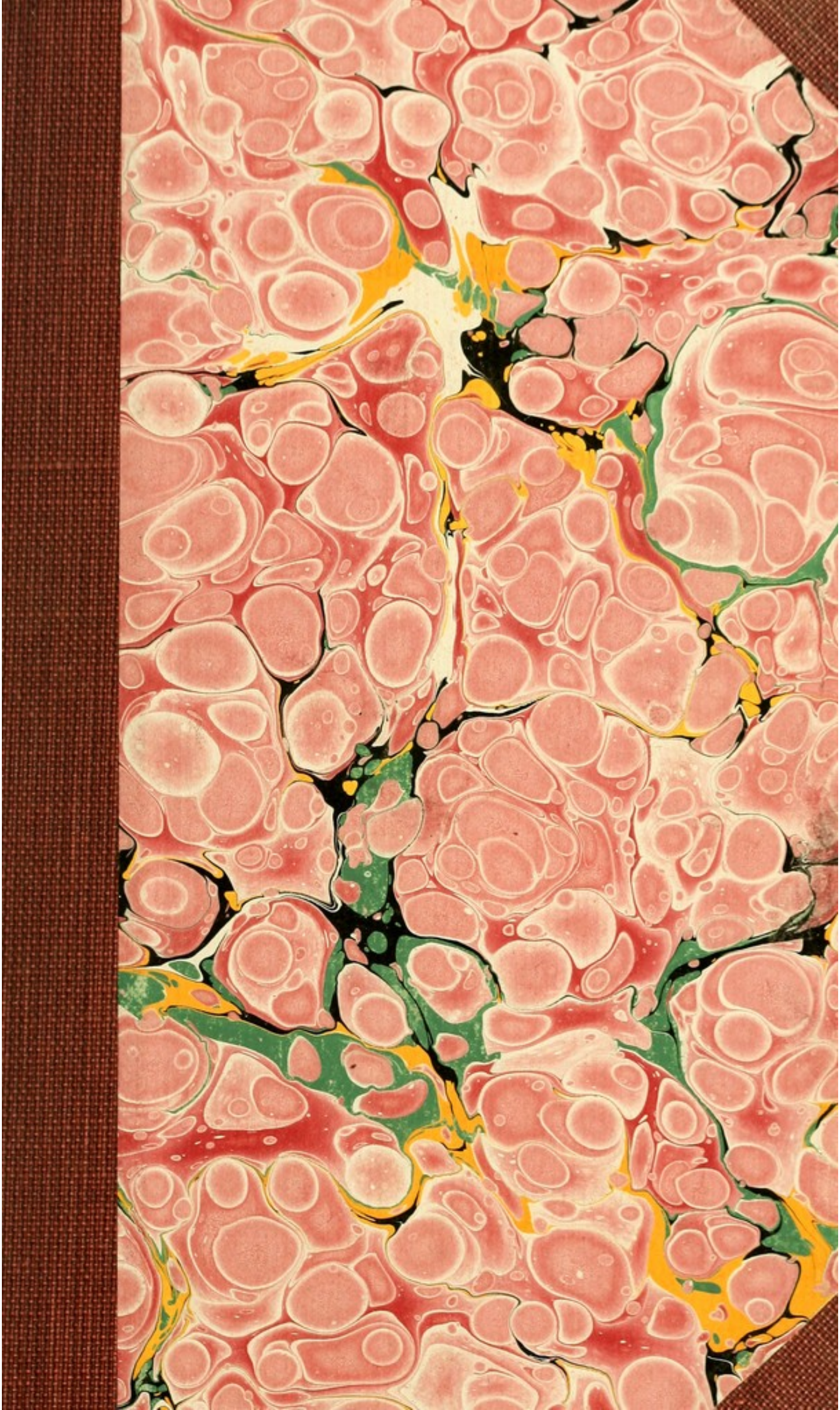
Orthopaedic apparatus and description of the mechanical appliances employed in the treatment of deformities and deficiencies of the body : with the directions for taking measurments for their application / by D.W. Kolbé.



ORTHOPÆDIC APPARATUS

AND

DESCRIPTION OF THE MECHANICAL APPLIANCES

EMPLOYED IN THE

TREATMENT OF DEFORMITIES AND DEFICIENCIES OF THE BODY,

WITH

DIRECTIONS FOR TAKING MEASUREMENTS FOR THEIR APPLICATION.

BY

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PREFACE.

HAVING been frequently consulted by physicians and others living at a distance, as to the mode of taking measurements for the construction of mechanical contrivances for the treatment of deformities and deficiencies of the body, I have been induced to prepare this catalogue, containing accurate directions in these particulars, so that no blunders can possibly occur if the directions are properly followed.

The forms of instruments described are of the most approved kinds, embracing the most recent advances and discoveries in mechanical therapeutics, as described in the latest and most elaborate works on this subject. They are approved of by the large mass of practising surgeons, as shown in Prof. Gross' System of Surgery, and Dr. Wales' Mechanical Therapeutics, in which works fuller accounts of these apparatus may be found.

I am also prepared to furnish, besides the above-described apparatus, any form of surgical appliances or modification of apparatus that may be ordered by the surgeon.

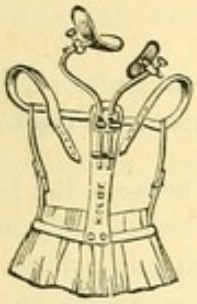
D. W. KOLBÉ.

APPARATUS FOR DEFORMITIES OF THE HEAD AND NECK.

WRY-NECK.

Figures 1 and 2 show Kolbé's apparatus for wry-neck, and Fig. 3 an apparatus for the same purpose, modified and improved.

Fig. 1.



Kolbé's apparatus for wry-neck.

Fig. 2.

Showing the mode of application of the apparatus.

Fig. 3.

Showing the application of the apparatus modified by Kolbé.

Both of the above forms of apparatus for wry-neck take their bearings or point of counter-extension upon the pelvis, instead of the shoulders, as in the ordinary collar apparatus, and they are therefore stable, without the slightest tendency to become displaced. The rotative force applied to the head by the two cephalic levers admits of graduation by means of ratchet centres, as seen in the cuts.

In ordering an apparatus of the sort, the measurements given in Fig. 7, page 5, will be required. A sketch or photograph showing the extent of contraction will be desirable, and assist greatly in making a well-fitting apparatus.

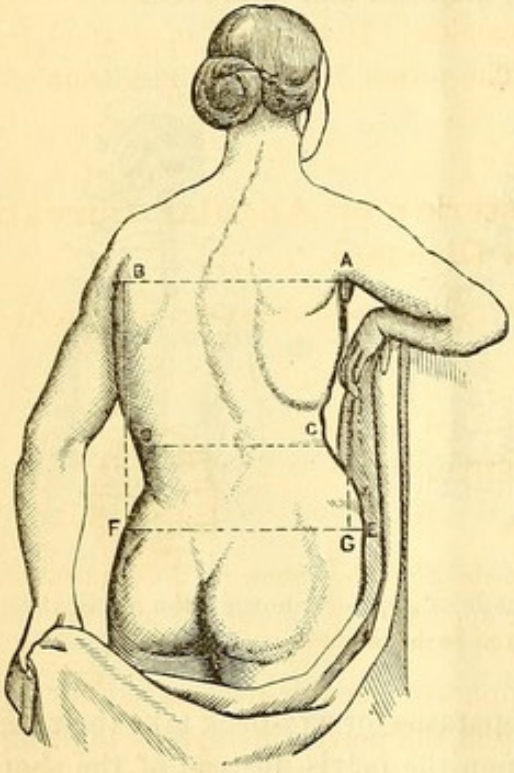
APPARATUS FOR DEFORMITIES OF THE TRUNK.

CURVATURES OF THE SPINE.

Apparatus for Lateral Curvature of the Spine.

Fig. 4 shows the manner in which the necessary measurements are to be made in ordering an apparatus for spinal deformity.

Fig. 4.



B A, D C, F G — Points of circumferential measurements of the body.

B F, A G — Distances between the highest and lowest body measures, extending from the armpits or axillas to the points of the hips.

In addition to the above measurements, please state to which side the body inclines (right or left); the age and sex of the patient. In ordering a spinal supporter, as there are a number in general use, it will be necessary to name the special one required; and should any modifications be desired, they should also be stated.

Fig. 5 represents Kolbé's apparatus for lateral curvature. It consists of a steel frame well padded with leather or other appropriate material. The power is applied by means of screws and ratchet centres, as shown above.

Fig. 5.

Fig. 6.

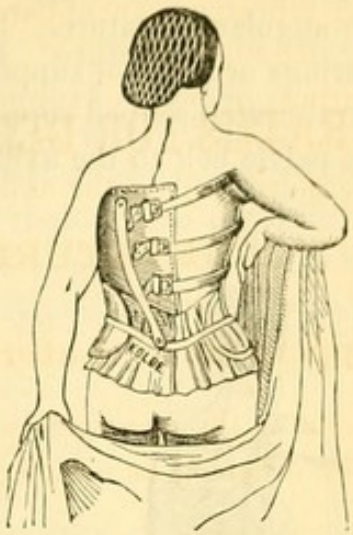
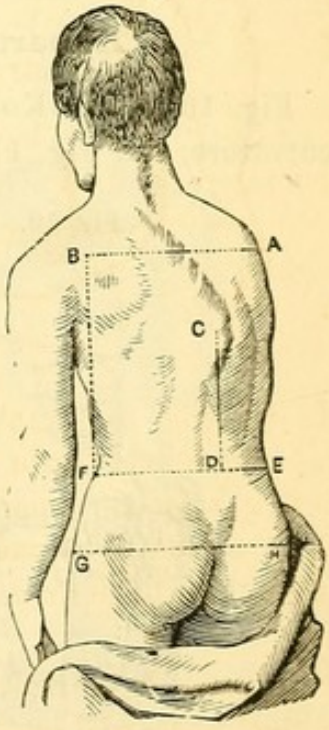


Fig. 6 illustrates the construction of another form of Kolbé's apparatus, particularly adapted to females. It consists of a steel frame, padded as in the former case. The power is applied by means of free centres and elastic straps.

Apparatus for Antero-Posterior or Angular Curvature (Pott's Disease).

Fig. 7 is given as a guide for taking measurements in ordering an instrument for angular curvature.

Fig. 7.



GUIDE FOR MEASUREMENTS.

G H, F E } Circumferential measures of hips.

B to A. Breadth of the shoulders.

C to D. Length from centre of curvature to horizontal line.

B F, A E } Distances between the two horizontal lines.

In all cases of this deformity, it will be necessary to send an outline of the dorsal protuberance, which may be obtained readily by placing the patient in a horizontal position on his face, and then applying a strip of sheet-lead, lead wire, or pasteboard cut edgewise, along the median line over the apex of curvature, and extending between the horizontal lines B A and F E. This will give a curved outline, which may then be marked off on a sheet of paper. The age and sex of the patient will also be required.

Fig. 8 represents an apparatus, modified by Kolbé, for antero-posterior or angular curvature. It consists of a light padded steel frame. The bearings or point of support is established on the hips by means of two lateral crutch-shaped supports, running on either side of the spine, from the pelvic belt to the axillas.

Fig. 8.

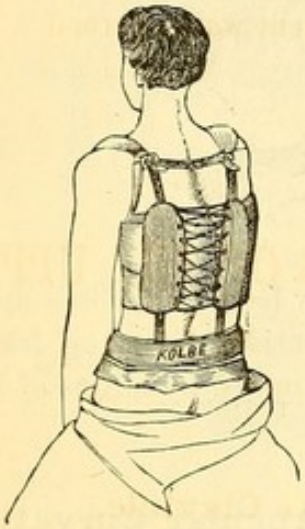


Fig. 9.

Fig. 9 shows the old form of a spinal supporter. It consists also of a light steel frame well padded, which takes its support on the pelvis, and supports the upper part of the body by axillary crutches.

Apparatus for Cervical Curvature.

Fig. 10 shows Kolbé's modification of an apparatus for cervical curvature, and Fig. 11 illustrates the mode in which it is applied.

Fig. 10.

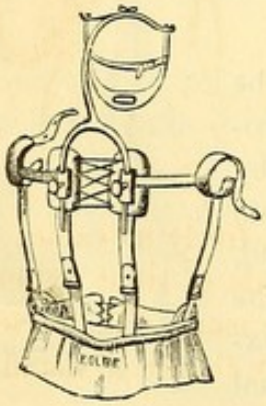
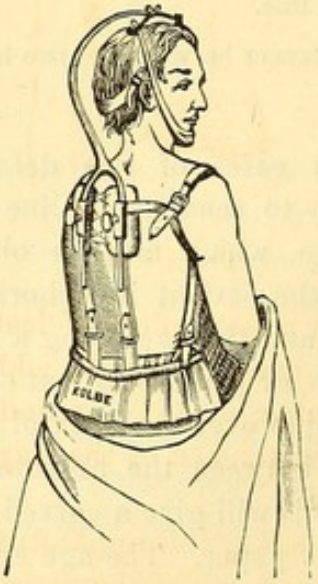


Fig. 11.



In ordering the above apparatus the person will be guided by the same measurements as are given in Fig. 7, page 5, with the addition of the distance from the line B A to the top of the head.

This instrument may also be employed in slight cases of wry-neck. It is similar in construction to the apparatus employed for the treatment of angular curvature in the dorsal region; the cephalic lever is movable, and in slight cases of distortion it may be detached from the body of the apparatus during the time the patient walks abroad.

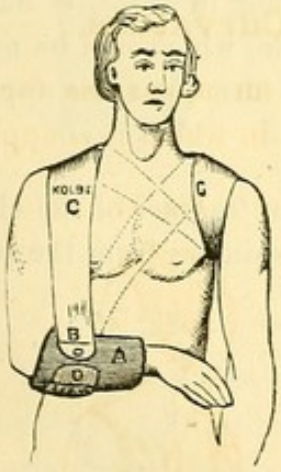
APPARATUS FOR DEFORMITIES OF THE UPPER EXTREMITIES.

FRACTURES.

Apparatus for Fracture of the Clavicle.

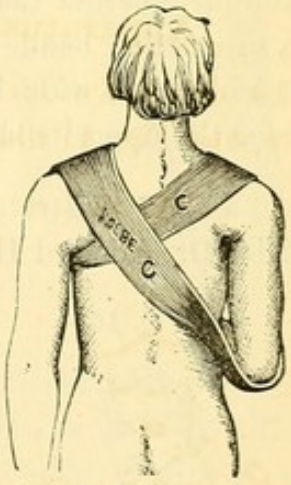
The apparatus represented in Figs. 12 and 13 (front and back views) is that devised by Dr. Boisnot. It consists of a leather forearm tray, A, lacing and made to fit the parts well. To the upper and outer part of

Fig. 12.



Front view.

Fig. 13.



Back view.

this tray a stout piece of leather is attached, freely movable; this part is again extended by the addition of two yards of stout webbing, C C, which, after coursing around the chest in the manner shown in the cut, is finally attached to the tray by the buckle D, thence to sound shoulder for sling.

In ordering this apparatus, no measurements are required, but simply the age and sex of the patient.

Figs. 14 and 15 show the apparatus of Dr. Levis. "It consists of a short, firm pad in the axilla, by which the shoulder is held from the

Fig. 14.

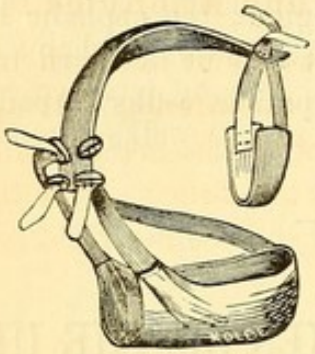


Fig. 15.

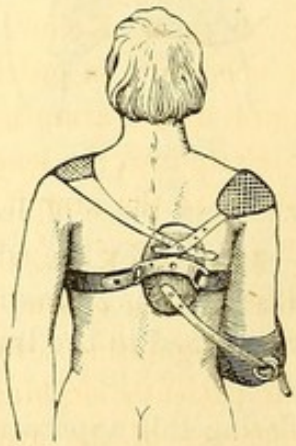
side, and over which, as a fulcrum, the elbow is drawn to the side. To the front and back of the axillary pad are fastened straps, which pass directly upwards, and are buckled to a wide main supporting band, which passes from the shoulder across the upper part of the back, and over the shoulder of the sound side, and terminates on the front of the chest. To the front end of the wide supporting band is suspended a sling, by which the elbow is supported. On the back of the sling, at a short distance above the point of the elbow a strap is attached, which passes obliquely across the back, and, coming in front, is buckled to the main supporting band. The extra buckle, which will be noticed at the front end of the wide band, comes into use when the apparatus is reversed for the opposite shoulder."

Figs. 16 and 17 illustrate the apparatus for fracture of the clavicle as designed by Dr. Edward Hartshorne. This differs from the preceding

Fig. 16.

Front view.

Fig. 17.



Back view.

in having a compress placed upon the lower and inner margin of the scapula of the injured side.

In ordering this apparatus, no measurement is required. State the age and sex of the patient.

Apparatus for Resections and Anchylosis.

Fig. 18 shows Kolbé's apparatus for resections at the shoulder-joint and in the continuity of the humerus. In ordering this apparatus, mark the seat of the resection; give the circumference of the shoulder, and of the chest just under the armpits; the distance from the armpit to the elbow, as well as a statement whether it be the right or left arm for which the apparatus is intended.

Fig. 18.

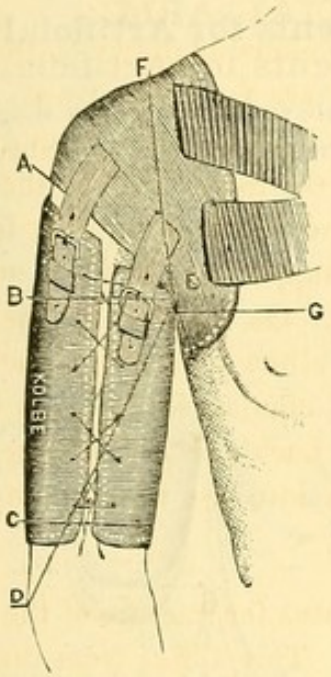


Fig. 19.

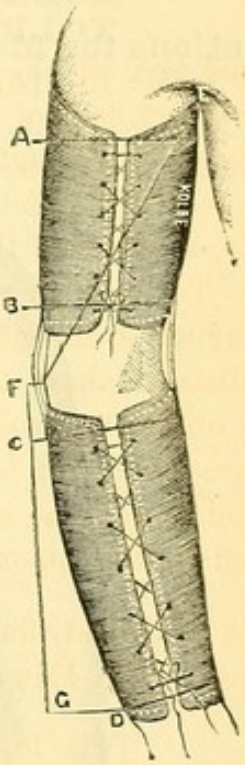


Fig. 19 shows Kolbé's apparatus for resection of the forearm. It will be necessary, in ordering this apparatus, to give the circumference of the arm at the armpit, above the elbow, below the elbow, and at the wrist. State also the length from the wrist to the elbow-joint, from the elbow-joint to the armpit, and whether it is the right or left arm.

Fig. 20 shows Kolbé's modification of one of Stromeyer's splints for anchylosis of the elbow. Other forms of the apparatus are made, in which the regulating screw is so placed as not to materially interfere with the patient's clothing. In measuring for this apparatus, give the circumference of the arm above and below the elbow, and also the length from the wrist to the elbow, and from the elbow to the armpit.

Fig. 20.

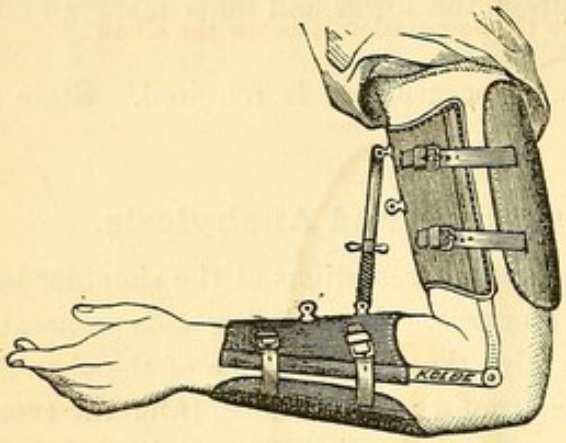


Fig. 21.

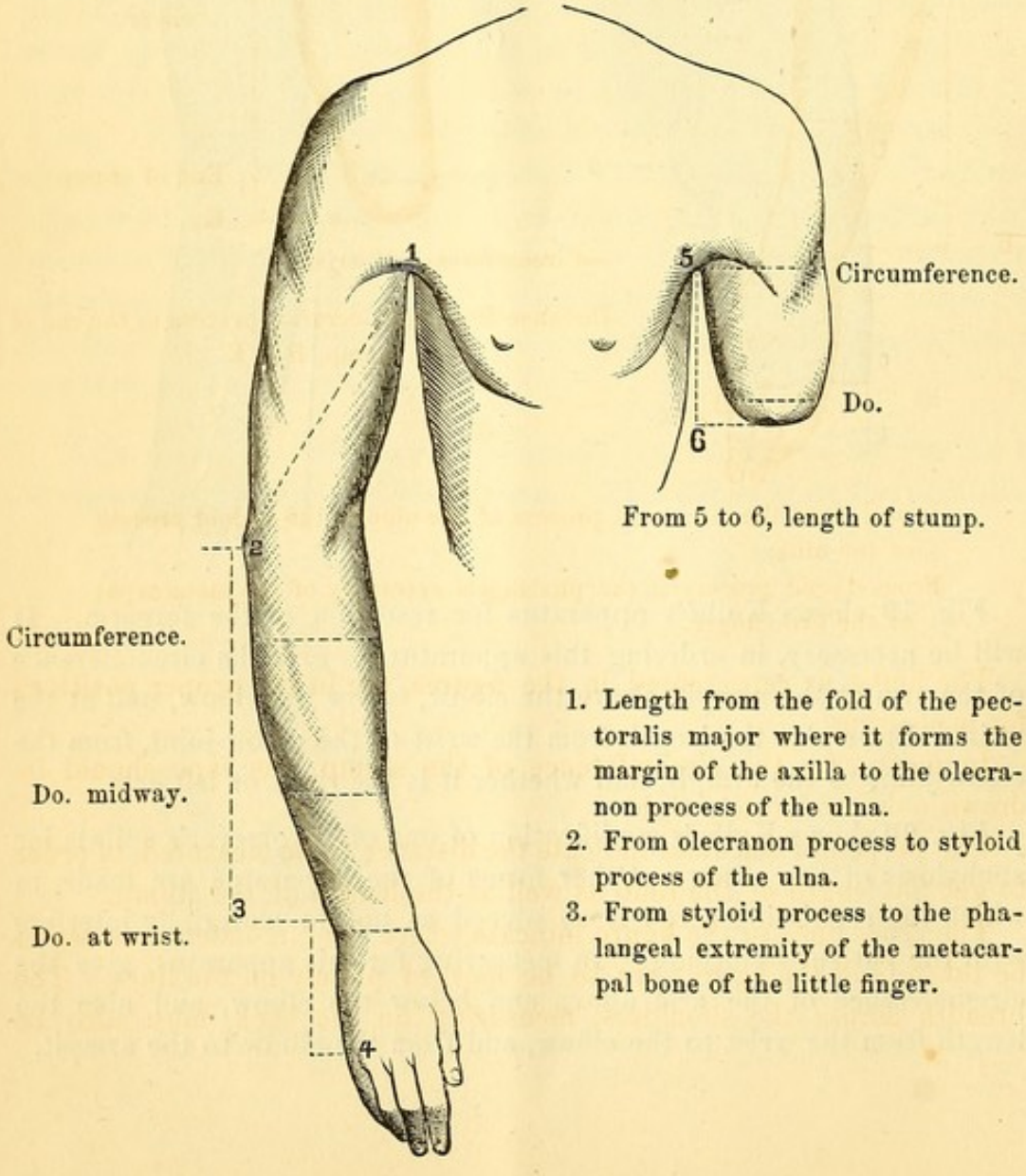
Fig. 21 shows the application of shoulder-braces. It will be simply necessary, in ordering these, to mention the age and sex of the patient.

KOLBÉ'S ARTIFICIAL ARM.

Directions for Measuring Patients for Artificial Arm.

Fig. 22

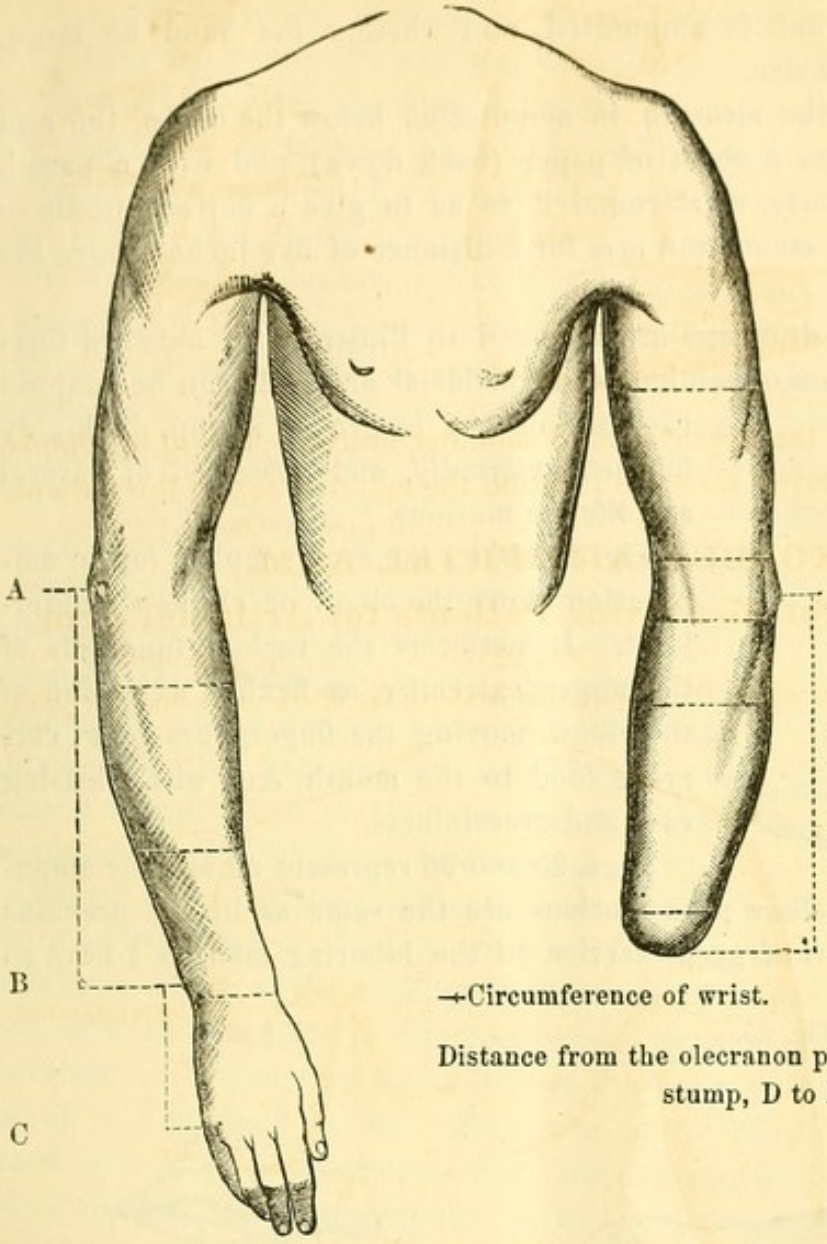
Will be used in cases where the amputation is above the elbow or at shoulder-joint.



1. Length from the fold of the pectoralis major where it forms the margin of the axilla to the olecranon process of the ulna.
2. From olecranon process to styloid process of the ulna.
3. From styloid process to the phalangeal extremity of the metacarpal bone of the little finger.

Fig. 23

Will be used in cases where the amputation is below the elbow.



Length from the olecranon process of the ulna to the styloid process of the ulna.

From styloid process to the phalangeal extremity of the metacarpal of the little finger.

The limbs, as represented in the figures, are in the proper positions for measuring.

In measuring the circumference of the stump, the tape should be drawn only moderately tight.

The perpendicular lines indicate the distance to be measured, in order to get the length of the limb as well as the length of the stump.

The cross lines in the figure indicate where the circumferences are to be taken, and the figures are to be marked plainly on the lines. The breadth across the shoulders, measuring on the back, must also be

given, and in measuring from 1 to 2 the tape should be drawn on the inner side of the arm.

State which limb is amputated, and whether the hand be large, medium, or small size.

After taking the measure, in amputation below the elbow, the arm should be laid on a sheet of paper (back down), and with a pencil, held perpendicularly, mark round it so as to give a correct profile of the shape of the stump and arm for a distance of five inches above the elbow.

The following drawings are intended to illustrate the outward form and the mechanism of motion of my artificial arm. It can be adapted to limbs of any length of stump, is highly finished externally, and possessed of natural and lifelike motions.

Fig. 24.

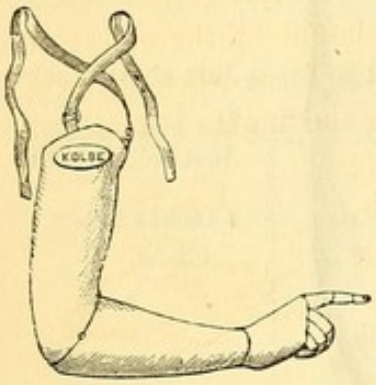


Fig. 24 shows the arm complete for an amputation above the elbow or at the shoulder-joint. It performs the various functions of the upper extremity, as flexion, extension of the elbow, moving the fingers, grasping, carrying food to the mouth, &c., with pleasing ease and gracefulness.

Figs. 25 and 26 represent an arm for amputation below the elbow; its motions are the same as in the previous case. This arm is of great service to the laboring man, as I have so

Fig. 25.

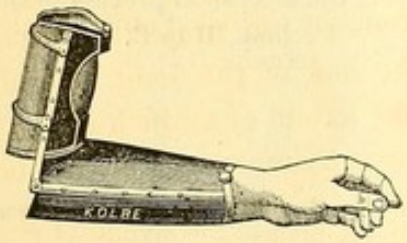
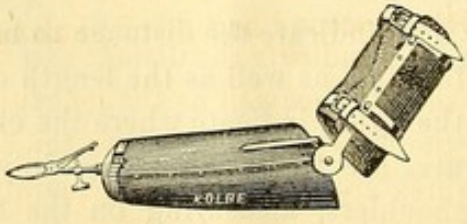


Fig. 26.

modified the connection of the hand with the forearm that the former may be removed at pleasure, and various useful contrivances substituted, such as a chisel, screwdriver, knife, fork, or spoon.

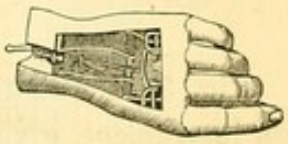
Fig. 27 shows the hand replaced by a pair of nippers.

Fig. 27.



The application of power is provided for in the construction of these limbs by the following mechanism: A traction-cord, consisting partly of webbing and partly of a well-tempered slip of steel, is attached above by the webbing to the shoulder of the arm opposite that which the artificial substitute is intended to replace, and below hooks on by the end of the metallic portion of the cord which runs about the forearm, to a short vertical steel slip running through a slit in the back of the margin of the wrist-plate; thus connecting it with the mechanical arrangements designed to move the fingers, which we shall shortly describe. The strip of steel at the level of and upon the outer side of the elbow is articulated with the aid of a metal slide working for its whole length upon a tenon or projecting pin, the upper end of the slide is connected to the webbing or leather strap going to the shoulder; the object of this arrangement is to change the direction of the force when the arm is bent. The mechanical arrangement for moving the fingers is inclosed in a cavity hollowed in the substance of the hand; it consists of a number of levers of different kinds, arranged in such a manner as to apply the force exercised by the traction-cord to the best mechanical advantage in moving the fingers. They are placed in the following position: A lever of the second order is placed at the upper part of the hand, and connected with a second lever of the first order placed in the centre of the hand, the fulcrum being a pin running transversely through the hand. The short arm of this lever is bifurcated, each division pressing upon a transverse bar connecting the ends of a short pin projecting from the base of two adjacent fingers. From the end of the long arm of the second lever a bar projects upwards to the extent of an inch and a half, and connected by a short coupling, by its proximate end, to an oblique bar fixed to the base of the thumb. A spiral string runs along each side of the hand, and, acting upon each couple of fingers, keeps them in a position of approximation to the thumb. The fingers are connected with the hand by a transverse bolt; the index and middle fingers, and the ring and little fingers, are coupled together, the former possessing the first phalangeal joints, while the latter are solid. As the mechanism thus far described provides only for the extension of the first phalanges, an additional lever, working by an excentric, is placed in the first phalanges, and acts upon the second and third phalanges.

Fig. 28.



Abdominal Supporter and Trusses.

Fig. 29.

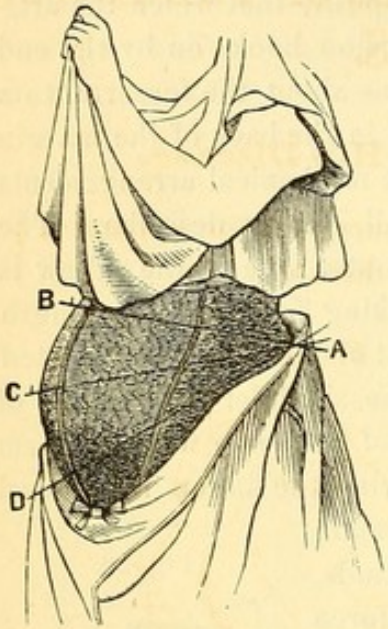


Fig. 29 illustrates the application of an elastic abdominal supporter in pregnancy and large tumors of this region. In ordering this bandage, simply give the circumference of the abdomen in the directions of the lines A B, A C, and A D.

Fig. 30 shows the ordinary truss. In taking measurement for such an instrument, give the circumference of the body at the point where the hernia protrudes—that is, on a level with the inguinal, crural, ventral, or umbilical apertures; and also mention if the hernia is on the right or left side, or both.

Fig. 30.

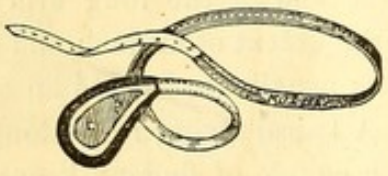


Fig. 31.

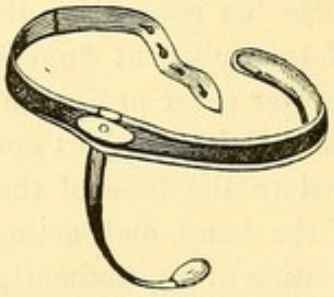


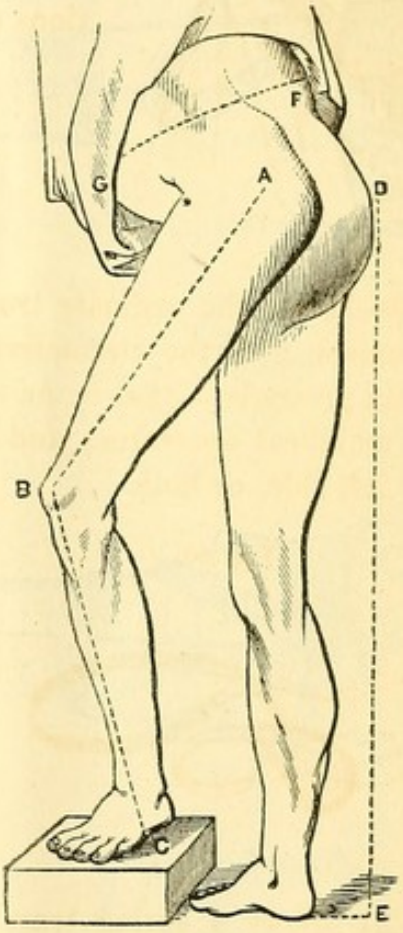
Fig. 31 shows a spring truss for prolapsus ani, or *falling of the body.* In ordering the instrument, give the circumference of the body above the hips, and the distance from the front central point of this line, over the perineum, to the centre of the back part of the line.

APPARATUS FOR DEFORMITIES OF THE LOWER EXTREMITIES.

Apparatus for Coxalgia, or Hip Disease.

Fig. 32 is intended as a guide for measurement for apparatus for ununited fractures, resections, and hip-joint disease.

Fig. 32.



G F. Circumference of body.
A B. Length from centre of hip-joint to middle of patella.
B C. From patella to sole of foot.
D E. Length of sound limb.

Circumference above and below the knee.

State also which limb is affected, and the age and sex of the patient.

In ununited fracture or resection it is necessary to mark the seat of fracture or excision of the bone; also two inches above and below. The length from the perineum to the sole of the foot should be given.

In all cases where a shoe is required, the measure for it should be taken as directed on page 18, Fig. 41.

Fig. 36.

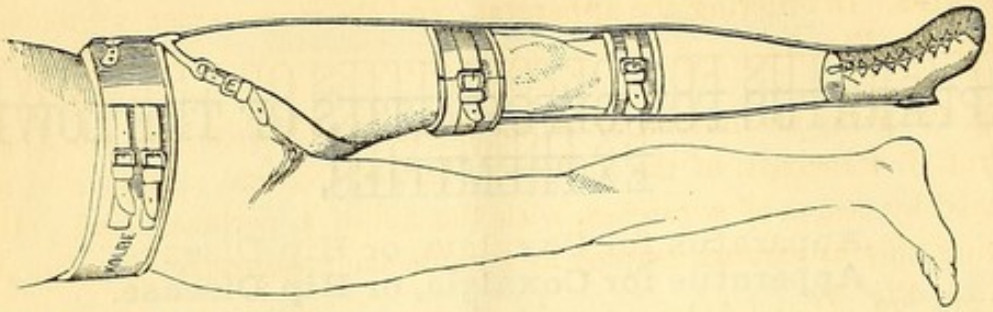


Fig. 35.

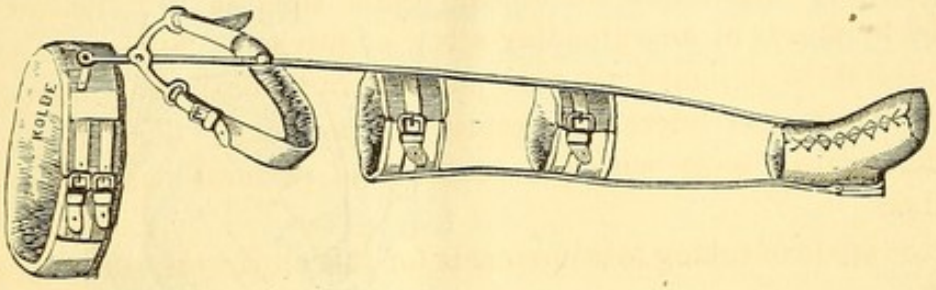


Fig. 34.

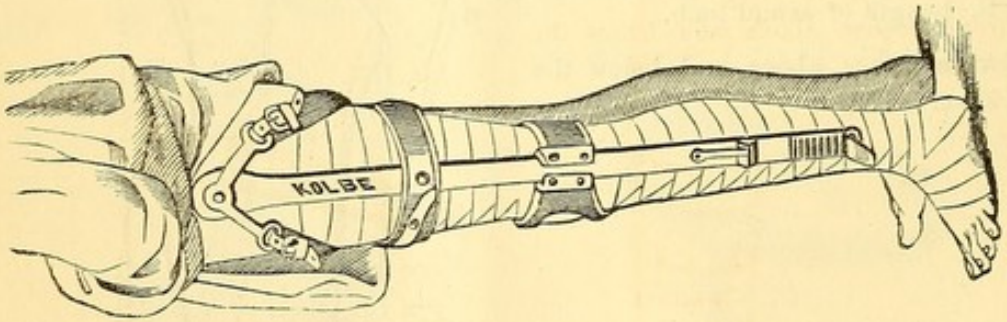
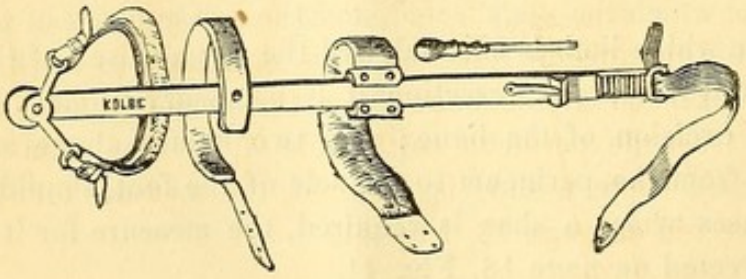


Fig. 33.



Figs. 33 and 34 show Davis' splint for coxalgia, and the mode of its application. In ordering the apparatus, send the measurements directed at page 15, Fig. 32.

Fig. 35 gives an illustration of an apparatus for coxalgia, modified by Prof. J. Pancoast, of the Jefferson Medical College. Extension is obtained by means of a ratchet, with the aid of a perineal band. In ordering this apparatus, employ as a guide the measurements given at page 15, Fig. 32.

Fig. 36 illustrates the mode in which the apparatus is applied.

Figs. 37 and 38 show an apparatus for coxalgia, modified by Dr. D. N. Agnew, surgeon of the Pennsylvania Hospital. Extension is obtained by means of an extending screw or ratchet. The upper part of the splint is designed to rest posteriorly against the tuberosity of the ischium, and internally against the perineum. This mode of construction does away with the necessity of perineal band of other apparatus.

For the mode of taking measurements for this apparatus, see page 15, Fig. 32.

Fig. 37.

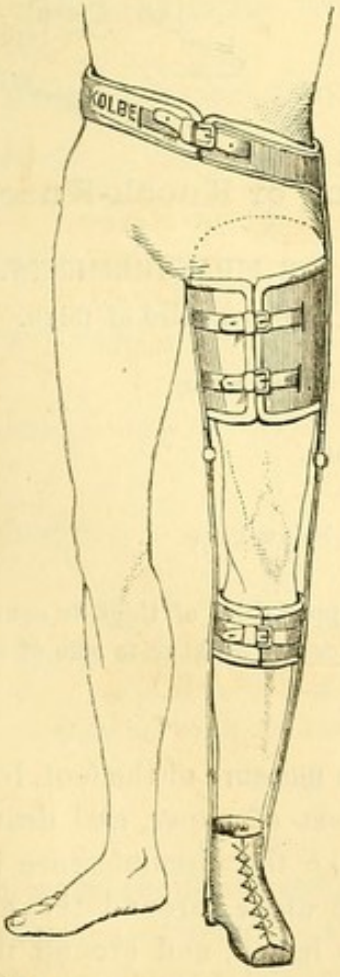


Fig. 38.

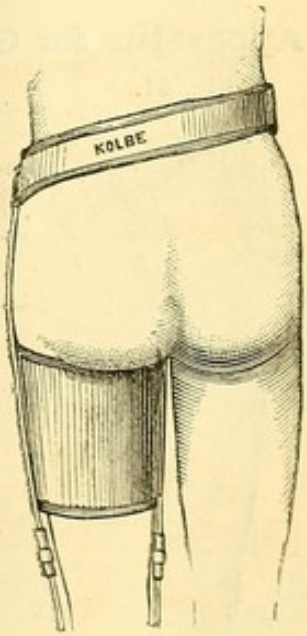


Fig. 39.

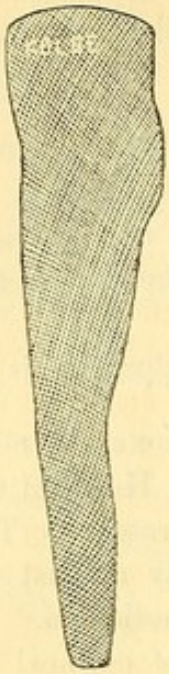
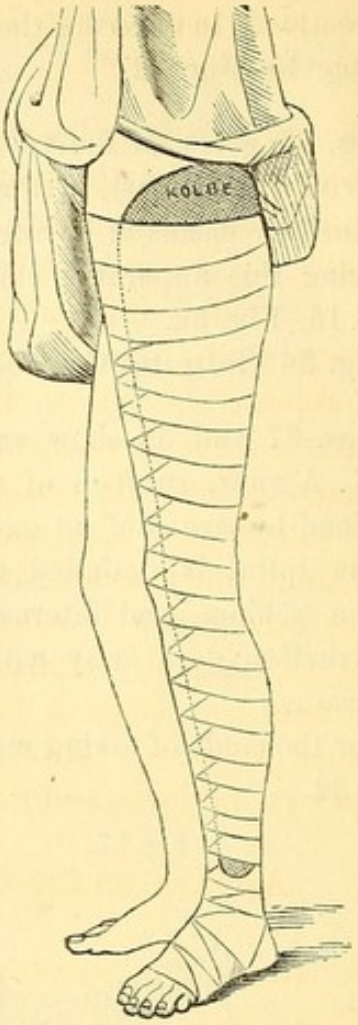


Fig. 40.

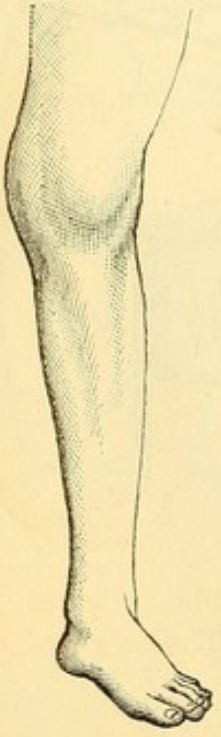


Figs. 39 and 40 illustrate the wire splint and the mode of its application in hip disease.

This splint is intended as a substitute for the carved splint. For the manner of taking measurements, see page 15, Fig. 32.

Apparatus for Genu valgam, or Knock-Knee.

Fig. 41.



GUIDE FOR MEASUREMENTS.

→ Circumference of upper third of thigh.

→ Do. above knee.

→ Diameter of knee.

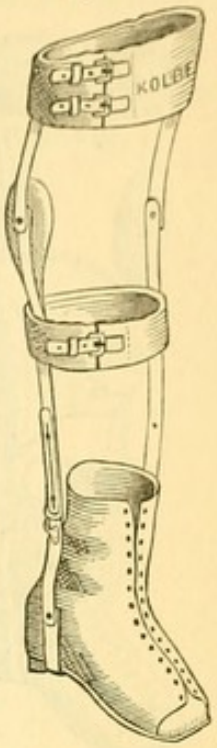
→ Circumference below knee.

Length from upper third of thigh to centre of knee; from centre of knee to sole of foot.

In taking the measure of the foot, let it rest lightly on a sheet of paper, and draw a line around it. Take the circumference immediately above the ankle, around the heel and instep, over the instep, and around the toes. It is also desirable to have the outlines of the

inner side of the knee-joint, which can be obtained as directed on page 5, Fig. 7. Age and sex of the patient should be given.

Fig. 42.



Kolbé's apparatus for knock-knee.

Knock-knee is an inward inclination of one or both knees, caused by the preternatural extension of the internal lateral ligaments of the knee-joint, and increased by the superincumbent weight of the body. To relieve this deformity, numerous mechanical contrivances have been constructed and employed. The one represented in Fig. 42 is the simplest and most convenient for the patient to wear, while its efficacy is none the less. It consists of a plain shoe, to which two lateral steel bars reaching to the upper third of the thigh are attached, and connected with calf and thigh bands; and provided with joints corresponding with the natural articulations, to allow locomotion. The knee is confined in its normal position by a well-padded knee-cap. Prof. Gross has described this apparatus in the last edition of his work on surgery.

Apparatus for Genu extrorsum, or Bow-Legs.

Fig. 43.

GUIDE FOR MEASUREMENTS.

Circumference of upper third of thigh. ⊢

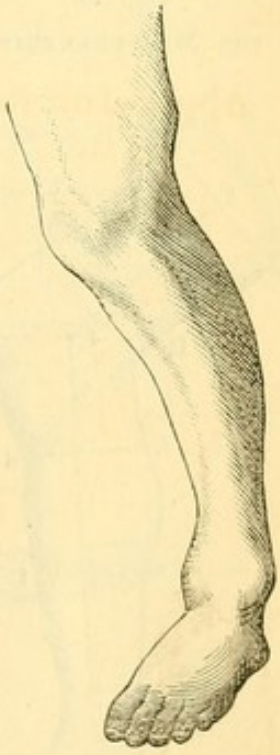
Do. above knee. ⊢

Diameter of knee. ⊢

Circumference below the knee. ⊢

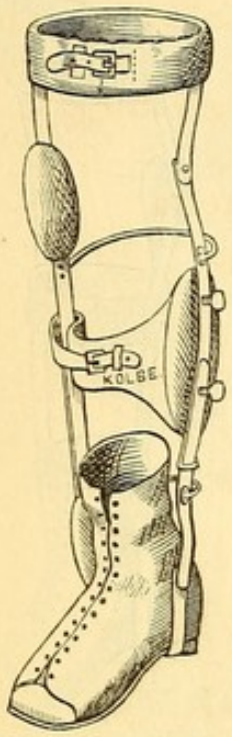
Circumference. ⊢

The length to be taken on the inner side of the limb, from the upper part of thigh to the centre of knee, from the centre of knee to sole of foot.



The curvature of the outside of the leg should be given, which can be obtained as directed on page 5, Fig. 7. The age and sex of the patient should also be stated.

Fig. 44.



Kolbé's apparatus for bow-leg.

In taking measure for the shoe, see page 18, Fig. 41. If the deformity is very marked, a photograph showing the form of the lower extremity will be advantageous.

As bow-legs is a deviation in the opposite direction to that of knock-knee, whether it results from elongation of the external ligaments of the knee, or by curvature of the leg bones, the mechanical appliance for it illustrated in Fig. 44 is constructed upon the same principle as that described on page 19, Fig. 42, with the difference that, in addition, a steel plate well padded is attached to the external lateral bar, and regulated by means of screws, while at the same time provision is made, by the continuation of the leather padding, to correct anterior curvature of the tibia.

Dr. Gross recommends the above apparatus in his work on Surgery, and Dr. Wales, U. S. N., in his "Mechanical Therapeutics."

Apparatus for Anchylosis of the Knee-Joint.

Fig. 45.

GUIDE FOR MEASUREMENTS.—Circumference of limb at D C, B A, L H, and K I. Length from E to F, and F to G. The measure for shoe to be taken as directed on page 18, Fig. 41.

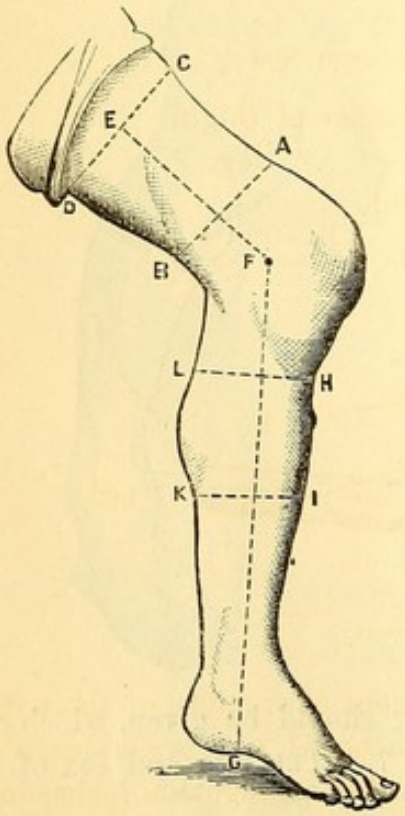


Fig. 46.

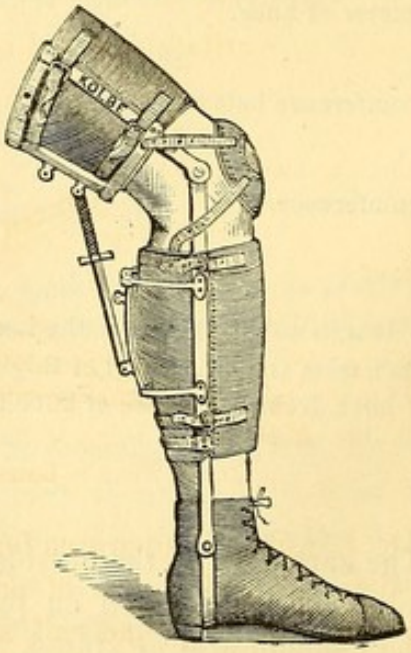


Fig. 46 shows the application of Kolbé's apparatus for anchylosis of the knee-joint. At the suggestion of Prof. Pancoast this apparatus has been modified so as to extend to the foot, thereby giving the patient additional comfort and support, and greatly facilitating walking.

Apparatus for Fracture of the Patella.

Fig. 47.

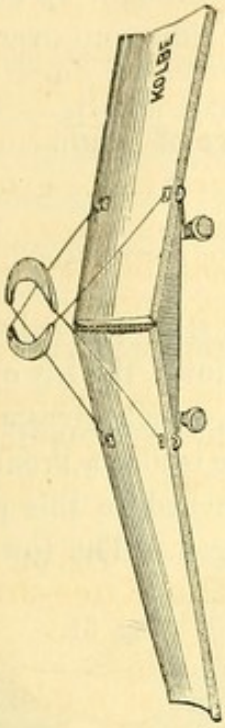
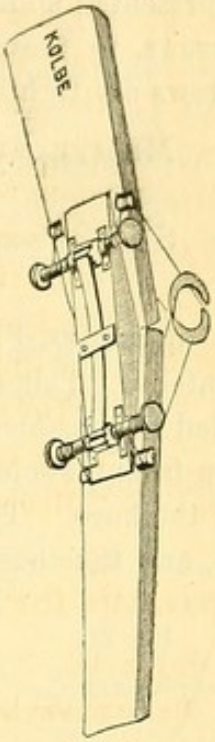


Fig. 48.



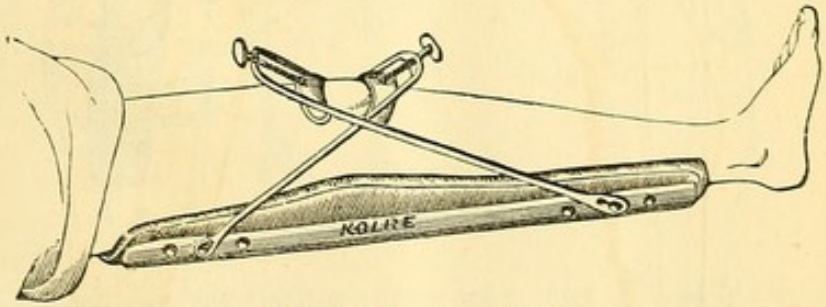
Boisnot's apparatus.

(See "Transactions of the American Medical Association," 1865.)

MEASUREMENTS: Circumference of thigh.
" " leg.

State age and sex of patient.

Fig. 49.



Lansdale's apparatus.

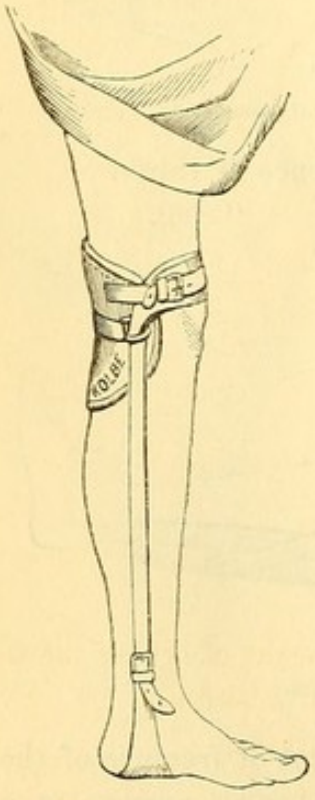
Dr. Lansdale's apparatus for the treatment of fracture of the patella consists of—1. A splint of one-inch pine board, concave at each end to receive the thigh and calf, six inches wide and eighteen inches long.

2. A muslin bag six inches square, filled with sawdust and sewed up, and tacked to the middle of the splint, to afford a firm support to the knee-joint and keep it in an easy position of slight flexion. 3. Two iron bows to button on each side of the splint near its extremities, and having a female screw in the middle to receive two thumbscrews, each operating on a semilunar pad backed with iron. 4. Across each extremity of the splint should be tacked a piece of bandage or strong tape (not represented above); these are to be brought up and tied over the thumbscrews, to prevent the pads from riding up over the patella when the screws are tightened.

MEASUREMENTS: Circumference of thigh.
" " leg.
State age and sex of patient.

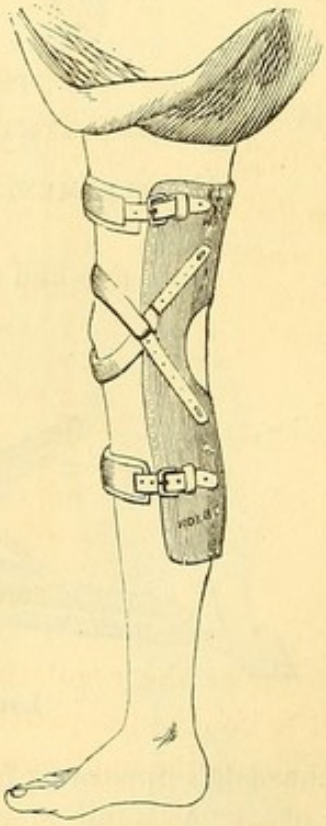
Dr. Levis' apparatus, Fig 50, consists of a strap padded where it lies above the patella. This strap is continued down the leg on each side, and is buckled to a padded stirrup-like strap, which gives a fixed point for extension from the sole of the foot. There is also a broad pad which rests behind the knee. Through a ring attached to this pad the first strap passes, and thus has its direction changed. The lower fragment

Fig. 50.



Levis' apparatus.

Fig. 51.



Hartshorne's apparatus.

of the fractured patella, having no force to displace it, is retained in position merely by a strip of adhesive plaster.

The apparatus is complete in itself, requiring no splints, and is adaptable to limbs of any size.

It is claimed that with this apparatus a patient can be well treated while walking about on crutches.

MEASUREMENTS: Circumference above knee, and length from knee to sole of foot.

Dr. Hartshorne's apparatus, Fig. 51, consists of a light tin case, fitting to the limb behind, lacing in front of the thigh and the leg, and provided with straps (elastic or not, according to circumstances), which are to be applied as usual across the joint, above and below the patella, and drawn obliquely, to be fastened and tightened by means of a wedge, screw, or hooks.

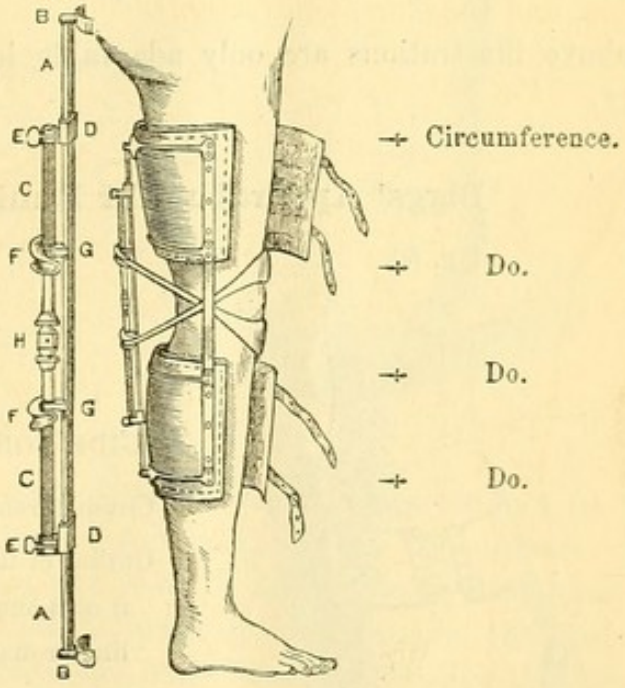
MEASUREMENTS: Circumference of thigh.
" " leg.

State age and sex of patient.

Fig. 52. Fig. 53.

GUIDE FOR MEASUREMENTS.

Length from the centre of the knee upwards and from centre of knee downwards.



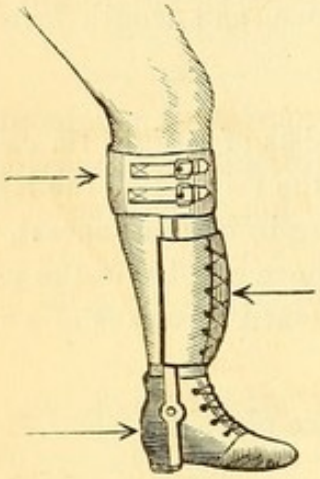
Turner's apparatus.

Fig. 52 shows the regulating screw by means of which the surgeon is enabled to confine the patella to its normal position.

Fig. 53 shows the application of the apparatus.

Apparatus for Anterior and Lateral Curvature of the Leg.

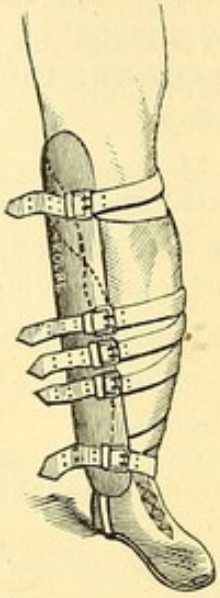
Fig. 54.



Apparatus for anterior curvature of the leg.

(Guide for measurements, see page 19, Fig. 43.)

Fig. 55.

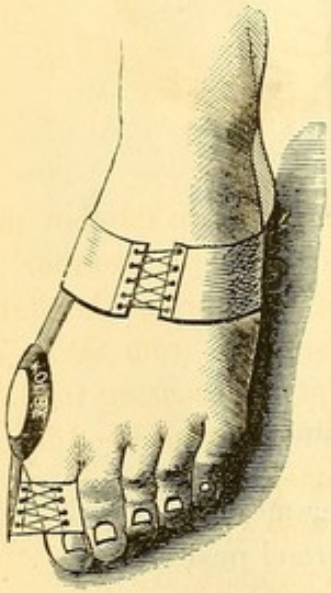


Apparatus for lateral curvature of the leg.

The above illustrations are only adaptable in slight cases of this deformity.

Biggs' Apparatus for Bunions.

Fig. 56.



GUIDE FOR MEASUREMENTS.

→ Circumference over the instep.

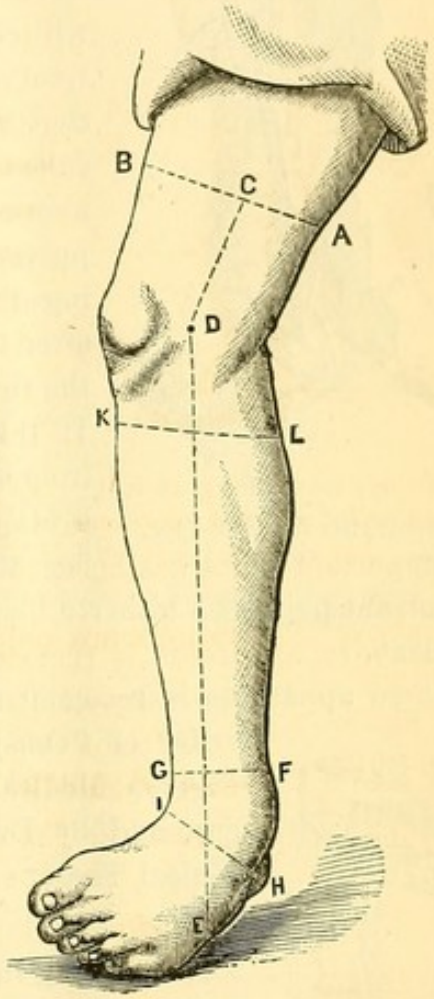
Outline of the foot obtained by placing it on a sheet of paper and drawing a line around it.

Prof. Gross has described the above in the last edition of his work on surgery, and Dr. Wales, U.S.N., in his "Mechanical Therapeutics."

Apparatus for Club-Foot.

Talipes varus, valgus, and equinus.

Fig. 57.



GUIDE FOR MEASUREMENTS.

B A. Circumference at the middle of thigh.

K L. Circumference below the knee.

G F. Do. above the ankle.

I H. Do. over instep and heel.

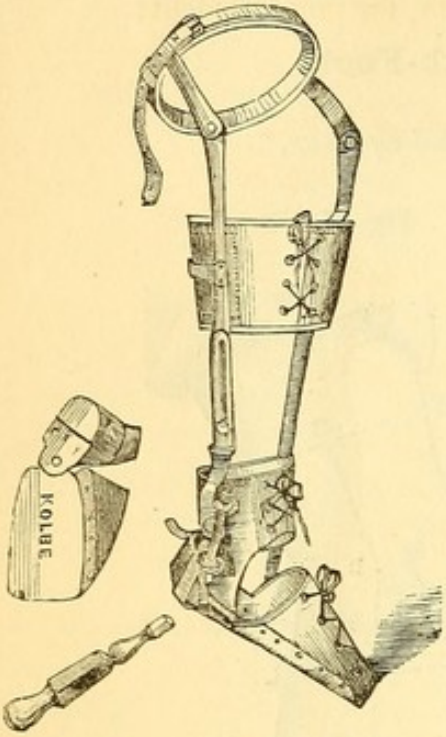
C D. Length from middle of thigh to centre of knee-joint.

D E. Length from centre of knee-joint to sole of foot.

To give a correct idea of the deformity, place the foot on a sheet of paper and draw a line around it, to obtain its contour. It will be found in children from two years of age upwards, who have been unsuccessfully treated, that, for want of support from the heel, the muscular power of the knee has been impaired, causing the knee to bend backward and inward. This fact should be mentioned in ordering, as the apparatus can be constructed to remedy this defect.

State age and sex of the patient; also whether tenotomy has been resorted to.

Fig. 58.

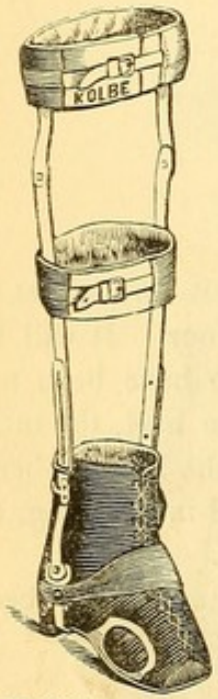


Kolbé's apparatus for club-foot.

The construction of this apparatus combines all the movements requisite in the correction of *Talipes varus, valgus*, and *equinus*, either in connection with tenotomy, or, if properly applied, without it. In children from a few weeks to one year of age, the apparatus will effect a cure simply by mechanical treatment. It may be proper to state that while this apparatus (commonly called club-foot shoe) combines the above-mentioned movements, it also possesses the great advantage of allowing the patient to walk about shortly after the operation; at least, as soon as the signs of inflammation have subsided. It thus not only relieves the patient from being compelled to lie down, but it greatly facilitates the process of bringing the foot in its normal position. This important point has hitherto been entirely overlooked by all other mechanicians.

The above apparatus is recommended by Prof. Smith, of the University of Pennsylvania, and Prof. Gross, of the Jefferson Medical College, in their works on surgery, and by Dr. Wales, U. S. N., in his "Mechanical Therapeutics."

Fig. 59.



Kolbé's apparatus for club-foot, used in after-treatment.

After having successfully overcome the deformity of the foot, either by operation or mechanical treatment alone, the result depends entirely upon the long continuation of a proper support. This after-treatment is accomplished by the simpler apparatus shown in Fig. 59. Its construction is such that it will confine the foot in the natural position, while admitting of free motion in walking. It also possesses the great merit of being less liable to get out of order, consequently diminishing expense. It may be readily understood that, owing to the necessity of the more complicated adjustments in the shoe represented in Fig. 58, its durability cannot be the same as that of the above apparatus. There is no necessity in every case to carry the

side bars above the knee; consequently, in ordering it, state whether the knee is deflected, as remarked on page 25, for measurements.

Calcaneal Club-Foot.

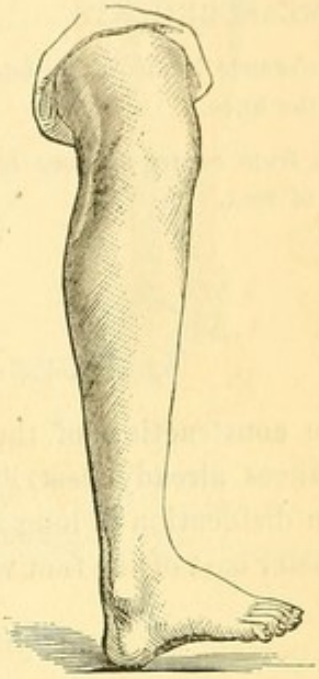
Fig. 60.

GUIDE FOR MEASUREMENTS.

Circumference above the knee. ⊢

Do. below the knee. ⊢

Length from middle of thigh to centre of knee, from centre of knee to sole of foot.

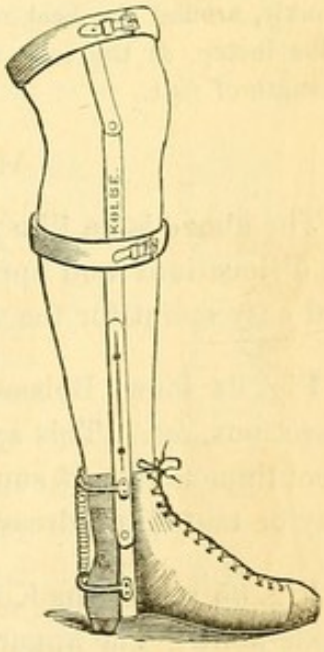


In taking the measurements of the foot, let it rest lightly on a sheet of paper, and draw a line around it. Take the circumference immediately above the ankle, around the heel and instep, over the instep, and around the toes.

State age and sex of the patient.

Fig. 61.

This apparatus resembles somewhat the one described on page 26, Fig. 59, and used in the after-treatment for *Talipes varus*, *valgus*, and *equinus*. It differs in possessing spiral or India-rubber springs attached between two circular arms stretching across from one lateral bar to the other, one above and the other below the centre of the ankle-joint. By the action of these springs the elongation of the tendo Achillis is effected. The sole of the shoe is provided with a steel plate sufficiently strong to maintain the normal position of the plantar arch.



Application of Kolbé's apparatus for *Talipes calcaneus*.

Prof. Gross has described this apparatus in the last edition of his work on surgery, and Dr. Wales in his work on "Mechanical Therapeutics."

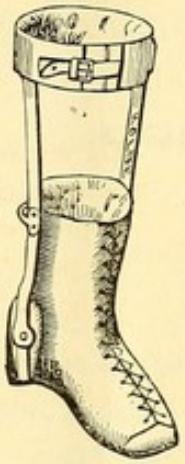
Apparatus for the Ankle.

Fig. 62.

MEASUREMENTS.

Circumference immediately below the knee.

Length from centre of knee to sole of foot.



Mention to which side the foot is inclined.

The measure of the foot should be given as directed on page 18, Fig. 41.

Kolbé's apparatus for weak ankles.

The construction of the above apparatus is similar to that of the appliances already described. It is an excellent support in sprains, and in dislocation of long standing, where the deformity is very marked. A plaster cast of the foot will be of advantage in making the apparatus.

Fig. 63.

In measuring for Fig. 63, give the circumference of limb below the knee, at the calf and ankle, around the heel, over the instep, at the toes, and length of foot.

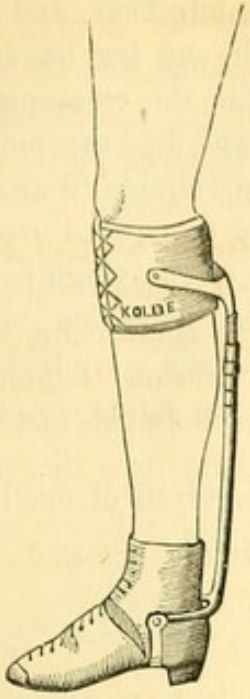
State whether the splint is to be applied to the inner or outer side; also whether for right or left leg.

The above is an illustration of a wire splint useful in the treatment of dislocations and sprains of the ankle-joint. It forms also a light and easy splint for the treatment of fractures of the leg.

Fig. 64 shows Boisnot's apparatus for dislocation of the ankle-joint, resections, &c. This apparatus explains itself, and is applicable where a continuous line of support is desired from below the knee. Exercise may be taken, and dressings applied without removal of the instrument.

Fig. 65 represents Kolbé's extension apparatus for dislocations of the ankle-joint. The apparatus is similar in construction to that shown in Fig. 62 for weak ankle, with the addition of two extension screws connected with the lateral stems, and also a regulating screw at the ankle-joint, by which talipes is prevented.

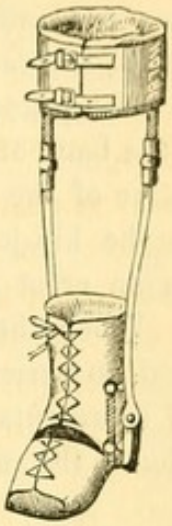
Fig. 64.



Boisnot's extension apparatus for dislocation of the ankle-joint, resections, &c.

(For measurements for these appliances, see page 28, Fig. 62.)

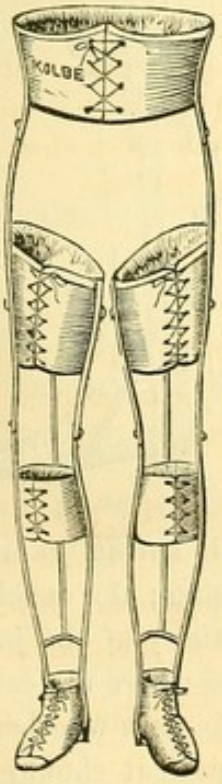
Fig. 65.



Kolbé's extension apparatus for dislocations of the ankle-joint.

Apparatus for Paralysis.

Fig. 66.



GUIDE FOR MEASUREMENTS.

Length from sole of foot to centre of knee.
" " centre of knee-joint to hip.
" " hip-joint to under the arm.
Circumference below the knee.
" above "
" of middle of thigh.
" around the waist.
" under the arm, if requisite.

Measure for shoe as directed on page 18, Fig. 41.

State the age and sex of patient.

Fig. 67.

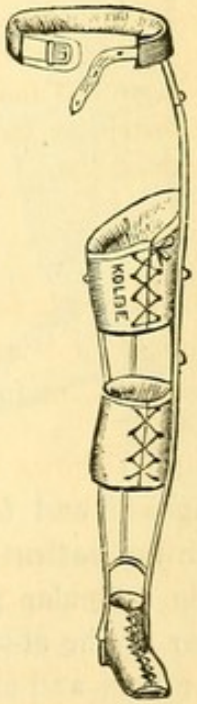
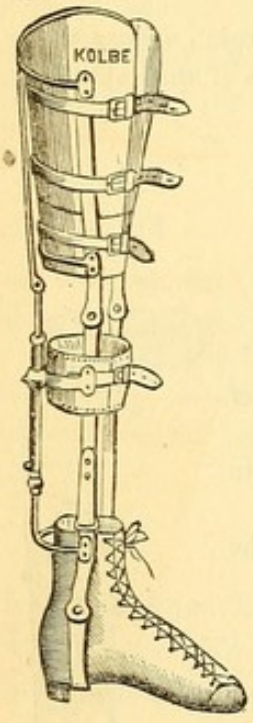


Fig. 66 represents Kolbé's apparatus for paralysis of both limbs. It consists of lateral leg-stems, carried on the inner side as high as the

perineum; on the outer, to the pelvic band, or to the armpit, as the case may require. Joints are placed at the hip, knee, and ankle, and are secured to the body by the pelvic, thigh, and leg bands. If the patient has not sufficient strength to maintain the erect position, the apparatus is provided with a contrivance to lock the knee, and, if necessary, also the hip-joint. In some cases it is preferable to attach elastic straps to the back of the pelvic band, running downward over the posterior surface of the thigh, to the back part of the thigh band, which will give the hip-joint an artificial muscular extension to hold the patient in an erect position, while it will allow a more free motion in walking. When the patient is lying down, the joints may be relaxed or unlocked, to permit free flexion.

Fig. 67 represents Kolbé's apparatus for paralysis of one limb. Its construction is the same as that shown in Fig. 66.

Fig. 68.

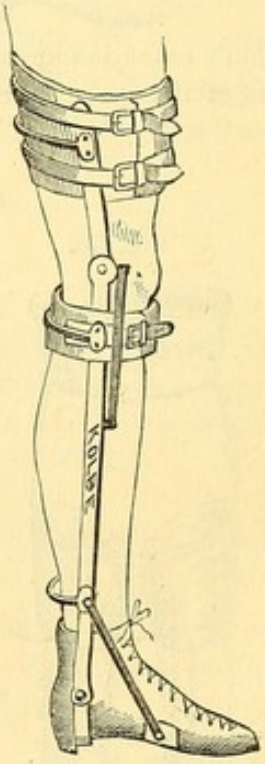


GUIDE FOR MEASUREMENTS.

Length from sole of foot to centre of knee.
" " centre of knee to hip.
Circumference below the knee.
" above the knee.
" of middle of thigh.

Measure for shoe as directed on page 18, Fig. 41.

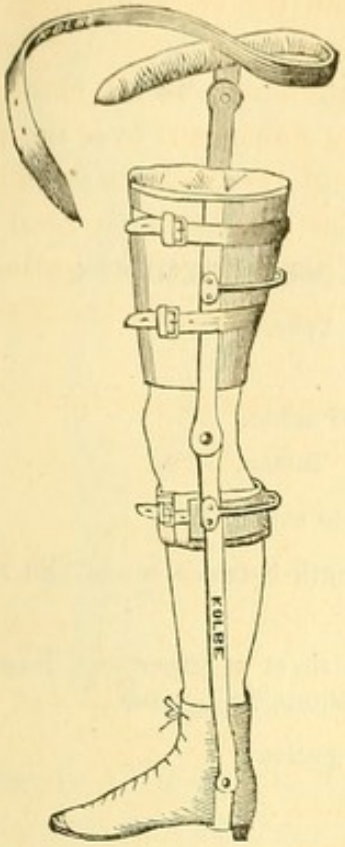
Fig. 69.



Figs. 68 and 69 illustrate Kolbé's apparatus with spring joints, by which the patient is enabled to flex the knee in walking; the deficiency of the muscular power being supplied by the elasticity of the joints. Either of the above is principally applicable in cases where the control of the knee and ankle is impaired. It is necessary to state whether the limb is inclined outward. The sex and age of the patient should also be stated.

Apparatus for Ununited Fracture.

Fig. 70.



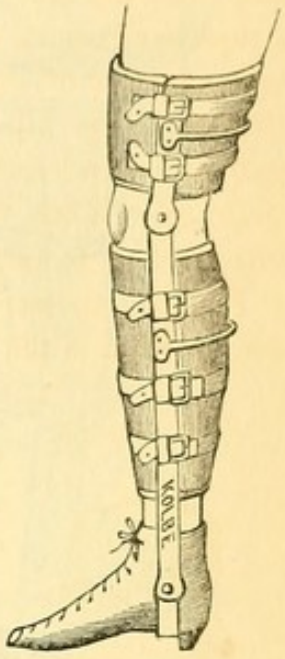
Fracture above the knee.

Figs. 70 and 71 exhibit the apparatus of Prof. H. H. Smith, of the University of Pennsylvania, for the treatment of ununited fracture.

A similar apparatus is also an excellent support in resections of the thigh and leg. It can be arranged to exert extension and counter-extension, if needed, without interfering with the movements of the limb.

(For measurements, see page 15, Fig. 32.)

Fig. 71.



Fracture below the knee.

Elastic Stockings.

A combination of vulcanized rubber, webbing, silk, or cotton, used in the treatment of varicose veins, ulcers, and swelling of the legs. In measuring for stockings for the entire leg, give the circumference at the points shown in the illustration. For parts of the leg, as follows:—

Ankle Stocking.—Circumferences from T up to E.

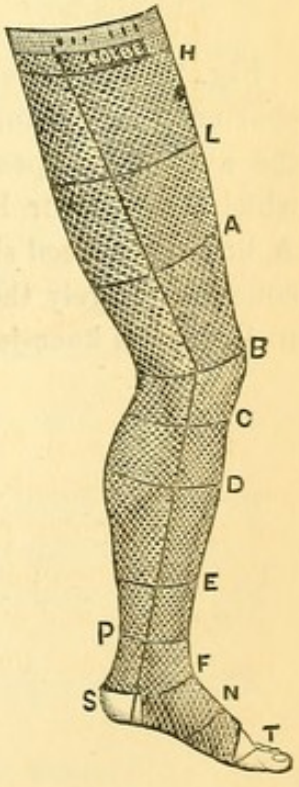
Leg Stocking.—Circumferences from T up to C.

Stocking for above the Knee.—Circumferences from T up to A.

For the Knee-Cap (only).—Circumferences from C up to A.

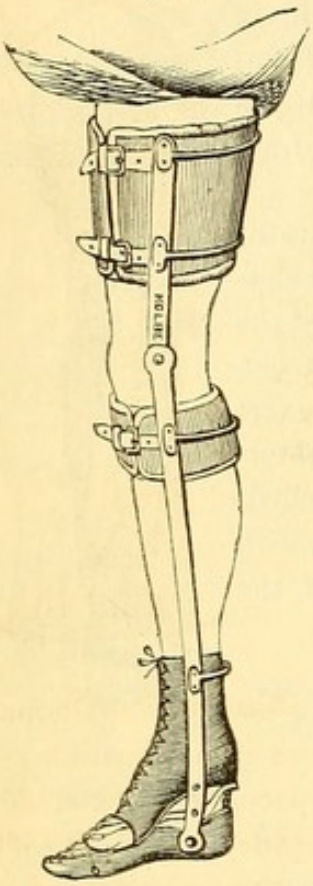
In all cases the length should be given from the sole of the foot to the point to which the stocking is to extend.

Fig. 72.



Apparatus for Shortened Limbs.

Fig. 73.



GUIDE FOR MEASUREMENTS.

Circumference above knee.

" below "

" around ankle.

" " instep.

Length from patella to sole of foot.

The difference in length between sound and defective limb.

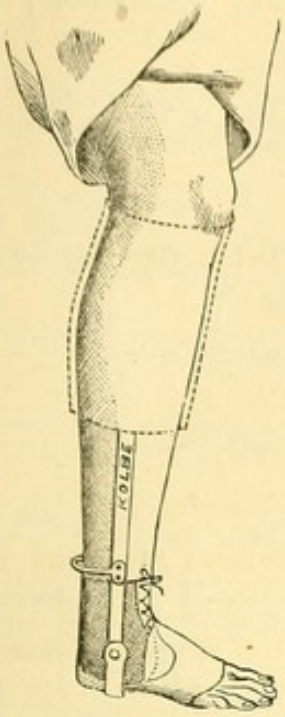
Place the foot on a sheet of paper and draw a line around it, to obtain its contour.

State age and sex of patient.

Fig. 73 illustrates Kolbé's apparatus to supply the deficiency of a shortened limb, caused by hip-joint disease, resection, &c., and obviates the awkward appearance in walking by the use of a high cork shoe, which is more or less dangerous, in causing sprain of the ankle-joint. A boot or a laced shoe is worn over the natural and artificial foot, which conceals entirely the deformity. When the patient has sufficient control over his knee-joint, no support is needed above the knee.

Apparatus for Amputation through the Foot.

Fig. 74.



GUIDE FOR MEASUREMENTS.

Length from lower edge of patella to end of stump.

Circumference below knee.

A plaster cast extending a little above the ankle, showing the deformity, should be taken. Also the length of the sound limb from the lower edge of the patella to the sole of the foot, and outline of the foot, should be given.

Fig. 75.

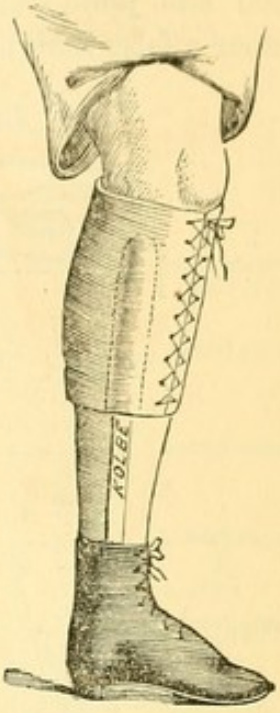


Fig. 74 illustrates Kolbé's apparatus used after Syme's, Chopart's, Hey's, and Pirogoff's operations. Fig. 75 shows its application. The perfection attained in the construction of this peculiar artificial substitute has overcome the numberless objections made against the above named operations. It as fully supplies the important necessity of comfort in locomotion, &c., as can be expected of any other artificial limb, when amputation is performed anterior to the insertion of the flexors of the foot.

KOLBÉ'S ARTIFICIAL LEG.

DIRECTIONS FOR MEASURING FOR ARTIFICIAL LEG.

1. In measuring, draw the tape moderately tight, and, to insure accuracy, measure twice at each point.

2. The limb should be bare, and the patient must stand erect, with the hips level, while the measures in Fig. 76 are being taken.

3. The patient must be seated while those in Fig. 79 are taken, and bear no weight on the foot.

4. Let the foot rest lightly on a sheet of paper, and draw a pencil-mark around it, to obtain its contour.

5. For amputation below the knee, when the patient cannot visit the

manufactory, it is desirable to have a plaster cast of the end of the stump to about six inches above the knee-joint.

State age and sex of patient; which leg amputated; whether well healed and joint flexible; weight of the patient; occupation; and whether a false limb has been worn before.

Fig. 76.

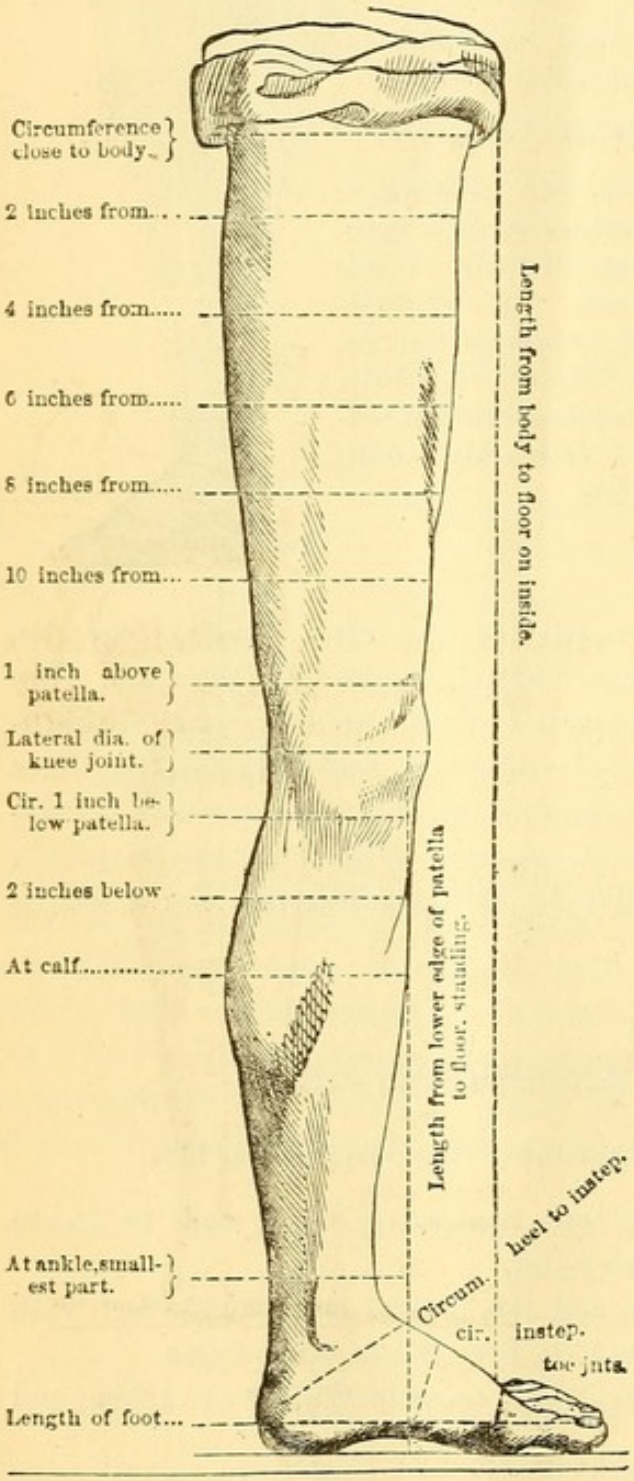


Fig. 77.

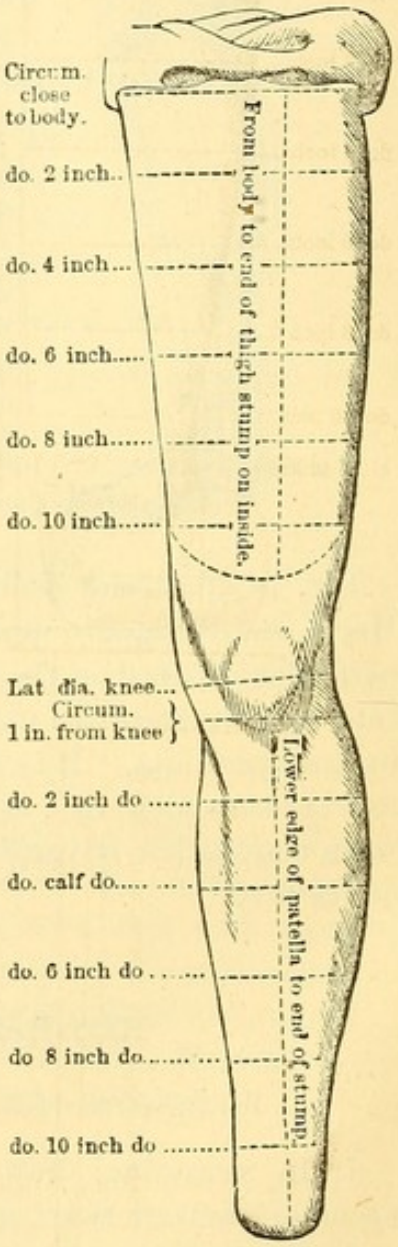


Fig. 78.

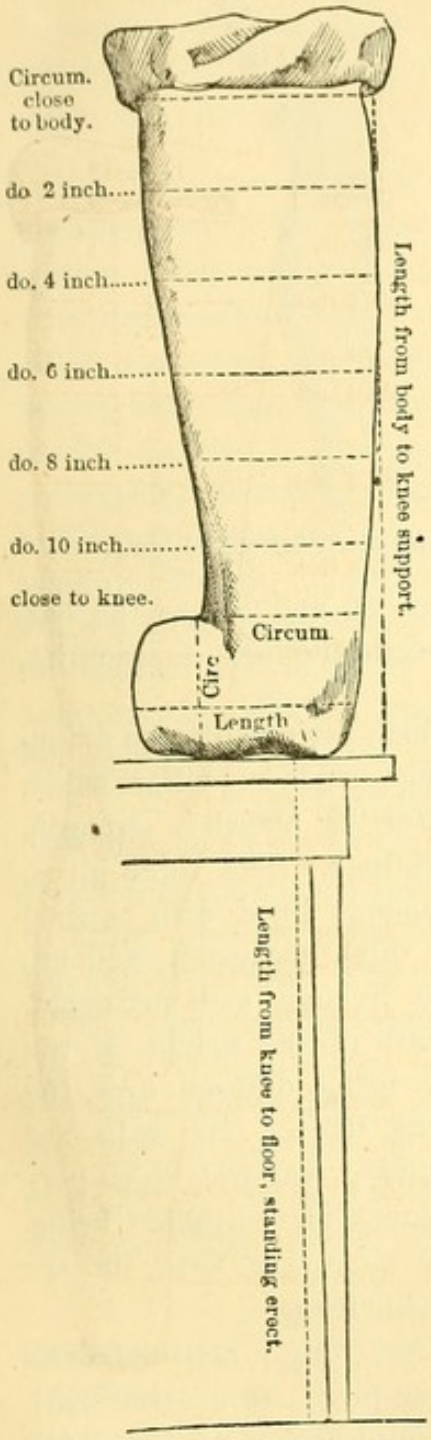

Circum. close to body.
do. 2 inch....
do. 4 inch.....
do. 6 inch.....
do. 8 inch .....
do. 10 inch.....
close to knee.
Length from body to knee support.
Circum
Length
Length from knee to floor, standing erect.

Fig. 79.

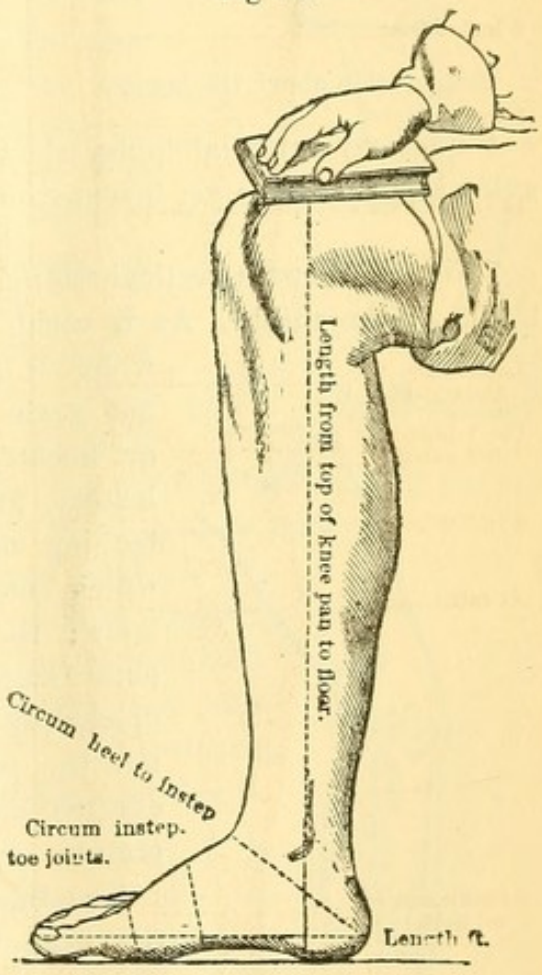
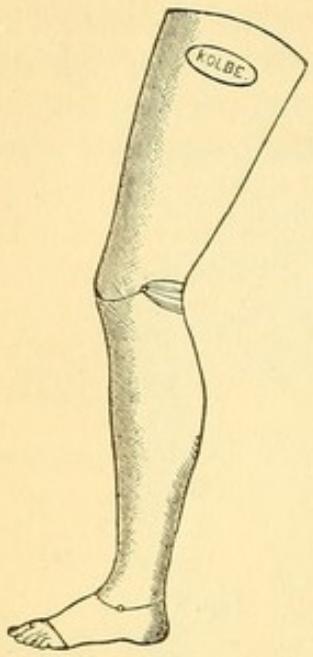
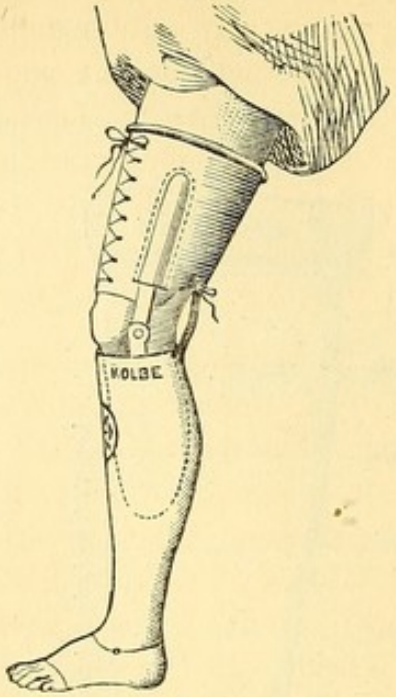

Length from top of knee pan to floor.
Circum heel to instep
Circum instep. toe joints.

Fig. 80.



Amputation above the knee.

Fig. 81.

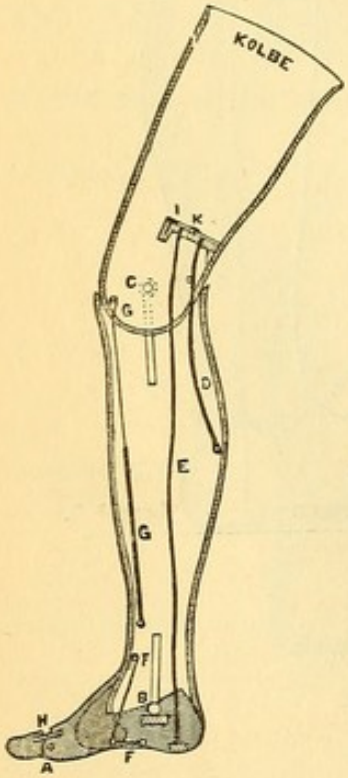


Amputation below the knee.

I offer my artificial limbs, shown in Figs. 80 and 81, as the best automatic appliance yet invented for deficiency of the lower extremities.

"Fig. 82 shows a vertical section of the limb designed for an amputation of the thigh. As is usual, the framework is of willow wood, which is selected for its tenacity, strength, fine grain, and lightness. The thigh-piece, or bucket, is commonly lined with washed leather, fitting the thigh accurately, and extending up to the ischium and perineum, which contain a part of the weight of the body; the balance being diffused over the outer surface of the thigh. Its walls are opened by oblong slits or fenestræ, which permit the proper amount of ventilation being effected, and, at the same time, allow the secretions of the part to escape.

Fig. 82.

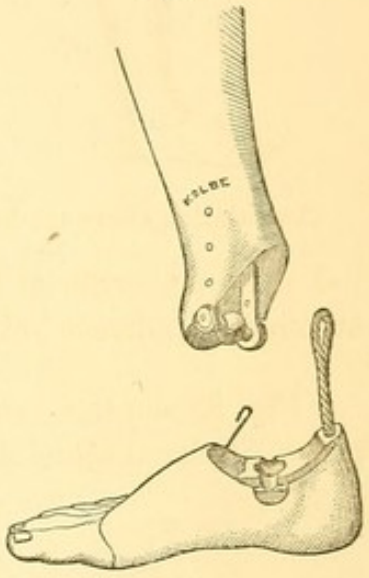


The thigh-piece is strongly articulated at the knee to the leg-piece by a steel bolt, which admits antero-posterior motion only. From the inner surface of the lower third of the bucket a wooden pin, I K, projects, to which are attached two strong cords made of twisted linen thread. One of these, I E, being inserted into the heel, represents the tendo-

Achillis; it supports the weight of the body by preventing the foot being bent at any greater angle than a right angle. The other cord, K D, is inserted into the middle of the posterior surface of the leg, and is accessory to the former, an arrangement by which the limb is rendered so exceedingly strong that the weight of the heaviest man cannot impair its stability. The cord marked G G is a spiral spring which is intended to give the leg a slight impulse forwards in taking a step; it is the analogue of the quadriceps of the natural limb.

Fig. 83 shows the mechanism of the ankle-joint. It is somewhat peculiar, combining all the strength of a ginglymoid joint with lateral motion. The inferior surface of the leg and the corresponding surface of the foot are provided each with a hemispherical depression, which, when conjoined, form a hollow sphere; in the interior of this sphere the globular enlargement seated at the centre of the steel ankle-bolt works, the extremities of the bolt passing through the lateral metal straps in holes a little larger than their diameter; these extremities are sustained by two pieces of India-rubber, which permit that amount of lateral motion desirable in the ankle.

Fig. 83.



F F, in Fig. 82, indicate the position of a cord attached to a horizontal metallic spring fastened to the sole of the foot, and intended to bring the foot again to a rectangular position with the leg after it has been extended; it is the analogue of the tibialis anticus.

H A mark the metatarso-phalangeal joint; it is a simple tenon and mortise joint, firmly bolted together, and under the control of a metallic spring which brings the toes straight with the foot after they have been extended by the weight of the body." (Description condensed from Wales' "Mechanical Therapeutics."

Fig. 84.

Fig. 84 represents a wooden pin, or "box-leg." It consists of a wooden frame widely grooved below, to accommodate the knee, and of two lateral side-pieces; the external, slightly curved backward, reaches from the knee to the crest of the ilium, and the internal half way up to the thigh. From the bottom of the socket a pin projects, and makes up the interval between the knee and the ground. (For measurements, see Fig. 78, page 35.)