so, the joints were unsound, and so lost all motion, by use while in that condition.

The want of knowledge concerning the “Flexion test” of disease and recovery, has led to the publication of statements which, viewed by the light from this “test,” appear ludicrous, for instance, the following taken from the statement of a surgeon, who has specially devoted himself to the tormenting of articulations:—

“The use of the weight at night is a matter of great importance. If it be neglected, you will find in many cases, that although all active disease has ceased, the limb will, in the course of a few months become flexed upon the trunk.”

The recurrence of flexion will not result on suspending treatment if the part has become sound, unless there be, not a relapse, but a secondary onset of the complaint. It is no wonder that Dr. C. L. Taylor has put on record the following:

“The symptoms generally relied upon as diagnostic of disease of the hip-joint are worthless, for all practical purposes of anticipating the graver stages or of affording indications for treatment.”

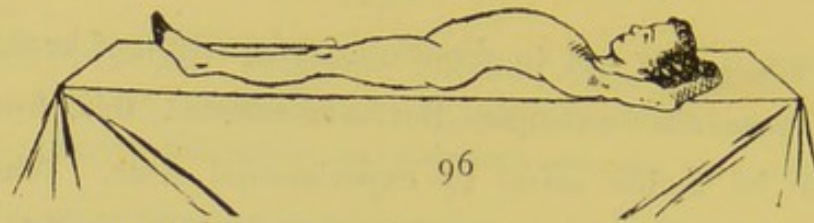


Fig. 96 is an illustration of the compensating curve usually observed whether one or both hip joints be affected, if the patient is placed upon a horizontal plane and urged to extend the limbs.

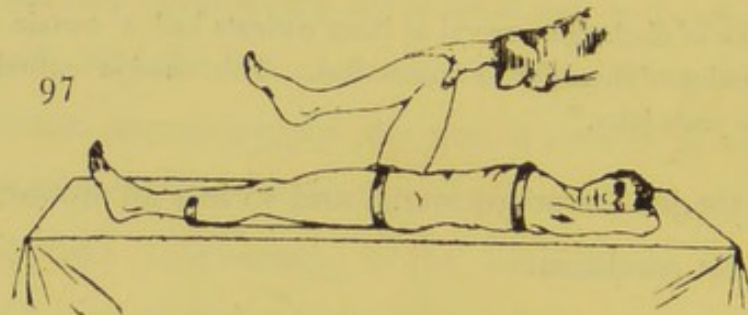


Fig. 97 shows a patient suffering from disease of the left hip-joint and recently fixed in a posterior fixture-splint, entering upon prefatory treatment, the reduction of flexion, the limited flexion of the right thigh shows that the flexion of the left hip has not been reduced and so the painful period has not passed, this variation of the flexion test enables us to calculate from day to day the amount of flexion reduced, until the minutest degree has been overcome and the right thigh completely flexes on to trunk. The foregoing is a description of the test by control of the unsound limb.*

*Before closing my remarks on the flexion test, as applied to hip disease and its cure I will draw the reader's attention to a paper read at the Annual Meeting of the Massachusetts Medical Society, June 11th, 1878, by Dr. Edward H. Bradford, M.D., of Boston, U.S.A., on "Reflex symptoms in Hip Disease." Had this paper been read four years earlier, it might have been suspected to have been one of the fountains, from which I drew my knowledge and not a coincidence. The axioms at the end of this very able paper comprise the essential particulars of the flexion test. They are as follows:—

1—"Serious disease at the hip joint may exist when no pain is complained of, and when no tenderness can be discovered.

2—Hip disease may be present, although the motion at the hip joint is quite free.

3—If the motion at one hip joint is more limited than at the other, hip disease must always be suspected, and the symptom regarded as highly characteristic of hip disease.

4—At the earliest stage the limitation of motion most readily recognised is in the direction of extension."

The mechanical treatment of hip joint disease.—From a very assailable position, an eminent United States Surgeon, armed with a certificate referring back to the year 1872, has judged it worth some trouble to lay claim to a part of the furniture designed by me. Having read Dr. Andrew's certificate and Dr. Blanchard's claim, as published in the Medical Standard of Chicago, January 1890, it is my opinion, that I need not make use of a fact usually allowed in defence, that is, priority of publication. Then setting aside the question of priority of publication, which the plaintiff does not question, his position is still assailable. If Dr. Blanchard, before making his claim public, had taken the trouble to read my volume, published in 1875, he would have there found a case recorded, for which the hip splint was used, dating as far back as 1867; it had been in use then, I think, about two years.*

In the year 1868, again employing my present model of hip splint, the son of Mr Owen Einon, Lumber Merchant, of Utica, U. S. A., was treated with permanent success, and this after the failure to avoid deformity during treatment elsewhere. This patient died many years afterwards of Phthisis. In the same year, the son of Mr Griffiths, Chemist, of Aberyrn, South Wales, was subjected to the same mechanical treatment for hip joint disease with success, and he is now living.

Dr. Blanchard asserted that "the invention, even to the

* To make certain of no errors, a search was made this week, and my patient of 1867 found—a female—residing at 14, Greyson Street. Dr. Clarke of Huddersfield examined her with me.

minutest detail of appendage and use," was his own, but this he qualified, as follows :—

"Some surgeons have noticed, that my hip splint is exactly the same, with extension, in an axis with the neck of the femur added."

So Dr. Blanchard's splint is at least a variation as to "the minutest detail of appendage." As to the use of this appliance, how has it happened, that while I was assailed by the majority of American Orthopedic Surgeons, as having introduced an invention theoretically wrong, impracticable and injurious, that Dr. Blanchard never once, during fifteen years, came to the rescue ! It is true, he has not opposed me. In justice to Dr. Blanchard we ought to suppose, that had he the theoretical and technical knowledge necessary for making the splint a success, he would long ago have rushed into the fray, and not nursed his grievance so long. A perusal of Dr. Blanchard's article inclines me to the belief, that if he has seen my hip appliance, he has no practical knowledge of my method of fitting, without which it becomes merely a side splint, rather than a posterior one. A perusal of my writings will show, that I tend to err on the side of over, rather than under, stating my debts to predecessors, as I ought, knowing that many of them are no longer alive to state their claims.*

Having disposed of the only claimant, who has appeared against me, I will now try and answer objections advanced against the practical application of posterior fixation, by the

* Tamplin's Manual of Deformities, published 1846, contains an illustration, page 186, of a hip machine in character like the one devised by me : he employed it for reduction of deformity. It does not appear that he employed posterior fixation for the treatment of hip disease.

means employed by me. As American Surgeons have honoured me with fully as much attention as I deserve, their objections will be reviewed first. In the Boston Medical and Surgical Journal, October 24th, 1889, there is published a paper by a Mr. Huddleston, of Boston, U. S. A. The paper was compiled, not from practice, but from gleanings in the Boston Children's Hospital; Mr. Huddleston informs his readers, that "it has been found difficult to fit the splint, and more difficult to keep it in its place after being fitted," or to simplify his expression, after fitting it would not fit. Where was Dr. Blanchard, when the gentleman was in this difficulty? The calamities, reported by Mr. Huddleston as having followed the application of the so-called "Thomas Splint," were certainly remarkable, "One patient died and one has not been heard from." I can inform Mr. Huddleston of a still more remarkable occurrence in my own practice. Dr. R. Gorst, Sen., of Huyton, and myself had made an appointment to apply the splint to a hip-joint, only in the subacute stage of disease; the patient unaccountably died forty eight hours before the splint was applied! Mr. Huddleston's contribution was read before the American Orthopedic Association, and has since been referred to by Dr. Schaffer in the New York Medical Journal, November 23rd, 1889; these two facts dignify the article, and I believe are the only medical qualifications Mr. Huddleston possesses. The next published objection to posterior fixation comes from a source, which from personal knowledge of the publisher, I am constrained to attach much importance to his

opinion; the adverse commentary is here re-published, taken from a re-print of Dr. E. Bradford's paper on "The treatment of hip disease," dated 1880, pages 16 and 21.

"The writer has been able to watch in the past five months a few cases treated according to Mr. Thomas's plan. One, an active child too young to use crutches, visibly lost in general condition from the confinement of the splint. Another gained both locally and generally, but complained of the irksomeness of the apparatus. A third has improved, and is free from active symptoms, but is inclined to lay aside his crutches and step on the affected limb. The apparatus is readily furnished and easily taken off."

"NOTE.—The following case came to notice as this article was going to press. It appears to illustrate the disadvantages of Mr. Thomas's splint."

"CASE XXI.—A boy aged five, with hip disease, had been treated for several weeks by complete fixation in bed and an extension by weight and pulley. The symptoms, which have been acute, have subsided. There was no swelling, pain, or tenderness about the hip, and the case had been progressing favourably for some time. A Thomas splint was applied and accurately fitted. On the following night, there was severe nocturnal pain, which increased on the next night. The next day the hip was found swollen and tender, and the limb sensitive to jar. The symptoms all disappeared immediately on removal of the splint and the readjustment of the extension. The boy has since been progressing well, as before. The coincidence was so marked that there could be no doubt that the disease had been aggravated by the splint, and that this exacerbation was stopped by its removal. It should be said that in six other cases where Thomas's splints were applied nothing of this sort has occurred."

The observation "that a child, too young to use crutches, visibly lost in general condition, from the confinement of the splint," is neither evidence for, nor against any means of treatment, as a treatment has not yet been found, which will infallibly and immediately arrest the disease. Neither is the second observation, "another gained both locally and generally, but complained of the irksomeness of the apparatus," conclusive

that the appliance was suitable. The irksomeness mentioned may have arisen from prefatory treatment, reduction of deformity or mis-fitting. Returning to "case 21"—

"A Thomas's splint was applied and accurately fitted," the observation which follows, "On the following night there was severe nocturnal pain, which increased on the next night."

This inclines me to believe, that probably the machine was correctly modelled; if so, "the severe nocturnal pain" would inevitably follow the application of the splint, if there remained at the hip joint some un-reduced flexion, and only on the correction of which, the night and other pains would cease. This is undoubtedly the explanation of the report "That in six other cases, where Thomas' splints were applied, nothing of this sort has occurred;" in these cases there could not have been any flexion to reduce. In a volume entitled "Reference Handbook of the Medical Sciences" recently published in the United States, there is a very concise and able article on "Chronic disease of joints," page 359, and in it there is to be found the following commentary:—

"The Thomas' hip splint, introduced by Mr. Thomas, of Liverpool, is an appliance used in England, and has many points of usefulness. It does not, however, furnish complete fixation, nor does it prevent the occurrence of subluxation, or counteract the spasmodic muscular contraction of the muscles connecting the lower extremity with the pelvis—so important a feature in hip disease. The appliance, however, prevents motion of any noticeable amount, enables the patient to be lifted without jarring the hip, and prevents flexion of the thigh. In certain acute cases the pain may be increased by the Thomas' splint, from the fact of the imperfect fixation furnished. The leg and thigh are firmly held by the appliance, i. e., the flat rod to which they are bandaged.

A substitute for the Thomas' splint, made of stout iron wire, introduced

by Dr. A. T. Cabot, of Boston, will be found of use in the case of smaller children, and is more readily fixed than the ordinary Thomas' splint."

All the objections advanced in this extract, have been already noticed and explained as not valid in a previous page of this "Contribution." There only remains for me to draw attention to the fact, that a single posterior fixative splint, if constructed of round iron, could not be modelled without employing a vice and tube tongs, and even then the modelling to fit right or left side, would have to be performed while the iron was bare, that is, had not been covered with leather. Any person suggesting to me, that round iron should be substituted for flat iron, would lead me to suspect, that he had not learned the manipulations required to make the splint an accurate, useful and comfortable fit.

Several American Surgeons have objected to the leverage, inseparable, they say, from the treatment of the hip joint by posterior fixation; they quite overlook the fact, that the leverage ceases as soon as the utmost flexion has been reduced, and continues in abeyance, so long as the fixation is kept in a state of efficiency. Those surgeons who persistently advance the "leverage" objection against my treatment, are well represented by Dr. N. M. Schaffer, of New York, who is known to me as the author of the most rationally written volume on "Spinal Curvature," that I have ever read, but the author of the most irrational contributions on "Joint Diseases." His last contribution on this subject appeared in the New York Medical Journal, November 23rd, 1889. In that contribution to hip-joint disease, like a politician in office, he argues for, in one

part and against in another, so that, whatever be the ultimate decision of surgeons on the disputed point, it will remain a vexed question what Dr. Schaffer's opinion really was. A critic, weighing this article by Dr. Schaffer, remarks :—

“ He teaches treating Ostitis by immobilization, and synovitis by motion, that is to say :—When the bone is diseased, and the articular surface not, he would immobilize ; while, when the synovial membrane is diseased, and the articular surfaces are affected, then he would give motion. He uses the Taylor hip splint, when the disease is in cancellous tissue of the head of the femur, which does not immobilize. While in tubercular synovitis of the knee, he uses a splint, which does pretty perfectly prevent motion at the joint. He cries loudly for traction to relieve traumatic contact, he uses it where the disease is not located at the articular surface, and does not use it where the disease is located, at the articular surface. He cries out against leverage in hip disease, but uses the Taylor splint, which being placed laterally allows the joint itself to become the fulcrum.”

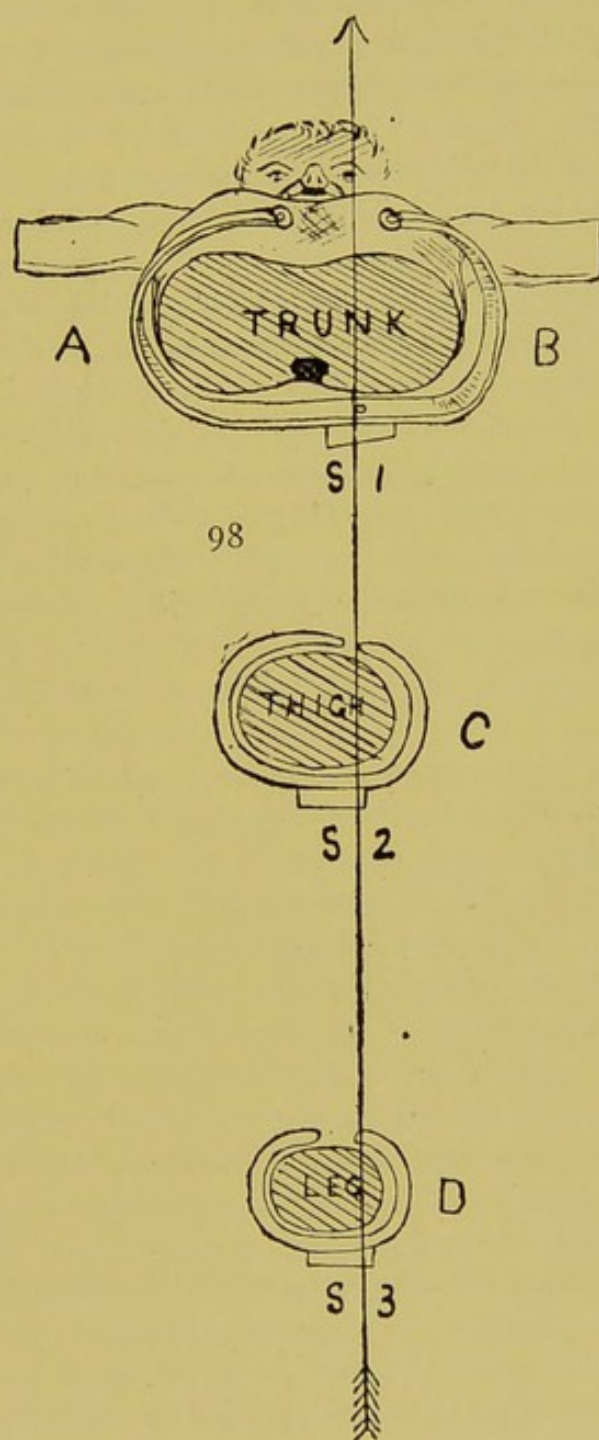
Dr. Schaffer, in this and other lectures, maintains concussion and intra-articular pressure to be the main evils, contra to my opinion, that friction and surgical compression are the prominent factors maintaining and aggravating the complaint. At the close of his contribution, he points to Mr. Huddleston's paper as evidence in support of some of his opinions.

Since my advocacy of posterior fixation, for the treatment of hip-joint disease, many surgeons in this country have adopted my mode of treatment, but only a few have concurred in the principles regulating the use of posterior fixation, the change introduced by me in practice being only that of placing the fixation posteriorly instead of laterally, a mere modification

of the practice of my predecessors. This explains perhaps the readiness with which posterior fixation has been adopted here.

The extension method, devised by James, and tried for the treatment of joint diseases by Brodie, never had a firm footing in this country, being theoretically opposed to the principles well established by our predecessors and accumulatively confirmed by practice. In Britain, objections to my method have taken the direction of modification, by additions to the appliance, so as to enable the surgeon, ignorant of the mode of fitting, to get it to remain in position; consequently, as soon as the fact becomes known, that by attention to certain details the splint can always be made to fit, then devices complicating the appliance will cease to be added. The only addition to my posterior fixative appliance worth notice, is the use in combination with it, of laminated splints and plaster of Paris. This is a theoretical and practical error, an item to the treatment of a hip joint, which increases a tendency to the progression of the disease.

Before describing my method of applying posterior fixation to the hip joint, and to make its description clearer to the reader Fig. 69, which at page 90 is somewhat obscure, is here reproduced and enlarged. The illustration consists of three sectional views of the trunk and hip-appliance when in position during use; looking in the direction of the arrow, from the lower extremities upwards—of course the head is partly hidden from view by the trunk section—the Fig. 98 illustrates the application of the splint to a left hip.



The foregoing illustration will be referred to as occasion demands in the illustrative cases that follow.

CASE A. —A boy about 10 years of age, is brought to the surgeon accompanied by his father, who is desirous to learn whether his son has any ailment affecting his right lower limb, as the boy has complained of debility and pain around the cap of his knee; these symptoms, have caused the father to suspect that the knee was the site of the boy's complaint, if any existed. At the request of the surgeon the boy's trousers were removed; then the surgeon having felt and observed the boy's knee joint, remarked, "The knee is healthy, please let the boy be totally unclothed." Afterwards he was subjected to a single and double test of the hip joints, with the result that, the surgeon announced he had diagnosed hip joint unsoundness of recent onset. The boy was now re-clothed and the surgeon's advice to the parent was this, that as the case, as indicated by the flexion test, was of recent origin it would not be advisable to immediately resort to mechanical treatment, because, if the complaint was of traumatic origin there might exist a strong tendency to recovery, which could be increased by only a partial suspension of the function of the joint, with restriction of the boy's mental and bodily activity and attention to his general health. If this advice was accepted then the hip should be again tested after the lapse of 7 or 14 days. The parent accepted the surgeon's suggestion.

On the boy being re-examined at the expiration of 14 days the flexion test showed no diminution or increase of the angle made by the right thigh with the boy's trunk—175 degrees about. The surgeon advised another delay of 14 days, guided by the fact that the complaint had not progressed. He added to his previous advice, "If we do not on our next examination, find distinct evidence of improvement in the articulation, then mechanical treatment ought to be applied;" the surgeon remarked also, "So far there has been no vantage lost by the delay and none will be lost by carefully watching the case, so that we shall have the satisfaction of knowing that a treatment somewhat irksome and tedious, if resorted to, was unavoidable in the interest of the patient."

When the boy returned the third time, for re-examination, the surgeon on applying the flexion test, observed very obvious evidence of a progression of the complaint, and he now urged the parent to allow the boy's right hip joint to be mechanically controlled. The parent acquiesced and remarked, "The boy's mother and myself had come to the conclusion that he was not improving and that you would be now doing more in the way of treatment than you have hitherto done." The surgeon now applied to the boy the means of posteriorly fixing the hip joint shown in Fig. 99, a front view, and Fig. 100, a back view when fitted to the patient. The surgeon's procedure of fitting was this, the boy being unclothed and reclining upon a rug-covered table, he was

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requested to lie in a straight line and extend his arms from his trunk, and remain quiet, as he would not be hurt. The surgeon now taking a hip splint Fig. 61, of suitable length, looked along the main stem of the splint, to see if it required adapting to the right side, and found it to have been finished without design, to be used either left or right; the surgeon requested the boy's parent to steady the splint, lying on the table, by grasping the lower wing, but the assistant wished to steady the splint by grasping both lower and top wings. This the surgeon objected to, remarking that it made the change he wished to make more difficult to perform; the next step on the part of the surgeon was to apply to the main stem of the splint two wrenches as Fig. 68, and as the splint was intended to be applied to the right hip, the wrenches were worked in a direction contrary to that of the arrows, shown in Fig. 68, until the mainstem had a slight rotation of its axis, so that all the portion of the splint, comprising the "buttock bend" down to the smallest lower wing was rotated in a direction posterior to the buttock and lower limb, while the trunk portion from the buttock bend upwards was rotated in an anterior direction. The surgeon now took up the splint and viewed it laterally, remarking to his assistant, that twisting of the main stem very frequently destroys the parallelism of the trunk and lower portion of the splint, by making a curve or lordosis from A to B, Fig. 67, on its inner aspect, whereas it ought to be a straight line. This malform was found to have occurred in this case, and was corrected by the application of the ratchet prongs of the wrench Fig. 60. Having made this last correction, the surgeon took hold of the boy's right lower limb with the right hand, and holding the splint in his left hand, the larger upper wing of the splint was slipped under the patient's loins, and the surgeon steadying the lower limb by traction of the patient's ankle, pushed up the splint into position, so that the large upper wing was close to the axillæ; then gently lifting the lower extremity, still maintaining slight traction, the splint was finally rotated and pushed into position. The operator now took a side view of the result, and it was evident, that while the patient was reclining and perfectly supine, no part of the splint was in view, except the outer portion of the wings, as Fig. 97. The surgeon now gripped the boy's thigh close to the knee including the splint, so as to temporarily hold the splint in position, and turning the boy over on his left side, he examined the "buttock bend" to observe whether or not the flat of this bend was in parallel apposition with the buttock; he noticed it was not, so as the inner edge of the "buttock bend" rather indented the skin, the surgeon rectified this by applying his wrenches and by reversing their action reduced some of the excess of twist, previously given to

the trunk portion of the mainstem. The boy was now restored to the supine posture, and the surgeon, with the aid of the ratchet ends of his wrenches, exactly modelled all the right halves of the several wings, ; the upper left one was made to exactly fit the contour of the chest just above the nipple, the middle left one to fit the thigh close to the groin, and the lower left one adapted to the form of the leg below the calf. The next act of the surgeon was to forcibly open out the right half of the upper wing, so as to get one or two inches of "plane surface" of the wing between the mainstem and the point at which he intended to start and curve the right half of the upper wing to its permanent form ; see Fig. 98.

The permanent form of left half of the upper wing, was a curve, commencing from the short plane, following the contour of the chest, but unlike the right half, it was not in close apposition ; see Figs. 69B and 98B. The surgeon remarked that the interval between the right chest wall and the right portion of the upper wing answered several purposes. It gave the patient room to occasionally escape from the left part of the wing, and diminished also the tendency of the splint to rotate outwardly, and that this interval should not be so large as to impede the patient's arm being brought to his side. Now the outside portion of the middle wing was fitted, just like the last described, but with a shorter plane close to the mainstem, then curved so as to almost meet the opposite half of the middle wing as seen in Fig. 98C ; finally the lower wing was fitted in principle like the two others, but it was noticeable, that to the lower wing, the surgeon did not give it the care in modelling, which he expended upon the fitting of the larger wings. The surgeon now remarked that there only remained for him to apply the shoulder braces, thigh and leg bandages. Turning the patient on to his side the calico braces were soon wound round the mainstem just below the upper wing ; then with a needle 18 inches long the calico was drawn through rubber tubes, which are intended to protect the patient's shoulders from the chafing of the rough calico ; the ends of the calico projecting through the two tubes, were reeved through an iron eye at each end of the upper wing, and then were suitably connected by knotting and pinning. The thigh just above the knee was now bandaged to the lower portion of the mainstem with a bandage 2 yards long and 4 inches wide. While performing this part of the operation the surgeon remarked to the boy's parent thus, "The two bandages I am now applying you will have to watch daily, and if you notice that they become slack, then please make them moderately tight again, replacing the thigh one just above the knee, always avoiding compression of the knee-cap ; otherwise, pain may be complained of around the knee, unconnected with the complaint

which we are treating. The lower bandage must be applied as I am doing, just above the lower wing, and be careful to include the mainstem in its grip." The surgeon now turned the patient again on to his left side and examined the posterior aspect of the work done, and not feeling satisfied with the "buttock bend" he without disturbing the splint from its fitted position, with his hook wrenches he slightly strained and untwisted the mainstem. Then the patient was re clothed, after which the parent of the boy had the following conversation with the surgeon :—*

P.—I have forgotten to mention, that we live several miles out of town, and will have to take the Railway home. How are we to carry the boy, as he is rather heavy to carry in arms?

S.—Let the boy stand, supported by you during his cab drive from here to the Railway Station; afterwards in the train he can do so again, if the carriage is so crowded that reclining is not practicable.

P.—Again doctor, suppose the machine chafes him anywhere, what are we to do?

S.—That is an improbability, as the deformity present is so slight, and there will be no great strain at any point; still you had better let me see him early if any chafing of the skin be noticed.

P.—When would you like to see him?

S.—This being the initial fitting, some alteration is sure to be required in 4 to 7 days, so I would like to see him at the expiration of that time.

P.—Do you not wish to see him sooner?

S.—No, as I want the slight flexion utterly reduced and the pain probable to arise from the reduction, to have subsided, before I finally fit the splint. It now fits well, but in 7 days hence it may be an indifferent one.

P.—Then you expect much pain to follow your treatment?

S.—This is a recent and mild case of inflamed hip joint; less than 12 hours may reduce the deformity I demonstrated to you. If so he will have no pain; if however the complaint has existed longer than we supposed, the reduction may take three times 12 hours, and the patient may have a few uneasy and sleepless nights, but such vigils are of no consequence I inform you in anticipation, otherwise probably you will release the patient in the middle of a storm, as

* By looking, on the line of the arrow Fig 98, it will be observed that it passes through the centre of the trunk part of the mainstem and left of the centre of the two limb portions although the mainstem is an apparently straight bar. This is however the result of the twisting to adopt the machine left and right as may be required; and it will also be noticed that the sectional view of the trunk part of mainstem is not parallel with that of the limb as seen in the two limb sections.

unreasonable as if a sailor was to jump overboard in rough weather and stay in his vessel during fine weather.

P.—I am glad to have been informed of this, as very probably I should have taken the splint off if only to appease his mother. Do I understand you aright, that until we bring him again you wish the boy to remain constantly reclining.

S.—I do.

P.—How soon do you think he will be fit to go on crutches, with patten, as I am told your other patients go about, when suffering from this complaint?

S.—As soon as we judge that the boy has recovered, so that such going about cannot much delay his recovery.

P.—I hope his health will not suffer by the confinement to the couch and house.

S.—Better to be confined to couch and house, with a great chance of the resolution of a disease, than to be out of doors daily, the disease increasing meanwhile.

P.—Could he not be taken out in an invalid carriage reclining?

S.—Yes, as soon as we find that the ordinary jarring of nursing and clothing, gives the patient no distress on the joint, when indeed to an unprofessional observer the case appears cured.

P.—One or two more questions if you please; his mother has just remarked to me “could not a lighter splint be applied,” the boy also says “it is heavy.”

S.—Yes, a lighter one could be applied, but I will not apply such. The boy has been brought here to be benefited bodily, not amused; the splint is heavy, but it is to bring about a good exchange. Its wear and weight will do away with disease, a greater weight; a lighter machine would really be only an addition to the weight of the complaint.

P.—Just one question more. We have been told that some of your splints come down to the knee.

S.—Your information is correct, but they are useless, except for supposed permanently stiff recoveries or very mild traumatic cases of adults, and only then as guards after supposed recovery.

P.—Well, we will return in 7 days; and now being fully informed, we must carry out your instructions; the boy's mother desires to know if there is any danger of the boy's knee becoming stiff.

S.—The knee is not the seat of the ailment, and so cannot become permanently stiff. If the mere resting of the part, irrespective of disease, could lead to permanent stiffness of a joint, it would be unsafe for many of us, to stay an extra period in bed. You must have noticed that pedestrians who

undertake to walk a 1,000 miles in 1,000 hours have to leave the track and go to bed to slacken their over heated joints.

P.—Ought our boy to recline upon a feather bed or mattress ?

S.—A feather bed is to be preferred, as when he lays on that, the mainstem sinks into it and so the patient feels less of the splint pressure ; the unevenness of the bed is of no consequence, as the splint will, if properly attended to, maintain the joint extended and free it from injurious variations.

The reporter's account of Case A. is an exact imitation of interviews for the application of hip splints, and a sample of the unedifying dialogues that have often occurred between myself and the parties consulting. The answering of enquiries, gains for the surgeon the consultee's confidence, and to me is often an amusing exercise. Such questions are always to be encouraged ; it is better that a surgeon should answer rationally, than that the questions should be secretly discussd in a conclave of the patient's friends, members of professions wide apart from either medicine or surgery. We will now introduce the reader to the second interview.—

Continuation of Case A.—

The boy was again brought for the surgeon's inspection, on the tenth day after the first application of the hip splint ; the boy was carried by a porter into the surgery, and while he was being undressed, the surgeon entered the room, and the boy's parent accosted him as follows :—

“Well, Doctor, we stayed rather longer than you told us, this is the tenth, not the seventh day ; several reasons induced me to make this delay, principally, I noticed your unwillingness that the boy should be carried about, and I saw the impropriety of it ; further, just as you foretold, beyond a few hours discomfort, he really never complained after we left you, and the appliance seemed to remain exactly posterior to the buttock, where you placed it. This day was also more convenient for me to come. We are pleased with the child's progress so far, and much hope that when you examine him now, you will alter your opinion, that many month's treatment will be requisite ; still we must submit, if you think that the time cannot be curtailed with safety.

The boy had now been unclothed, and put to lie on the rug-covered table, and as the surgeon approached to examine the patient, the parent followed him, remarking, "The splint is exactly as you left it, Doctor; it has not moved or altered." The surgeon replied, "That is all very well, but you see the boy has settled down on the machine; the wings require contracting, the shoulder braces have stretched and require shortening." This defect the surgeon performed in about four minutes, about a third of the time he employed in the initial application. The surgeon, addressing the parent, said, "As regards your wishing to know whether the time of treatment could be curtailed, let me draw your attention to the fact, that before commencing treatment, we gained the assurative knowledge, by reasonable delay and observation that in the part affected, the tendency was in the direction of the progression of the disease; consequently we must not by frequent attempt at diagnosing recovery delay the advent of it.

The parent now requested an answer to one more question,—“Is there any fear of our having a stiff joint here?”

S.—Do you mean as a result of fixing the joint, or of the disease.

P.—Both. For instance: in the Journal of the American Medical Association, of March 29, 1890, page 466, in a report of the Orthopedic section, there is found referring to hip-joint inflammation this opinion, “ankylosis was the result of inflammation and immobilization of an inflamed joint; and the arrest of function was a primary antiplogistic.”

S.—I fear the report is not a correct one; or if so, certainly, the speaker was incorrect, as the last part of the report contradicts the first portion. Please consider for a moment, and let us suppose a fatal case of Typhoid; would you judge these two factors, absence from business and reclination in a bed to be errors in his medical treatment tending to extinguish life.

P.—I am satisfied; but your remark about medical treatment, reminds me to ask you does my son require any medical treatment?

S.—No special treatment is indicated as yet. It is my desire first to notice what surgical rest to his joint and what is popularly termed, “rest” of other parts of his body will do towards increasing his general vitality, of which the inflamed part will share, and so regain good recuperative tendency.

P.—Just so. When would you like to see the patient again?

S.—Let me see him here again in six weeks.

The boy in case A. was fixed as shown in Figs. 99 and 100, front and back views.

On the patient re-visiting the surgeon at the appointed time, the parent

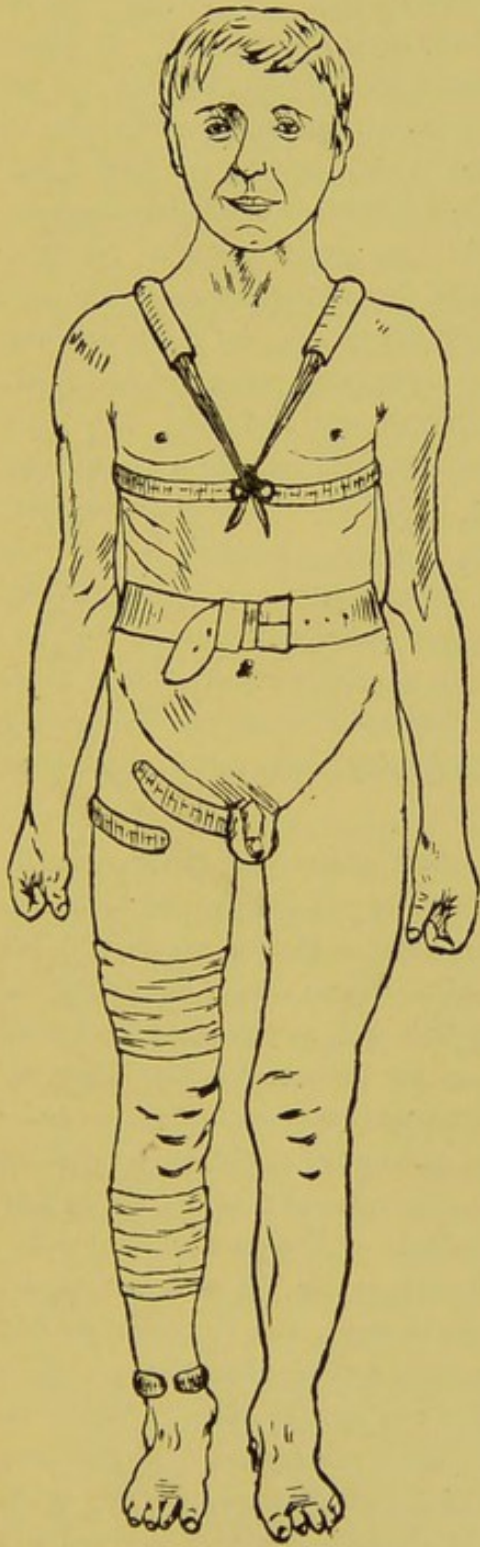


Fig. 99.

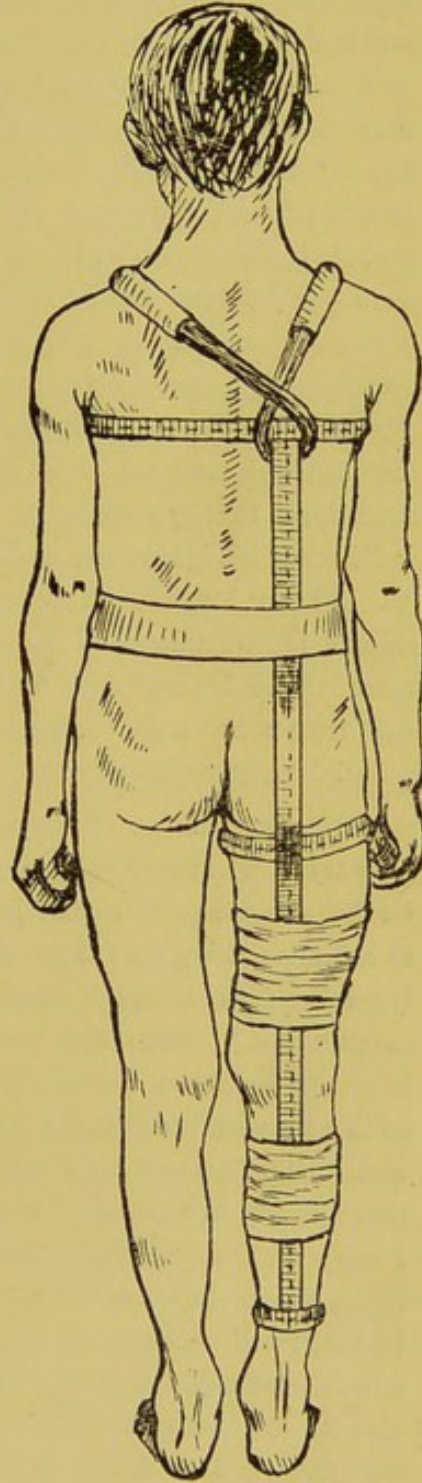


Fig. 100.

reported progress as follows :—“ We have got on very well, no pain day or night since our last interview, indeed we think the boy is quite well ; he sleeps and feeds well, and we think he might be allowed to go on crutches, but we will abide by your decision.” The surgeon on examination by manipulation of the patient’s groin, also around the trochanter and applying the flexion test Fig. 97, to judge whether any deformity in the direction of limited extension existed ; found that while the limb which was under treatment lay fully extended, the other thigh would completely flex on to the trunk. The surgeon now informed the father, that although the patient had done well, the period of treatment was unreasonably short for securing permanent soundness, consequently, another two months’ reclination was advisable. The boy’s parents assented to this decision, but remarked, “ Doctor, will you not loosen the bandage, and try whether the joint is stiff?” The surgeon declined, remarking, that by doing so at this period, it might reasonably be taken as evidence of his ignorance, and if he were not so judged, any intelligent critic would know it would be an act of frivolous curiosity, because at the termination of treatment, all the motion due to appropriate and efficient treatment would be awarded, and only in proportion to our care in carrying out treatment uninterruptedly and consistently with certain established principles ; so ended this interview.

At the termination of two months the patient re-appeared, accompanied by his parent, who remarked,—“ I quite expect that you will give him his liberty on this occasion ; our friends, in conjunction with his mother and myself, fail to notice anything the matter with him, and of late no change except that he is gaining flesh, although we have restricted his diet, as you advised, to three meals a day.” The surgeon now examined the patient and after doing so, informed the parent that the boy’s condition was very satisfactory, so much so that he would permit the boy to go out an hour before dinner and evening meal, daily, just to loiter about, but during the remainder of the twenty-four hours he was to recline. The parent remarked,—“ Using crutches and patten I suppose ;” to which the surgeon answered,—“ No, he does not require them, the resolution of the disease has been so rapid, that by to-day we find he has, to all appearance, overrun the necessity for such precautions ; I would like to see the patient at the end of another two months’ time.” When this had elapsed, the patient again visited the surgeon, accompanied by his guardian, who remarked to the surgeon,—“ You have had him now, Doctor, nearly eight months under treatment, we think him quite well and we hope you will be able to suspend treatment, many of our friends think that it has been unnecessarily long and that after all, it may have been only rheumatism.” The

surgeon replied—"Diagnosing that the case was rheumatic, and merely physicking would not have cured him; as for the time expended in the treatment, it has been exceptionally short, had the treatment been exceptionally long, from our neglect or inability to diagnose recovery, no harm would have been done beyond waste of time." The surgeon now examined the patient, testing him with the splint on, for any slight recurrence of deformity consequent upon the liberty given the patient; the evidence was satisfactory. The surgeon now released the limb from the limb-portion of the splint, and placed his hand between the splint and the knee, in the popliteal space, at the same time requesting the patient to avoid controlling the limb, he now gripped the knee and gave it a few shakes, and found the hip-joint loose. The surgeon told the boy's guardians, that he would release the limb from all mechanical control, and let the boy make moderate use of it daily, but to avoid the sitting position for a week or ten days, also that the patient might either stand, walk, or recline and to return again for inspection at the end of six weeks' or two months' time. The examination by the flexion test two months afterwards was so satisfactory, that the patient was pronounced permanently cured.

Case B is another illustration, and like A, is ideal, but will be found quite parallel with a type constantly met with.

Case B :—A child from 6 to 7 years of age, is brought to the surgeon for examination, suffering from some lameness of the right lower limb. The surgeon having placed the child unclothed upon a rug-covered table, after examination, announces as his diagnosis, the existence of hip-joint inflammation which had existed at least four months: the thigh making an angle of about 160 degrees with the trunk. The surgeon also added the information, that in the direction of treatment, the mechanical part of it would have to take the foremost place. To this advice, the guardians of the boy assented, the surgeon then proceeded to fit his posterior appliance for reducing the obvious deformity and to afterwards uninterruptedly fix the hip joint. This being done in the manner of manipulating case A. with slight changes consequent upon the variation in development of this particular patient; for instance, this one being much more robust than the previous patient, the buttock bend required to be made deeper, and the parallelism of the trunk and limb portions of the splint restored, which had been disturbed during the alteration. The surgeon after fitting the splint, enveloped the boy in the rug, and told his guardians that he would complete the fitting in an hour, as by that time the machine would be quite a mis-fit, in consequence of much of the recently formed flexion having become reduced. At the termination of an hour, the

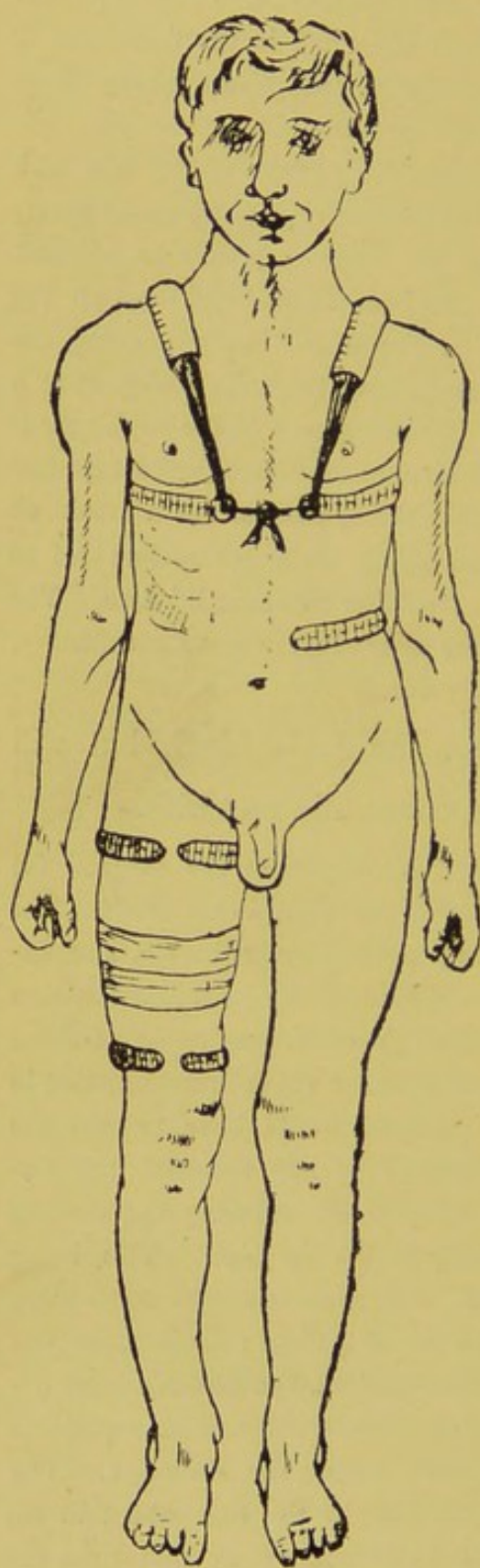


Fig. 101.

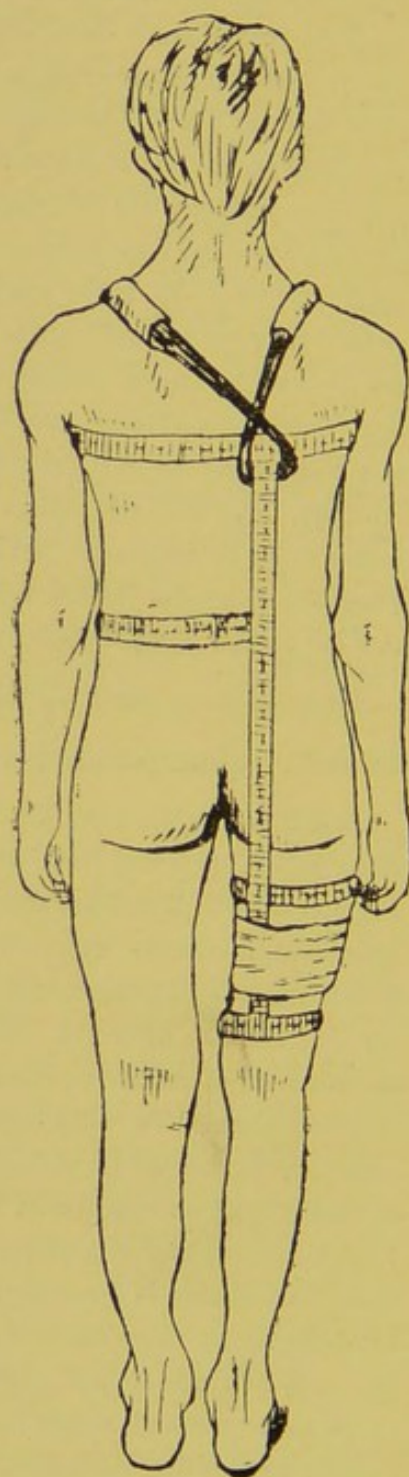


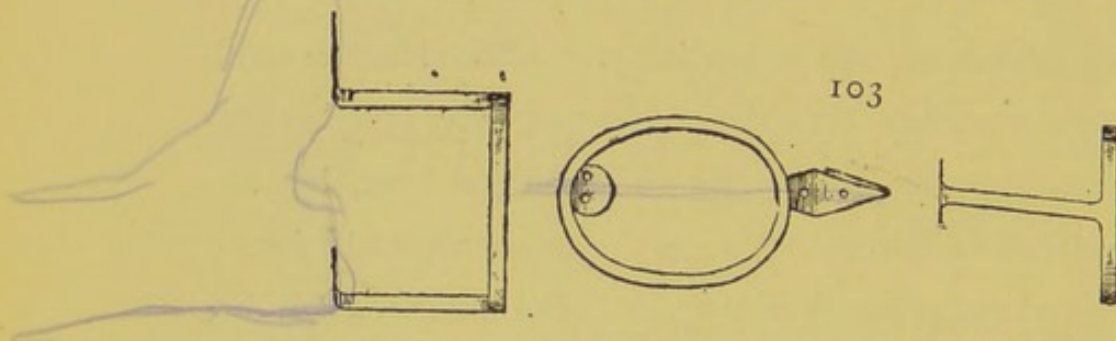
Fig. 102.

surgeon returned, and found the upper, middle and lower wings much too capacious ; consequently these were all contracted by the use of the wrench. The thigh and leg bandages were also tightened, and the guardians of the boy were warned, that for some hours only, the patient would have a tolerable amount of pain to endure, to which they were to give no heed beyond maintaining the thigh and leg bandaged firmly by tightening once a day. This case ran an uneventful course during the eighteen months of treatment. During the first four months he was kept always reclining, afterwards twelve months were spent reclining or using crutches and patten. During the last two months of treatment, the latter were dispensed with, and the iron walking hip splint, front and back views of which are shown in figs. 101 and 102 was substituted.

The use of crutches and patten is never advised by me until obvious symptoms have subsided. How a pair of crutches are to be ordinarily employed requires no illustration here, but an occasion does sometimes arise when the surgeon should interfere in regard to the length of the pair. For instance, if it be noticed that the pelvis is becoming tilted, that is, its wing corresponding to the diseased side is elevating, then the crutch worn on the side suffering ought to be shortened in proportion to the height of the tilt. Again, regarding the patten, its construction and application to the boot is of some importance, if we wish the patient to feel both comfortable and confident in using it. Fig. 103 will perhaps enable me to explain the advantages secured by adhering to a special shape. The illustration shows three views, side, under and front ones ; by looking at the side view, it will be noticed that the flaps point both in the same direction, both heel and sole flaps, this enables us to attach the patten to the boot, so that the posterior or heel-stem of the patten comes close to the posterior edge of the boot's heel. Pattens are often made with the heel flap pointing backwards, such a

crutch

one, when in use, gives the wearer a feeling of a tendency to fall backwards, to avoid which he has to lean forwards ; further, such a patten is always straining the tendo Achillis. The under and front views of the patten are here given to show the splay which ought to be given to the two upright stems of the patten, otherwise the wearer will miss some comfort, or if he has any tendency to splay of his foot a valgus would be induced. The patten delineated in fig. 103 is for the right side boot.



Case C.—The surgeon was invited to visit a youth residing several miles out of town, and reported to him as suffering from hip joint inflammation ; before starting to make the visit he was informed, that the measurement from the patient's breast nipple to the lower portion of the calf of his leg was 26 inches, consequently the surgeon took with him on his journey three sizes of hip machines, viz., 24, 26 and 28 inches, so as to make certain of having at least an approximate fit.

On making an examination, he found the patient suffering from inflammation of the right hip joint with obvious flexion and abduction. Finding the hip appliance 24 inches in length best suited the purpose of treatment, the surgeon performed upon the patient and the splint, the manipulations reported in detail in Case A—and as in Case B, after the initial fitting, remained by the patient a little while, lest some little correction might be required. The surgeon during the second inspection found that he had to amend his “fitting,” principally contracting the left halves of the three wings, but he had also to “descend” the left half of the upper wing, otherwise it was noticed that the patient's buttock escaped to the left from the mainstem of the splint, so that the machine was not more efficient than a lateral splint would have been. The arrangement as the surgeon left it at the time of his

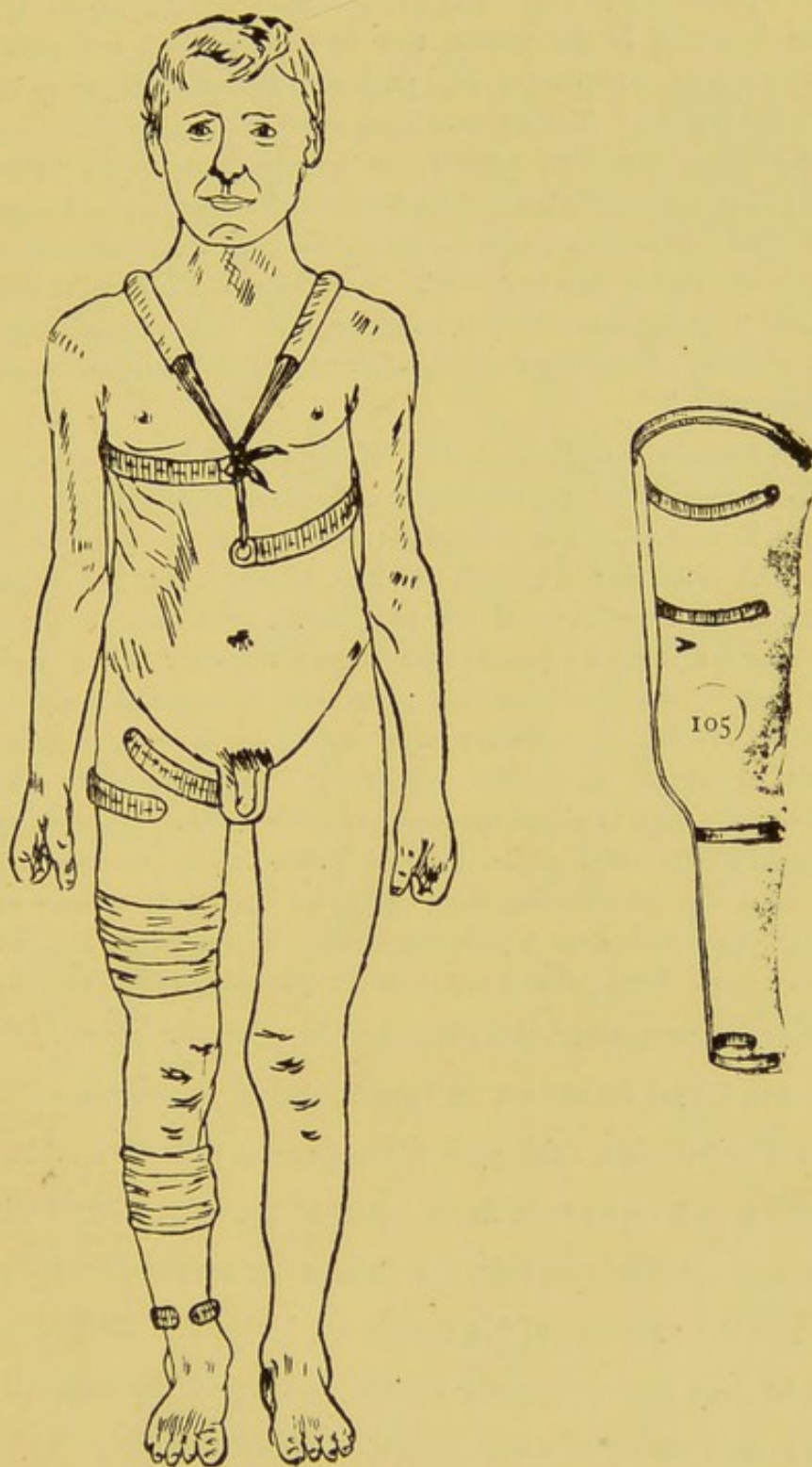


Fig. 104.

first visit is shown in Fig. 104. When leaving the house the surgeon informed those interested in the patient, that he would return in two days, and bring with him an extra portion Fig. 72, for the hip splint necessary in this case, for the left side. The surgeon being asked if he could give his prognosis of progress and cure, replied that he would venture to predict, as soon as he had successfully reduced the flexion and abduction, and when he had weighed the symptoms, after the correction of the deformity when all all friction and tremor were prevented. This visit was closed by the surgeon remarking, "my experience inclines me to the belief, that abduction cases are more troublesome to manage than any other cases of deformity accompanying hip inflammation."

On the second visit and examination of the patient by the surgeon, he found that "descending" the left wing to correct the abduction had answered fairly well, nevertheless, as it is not so trustworthy as an extra wing, this extra portion, which he had brought with him, he now applied. During the act of turning the patient upon his side to apply the extra wing, for the splint was not removed from the patient, the surgeon noticed that the posterior superior crest of the ilium was very prominent, consequently the splint was extra padded, so that its mainstem could not come in contact with the iliac crest, as friction against the crest would cause the patient to voluntarily abduct the thigh to escape the consequent discomfort. Fig. 105 shows the splint with extra wing, padded to avoid chafing of the posterior rim of the iliac crest, the extra padding extending along the whole portion of the trunk, part of the main stem terminating gradually, just where the buttock bend commences. Figs. 106 and 107 show the splint applied with extra wing.

Some sufferers, when we examine the posterior aspect of the pelvis, are found to have a sacrum bounded by prominent iliac crests on either side, such patients appear as if their iliac bones were set at a lesser angle than usual to the sacrum, in such, if provision is not made for this, the patient lies on the affected side to escape the pressure of his couch or his splint and is able almost to defy the surgeon's efforts to correct the abduction, that is symptomatic of a phase of the disease.

Seven days after his first visit the surgeon made a third visit and found the patient in this condition :—

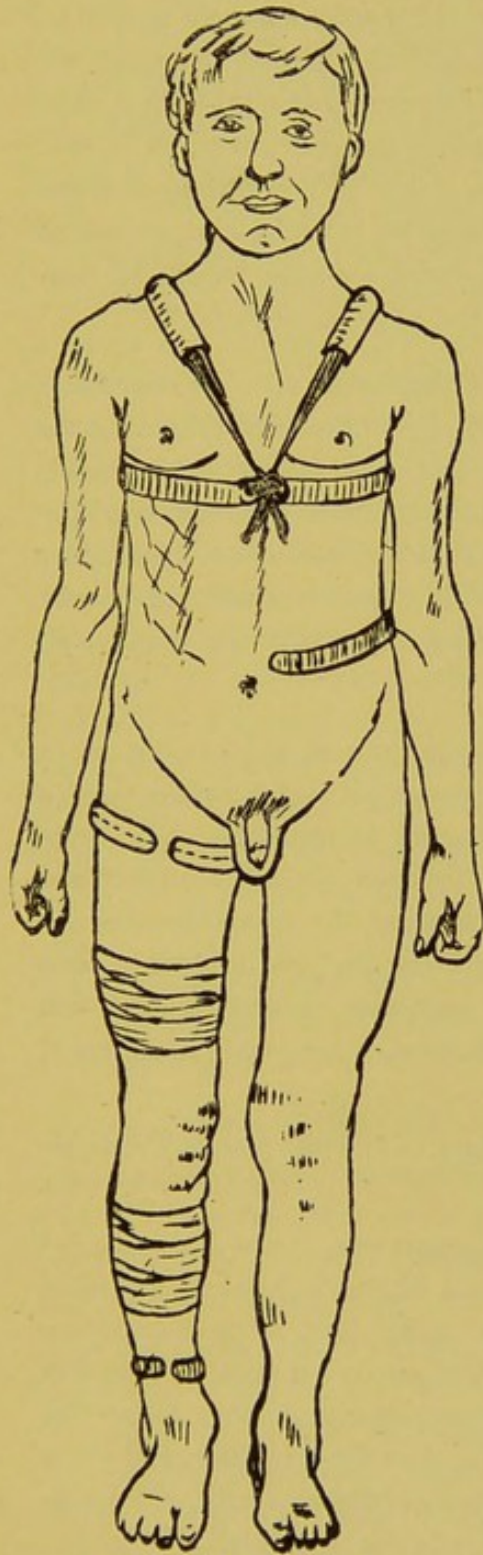


Fig. 106.

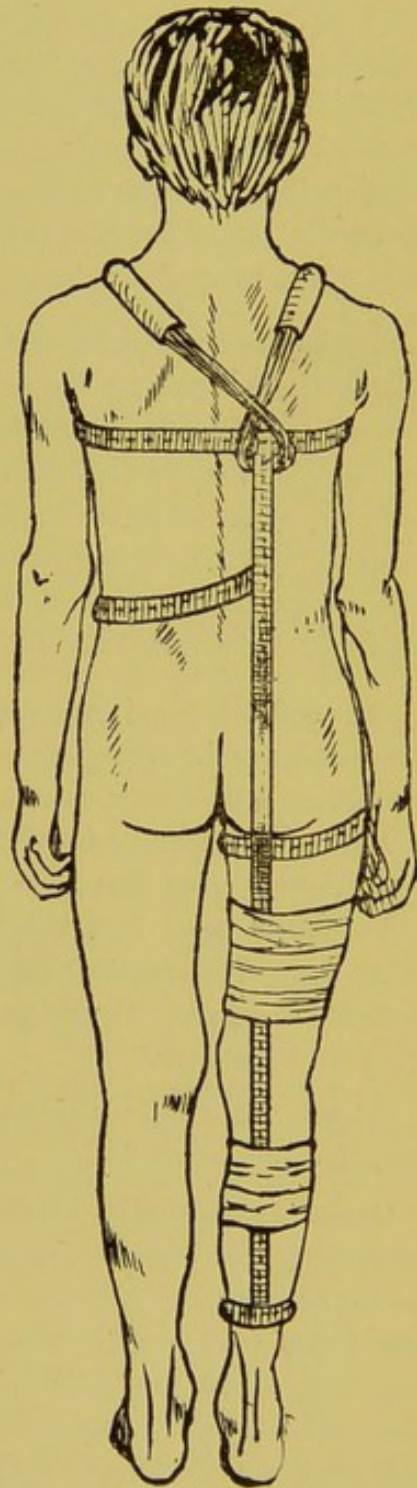


Fig. 107.

“The pain attendant upon the reduction of deformity disturbing and delaying sleep, had passed away, and so long as the sufferer was not moved, he felt free from suffering, on the surgeon manipulating around the joint, the patient complained of some discomfort, and the parts covering the joint were slightly swollen; the surgeon now left the patient, promising to return in four weeks, he had before leaving, instructed the patient’s nurse to daily re-adjust the thigh bandage, applying it close to the knee, but to avoid compression of the patella, as so doing gave cause for discomfort at the knee; but the leg bandage was to be applied rather close to the lower wing of the splint.”

During the examination of the patient at the fourth visit, he was found utterly free from pain by day or night, and any disturbance caused by the necessary manipulations of nursing, gave no pain; the patient was reported, as “sleeping soundly and feeding well,” manipulations by the surgeon of the parts around the joint gave no discomfort, and in appearance the joint under treatment and its coverings were symmetrical in comparison with the healthy one, except that the affected extremity appeared longer than the sound one, from evident downward tilt of the pelvis.

The patient’s friends now requested from the surgeon a prognosis, as to the prospect of the motion of the joint being conserved and deformity avoided also what length of time would have to be spent in treatment. The forecast given was the following:—“From the patient’s present condition and progress, we expect that motion will be conserved, the deformities of flexion and abduction must be avoided, no matter how the case progresses, and as to the period required for treatment, twelve or eighteen months will probably be ample. All this granted that the present favourable condition of the patient continues.”

“I will return again in six weeks, and hope to find the present favourable condition continuing.”

On the surgeon making his fifth visit, the report was, “that during the last week the patient began to complain of some discomfort at night, and when having the attentions of his nurse he has also complained, so much so that we have had to be careful when handling him and we do not think he has taken food with his accustomed relish.” The surgeon on examination, found that the affected limb now appeared rather shorter than the sound one, and it was evident that the pelvis on the unsound side was tilted upwards, manipulations about the joint evidenced, that the trochanter was slightly enlarged, and tender on percussion, and the patient at times, was conscious

of "knee pain." As the bandage had been applied so as not to compress the patella, it was an unalloyed indication in conjunction with other signs, that the previous very hopeful prognosis made by the surgeon was not to be totally realized. In answer to questions, the surgeon now announced an unfavourable change in the patient's condition. He informed the patient's friends, that the night pains indicated distension of the joint capsule, and that by its rupture and ease of pain, the present prospect would not be much improved, nor would matters be any worse than they were at present, and that ultimately an abscess might have to be dealt with, which might or might not, be absorbed. The surgeon, before leaving, promised to return in two or three weeks, advising in the meantime some medical treatment in principle, partly symptomatic and constitutional, and a continuation of strict adherence to the mechanical method, with the avoidance of unnecessary disturbing of the patient by clothing and unclothing, or by removing from one chamber to another. On making the sixth visit, two weeks after his previous one, the surgeon was informed that after the patient had taken the medicine for a week, night pain ceased, and the sufferer had begun to feed rather better—the attendants evidently erroneously attributing ease of night pain to the medicines prescribed; which were prescribed designedly to assist in improving the general state and indirectly the nutrition of the diseased locality. On the surgeon carefully examining the "joint part," he found on the inner side of the tensor vagina femoris and outer edge of sartorius muscle, a small and deep-seated fluctuation; the patient had to be gently manipulated, otherwise pain in the groin and down along the thigh was induced. The surgeon now advised a continuation of the treatment advised at the fifth visit, and promised to return again in three or four weeks.

At the seventh visit, the attendants upon the sufferer reported no special change, and an examination by the surgeon revealed no more than, that the previously deep fluctuation had become more superficial and greater in bulk—at this visit no change of treatment was advised. The medical attendant intimated that he would repeat his visit in six weeks hence. On making the eighth examination of the patient, the surgeon found that the patient's general state was much improved, he had begun to regain the bulk of flesh lost during the previous two months, and was feeding with better enjoyment; the pain on jarring the limb was almost gone. The fluid travelling from the joint had not increased in bulk though it had become now almost sub-cutaneous, and was descending along the front and lateral aspect of the thigh. The trochanter when compared with the opposite one, was felt decidedly enlarged.

After this examination, the surgeon was asked for his prognosis, which was as follows: "Well, we are evidently on the "mending" again, and hope to conserve motion, but must avoid abduction, flexion and its consequent shortening, possibly the shortening caused by the pelvis tilt may be also undone—but probably we may have some shortening arising from the fact that initially the inflammation arose in the femur head or its base, which would damage the vitality of the growing point of the upper portion of the femur, an unavoidable shortening. In this case, with the exception of the last mentioned defect, I hold the opinion that the termination of the case will be satisfactory, and if there occurs no relapse from the patient's present satisfactory state, then at my next visit in six weeks, it may be found prudent to allow the patient to go out into the open air on a patten, supported by crutches; the crutch under the arm of the affected side to be made an inch shorter than the other one, to aid the descent of the uptilted pelvis."

At the appointed time, the ninth visit was made, and the surgeon found the patient in excellent health, no pain complained of whether he was at rest or being handled; abscess not enlarging, but had further descended along the outer aspect of the thigh. The surgeon now readjusted the hip machine, improving its fit, necessitated by its long wear and the altered contour of the patient by his growth and extra nutrition. A patten and pair of crutches were ordered to be employed out of doors for an hour or two daily, weather being favourable—and the surgeon intimated that in two months he would return. However, before leaving, he gave the following advice to the patient's attendants: "It may happen that unexpectedly the pus collection may ulcerate through the skin, so you ought to be prepared promptly to meet this eventuality. Here is a prescription for a quantity of medicated wood sawdust to be applied three times a day, as soon as the skin gives way at the time that the contents of the abscess begins to leak through the skin, you can then leisurely write to me, and I will at once come here—furthermore, his daily exercise upon patten with crutches is then to be suspended.

Five weeks after his visit, the surgeon was informed by letter that the skin over the abscess had become partially discoloured or rather extra coloured and painful during three days, then had suddenly commenced to discharge. In a few days after receiving the foregoing information, the surgeon visited the patient, and found him in a condition much similar to that in which he was observed to be during his ninth visit, with exception only of the abscess having begun to leak through an opening $\frac{3}{8}$ of an inch in diameter, without constitutional disturbance. The surgeon taking a pair of blunt pointed scissors, slightly enlarged

the opening, and compressing the abscess, turned out a quantity of curdy pus and granular matter, then syringed out the cavity with a solution of Zinci Chlor. of about a grain to the ounce of water, afterwards replaced the dust dressing, giving instructions that it should be used in a liberal quantity, renewing thrice a day, also, that until the abscess had been disposed of, or at any rate for some time it would be very imprudent to allow the patient to go out of doors, but rather to constantly recline. This terminated the tenth visit, and the surgeon said that he would not return again for two months, except specially sent for, should any new phase appear.

In two months the eleventh visit was made, and on examination, the patient's condition was found still satisfactory—the abscess had ceased discharging during the previous two weeks—the surgeon advised a continuation of his previous advice, and the precaution of reclining for at least another three weeks, after which, the patient might resume his patten and crutch and go out of doors again, and if his present condition continued, the patient at the end of the next two months, might venture upon a journey to town to consult the surgeon instead of being visited by him.

In two months the patient visited the surgeon, who was so satisfied with his progress to recovery, that he took his measure for a walking hip splint Fig. 101, which he promised to have in readiness for application when the patient revisited him again in six weeks.

On the patient returning at the appointed time, the surgeon removed the long hip splint hitherto uninterruptedly worn, and applied a short one, front and back views of which are shown by Figs. 101, 102, during the change, the patient was tested by the flexion test for the deformity of flexion, and by manipulations for motion at the joint, both were satisfactory; while the shorter splint was being fitted the patient's parent remarked that "though shorter the splint was stronger in the mainstem, and so no lighter in weight, than the previously worn one," the surgeon replied that "now we have released the knee, the patient's power to strain the joint was greater, and provision to meet the greater strain was necessary, the short splint though only a precautionary machine had nevertheless to be made trustworthy, otherwise it were better to do without an untrustful protector," the surgeon was also asked "if the patient could now, better than before, assume the sitting position, the surgeon replied "the machine is specially intended to protect the late sufferer from over-strain during the time he sits sidewise upon the sound buttock." The patient was now dismissed with the request to return in three months, and in the meantime to go about without either patten or crutches, for several hours daily.

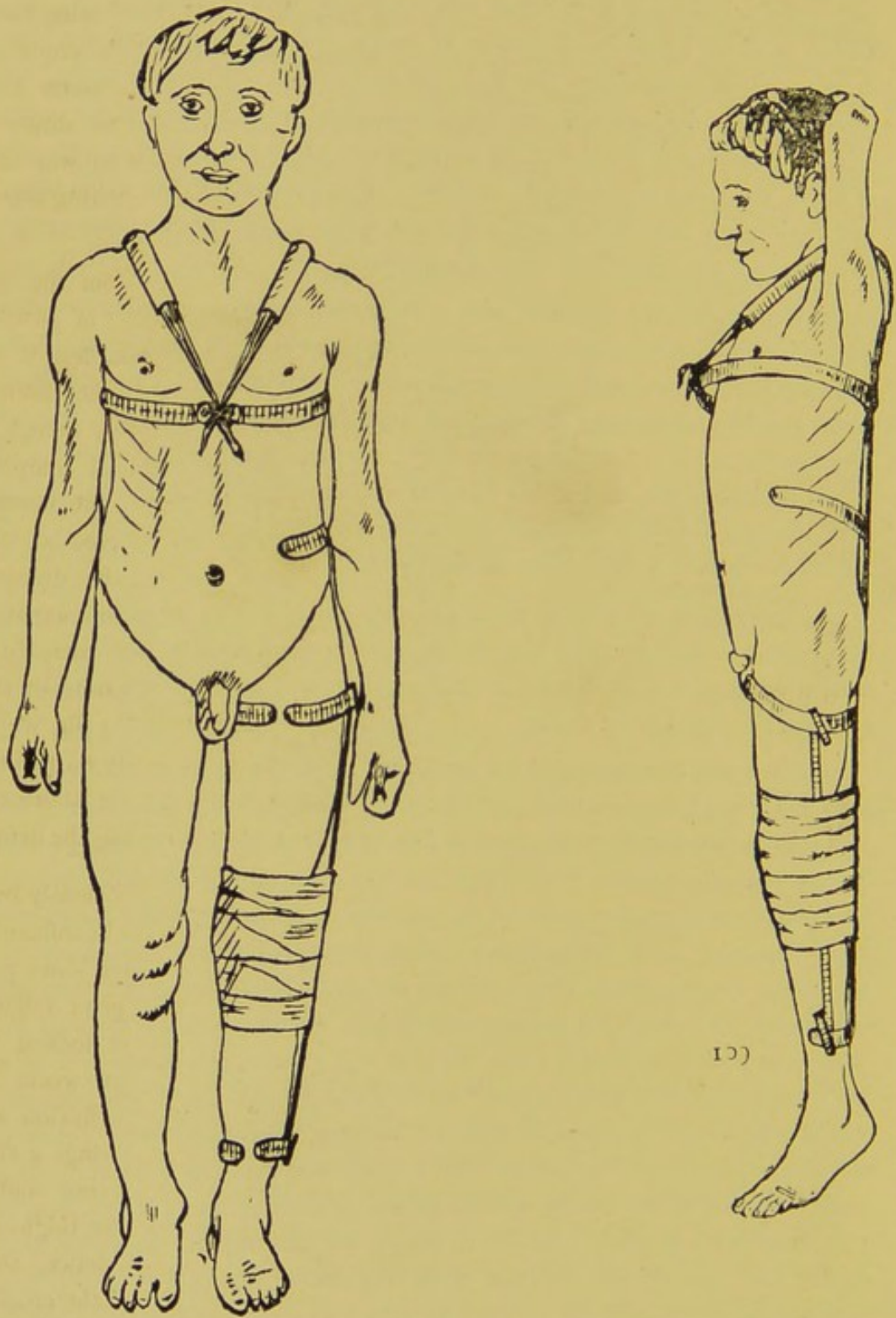


Fig. 108.

On the patient returning at the expiration of the three months, the surgeon thoroughly satisfied himself, both by cross questioning and physical testing that the patient had become cured, so he was released from mechanical control, and requested to return in six weeks to enable the surgeon to observe the crucial test of unrestricted use. When this period had expired, the surgeon again examined the patient, and found that the motion of the joint was increasing to and from the position in which it had been maintained during treatment, the sign of genuine recovery.

The only defect remaining in this case was a slight shortening, from the inflammatory action being initially femoral, so that the upper centre of growth had been checked. Concerning this defect, the patient's friends desired to know "if the lately affected leg would grow apace with the other limb." The surgeon's reply was that "this shortening would be permanent, though it might become less apparent in his gait by the formation of a special compensative curve, the pelvis on the side lately affected, tilting below the normal horizontal line of the pelvis; the upward tilt of the pelvis observed at one period had been corrected by the wearing of a short crutch on the diseased side, and now that the crutches were not worn, and the part was cured, I would advise that when the late patient is out of doors, he should carry in a satchel a weight of 6 or 7lbs, grasped by the left hand, the opposite of the side lately suffering; this will tend to give the pelvis the wished-for tilt, which will mask the defect that was unavoidable." The surgeon specially warned the patient's parents not to resort to an extra thickness of sole to the shortened limb before they had during a long period tried his plan for masking the defect.

*Tilt my
of pelvis*

Case D. is that of a boy brought to the surgeon, suffering very obviously from defect of his left hip joint, which on examination proved to be inflammatory, with the usual degree of flexion, indicating that it had existed some 7 to 8 months, there was adduction, internal rotation and a slight genu valgum. After a short consultation with the patient's parents, the surgeon locked the affected hip by posterior fixation, employing during the first two weeks the simple form of Thomas's hip slint, figs. 97, 100, and when the flexion was corrected there was added to the outer halves of the two lower wings a cross bar, as shown in fig. 108, a front view, and fig. 109 a lateral view and an extra wing to the outer edge of the main stem. In bandaging the thigh and leg, a deviation was made by the surgeon from his ordinary practice, thus, first the thigh and leg were bound to the mainstem, exclusive of the crossbar in his usual manner, but afterwards the knee mainstem and crossbar were gripped by an encircling bandage. Beyond the fact that an abscess formed

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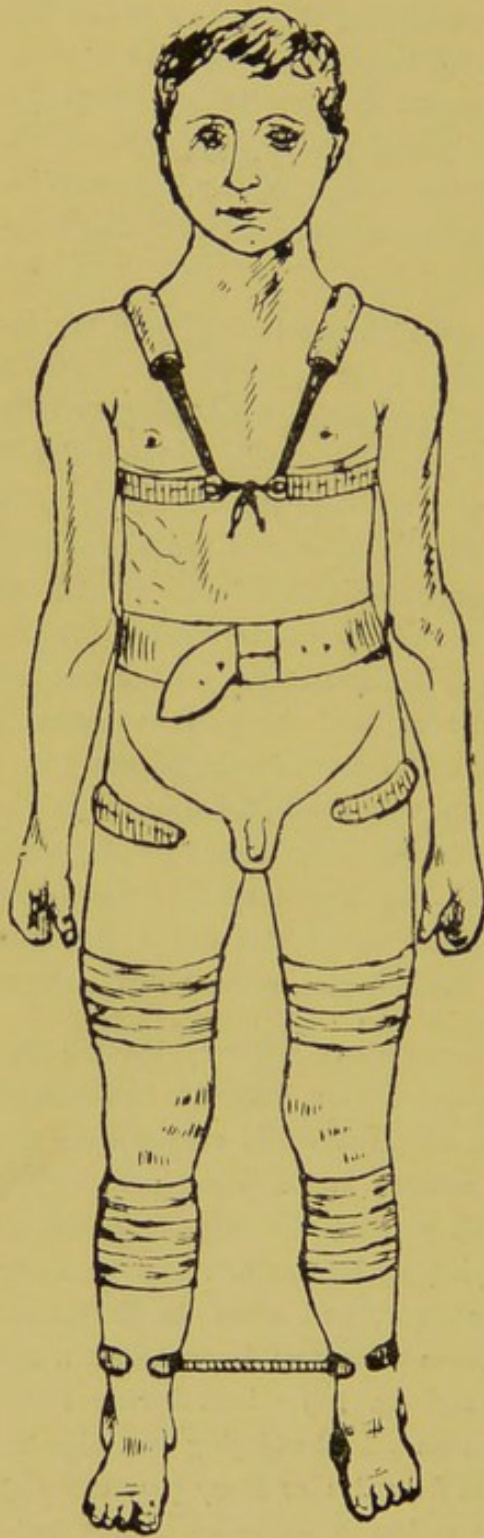


Fig. 110.



Fig. 111.

in this case which pointed behind the trochanter; the case presented no feature of special interest, it ran a course much similar to that of case C.

Case E. It was that of an infant 3 years of age. The parents were themselves confident that the right hip or thigh was affected, but after a painstaking examination of the child, it was evident that both hips were affected with inflammation, but differing in degree. It being decided that the child should be rationally treated, without delay the treatment was commenced by placing the patient in a double hip splint, as fig. 110, a front view; a posterior view is shown in use at fig. 111.

Case F. This case was that of a child 4 to 5 years of age, with long existing hip disease of right side, communicating with which were several sinuses anteriorly and posteriorly, some of the openings being so situated, that the application of direct posterior fixation to the right side, would have been inconvenient and troublesome to maintain clear, &c. The surgeon arranged his fixation as seen in figs. 112 and 113, the main portion being applied to the right side and a section only to the left diseased limb.

A few rules, relative to the proper order of applying the hip machines described in the preceding pages, will not be out of place here; by adhering to them, the operator saves time, avoids annoyance and the appearance of roughly handling the patient:—

First. The initial act should be, to place the machine so far posteriorly, that it is just out of sight at the buttock part, when the patient is lying horizontally.

Second. The machine should be pushed upwards, until the upper wings are close up to the patient's axillæ.

Third. An assistant should grasp the patient's leg together with the lower part of the main stem, to hinder the machine from slipping downwards, while the operator is manipulating it.

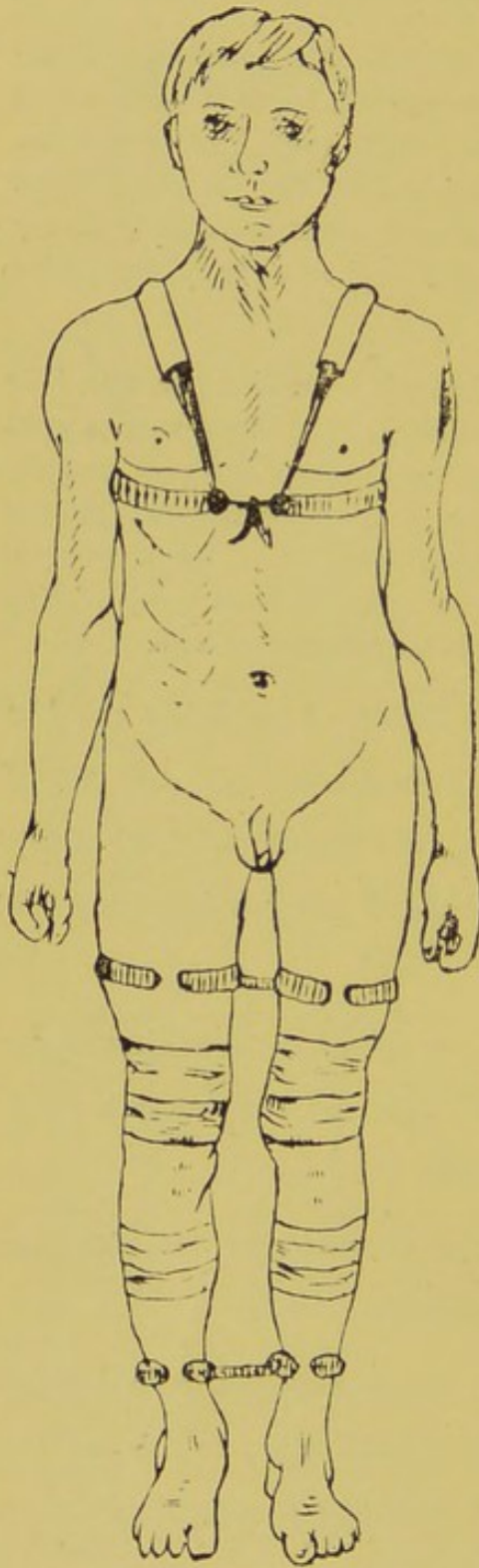


Fig. 112.

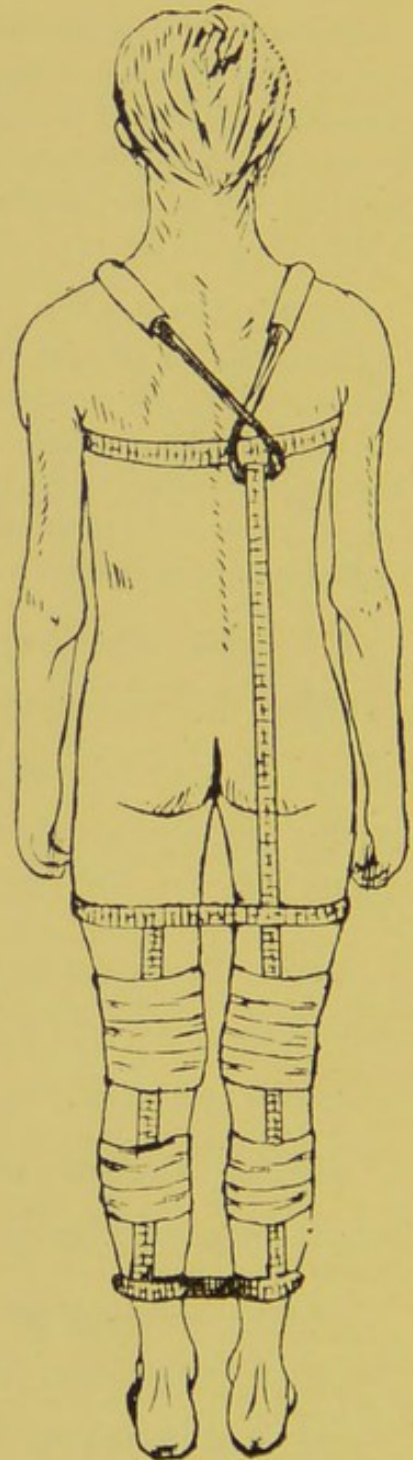


Fig. 113.

Fourth. The surgeon should proceed first, to closely fit the wings which grasp the sound side of the trunk, thigh then leg, see fig. 98, afterwards the wings B C D, fig. 98 are adjusted. page 233

Fifth. The shoulder braces are to be adjusted, afterwards the thigh and leg bandages.

Sixth. The patient or his friends, should be warned of the symptoms to be expected, during the few hours or days that follow fixation.

Seventh. The short, or walking machine, is totally untrustworthy for aiding resolution of primary disease of the hip-joint, and equally unreliable for some cases of inflammation of the hip arising from a secondary cause. As a protector or conservator, where we have cases of permanent ankylosis, it is very valuable, from the fact that by its use, we give the patient some further degree of liberty, at a time when we are in doubt of the advent of genuine recovery,—the character of ankylosis not being so confidently possible of early detection.

To those surgeons who do not employ my means of posterior fixation, I will point out a few of its merits. Indeed it meets the requirements of most of the "sectaries" devoted to the treatment of hip joint disease, with the exception of that sect which advocates motion as a curative item. It gives us as much fixation, as is practicable under the conditions that we have to deal with, viz. bones covered by a great

thickness of flesh. Again, the constant tendency of the machine to escape from the body causes the two wings internal of the thigh and leg to distract the femur head ; this should please the "distractionist." Further, by attaching an extension gaiter above the patient's knee and fastening it to the lower wings, also casting away the shoulder braces, the weight of the hip machine, by its tendency to slip down, makes good extension upon the lower extremity,—this should please the 'extensionists'; again, the anti-concussionists can be satisfied, as by the patten, their views are accepted and provided for.

*hip knee
patten
both affected*

It may happen that the surgeon is called to attend a case of hip disease, where there also is knee joint inflammation on the same side. It is obvious that such a complication makes the employment of my hip and knee machine very awkward. This difficulty can be surmounted by attaching to the two lower wings of the hip machine, the arrangement shown in fig. 114. In the illustration fig. 115 it will be noticed that it consists of a flat rod riveted to the four ends of the lower wings, to that a knee and ankle leather is stitched, like my ordinary knee splint, but the rod projects beyond the foot two or three inches, so long beyond it, that it reaches as far as the ground ring of the patten to be worn under the foot of the sound extremity. Many children who were thus rigged by me could go about very well without their crutches.

Figs. 116 and 117 are back and side views of the use of a "nurse" when applied to a hip splint.

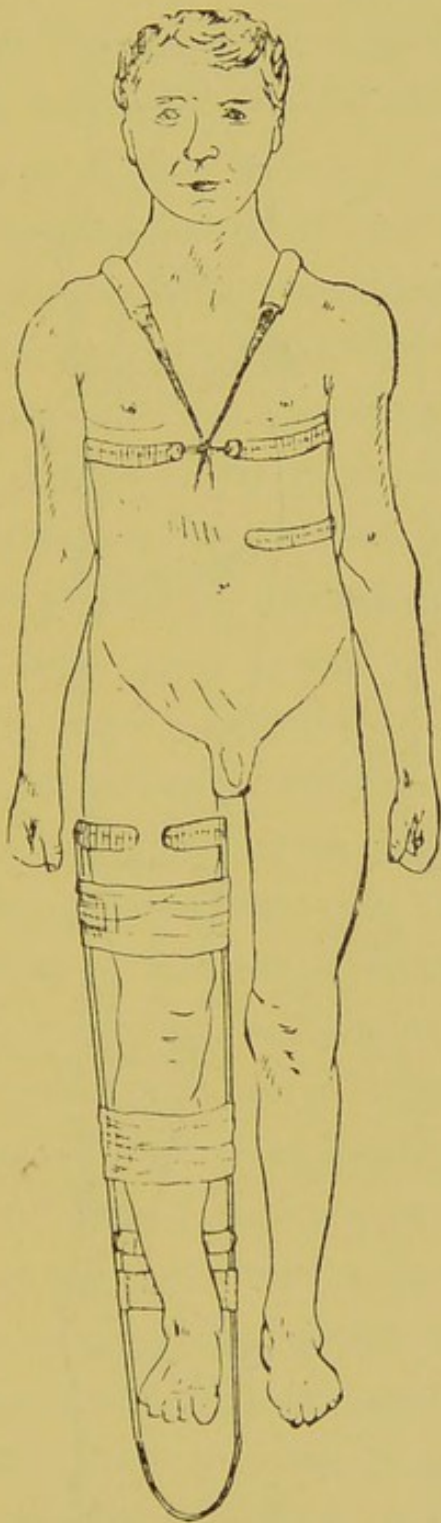


Fig. 114.

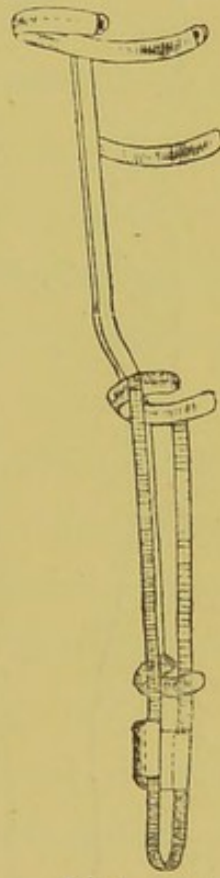


Fig. 115.



Fig. 116.

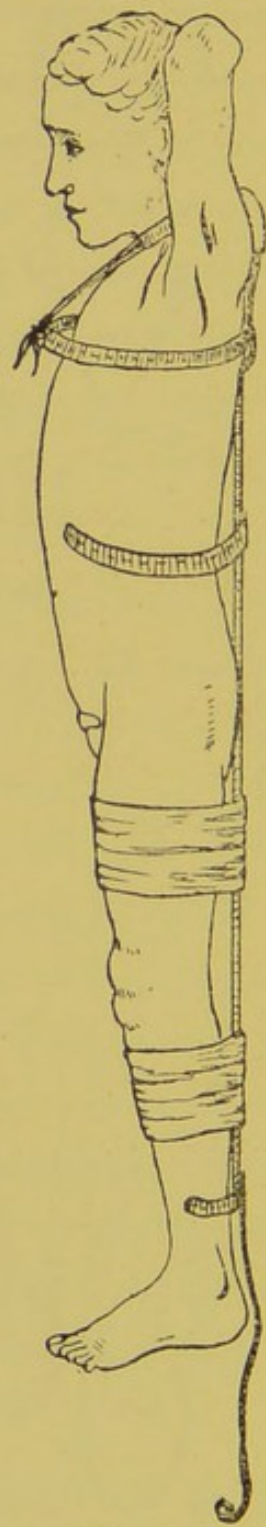


Fig. 117.

The principles of the treatment of the constitutional state, during the existence of primarily or secondarily caused articular disease.—

Having secured for the affected joint the utmost practically unalloyed rest from friction and concussion, by mechanical means, guarding against alloying this important gain by the commission of errors against physiological rest, neither employing local compression,—the “direct method”—nor nagging at the articulation,—“the extension method,”—we shall have then much unburdened the sufferer’s constitution and shall miss many of the symptoms and much of the pathology observed by our predecessors and our contemporaries. Having gained a good point of vantage by fixation, from this we are able to prescribe for purely constitutional symptoms, less mixed with the signs of mechanical irritation caused by friction and tremor.

We have to detect where, besides the invaded joint, the patient’s other weak points exist. The chronic disease diagnosed as affecting the joint, may be the remains of traumatism, rheumatism, gonorrhœa, syphilis, struma, or a combination of these. Living in the days of Sir Joseph Lister’s valued addition to our knowledge, of the cause and continuation of many diseases, Bacilli and their alkaloids are generally recognised as factors which ought to be dealt with by prescribing. As Sir. J. Lister has pointed out, one mode of influencing these parasites is by maintaining or increasing the “antiseptic agency of living structures,” a condition inimical to the life and further development of Bacilli, especially in parts not yet invaded by disease.

Regarding the deportment and feeding of the patient, when

the weather is favourable and the condition of the patient not prohibitive, he should be allowed to go out of doors. Next, his periods of feeding should have sufficient intervals between them, that the stomach digestion of one meal is consummated before another is taken, and the quantity should be regulated only by not exceeding the amount enjoyable; also, that at dinner, the meal at which the greatest quantity of nitrogenous food is consumed, the least possible quantity of liquid should be taken; again, if four meals are taken daily, the fourth should be the smallest and in quality easy of digestion. If the patient can afford it, he should not engage in close mental efforts, nor in violent, or even easy long, though light and so equally tiresome, employment; either of the foregoing exercises would divert nerve force from the viscera and structures of nutrition and depuration, upon which greatly depend the patient's chance of recovery, as their maintenance up to the normal state of health is very necessary. For beneficially influencing the organs of nutrition and excretion, besides judicious feeding, we possess drugs inorganic and organic, of two classes; the chemical, acting as caustics; the physiological, which may be inhibitive or sedative diminishing vital action, or stimulant which hurry on the vital changes. Since the acceptance by the profession of the septic origin of most diseases, it has become the practice to prescribe antiseptic drugs for internal administration, under the supposition that when they are thus taken, they act germicidially, whereas in non-lethal doses their action is physiological, inhibitive in character, so, only antagonistic to the development of

new germs and can only modify the action of those germs already formed, on which no drug can act as a germicide without fatal effect all round. The explanation, in my opinion, of the success following the internal administration of antiseptics, is the fact, that they are inhibitives in character and that nearly all septic poisons are stimulants in action. Returning to the immediate question of the treatment of joint diseases specially by drugs, practically we are limited to two classes, inhibitants and stimulants, they, acting by their inherent power to localize themselves and then affect special structures, so when located they cause the signs of "deflection" of nerve force, to or from the locality of their action; the surgeon, by the selection of appropriate drugs, directs the "deflection" to the sufferer's advantage. The preceding rule of practice, in my opinion, can be carried out, by the practice of administering inhibitants of one structure to benefit another not to be acted upon by the remedy,—the indirect method of prescribing,—or by stimulating one or more structures if practicable,—the direct method,—the latter is rarely possible, as the number of special stimulants in our possession is very few. Again, when we do not intend to utilize the primary inhibitive effect of a drug, then combining an inhibitant of one structure with a stimulant of another, by a combination of the indirect and direct stimulation our object may sometimes be better gained, as the inhibitive remedy though sedative in its primary action leads to excitement in areas it has not reached and so seconds the effect of a stimulant acting upon those areas. Holding the theoretical views sketched in the

preceding pages regarding the use of drugs, it has been my practice, with I think some advantage to sufferers from articular diseases, to prescribe amongst other appropriate remedies, those, which will inhibit the muscular area, the function of which can be partially dispensed with, deflecting the nerve force to parts, the functional activity of which it is desirable to maintain or increase. By abstinence from close study and tiresome muscular effort, we conserve, on behalf of the patient's organs of nutrition and depuration, a store of energy, which can in my opinion, be further added to, by the administration of suitable doses of inhibitive drugs. The reader may now ask, "What are the remedies you employ and where is the evidence that they were appropriate?" In answer, the fore-going sketch is a statement of the medical part of my treatment of joint diseases, the results of which have impressed me as being satisfactory. Convinced of the value of these theoretical opinions, I do not particularise the remedies; it would be an insult to the reader, who, if he is a medical man, can, as well as myself, select his remedies upon the basis laid down. The days of set formulæ "are numbered"; prescriptions no longer as appendices, lumber our text books of Practical Medicine. The next relic of our infancy to disappear will be the various National Pharmacopœias; men with the knowledge of to-day incline to treat them with contempt by ignoring them. Now that this contribution is drawing to a close, it would be an omission for me not to explain why I have not introduced more real cases in illustration of my practice. That

the relation of actual cases is necessary at times I admit, and then it is not possible to substitute ideal ones. In this instance the ideal cases answer the purpose of demonstration best, the only drawback attendant upon the publication of an ideal case is, that the surgeon misses the opportunity of legitimately advertising himself. In "Contribution," part viii. on the "Inhibition of nerves by drugs," published in 1883, there are to be found my theoretical views regarding the art of prescribing, and the action of drugs and septic poisons; it is a very crude sketch,—I had not then read similar efforts by Drs. Headlam and Rogers, which as far as they go, support my views; again Dr. Brunton in his "Pharmacology" published in 1885, two years after my pamphlet, also contains my views and some of the errors I made in a previous publication in 1875. The fact that these gentlemen accompany me on part of the journey, has induced me to curtail this chapter on the "constitutional treatment of joint diseases," and encouraged me to re-write during the coming year, part viii. on "the action of drugs" in the art of prescribing.*

*By using the "deflection" theory as a basis and its two phases, the direct and indirect effects of drugs,—rather than by any other theory yet proposed,—it is possible to defend the practice of the simultaneous employment of drugs the opposites to each other in character. For instance, in Tetanus, Belladonna, Opium, Calabar Bean, Chloral, etc., suitably selected and proportioned. Epilepsy; Belladonna, Digitalis, Calabar Bean, Bromides, Acetanilide, which are by no means similar in action though appropriate for the purpose. Another example: Locomotor Ataxy, in suitably calculated doses Opium and Strychnia have an excellent effect, a combination of an inhibitant and stimulant giving a better effect than either of these alone. It has been my practice in this lesion to combine with the remedies the application of flagellation to the cervical, dorsal, lumbar, and sacral regions, rather than resorting to the round-about way of "suspension," which, at its best, can give but slight stimulus to the spinal cord.

A REVIEW OF ORTHOPEDICS IN 1890.

“Is there any thing whereof it may be said. See, this is new? it hath been already of old times, which was before us.”—ECCLESIASTES 1. 10.

In 1876 I published a “Review of the Past and Present Treatment of Inflamed Joints.” Although so titled, it was mainly and unavoidably a review of Transatlantic methods of treating diseased joints. Whether the publication of my views has influenced subsequent practice is a question I will leave others to decide. This we all know, that in this country, the practice of the so-called American method fell off so much, that it is seldom resorted to. Possibly, this notable decline may, in some degree, be due to our not being favoured of late years with periodical visits from the great apostle of the American system. Last year, however, we were presented with a communication from one of the “lights” of the American systems.* In the *Lancet* of December 2nd, 1888, Dr. Judson, in an article titled “The American Hip-splint,” gives the readers a history of the splint with the etiology, diagnosis and mechanical treatment of hip-joint disease. The best refutation of Mr. Judson’s paper published in the *Lancet*, was written by himself,

* The Review was first published in 1876.—rewritten in 1889, and is here again republished.

and published in the *New York Medical Review*, May 1st, 1886, which article is a recantation of the opinions, regarding the principles of the treatment of joint disease, published by him in the *New York Medical Record* of July 7th, 1883, which, notwithstanding his recantation, he again reproduces in the *Lancet*, of December 2nd, 1888. His renunciation was a full acceptance of the principles of my teaching, giving me only a covert acknowledgement in the following words: "I have none of my fellow workers in view; we have all been followers of Dr. G. H. Davis." The lecture was an epitome of my writings. While Dr. Judson was endeavouring to revive the American method here, another surgeon, Dr. Shaffer, of New York, was placing the principle and the methods of treatment which are growing in favour in this country, in his surgical balance, and since has decided, that they were of short weight. He mentions as one of its faults, that it is "old fashioned." To this I will not object, and against it he points to the American method, which is "totally new;" to this, again, I cannot possibly object, believing this to be the *only* merit it can claim. That my predecessors, for the last hundred years, worked upon the same lines as myself, does not add to my reputation, but the past cannot be undone, and it is my duty and pleasure to fully acknowledge their labours.

Having one advantage which qualifies me to pass an opinion on the American method, it may not be presumptuous for me to make the attempt. Early in life I was, in my practice, a close imitator and an ardent admirer of the best exponent of American

Orthopedics, my friend Dr. Bauer, now of St. Louis.* Consequently, from practical experience, I know what the American method can do, and had it given me even the results possible by the mechanics of our predecessors, it would not have been laid aside. What can the method of treating joint disease, which others and myself are the exponents, do? We assert, that every case of hip-disease can be cured without leaving a fractional deformity of flexion, consequently, without any shortening, except that either arising from the arrest of growth, where inflammation has interfered with the growing points in the upper parts of the femur, or from erosion; no matter whether the case goes on to suppuration or not, or is even presented to us, for treatment, in an advanced state of suppuration. We assert the same regarding the treatment of knee-joint disease; and gladly acknowledge that our practice is only an accentuation, of the principles which our forefathers taught; which principles some surgeons in Great Britain and America, with no doubt honourable intentions, have tried to discredit. The American method is not applicable to all the various stages of joint disease, as the method termed by Dr. Shaffer "old fashioned" is known to be. Messrs. Judson and Shaffer utterly ignore the fact, that diseased joints would recover without sur-

* A surgeon whose portrait has been sketched for us by an opponent. "Professor Louis Bauer, of Brooklyn, (now of St. Louis) a German surgeon of very scientific attainments, with an energy that knows no limit, has devoted his time almost exclusively to this department of surgery. In fact the professional mind of this country has been attracted to this particular branch of surgery through the various articles of this able author in the different medical periodicals, more than from any other source, and his lectures on this subject are very valuable instruction to Orthopedic literature." I also confess to having partaken of the fruit of this surgeon's labours, and though as time passed on we diverged, his influence was not totally unfruitful.

gical aid, but would be hampered by remaining avoidable deformity, which would diminish the usefulness or make the limb useless ; just as with a fractured limb, the patient can recover without a surgeon, but a restoration of symmetry would not be probable. The " American hip method," as introduced to us, is only the addition of a mechanical contrivance in front of the efforts of nature, with which it interferes by its weight, to merely hinder the development of extreme flexion. Locking the knee by any simple contrivance would have the same effect, as the lower extremity, locked at the knee by the extra weight of leverage attained, gives more force than the flexor muscles of the hip-joint can continuously sustain, if the extensors of the thigh are thus assisted. For the treatment of articular disease, the means we require are not such that, when in use there is a continuous tussle between them and the muscles controlling the joint. We want a method, which will do immediately in practice just what nature tries to perform gradually, *i.e.*, immovably fix the articulation, so that the intelligent muscles, finding their labour no longer needed, take a rest until invited again to enter upon their duty. Messrs. Judson and Shaffer appear to make " traction " the distinguishing features of their " American Method " ; further, ascribe its introduction into surgery to United States surgeons, whereas, we know that traction was introduced into surgery by Mr. James, surgeon, of Exeter, in the year 1839. At the annual meeting of the British Medical Association, at Liverpool, Mr. James proposed it as a means of treating fractures ; subsequently Sir B. Brodie tried

traction in the treatment of joint disease, and, we presume, it was not a success, or that excellent clinical observer would have continued its use. One of the modes of settling a disputed point in both surgery and medicine, is to make a comparison of statistics, and from them draw a conclusion, as to the relative merits of the means in question,—statistics collected from even a public institution are not always above suspicion. Not being attached to such an institution with its staff of clerks, a mere general practitioner like myself rarely possesses statistics of his practice; for this reason I do not produce any. However, supposing I had collected statistics regarding any special treatment, it is obvious that these statistics would not be reliable, if from writings or personal knowledge of my practice, the scrutiners found out, that I had either neglectfully or ignorantly omitted, a known reliable rule for diagnosing, the slightest as well as the greatest degree of the disease and the advent of cure. Statistics collected under such circumstances would be of but very little value.

In the *New York Medical Journal*, May 21st, 1887, Dr. Shaffer publishes statistics, bearing on the ultimate result of the mechanical treatment of hip-joint disease. The hip-joint is a favourite field with “tractionists,” I suppose because there is plenty to pull at, and that it is the joint which is most amenable to mechanical treatment. In compiling the statistics, Dr. Shaffer was assisted by twelve medical clerks; this fact of itself excuses my neglecting to keep a register. In the paper published by Dr. Shaffer he gives an analysis of fifty-one cases of

dispensary patients who had the advantage, when necessary, of being in-door patients, and wore an apparatus which locked the knee-joint. One case was excised, remaining in bed twelve months after the operation—just what I have observed myself—not much gained by excision.

Five statistical tables are given:—

No. 1. Shows length of time under treatment.

No. 2. Shows the length of time disease had existed previous to treatment.

No. 3. Shows the relation between the absence or presence of abscesses, and shortening.

No. 4. Shows under 10 years of age and after that age.

No. 5. Shows the influence of the presence or absence of abscesses upon joint motion.

For various reasons, ten cases were subtracted from the fifty-one examined, and the five tables relate to forty-one only. Let us suppose these tables to have been compiled under circumstances precluding any question arising regarding their value, then according to table 5. the result of the "American method" is, that out of forty-one cases, three only recovered with perfect motion; sixteen had no motion, and sixteen had only limited motion, these last taken with the commentary attached to table 5, "examination proved that the amount of motion proves less as time goes by," practically brings the no-motion cases to ninety-four per cent. Better results would have followed if they had received no treatment whatever.

Table 1 is of no clinical value ; it merely records the time under treatment. It neither records the condition of the patient at the commencement, nor is there any evidence of recovery at the termination. Nay, Dr. Shaffer's comment upon the cases is evidence that they were discharged as cured while yet unsound. It is true, we are told :—

“ That many, if not all, of the patients treated in the dispensary are experimentally discharged as cured, before they are finally entered as actually cured.”

I shall prove, further on, that Dr. Shaffer has not so carefully studied my writings as to master the “ experimental ” test of soundness. I make him my debtor in this instance, because, up to the publication of my treatise on “ The Hip Joint,” Dr. Shaffer nowhere refers to the “ experimental test,” a test which is merely the reversal of that indicative of the disease, which he seems equally unable to grasp, as evidenced in *American Clinical Lectures*, Vol. III, No. 6, as well as in this article. As soon as American surgeons master the details of the simple flexion test, which indicates the slightest trace of hip-joint malaise, and its opposite use, the experimental test of recovery, the American method of treating hip-joint affections, will be relegated to the history of bygone surgery. Table 2, in its construction, presents one of the defects apparent in table 1. For instance, of what use is it to inform us, that the treatment in one case commenced in the ninth year of the disease? It might not be so urgent as a case of nine weeks. Indeed the fact that the sufferer was alive proved that unaided nature was making a prolonged,

and so an excellent effort, to gain the ascendancy over the disease.

Tables 3 and 4 contain nothing more than we already know, and might expect under the clinical conditions. We now come to the comments attached to these tables, which show, that if Dr. Davis' followers had devoted their observations a little more to the physiological aspect of the question as well as to the construction of devices, they would dissent less from the practice of British surgeons. It is noteworthy, that in no part of Dr. Shaffer's paper—which is a comment upon treatment, as well as upon his tabular statistics—does he even allude to a standard diagnostic method applicable at the commencement of treatment. I shall now quote from several paragraphs to show that he is unacquainted with any trusty "experimental" method of diagnosing genuine recovery. For instance, we are informed that :—

"Examination proved that the amount of motion grows less as time goes by. At the time of discharge several of these patients had a certain recorded degree of motion of the affected articulation. This motion had entirely disappeared a few years later, and in this table these cases figure as cases of ankylosis."

If this paragraph is correct, and I have no doubt it is so, then only the three cases classed as having "perfectly free motion" were really sound when recorded as cured, otherwise motion would have increased. Hence the valuelessness of table 1.

The paragraph I have quoted from Dr. Shaffer's paper contains the formula of the test of use, yet he only records it as

evidence gained from the patients, and failed to recognise in it an invariable rule, which, being applied early, would not merely have conserved motion, but would in addition, have enabled him to finally discharge his patients with the certainty of an increasing range of action. Further on in the paper my adverse comment is confirmed :—

“The amount of motion in the joint when the disease is arrested and the apparatus removed, is very apt to diminish somewhat in the course of years; but recovery with perfect motion is not impossible, nor indeed unlikely.”

This paragraph is a contradiction. I hold, that for it to be surgically correct it ought to read thus :—

The amount of motion in the joint when disease is arrested must increase, but if it decreases with time and use, it was unsound when the treatment was suspended.

The probability of conserving motion depends upon the efficiency of uninterrupted fixation.

Dr. Shaffer has published a pamphlet entitled “Reflex Muscular Contraction, &c.,” in which, at page 5, will be found a mechanical device for correcting adduction of the hip-joint, by which method the acetabulum is unavoidably used as a fulcrum, though he supposes the contrary. “Again, by consulting page 13 of the same publication, there is to be seen a device to reduce flexion of the knee-joint, during the operation of which, intra-articular pressure is also unavoidable. Indeed, in this question of “fulcrum and leverage,” Dr. Shaffer contradicts his teacher. As proof, I refer the reader to Dr. Ridlon’s third fasciculus of “Contributions to Orthopedic Surgery.” In a letter placed in the footnote of page 24, we find the following :

“Then the only safe principle we believe to be fixation and leverage progressively modified.”—H. J. TAYLOR. “P.S.—You will see from the references that we do not believe in the motion without pressure,” while inflammation is acute and progressive, using fixation and counter-extension in such cases.”

Without a knowledge of true principles—which of course, apply to all diseased joints—contradictions in teaching and practice must be committed; for instance, at page 4 of Dr. Shaffer's publication on “Reflex Muscular Contraction, &c.,” we find:—

“The primary indications are therefore to relieve joint pressure and to arrest friction.”

In the “Annals of Anatomy and Surgery”* Dr. Shaffer has laid down the rules for the treatment of disease of the ankle-joint.

“Some surgeons seem to be afraid of producing ankylosis by immobilizing a joint in a state of chronic inflammation. I wish we could accomplish this end by so simple a procedure; but ankylosis, in chronic arthritis, is not so easily produced. You may stiffen a joint more or less in a state of chronic inflammation, by an immobilizing apparatus, but you will very rarely produce ankylosis by this means.”

The above reads not unlike the heresy I have taught, which, if Dr. Shaffer thinks incorrect, he renders surgery good service by opposing. But in the same contribution to the “Annals” there is to be found the following:—

“To revert more particularly to chronic synovitis again, I said, and I again repeat it, do not immobilize the joint in *chronic synovitis*. If you do, the joint soon becomes stiff and useless, and the closely observing friends of the patient will inform you—and they will state a fact—that the joint is in a worse condition than before you applied the apparatus. Use of the joint

in chronic synovial inflammation, therefore, is indicated. Motion, without pressure, is plainly demanded; in other words we must *avoid traumatic contact of the vulnerable surfaces*. To accomplish this we must produce a certain amount of traction, but we must not prevent free movement."

In the year 1879, Dr. Shaffer published a volume entitled, "Pott's Disease: its Pathology and mechanical Treatment." It is an excellent contribution to the surgery of this ailment. At pages 40, 41 and 42, he tersely shows the evil and the defects of the "plaster plus traction" method of treating spinal disease. He, like myself, has adopted a modification of Dr. Bauer's posterior shield. We all like to modify the work of our teachers, I suppose, because it will be assumed by our contemporaries that a modification is a second and improved condition. However, to return to the traction question, the posterior spinal support of Bauer, and its modification by Shaffer and myself, act upon the principle of lever and fulcrum, and to be effective it must act continuously for a period varying from one to three years. The following is Dr. Shaffer's description of its action.

"I may state, further, my views in general upon the comparative merits of the antero-posterior support and the plaster jacket. The former acts scientifically upon the principle of a lever with the fulcrum at the point of disease."

So that which is beneficial to spinal disease, though applied long and continuously, if applied to hip-joint disease only for a few hours, is, according to Dr. Shaffer's manifesto, an evil with no compensating benefit. Inconsistently he gives the reader to understand that he would employ traction if he could, to the treatment of spinal disease, the impediment being an assumed or supposed risk of damage to the sound portion of the

spinal column. On reading Dr. Shaffer's volume, it did not appear to me, that there was any call for his excusing himself neglecting to employ traction in spinal disease, inasmuch as at page 40 he gives, against its use, an excellent reason based upon fact, and as it equally applies to hip-joints it well deserves reproduction here.

“If suspension separates the bones, it does so at the risk of breaking up any reparative process that may have begun, and I am inclined to think that it may accomplish more, in this respect, than is advisable in advanced cases; and if this force be used, the tetanoid spasm of the muscles prevents, in a great measure, separation of the diseased surfaces in the more recent cases.”

Five per cent. of hip-joints attacked with inflammation, recover with perfect motion, though not treated. I base this opinion upon a fact in my practice, that where a patient has been a sufferer during only a period of from one to four weeks, even though the signs are distinct, I prescribe a fortnight to three weeks' reclination, often with success, gratifying to the sufferer who has so easily escaped from prolonged mechanical treatment. Except Dr. Shaffer is now, February, 1889, better qualified to sit in judgment upon the treatment of hip-joint inflammation than he was, as I have shown in 1886, he is not capable of judging the merits or demerits of the principles and practice which others, as well as myself, are advocating.

Some of my readers may say that, “Dr. Shaffer might in twelve months have much modified his opinions.” This, however, can be set at rest, for in a printed official circular titled “Official Action Relating to the Orthopedic Department of St. Luke's Hospital,” dated December 18th, 1888, Dr. Shaffer, while plac-

ing a method in the "index expurgatorius," gives his reasons thus :—

"To summarise : chronic joint inflammation is accompanied, as a rule, by reflex spasm of all the muscles controlling an inflamed articulation. If the inflammation be unchecked, deformity, due to this muscular spasm ensues. As a result of the force exerted by the combined action of all these muscles—and in the struggle for supremacy between the stronger and the weaker groups—there occurs an inter-articular pressure, due to this muscular spasm. It is Nature's effort to limit motion and to produce rest to the articulation. It is present, night and day, and it is wholly beyond the control of the will of the patient. Nothing that I have ever used will annul it, but the profound anæsthesia of ether or chloroform, or prolonged traction. It is the most important sign of hip-joint disease, taking precedence over every other sign or symptom, both from a diagnostic and prognostic standpoint. And as it has been proven many times that anything which increases inter-articular pressure, also modifies this muscular sign, and as it has also been proven that anything which increases inter-articular pressure, increases also all the symptoms of the diseases, it becomes our duty to base our treatment upon the pathological expression of the disease.

"Hence I may say, that the proper way to meet the conditions named, is to apply a mechanical force, which, if it does not separate the inflamed surfaces, at least modifies their traumatic contact.

"If the attempt is made to overcome this deformity, due to muscular spasm, by means of an apparatus which does not make traction "in the line of deformity," its fundamental principle (*as is done by the Thomas splint*), we create a still greater inter-articular pressure, because we then use inflamed joint surface or surfaces as a *fulcrum* to overcome the *resistance* (the muscular contraction) the *power* being applied with a fixed apparatus that does not aim at anything more than *position* and the assumed fixation that is supposed to accompany it. In fact, the supposed "rest" under these circumstances, is a fallacy, and we directly increase the traumatic contact."

In the interest of our art the component parts of these three paragraphs will be here reviewed.

We are informed that :—

First, "Chronic joint inflammation is accompanied, as a rule, by reflex

spasm of all the muscles controlling an inflamed articulation. If the inflammation be unchecked, deformity, due to this muscular spasm ensues."

This is neutral ground, and does not contain either argument or information in support of, or against, any particular treatment.

Second. "As a result of the force exerted by the combined action of all these muscles—and in the struggle for supremacy between the stronger and the weaker groups—there occurs an intra-articular pressure, due to this muscular spasm."

What is meant by the "the struggle for supremacy" is not very plain; in fact, it is known only to be a well-meant effort on the part of the muscles to fix the joint, not a mere "tussle" between several sets of muscles. During their efforts at fixation, the femur, unavoidably, must come in contact with the upper section of the acetabulum, but we do not mend matters, by employing traction and transferring pressure to the lower segment of the acetabulum, during the "tussle" for "supremacy" between the mechanical traction of the surgeon and the whole set of muscles that control the joint.

Third. "It is nature's effort to limit motion and to produce rest to the articulation. It is present day and night, and it is wholly beyond the control of the will of the patient."

Let us give thanks that the whole of this paragraph is true. Nature knows that the arrest of motion is the one thing needful before all others. The art of surgery is only of yesterday in comparison with the time man has been upon the earth. It was the only chance of recovery, during the very distant past, from hip-joint inflammation, in comparison with which Dr. Shaffer's statistics show that the American method gives no gain. I can recollect the time when the tractionists, believ-

ing spasms to be the root of all evil in joint disease, made the absurd proposa¹, that all muscles controlling the diseased joint should be tenotomised, to make it as flail as possible, and thus to relieve articular pressure. Possibly some of the tractionists might say, "We should perform this wholesale section of tendons in combination with the use of mechanical devices," but it is obvious that even then, it would not make the proposal less absurd as the tendons would not remain long enough un-united.

Fourth. "Nothing that I have ever used will annul it, but the profoundest anæsthesia of ether or chloroform, or prolonged traction."

With the conclusion of this article I quite agree,—prolonged traction, very prolonged indeed, will annul it. From the evidence of tractionists in this country and America, they spend as much time in reducing a deformity by traction as would suffice for some surgeons to cure the case as well. Hip-joint cases in America must be accompanied by muscular symptoms totally different from that observed in this country—if this paragraph be correct. In this "old fashioned" portion of the world, we notice that the deformity indicative of hip-joint disease is accompanied by a structural muscular change, which, except force be also applied, no anodyne will annul, for we know that from the initial moment of the disease a structural change commences in the muscles, not noticeable at that period, but as the disease progresses the change becomes more and more tonic, and the muscles are so altered that one set becomes abnormally short, and the other abnormally long. Under the influence of an anæsthetic, the slight structural changes of the muscle at the

very initial period spring out by the weight of the limb, but the greater change requires further time. In this country it has been found that immovably fixing the hip-joint annuls pain and spasm, except during the period of distension of the hip-joint when it is about to rupture.

Fifth. "It is the most important sign of hip-joint disease, taking precedence over every other sign or symptom, both from a diagnostic and prognostic standpoint."

This is the most important of the paragraphs. It is upon the proper interpretation of this paragraph that the whole question of the treatment of diseased joints rests, and upon which all erroneous methods are sure to be wrecked. A correct interpretation of this paragraph, enables a surgeon to diagnose the very day of the onset, and the week of recovery. In none of Dr. Shaffer's contributions to surgery does he even imply that he understands the trustworthy flexion test—an infallible guide to diagnosis and prognosis, and an antidote to the American system of treating this disease by motion and traction, no matter how carried out.

Sixth. "And it has been proven many times that anything which increases inter-articular pressure, also modifies this muscular sign (and as it has also been proven that anything which increases inter-articular pressure, increases also all the symptoms of the disease), it becomes our duty to base our treatment upon the pathological expression of the disease."

We are in possession of a clinical fact, never disputed. It is this: That the period of most uninterrupted tenderness and spasm of the muscles is when the joint is hyper-distended with fluid, and consequently the articular surfaces not in contact, yet

as soon as the capsule ruptures, pain is relieved, and spasm ceases, though the articular surfaces are again in contact, a matter really of very small importance.

Seventh. "Hence, I may say, that the proper way to meet the conditions named, is to apply a mechanical force, which, if it does not separate the inflamed surfaces, at least modifies their traumatic contact."

Here, Dr. Shaffer and myself agree, and he will find that "the Thomas splint," while immovably locking the joint—the first necessity in treatment—is also a force "which, if it does not separate the inflamed surfaces, at least modifies the traumatic contact," annuls tremor and muscular spasm, and will be found to come up to his ideal of treatment, minus motion, the arrest of which will give him a better percentage of cases cured with preservation of motion.

Eighth. "If the attempt is made to overcome this deformity, due to muscular spasm, by means of an apparatus which does not make traction 'in the line of deformity,' its fundamental principle (*as is done by the Thomas splint*), we create a still greater inter-articular pressure, because we then use the inflamed joint surface or surfaces as a *fulcrum* to overcome the *resistance* (the muscular contraction) the *power* being applied with a fixed apparatus that does not aim at anything more than *position* and the assumed fixation that is supposed to accompany it. In fact, the supposed 'rest' under these circumstances, is a fallacy, and we directly increase the traumatic contact."

From reading this paragraph we might suppose, that Dr. Shaffer reduced hip-joint deformity by a method fundamentally different in principle from that of the "Thomas splint." It is not so,—the difference is merely a question of time ; the tractionists occupy months, where 'the Thomas' takes but few hours in reducing the deformity. Traction "in the line of deformity" would be endless traction. How is it possible for a flexed hip-joint

to have its angle from the plane reduced if the traction is constantly at that angle? If the deformity is to be reduced, there must be a diminution of the angle to the plane, during which there is constant intra-articular pressure upon the upper or lower segment of the acetabulum, as a fulcrum; by the Thomas splint it is done rapidly by the weight of the locked knee, often in a few hours—seldom a week. If we take the evidence of Messrs. Taylor and Marsh, the time expended in reduction by traction may extend over several months; further, Dr. Taylor, in his writings, is careful to warn us against over traction, which he has known to damage even the healthy joints in the neighbourhood of the diseased one. Dr. Shaffer appears, from his writings, to follow the practice of Dr. Taylor. As to the “assumed” and the “supposed” “fixation” and “rest” assertion made in this paragraph, I make an opposite assertion, easy to be confirmed by experiment: That the flexion test of the presence of, or recovery from, disease, is a rigid scrutator which any one, trained or untrained, can employ as a surgical auditor. By the adoption of which procedure nothing is left to the judgment of either an interested surgeon or a dissatisfied patient.

In various parts of the volume, the author gives us his opinion in brief, concerning the principles of treatment of the larger articulations. At page 36, we are told:—

“1st. Mechanical treatment, either in the spine or larger joints should not be used with the idea of overcoming the muscular resistance. We may succeed in antagonizing the muscular spasm to a certain extent, but it cannot be annulled by any mechanical therapeutics we may devise.”

This is not quite consistent with the "St. Luke's manifesto," in which we are informed that "æther or traction" will do so; neither is the following:—

"It is certain that a comprehensive mechanical extension in a typical case of dry ostitis of the hip or knee-joint does no more than to slightly modify the reflex muscular spasm. Suspension or extension, even if they could be made continuous, can do no more in Pott's disease."

As evidence to show upon what an insecure foundation the Censor of St. Luke's Hospital, New York, stood, December 18th, 1887, when he fulminated his edict against what he supposed to be a retrogression in treatment, we present him with a few gleanings from the published opinions of Dr. Shaffer's trainers in America, and the representative of the American method in this country; they are a mixture of incompatibles.

"But motion at the knee is a decided disadvantage. It prevents, or at least diminishes, motion at the hip-joint." Page 23, "Mechanical Treatment of Hip-joint." Taylor.

This is not correct, as it is evident, that fixing the knee limits the friction and motion at the hip-joint, while permitting motion at the knee increases friction, allowing more action at the hip.

The following are taken from the *New York Medical Record* of September 1st, 1867—May 8th, 1875.

Dr. Taylor expresses his disbelief in the possibility of drawing out the head of the bone by extension, and very properly remarks:—

"It would be harmful if it did occur."

In one paragraph we are told that:—

“On the other hand, if contractions accompany or follow disease, we may be sure our counter extensions have been inefficient, and therefore worthless, and that the improvement, if any, is due to the quiet fixation of the joint, which the splint has been a convenient means of accomplishing, and I suspect this is very often the case in the use of both splint and pulley.”

So that “quiet fixation” can lead to improvement according to Dr. Taylor. The next quotation asserts that “traction” has its evils:—

“I have seen several legs irretrievably spoiled by applying the straps on the leg only, neglecting to include the thigh. This has been generally done when the treatment had been by the weight and pulley; force enough to relax the powerful muscles about the hip-joint must be liable to pull asunder the weaker ones at the knee and ankle, if traction be made only from the foot and leg.”

If this damage can occur from extension applied to a sound joint, what may be the amount of damage done to an unsound articulation, the structural surroundings of which are softened by inflammation?

Again, we are informed that:—

“With the best appliances disease of the hip-joint is not easy to cure.”

The following quotation shows poverty in diagnosis:—

“The symptoms generally relied upon as diagnostic of disease of the hip-joint are worthless for all practical purposes of either anticipating the graver stages of the disease, or of affording indication for treatment.”

Yet the reader is not introduced to any other method of diagnosis, though he admits the worthlessness of the usual symptoms relied on for detecting this lesion. Here is a paragraph contrasting the effect of art with non-interference in a case presented to him for treatment. He says:—

“Without treatment it was only a question of time, for death of the bone, with its attendant dangers, would occur; and with treatment, increased physical suffering was inevitable.”

If this is a deduction from Dr. Taylor's own practice, it is by no means creditable to a method, of which Dr. Shaffer is a close imitator. In one of the articles in the *New York Medical Record* there is given the history of a case of hip-joint inflammation which had existed fifteen months; at the time the patient consulted Dr. Taylor, his joint was evidently in a condition of inflammation; yet, to correct the deformities present, the author's splint, with counter-extension, were used, together with weight and pulley as extra tractors. This latter item was equal to a pull of fifty pounds added to that of the counter-extension apparatus, which equalled in all, one hundred and fifty pounds. and all this had to be continued uninterruptedly for six weeks. Simple fixed reclination would have succeeded in as many hours. I make this assertion, basing it on the history given, viz., that the disease was active; this being the easiest, quickest, and safest period for reduction of deformity.

In Dr. Taylor's treatise on the “Mechanical Treatment of Hip-joint Disease,” we find this mysterious statement:—

“There be cases in which the mechanical treatment on account of Pathological conditions, is not applicable; let such be left out of consideration.”

And again we find in it the following conclusions:—

“1st. To relieve the pressure in the joint due to muscular contraction, by temporarily destroying the muscular irritability and contractility.

2nd. To protect the joint from weight and concussion.

The indication for arresting motion in the joint, which is well met by the gypsum bandage and similar expedients, pertains only to a condition of rigid muscular contraction, and consequent increased constant pressure in the joint. But no such necessity exists after the muscular rigidity has been overcome to the degree of entirely removing all pressure within the joint.

On the contrary, motion in the joint without pressure is not only not injurious, but beneficial."

Let Dr. Taylor's teaching be compared with the published opinions of Mr. Marsh (who represents "weight and pulley treatment" in this country). taken from his published opinion:—

"The time at my disposal does not allow me to do more than thus very briefly to describe the principle of these instruments and the method of their construction; and in so short a notice it is not possible to do them justice. But you may find a full account of them in Professor Sayre's recently published Lectures on Orthopedic Surgery (Churchill, London), or in Dr. Taylor's essay on the Treatment of Disease of the Hip-joint (New York). The object at which they aim is undoubtedly most important, and they are constructed with great mechanical skill; yet I confess I have found it extremely difficult to obtain satisfactory results by their use. I suppose the greatest amount to which the surface of the head of the femur can be separated from that of the acetabulum cannot be more than about the tenth of an inch. And it is very difficult to preserve efficient extension and counter-extension within this range; for the parts cannot be acted upon as if they were parallel metal plates to be adjusted by a screw; they must be controlled through the agency of perineal bands and strapping fixed upon the skin, and all these are apt to give when they are subjected to constant traction; and, if they yield, though it be but slightly, they soon, in the aggregate, lose this tenth of an inch of extension, which they should maintain, and then the articular surfaces come again into contact. Besides, I may refer to what has seemed another difficulty. Both Dr. Sayre and Dr. Taylor allow to move the thigh upon the trunk by bringing it towards flexion, and it has always appeared to me that, if the perineal band be adjusted, according to their direction, when the limb is extended, it will become loose when the limb is flexed. However, I have not the good fortune to see Dr. Taylor carry out his treatment (though I once saw Professor Sayre apply his splint to a patient in the hospital); but the results published both by him and Professor Sayre are very striking, and are such as all may envy. Still, I cannot help thinking that, with either instrument, extension

and counter-extension can only be maintained by such an amount of incessant watching as cannot be secured in the usual course of practice ; for, so far as I have observed, the perineal band requires re-adjustment—when the child is up and about—several times in an hour, and it always grows loose in the course of the night. Again, perineal bands must always be very troublesome appliances in children, especially in girls.”

Next follows an antidote to Dr. Marsh, taken from Dr. Taylor's teaching:—

“The painfulness usual during activity is lessened by the quiet of the patient's position, and this is wrongly credited to the effect of extension ; while the muscular contractions are still not overcome; the pressure in the joint continues practically the same, and while the surgeon may fancy that his patient is being cured by extension and counter-extension, he often is really getting only a certain amount of temporary relief from fixation.”

“In careful, experienced hands, the weight and pulley may be made a valuable means : as frequently employed by the careless and inexperienced, my observations in this country and in Europe, satisfy me that it is inferior in practical results to the plaster of Paris bandage, which does not seek so much and generally accomplishes the ankylosis which it seeks, and with the leg in a better position than is generally obtained by carelessly employed extension.”

The great apostle of the American method, Dr. Sayre, is well known to us. In lecture xiv. of his published work on “The Joints,” referring to ankle joint inflammation, he teaches thus:—

“By the splint I prevent motion which would be the cause of relapse.”

“I should do well, I think, to explain to you when motion is injurious, and when it is demanded.

So long as there is active inflammation in a joint, motion is injurious, and rest absolutely necessary.”

Why the author should here arrest motion, and not advise its limitation but the very reverse in inflammation, of the hip-joint, I fail to perceive. Of course, I can understand motion being permitted where no inflammation exists ; sound parts do not require a doctor.

In the same volume is to be found the following :—

“ In looking over Sir Benjamin Brodie’s work, I find he recommends positive rest, and that is all. But you may do this—you may rest the joint in splints—but you do not do all that is required. You may keep the limb perfectly still, and locked up in every conceivable way, and yet do not overcome the tendency of the muscles to contract—you do not prevent the reflex action.”

Here Dr. Sayre is certainly mistaken, for in page 139 of Sir Benjamin Brodie’s volume on Disease of the Joints, fifth edition 1840, he will find that the extension method (or counter-extension) is advised, and details for its practical application are given, but I must admit that the arrangement would not allow of the application of a hundred and fifty pounder, as Dr. Taylor reports, but which Dr. Sayre says, is not essential.

“ Simply enough extension to overcome the reflex contraction of the muscles.”

Sir B. Brodie’s mode of applying extension was, I judge, such as would if required, permit more extension than would satisfy Dr. Sayre, but he does not report well of it, and the veterans in the medical profession of Great Britain, will readily vouch for Brodie’s acuteness of Clinical Observation ; had there been any merit in extension, it would probably not have escaped his observation, interested as he was in this department.

Sayre here or there contradicts himself ; Taylor follows suit ; Mr. Marsh intervenes with another contradiction ; and Tractionists *en masse* denounce Brodie and his predecessors.

From the same volume by Dr. Sayre, lecture xvii., I will give a quotation which is a key to the reason why the American

method produces such a low percentage of perfect results :—

“The instrument must be worn until the joint is well ; until concussion, produced by bringing the tibia and femur together, does not cause pain, and until pressure over the coronary ligaments is painless. When this can be done, you may remove the instrument and commence the passive movement and manipulations that are to restore motion to the joint, and complete the cure.”

Is this the American test of recovery ?

These symptoms are given as supposed to indicate the sound state, and that the limb is fit for use, but they are not trustworthy criteria of the condition of the joint.

Dr. Sayre's volume is a text-book of the motion treatment of hip disease, also known as the “American treatment,” and, like other tractionists, he varies his principles as well as his means according to the region which he has to treat. We extract from his volume the following series of incompatibles :—

“In this case, then, I have accomplished what ? By my excavation I have removed the essential morbid cause ; by the splint I prevent motion, which would be a cause of a relapse.” Page 169. Ankle.

“So long as there is active inflammation in a joint, motion is injurious, and rest is absolutely necessary.” Page 169. Ankle.

“In all these cases, no matter in how favourable condition the joint may be, when the instrument is removed, it is necessary for a time to apply some kind of apparatus to protect the joint against accidents, such as falls, trippings, etc., and also to prevent too free motion of the joint.” Page 209. Knee.

“Again, firm support may be given to the limb, and at the same time motion of the joint allowed within the limits of safety, by the use of the instrument I now show you, made by Mr. Darrach, of Orange, New Jersey.” Page 209. Knee.

“Motion is much more painful than rest, even when rest is accompanied by pressure produced by muscular contraction. Hence the patient naturally choosing the least of two evils.” Page 246. Hip.

“The local treatment which has grown into favour during the past few years, but which I have advocated earnestly for the past twenty-five years, depends upon the necessity of giving absolute rest and freedom from pressure of the parts involved in the disease, without materially interfering with the mobility of the joint.” Page 259. Hip.

“Bonnet’s method—fixation without extension—for local treatment has been the plan abroad. In this country, however, fixation with extension has been chiefly employed, and to afford an apparatus that would meet these indications, leathern splints, gypsum and starch bandages, and strong wire gauze, moulded to fit the limb, have all been employed with more or less benefit, but all these plans prevented mobility. Page 259. Hip.

“There are many cases in which the inflammation is so violent, and the pain upon the slightest movement so intense, that absolute rest is requisite for a time, and in such cases the fixed dressing alluded to, answers a most excellent purpose. Under these circumstances I employ most commonly the cuirass, with extension. (See Fig. 120.) But motion is as essential in retaining a healthy condition of the structure about a joint as light is essential in retaining a healthy condition of the eye; for the ligaments around a joint will become fibro cartilaginous, or osseous, if motion is denied them, particularly if a chronic inflammation is going on within the joint with which they are connected. It was in consequence of such accidents occurring in several instances that I was led to contrive some plan by which extension could be maintained that would remove pressure from the acetabulum and the head of the femur, and at the same time permit motion of the joint, thereby retaining the capsular ligaments in a healthy condition.” Page 260. Hip.

“If left to itself, the rest which is so essential to the joint is procured by the firm muscular contraction which prevents motion, and this is so perfect in many instances, as to assume the appearance of genuine bony ankylosis.” Page 274. Hip.

“If employed at all, they must be frequently removed, and passive motion employed, else ankylosis, more or less complete, will take place, and the last state of the patient may be worse than the first.” Page 274. Hip.

“The patient should then be secured in some apparatus—the wire cuirass (Fig. 169), is most inconvenient—which will prevent the possibility of motion.” Page 277. Hip.

“This plan is to be pursued until the more acute symptoms have subsided; but as it is a disease chronic in its nature, long confinement in a bed is injurious

to the general health, and we must, therefore, contrive some mechanical appliance which will give extension, and counter-extension, at the same time admitting motion of the joint while it permits the patient to take exercise in the open air." Page 13. American Lectures.

"In some cases where the disease is very acute and the children very small, this is best effected by placing them in a wire cuirass; a modification of Bonnet's grand appariel will be found very useful. When this treatment is employed, it is necessary that the child should be taken from it very frequently, and have all the joints carefully moved, otherwise too long-continued rest of the joints may end in ankylosis." Page 14. American Lectures.

"Perfect rest, long continued, even of the diseased joint, is decidedly injurious, as there is danger of its resulting in ankylosis," Page 14. American Lectures.

Further, what is meant by the following?

"If it (the appliance) was designed that the motions of the joints should be free, and no harm should attend this freedom of motion unless the joint itself becomes the seat of disease."

Are the appliances used where no joint inflammation exists, if so, for what purpose?

At pages 262-3, the Sayre hip apparatus and its mode of application are given, and the inventor mentions that other means must be used during the night, such as the weight and pulley; this latter he designates "bed extension." At page 268, the information is given that the appliance cannot support the weight of the body, and crutches are advised as accessories. Up to the time of reading this page, I understood that Dr. Sayer taught that his splint prevented intra-articular pressure, if it cannot sustain the trunk weight, it certainly cannot relieve intra-articular pressure. From the last and following paragraphs of page 269, it is apparent that Dr. Sayre, like Dr. Taylor, has not found the

value of the simple but very important aid in the mechanical treatment of this affection, namely, locking the knee-joint; which alone, I suspect would, in the treatment of early inflammation of the hip-joint, give results quite equal to those obtained by the use of their own illusive machines.

This is significant information. The first stage, he says, can be treated by the Sayre or Taylor appliance, but when:—

“There is a great deal of tenderness around the joint, and other evidences of inflammatory action are present.”

Then he advises weight and pulley, but:—

“If the patient is uneasy, restless, irritative, and does not bear the extension apparatus well.”

It is advised to place him in a wire cuirass, or other fixed apparatus. Much as Dr. Sayre has advocated the extension treatment, more emphatic testimony than he gives here, to the superiority of posterior fixation, could not possibly be advanced.

The above amounts to this:—That if the patient cannot tolerate the irritation of extension, then give him plenty of fixation and alleviate his sufferings.

Another quotation from a tractionist, the representative man in this country. *British Medical Journal*, vol. ii., 1877.

“This use of weight at night is a matter of great importance. If it be neglected, you will find in many cases that although active disease has ceased, the limb will, in the course of a few months, become flexed upon the trunk, so that the child walks more and more upon his toe, and with more and more lordosis.”

Politicians in this country cry out to the electors, “Register.” My advice to the tractionists is, DIAGNOSE, then you will find

that hip-joints do not "become flexed upon the trunk although active disease has ceased." Learn how to *really fix*, and *arrest motion* in a diseased joint, and you will have no more muscles to "struggle" with for "the supremacy." Neither will you be disappointed as Dr. Sayre, at page 211 of his volume, says that he has been :—

"There are some cases in which the disease progresses reasonably well until passive movements are resorted to, and then there is at once an almost constant tendency to new inflammatory action, in consequence of such movements, however carefully they may be made."

At hand we possess infallible means of detecting disease of hip and other joints, and equally trustworthy helps to recognise the advent of recovery.

The gentleman who undertakes the often thankless duty of Censor, is deserving of any thanks he may receive; but undertaking the responsibility without competent knowledge—theoretical or practical—of the question in dispute, he deserves the neglect which too often falls to the lot of the meritorious.

The quotations which I have given from the published writings of the Tractionists and Extensionists, show that they are not in agreement with each other as to the foundation of treatment; consequently their disagreement in practice is very pardonable. But besides the above set of practitioners there are other sects of Orthopedists known as the Do-nothings, they remind me of a late United States political party, who rejoiced in being termed the Know-nothings, and I believe they will be equally as short lived as the latter. Dr. J. C. Hutchinson

was the premier of this party. In the Proceedings of the Medical Society of the County of Kings, U.S.A., vol. IV., No. 2, for April, 1879, we find given to us the "planks of their platform" in an article on the "Mechanical Treatment of the Hip, Knee, and Ankle-joints by a Simple and Efficient Method - the Physiological Method—with cases."

On a careful review of Dr. Hutchinson's article, I find he was quite as capable of refuting himself as any tractionist. In this article Dr. Hutchinson nowhere acknowledged an indebtedness to me for any part of his mechanical device, but for this omission he is absolved, by his extreme condescension in having adopted as a title to his paper the larger portion of a title-page of a volume published by myself in 1875. The principles of treatment advocated by Dr. Hutchinson were the following:—

"The indications for the mechanical treatment of inflammation of the joints of the lower extremities are to secure *immobility, extension, the removal of the superincumbent weight of the body, and means of enabling the patient to take open-air exercise.* The accomplishment of these indications, and the use of judicious medication and proper hygienic influences, comprehend all the principles of treatment.

Immobility of an inflamed joint, absolute and complete, is a primary and essential condition of its local treatment. The more effectually this is secured, the more rapidly and perfectly the joint recovers its normal condition, and the less danger there is of its being permanently damaged. . . . I am aware that many excellent surgeons believe that the danger of irreparable structural change and ankylosis of the joint is very great from prolonged fixation. This I am sure is an error. There may be a temporary ankylosis, such as arises from a diminution of the elasticity of the articular cartilages and an enfeebling of the ligaments and the muscles from disuse; but such changes are or need be only temporary, for by careful and steadily increasing use, reparation takes place in all these structures, and after a time they show no defect. I have never

seen true ankylosis when the joint has been immovably fixed until the inflammation has subsided, except in cases of extensive destruction of the joint-structures, in which case a cure by ankylosis is the thing to be desired. Exceptional cases no doubt occur, but the ankylosis takes place more commonly when fixation is incomplete, and more or less motion and friction are permitted before the inflammation has entirely subsided.

The object of extension is—(1.) To correct the malposition of the limb. An inflamed joint is never straight; it involuntarily becomes flexed, nor is it possible for the patient to prevent or change this position. The flexion takes place slowly, almost imperceptibly, but surely, even when the limb has been permitted to rest quietly in bed, undisturbed either by the patient or nurse; the degree of flexion depends upon the intensity or the duration of the disease. Every joint, when it becomes inflamed, assumes a characteristic *position*, which it is important to know, not merely as a diagnostic sign, but also as a point which may be made useful in treatment."

I highly recommend the above declaration of principles—it is very natural to do so,—as I have had no occasion to change my opinions since they were first published, fourteen years ago, for the judgment of the profession. Dr. Hutchinson having very ably made a condensed extract of my teaching, for which my thanks are tendered, then proceeds to show his application of these principles to the treatment of hip-joint inflammation, prefacing his demonstration by a condemnation of the practice which Dr. Shaffer confidently recommends. Also he informs us that:—

"Thomas, of Liverpool, believes that the indication of the proper treatment of the disease are to secure immobility of the joint with extension, while Professor Hamilton's wire gauge apparatus was designed merely to secure immobility of the joint without extension."

I believe that I ought to understand Mr. Thomas' principles and practice as well as any one in this country; I am not so sure as to Professor Hamilton's. From at least the year 1875 to

1889, Thomas adhered to the practice of immobilizing of the joint without extension. Referring to Mr. Thomas' practice, we are further informed :—

“The instrument is carefully moulded to the inequalities of the body by means of wrenches, and is well padded and covered with leather.”

This, I believe, is not quite correct, but the same remark does not apply to the following quotation :—

“The apparatus will not permit the patient to sit down.”

This is good evidence of the efficiency of Thomas' apparatus. Before terminating the discursive part of his paper, Dr. Hutchinson very ably points out the errors of the Davis, Taylor, and Sayre practice, and again refers to the :—

“Thomas instrument, by its long leverage, extending from the angle of the scapula to the calf of the leg, has some control over the movements of the joint, but it is unnecessary for this purpose.”

“Has some control,” may be taken to mean an insufficient control, and that more control may be attained by another method. This interpretation of the words, “some control,” cannot be correct, viewed through the fact that Dr. Hutchinson, in his treatment of hip-joint disease, makes no attempt to control the joint. He may reply, “not so,” as :—

“This immobilization of the joint a kind of Providence has secured, in spite of the efforts of the surgeon to prevent it.”

It gives me pleasure to unite with Dr. Hutchinson in acknowledging the efforts of “kind Providence,” but however desirous it may be to gain immobility, inasmuch as we have at hand devices which will give us more fixation than even the efforts of

“kind Providence,” *i.e.*, the muscles, it is our duty to dispense with Providence on this occasion. Could the muscles maintain the limb from the onset of the disease until the moment of recovery, fixed in an unvarying desirable position, then surgeons would not be required and all might be left to Providence. That portion of Dr. Hutchinson’s paper relating to hip-joint disease, concludes with a description of a portion of my devices for the treatment of this complaint, the adoption by him of a portion only, *viz.*, “crutch and patten,” is condemned by his own teaching, as the following extract proves :—

“The greatest obstacle to recovery is friction of the inflamed surfaces. I do not mean a mere limitation of the movements of the joint—such ‘rest’ as is obtained by placing the limb upon a soft bed or pillow—but the perfect fixation secured by a splint or other means, which admit of no motion whatever.”

Dr. Hutchinson concluded with a relation of cases, which in no way illustrated his treatment, further, he disqualified the whole of the first portion of his paper, by the admission that some class of cases “should be treated in bed, in a long splint under weight and pulley.” The next point Dr. Hutchinson discussed was the treatment of knee-joint disease.

“For the morbid conditions of the knee-joint the indications for treatment are in all respects the same as for inflammation of the hip-joint, with the addition of *compression* over the joint.”

If called upon to decide upon the merits of the treatment by compression and the treatment by “kind Providence,” I should, without hesitation, decide in favour of the latter. It would be some effort towards a retrogression of the disease

while, on the other hand, compression would be an effort aiding its progress. Where ankle disease exists, Dr. Hutchinson employs means theoretically the same as he uses in knee-joint disease. A discussion followed the announcement of this new gospel, and one enthusiastic surgeon made a complimentary comparison between Dr. Hutchinson and Copernicus, and no doubt, had I been present at the meeting, this enthusiastic and liberal-minded surgeon would have meted out to me quit : as much credit as I am entitled to.

The Student, at this part of the controversey, may say, "Well, we have tried the application of rest and fixation for the treatment of articular disease, in the United States and elsewhere, before and since Mr. Thomas published his views of treatment." My reply would be that, the remark was correct. M. David, in France, in the year 1778, and Mr. Hilton about one hundred years after laid down a theory of rest, the latter a mere replication of the former, a great advance in teaching, nevertheless marred by their not having discerned the essential difference between the "indirect method,"—the complete extension of their theory,—and the "direct method" which they practised,—tolerable only occasionally,—but always a breach of their theory. From a trustworthy source of information, I learn that "Rest and Fixation" has its representatives amongst the United States surgeons. I now propose to select from the writings of one of them an example which will show that my teaching and theirs materially differ. Dr. F. Willard, Philadelphia, may be fairly accepted as a representative man. By his thoughtful courtesy, there

is in my possession a copy of his pamphlet on "Joint Disease Treated by Rest and Fixation." I can recommend this to the notice of surgeons as being one of the few pamphlets in which the author never contradicts himself. By rest he always means interrupted rest, by fixation always interrupted fixation. I have during the last twenty years, invariably held opinions and applied treatment the converse of this.

I am told, and readily believe it, that Dr. Willard long preceded me in drawing attention to Rest and Fixation for the treatment of joint disease from his own standpoint. My formula is that, the rest must be physiological as well as mechanical, and uninterrupted so long as the slightest unsoundness exists, and that the mechanical treatment should not trespass upon the physiological, so as to interfere with the nutrition of the diseased part. I now give the reader a quotation from Dr. Willard's pamphlet :—

"The application of rest as a principle in the treatment of joint disease, although very generally accepted, is yet frequently employed only as adjuvant to other measures of relief, while its proper position is in the first rank, and all other means are subsidiary."

"The principle is capable of wide application in medicine. Splint—rest-producers—are applied in fractures and in wounds to limit inflammation. Inflammations of the pleura, liver, intestines, or peritonæum are best controlled by absolute recumbency. In joint inflammation, quietude, unaided and alone, is capable of effecting more in averting and subduing a developing disease than iodine, blisters, heat, cold, the cauterly, *et id omne genus*. mental treatment ; but no surgeon is justified in trusting to their power when dealing with a disease which is so prone to develop the most serious results if neglected. As soon should he trifle with a bleeding femoral artery or a post-partum hæmorrhage. In osteitic cases, especially, the evil tendency is so strong that no time can be lost,

“Those who advocate the ‘motion-without-friction’ assert that motion is the normal condition of a joint, which statement, while true as regards normal articulations, is no more applicable to diseased ones than to inflamed muscles or other tissues.”

Absolute “recumbency” merely, would be of very little use where inflammation of the pleura, liver, intestine, or peritoneum exists, if the patient with the first-named complaint, were permitted constantly to sing a song, or with the second allowed to take daily emetics, or with the third and fourth, red herring and a purgative.

In the following paragraph a slight error occurs.

“Nature evinces her aversion to motion by producing the most perfect rest which she is able to accomplish unaided. Muscular rigidity is the first and most common *avant-coureur* of danger.”

Muscular rigidity is the partner, not the fore-runner, of unsoundness, it increases with the disease side by side. The extract which follows the previous quotation shows that the author does not practice fixation until the case becomes acute.

“If the affected member is the lower limb, it should under no circumstances be placed upon the floor, and, until pain and all signs of acute inflammation have subsided, the recumbent position should be unceasingly maintained. If starting or spasmodic pains are present, weight and pulley extension should be employed, and fixation enforced until relief is secured.”

If the reader, however, will compare the preceding with the following quotation, he will sympathise with me in my difficulty in deciding at what stage of the disease Dr. Willard applies his disjunctive rest treatment.

“The abortion of articular disease is considered impossible by some surgeons, but cases of traumatic origin can, within the first ten days, be easily checked. The sceptical maintain that such a case is not one of true

joint disease. It certainly is not articular osteitis ; but a flame is as much a fire, save in degree, when first started, as when it has become a conflagration, and every suppurating articulation had a stage when it was but a tiny spot of irritation. One week of proper early treatment is more efficient than months of latter work.

Ten days seems to be his favourite period for fixation. Of course, if ten days' fixation is sufficient to make a diseased hip-joint sound, then a further period is a waste of time. At page 4 we are informed :—

“In many cases a cautious surgeon can gain considerable time by straightening the limb during anæsthesia, but such a procedure requires the greatest caution lest inflammation be excited.”

How an alteration of deformity can be brought about without some, be it ever so slight, aggravation of the inflammation, I cannot understand, when we take into consideration the fact that in altering a sound deformity some degree of unsoundness is induced, except the subject be lifeless, in that case, of course it is mere laceration, nothing further follows. The mid-paragraph at page 6 is devoted to the treatment of joint disease, and the devices are such that, while he secures mechanical fixation, his means create physiological disturbances.

In page 1, Dr. Willard commends Dr. Hutchinsons's mode of treating hip disease as being only suitable “among poor patients.” Why poor patients? Surgery is not a “caste” art. By a study of my teaching, it will be found that whether the patient belonged to the favoured or the neglected of Providence, the treatment, whatever money is at our service is the same, the cost is the same and that very moderate, being

as reasonable and efficient as it is moderate. Dr. Willard seconds Dr. Hutchinson in testifying to the efficiency of the Thomas' hip-splint.

“ Thomas' posterior bar answers a good purpose, but is open to the objection that sitting is impossible in a proper position.”

Dr. Willard's hip-appliance has an arrangement to enable the patient to sit, thus flexing his hip-joint while it is yet unsound, an excellent device if we could lay aside the disease for the occasion. That the reader may see that there is not any misinterpretation, the following quotation is appended :—

“ Objection has been raised to my apparatus, that it permits motion ; but experience shows that the simple temporary flexion movement is far less injurious than the twist necessitated by other fixation splints, since it is impossible to restrict patients to standing and lying.”

To permit “ simple temporary flexion ” is a great evil, a stab at the essence of treatment. In my opinion it is far better to follow the “ Providential ” treatment of Dr. Hutchinson.

As showing the great difference between the author and myself in our theoretical opinions, here follows another quotation :—

“ To apply the principle of rest, we have here, first, to tightly wrap the wrist and hand with the adhesive-plaster bandage, which exerts pressure and tends to prevent the posterior displacement of the carpus, which is so common when the dorsal ligaments give way. Over this should be applied a gypsum bandage, the hand being held during the hardening process midway between supination and pronation.”

Here we have, as I have already pointed out, a mechanical interference with the nutrition of the part, a compression applied to an unsound region, an evil equal to concussion. At another

page devoted to the treatment of elbow-joint disease, pressure on the diseased area is there again advised, a practice incompatible with actual rest of the part.

Dr. Shaffer, by his manifesto from St. Luke's Hospital cannot prolong the life of the practice he wishes to protect. If such a surgeon as Dr. Ridlon wavers—who has witnessed Dr. Shaffer's practice, and assisted him—we may reasonably conclude that it has very evident faults. The Tractionists of the Davis type refute themselves by their own writings, and the Extensionists by weight and pulley, are constantly committing "self-despatch." Inexplicably to me, all Orthopedists, when discussing the treatment of articular disease, confine their illustrations to the hip-joint. No doubt one joint is sufficient, though the mechanics of the treatment may vary, but then we find that with them the principles vary according to the special joint that has to be treated. Dr. Shaffer's treatment is no exception to this inconsistency.

Like puffed patented "plasters," many of the plans of treatment in application unavoidably give some fractional degree of fixation of an indifferent quality, thus the sufferers are sure to express some satisfaction, and the surgeon deluded by this comes to believe that, what was required has been gained.

As soon as we recognise the true principles of treatment, there will be no excuse for issuing manifestoes to regulate treatment, as it will not then vary radically; it will only be the addition or the removal of a buckle or button, or the ornamenting of our means to suit the harmless caprice of the patient.

The foregoing review was published in the early part of the year 1889. In September, of the same year, at the meeting of the "American Orthopedic Association," held at Boston, U.S.A., under the presidency of Dr. E. H. Bradford, a paper was read on "Rest and Fixation," by Professor De Forest Willard, M.D. In my opinion, it would have been better to have entitled it, "A refutation of the teaching and a protest against the practice of a British surgeon." It is my purpose to terminate this review by an attempt to defend the person criticised. It would have been more congenial labour to me if the critic had, before publicly dissenting from Mr. Thomas, read the latter's statement of principles and descriptions of practice, as then, it is very probable that Professor Willard would have been a consenting, rather than a dissenting party. Professor Willard and Mr. Thomas differ only in degree, but that very materially, viz: as to how much rest can be got, ought to be given, and whether in repeated doses or one continuous dose.

The opening portion of the paper is here reproduced:—

"I believe that rest to a joint can be obtained in a variety of ways, and any plan that will produce this result will give good cures. The means will differ according to the judgment of the surgeon. I am satisfied that excellent results follow the use of Thomas' splint, but I do not think they are caused by this particular form of splint as much as by the long-continued application of the principle of rest for month after month. If I understand his method correctly, his custom is never to allow the removal of the splint during the entire course of the disease. In my opinion it is largely this persistence, combined with the fact that his cases are all in private practice, that secures the excellent results that he reports. I confess that such absolute rest is not obtained in the practice of the majority of American Surgeons, since with nearly all of them a certain amount of motion is undoubtedly produced in

their efforts to obtain cleanliness. English mothers must be far different from those in our country, if they permit their children to continue for such a length of time without securing for them that condition of cleanliness which is so important to health."

Professor Willard does not admit that the Thomas splint gives us the best fixation, no doubt by totally encumbering the sufferer, and that out of all proportion to the benefit to be gained, a little more fixation might be secured. But Mr. Thomas only contends that for posterior fixation of the hip-joint, his design is the most useful before the profession at present, by referring to page 133 of the "Transactions of the Association," there is to be found a description of Thomas' splint by Professor Willard, thus:—

"Thomas insists that his splints should be made of malleable iron strips, and he claims that steel is unsuitable. My experience with iron bars has been that when a child sits or brings any strain upon them they assume a position of greater flexion than before, and remain there."

This is not the splint known as a "Thomas' splint," which machine is made of malleable iron, strong in proportion to the muscular power of the patient; so rigid, that only by suitable wrenches, not by wear, can it possibly be altered in shape. The next portion of Professor Willard's paper shows that he is unacquainted with Mr. Thomas' published opinions.

"Mr. Thomas asserts, on page 5 of his article above mentioned, "that every case of hip-joint disease can be cured without leaving a fractional deformity of flexion, and consequently, without any shortening, except that either arising from the arrest of growth, where inflammation has interfered with the growing points in the upper parts of the femur, or from erosion, no matter whether the case goes on to suppuration or not, or is even presented to us for treatment in an advanced stage of suppuration." If he can prove by statistics that this remarkable statement is true, that *all* cases, *subpurative*

or *non-suppurative*, can be thus cured without even a "*fractional deformity of flexion*," and "*without any shortening*," then I shall be exceedingly glad to abandon any form or plan of treatment which I have either practised or seen practised in the past. We are accustomed to see some beautiful results in carefully managed cases in private practice, but to obtain such perfect cures in "*every case*" has never been reached."

The term "rest," is used by Dr. Willard as though it were only his "trade mark," and not to be carried out in practice, to its utmost practical extent. Mr. Thomas still maintains, that beyond the deformities of shortening arising from arrest of growth and erosion, the others need not exist to be counted in making statistics, provided heed is given to his advice.

"I do not argue against Thomas' splint ; on the contrary, I have used it with good results, and I believe in it because of its fixation powers, but I do not believe that it is the only splint that produces rest. Rest can be secured by traction, by leather appliances, by plaster-of-paris, by wood, by binder's board or by any rigid material ; even traction splints produce a certain amount of rest. The secret of success, in my opinion, consists in carrying the splint far enough above the hip-joint to produce a certain degree of fixation that will approach most nearly to absolute rest. I do not believe that absolute rest, in its true sense, can be obtained, but we can approximate it. Any splint therefore, which is intended to secure rest must reach to the thorax above and to the calf below. Upon this condition, rather than upon any particular form of splint, success depends."

If we subtract from this paragraph, the practical error committed by Dr. Willard, in advising the "direct method" of practice ; his views and those of Mr. Thomas appear to coincide, so far well, but by the subtraction, we remove a very essential practical difference between the combatants, one of the differences that exist between Mr. Thomas' practice and that of his predecessors and contemporaries.

Having already shown by a quotation from Dr. Willard's paper that he is not acquainted with the essential element in the construction of a Thomas' splint, that is its rigidity, no wonder then that he does "not believe that it is the only splint that produces rest." Mr. Thomas has always maintained that the use of posterior hip-splints, whether of iron or steel, which the patient can possibly strain, is worse practice than the "providential Hutchinson" treatment. The foregoing quoted portion of Professor Willard's paper informs us, that in practice he makes no distinction between the "indirect" and "direct" method of treating articular disease, in this he materially differs from Mr. Thomas, regarding the extension of the proposition he has laid down. Professor Willard says, that :—

"Any splint, therefore, which is intended to secure rest, must reach the thorax above and the calf below to produce a certain degree of fixation, that will approach most nearly to absolute rest."

The Thomas splint is constructed in accordance with the foregoing rule, but the Willard hip-splint is not. In the paper under consideration, at Page 130, we find this expression of opinion :—

"Absolute rest is not secured by the Thomas splint, unless English children are different from our own. With this splint it is impossible for patients to sit with any comfort, except upon a higher chair. Children will sit, and in doing so considerable *twisting of the limb upon its long axis*, is the result.

It is known that Mr. Thomas has expressed disbelief in the practicability of securing absolute rest, the same opinion as Professor Willard, concerning a very obvious fact, that whether

the children be reared in the Old or New World, their bones will be found covered with soft structures, a very obvious and unsurmountable impediment to our gaining absolute fixation of the bony skeleton. Does the employment of a hip-machine by the surgeon, for the unsound joint,—we do not treat healthy ones,—constructed to release the joint if the patient attempts the sitting posture, indicate that its designer sufficiently extends surgical rest, or aims at approximately approaching its absolute degree?

Again, supposing that “children will sit,” and “so considerable twisting of the limb upon its long axis” resulted. Is the smaller evil to be compensated for by the commission of a greater one, unlocking the joint to suit the caprices of patients of the “children will sit” type? Professor Willard replies “yes,” as follows:—

“The avoidance of hip-straining motion first led me to adopt, in certain non-acute cases, a form of splint with unlocking joint, in which the joint was temporarily released when the child sat, flexion being allowed so that sitting became easy, and the patient was made comfortable on an ordinary chair.”

In the next paragraph he adds a qualification.

“I acknowledge that this permits temporary motion, but protection of the joint is constant, and the amount of motion is but little; the injury to the joint is less than is the strain caused by the twisting of the joint while wearing a posterior bar. I have the advantage of having given personal supervision to *both* forms of apparatus, and know whereof I speak.”

No wonder he places his own means of fixation of hip-joint disease and Mr. Thomas' on a par with “the providential method,” if he temporarily unlocks the joint and uses a Thomas' hip-splint, which in its construction adds to the

present friction and tremor, from the constantly varying leverage caused by alteration in shape of the machine during its ordinary wear. It is true that at page 131 of the Transactions, Professor Willard informs us that he employs the unlocking hip-machine for "those cases that have passed the acute stage," Mr. Thomas' objection to such practice is, that either the patient is sound or unsound, if diagnosed as cured, treatment is superfluous, if not, then the full precaution of arresting the major evil, flexion, ought to be continued, and that uninterruptedly. The Professor's treatment during the acute and painful stage is best described by himself. Mr. Thomas is of the opinion that the terms acute and chronic are very misleading, the word inflammation better describes the condition, from the onset to the time of cure.

"During the acute and painful state I consider absolute rest essential, and by rest, I mean rest in the horizontal position, with support of the limb and body by sand-bags, side splints, posterior splints, or any other form of fixation apparatus that may be selected by the surgeon."

The above paragraph, concludes with extolling the extension treatment and remarks not encouraging to the "distractionists" and the "splint tractionists." In the absence of a common principle, it is no wonder the art of Orthopedics is so minutely divided into sects. No wonder Professor Willard informs us that:—

"I have learned not to rely upon a single method of treatment, but to secure all the good that can be obtained from any plan of theory or practice. I am convinced that rest of the joint is the positive element in preventing, aborting, and lessening inflammation."

The foregoing is a fair statement of the opinions of Professor Willard as given in his writings, regarding Rest. His theory is his own, but his practice is culled from various sources, without sufficient winnowing.

At page 132, Professor Willard complains that Mr. Thomas has wrongly interpreted his expression, "that cases of traumatic origin can, within the first ten days, be easily checked." This explanation necessitates an apology from Mr. Thomas. The error however is excusable, if we read this :—

"The limb, under no circumstances, should be placed upon the floor, and until pain and all signs of acute inflammation have subsided, the recumbent position should be unceasingly maintained."

"I desire, in connection with the exhibition of the accompanying splint, not only to call attention to its adaptability to ununited or badly-united intracapsular fractures of the femur, but also to recommend it as an exceedingly useful support in the disabilities following sprains, lacerations, twists, and dislocations (congenital or traumatic) of the coxo-femoral articulation. Of its use in hip-joint disease, I would say here that it is of the greatest advantage in non-acute cases in the first stage, and in the majority of patients during the other stages."

"The joint allows only the hinge motion, a matter which is of decided advantage in twists or lacerations, and also in hip-disease where the round ligament is involved, as rotary and lateral motions would tend to prevent the needed repair."*

"Again, on page 5 of the reprint named, I distinctly state that "if the case is osseous in its origin, *several months* should elapse *after all cessation of pain* before crutches be permitted," and on page 7, "after all pain has ceased for *months*, some form of apparatus should be applied to prevent joint motion, and yet to permit the patient to move about on crutches, and with a high shoe on the sound foot."

"Long immobilization certainly does not produce ankylosis, but it does prevent it."

* Professor Willard's Hip Injuries, &c., read before the Academy of Surgeons, Philadelphia, June 7th, 1880.

“I do not argue against his methods. I only claim that the same results can be obtained in a variety of ways. No individual should be limited to a single splint, for it is not the splint that cures hip disease. Such a result is only to be obtained by the most careful and constant supervision of the various steps of the case in its several stages for many years.”

“We are to keep constantly in view the prevention, limitation, and reduction of the inflammatory process, while at the same time we so fortify the general health that it may successfully combat and at last throw off the destructive tuberculous process.”

If the splint, the mechanical treatment, be not the greatest item towards shortening the period of resolution of the disease, and avoiding some of the deformities, why employ it at all?

In conclusion, notice must be taken of Professor Willard's last remark, that :—

“As I understand it, all of Mr. Thomas's cases have been in private practice. It is not strange, then, that he should secure good results. This class of cases in our own country will also yield admirable statistics, but in the great crowd of drifting dispensary cases, where any form of treatment is given but a small chance of success from the neglect of even simple directions, it is not strange that most direful results are seen. I have often seen cases where even the plainest injunctions have been absolutely disregarded, and yet the surgeon or the plan of treatment has been compelled to bear the blame of failure.”

The remark, that “all of Mr. Thomas's cases have been in private practice,” is intended to convey to the reader the impression, that they were treated under specially favourable surroundings. Professor Willard, like most of us, believes that our surroundings influence, sometimes decide for us. The conditions Professor Willard refers to, Mr. Thomas, with regret, informs us he very seldom enjoyed, because, during all his professional life he has worked amongst what is termed

the "lower orders," and envious of surgeons "who had the advantage, when necessary, of (their) patients being indoor," at the expense of a suitable institution. Mr. Thomas not only had to contend against unsuitable surroundings, but against "touters," on behalf of Hospitals, who cross his path in the guise of City Missionaries, District Nurses, and others, who judged that because he possessed not these appointments, aids to fame, that his incapacity had barred the way. All contained in the "Contributions," was gleaned in the "Courts," not the "Squares," of Liverpool.

"Our surroundings influence us." The field in which Mr. Thomas worked, entailed a heavy physical and pecuniary strain, that stimulated him to devise means, while effective to resolve the lesion, relieved him of much toil, and in this endeavour, culled information which enabled him to extend the grammars of the questions that have been in dispute between himself and critical friends in the art, enabling him to push forward an "act of uniformity," the "Flexion Test," for influencing the management of all diseased joints.

APPENDIX.

NOTE I.

Having persistently championed Mr. James' claims on several occasions, I thought it would be interesting to reproduce the subjoined letter, his last contribution. From its perusal it is plain, that unjustly to himself, Mr. James allows the claim for Hildanus set up by Mr. Syme, Bell, and others. Hildanus had no knowledge, so far as a study of his writings can inform us, of any method of long continued extension, the Hildanus extension related to mere temporary force employed to reduce dislocations, or fractures at the primary setting.

To the Editor of THE LANCET.

SIR,—Since my memoir on difficult dentition was sent off, my friend Mr. Lydall, who kindly supplies me with that information which my sad loss of sight would have otherwise excluded, read to me Mr. Erichsen's important communication with respect to fractures of the thigh. To these my attention has always been especially directed. Mr. Erichsen mentions the three modes of treatment employed at University Hospital—*i. e.*, by the long splint, perineal bandage, and traction by weight and pulley; the last in terms of considerable approbation. He seems to consider Dr. Buck, of New York, as the originator of this mode of treatment. I am sure that if he had been aware that I had any just claim to the introduction of the method, he would not have omitted to have mentioned it. I may, however, state, that in the introductory address given by me at the meeting of the Provincial Association, at Liverpool, in 1839, I gave an account of the method I had been in the habit of employing for some time, by traction with weight and pulley; and this account as contained in my address, was published in the "Transactions

of the Provincial Medical and Surgical Association," vol. viii. p. 215 ; together with a plate, showing the apparatus. A model was also sent to the Exhibition of 1851. Up to this time I was not aware of this mode of treatment having been employed ; and I believe we must go back as far as Hildanus for proof that it had been.

A few days after the meeting at Liverpool I was at Edinburgh ; and I am glad to have this opportunity of acknowledging the very kind attention I received from Mr. Syme. He informed me that Hildanus had described an apparatus for the purpose. It, however, appears that his patient could scarcely have borne it as there represented—at all events it fell into disuse.

It is now more than thirty years since I was induced to employ this plan, from occasional failure in muscular subjects, by Desault's long splint, however carefully applied. The failure proceeded from the *constant* tendency of the muscles to contract, while the control over them was at *intervals only* ; and any failure in the retentive apparatus would give them the advantage. This is met by the constant action of the weight and pulley ; and I found it very advantageous in fractures of the lower part of the femur.

I found ere long that although this method of extension in the straight position was successful in the lower part of the thigh, it failed to obviate the difficulty which has always been found to exist in the upper third, especially in muscular subjects, where the flexors of the thigh and the pelvis exert a predominant power, and produce what is called "The rising end of the bone;" which if it cannot be controlled, produces both an angular union and shortening of the limb. To obviate this, Mr. Pott, as is well-known, laid his patient on the side and placed the limb in the flexed position ; but although this is calculated to bring the two portions into a straight line, yet it provides no adequate power to prevent shortening and if the patient cannot be prevented from occasionally turning on his back there is a strong tendency to carry the upper portion inwards with the pelvis. To meet these difficulties I availed myself of the bed the grandson of that celebrated surgeon brought into use—I mean my late friend, Mr. Henry Earle's. The thigh, being surrounded by four light splints to prevent lateral displacement, I laid upon the second segment of this bed at the most convenient angle, the knee corresponding with the joint of the bed—which is capable of adaption as to length—the leg and foot resting on the third segment. Two short pads of a wedge-shape, with the base corresponding to the condyles, and short splints over them, are grasped by a cord having a clove hitch, the two ends carried down from the condyles united at a convenient distance and then carried over a pulley,

and connected with a bag of sand, which I found the most convenient mode of proportioning the weight. The use of these short pads and corresponding splints was to prevent the cord from slipping over the joint (and I may mention that I have found the same plan useful in reducing dislocations). The counter extension was provided for by a firm buckle belt round the pelvis, with straps carried round the lower part of the first segment of the bed, and occasionally with a permanent strap also. By this mode the fractured pieces were kept in a straight line, displacement in every direction being provided against, and sufficient extension maintained to prevent overlapping. The cases treated in this way did perfectly well.

Since the account was published to which I have alluded, I have in vain hoped that the method proposed would have been carried out by others. But I may fairly conclude that from the manner in which Mr. Erichsen speaks of Dr. Buck's plan, that this hitherto has not been the case. It was with great satisfaction I found that one so distinguished as Mr. Erichsen had adopted it with satisfactory results.

Although now for some years, I have been unable to pursue my profession, yet I feel the greatest interest in all that appertains to it; and if in introducing the principle of traction I may have contributed to promote it, more especially if the methods, which I adopted should be found useful, it is all that I desire.

The Transactions in which the account was published unfortunately were discontinued, and have since been greatly neglected; but had the memoir I published met Mr. Erichsen's eye, I am sure he is the last person who would have omitted its mention.

I am yours obediently,

J. H. JAMES, F.R.C.S., &c.

Exeter, May 25th, 1868.

NOTE II.

Dr. Ridlon of New York, U. S. A. while in Liverpool called my attention to a few omissions, amongst others, "that I had not distinctly stated that the hip-machines were made to be altered to fit right or left hips" by rotation of the mainstem. They always leave the hands of the maker to be altered by the surgeon to fit the right or left side as he may require.

NOTE III.

Trochanteric disease although accompanied by limitation of motion, yet the sign of flexion may be sometimes very slight ; nerve distribution probably, will be the explanation of this.

NOTE IV.

In fitting a patient having knee disease, at times there may be old disease of hip—with some remaining deformity or limitation of motion,—then the patient may require the groin ring to be set at an acuter angle than ordinarily to the mainstem, otherwise the outer rim of the groin ring will not go over the trochanter so as to be pushed up into position at the groin.

NOTE V.

In the letter-press explanatory of Figs. 108 and 109, there has been pointed out to me an ambiguity or omission to state the fact, that the external rod connecting the outer wings of the middle and lower cross bars, besides being used to correct abduction, is also employed to correct genu valgum, not an infrequent accompaniment of hip disease with tendency to abduction. In such cases the inner wing of the middle cross piece can be removed, with advantage, when found to be a hindrance to cleanliness, &c.

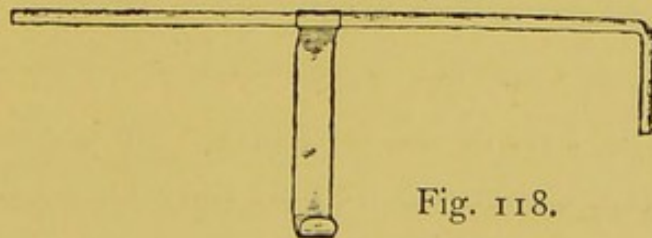


Fig. 118.

NOTE VI.

Fig. 118 is an illustration of a convenient instrument for measuring accurately the position of the mid-groin wing of

the knock knee reducer. It consists of a rod bent at one end, on it there is a sliding wing. The rod is placed outside of the limb, its hooked end projecting under the boot, just in front of the heel, then the wing is pushed up to the groin, and the position of the groin wing chalked upon the rod; the position of the other wing is also marked and the super-trochanteric pad, then the instrument, so marked, is handed to the instrument maker.

NOTE VII.

At page 53, there is to be found the following:—"If the foot feels to be held too much inverted, the part a. D. of the vertical stem requires to be slightly rotated upon itself in a direction that will make the point of the hook at D. indicate a little backwards." The foregoing is required to be attended to, to gain a perfect fit and diminish the tendency of the machine to rotate from its true lateral position, when the heel-hole is at a right angle to the boot. My description may not be lucid enough, if so, the reader by reference to page 81, and giving the hole in the boot a right slant C. D, or left slant A. B., fig. 54, as may be required, he need not trouble to give a. D., fig. 28 the twist or rotation described.

NOTE VIII.

In the pages devoted to Fractures of the Patella, I have neglected to emphasize the importance of constantly and firmly maintaining the knee at full extension. The position of full extension totally depending upon the correct regulation of the mid-leather in relation to the lower one, which should be as tight as possible. All this is important when aiming at the most perfect restoration, close approximation of fragments.

Read Sept 1st 1890. B.R.
good but not which new matter replaced with premium of H.O.T.

PRESS OPINIONS.

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