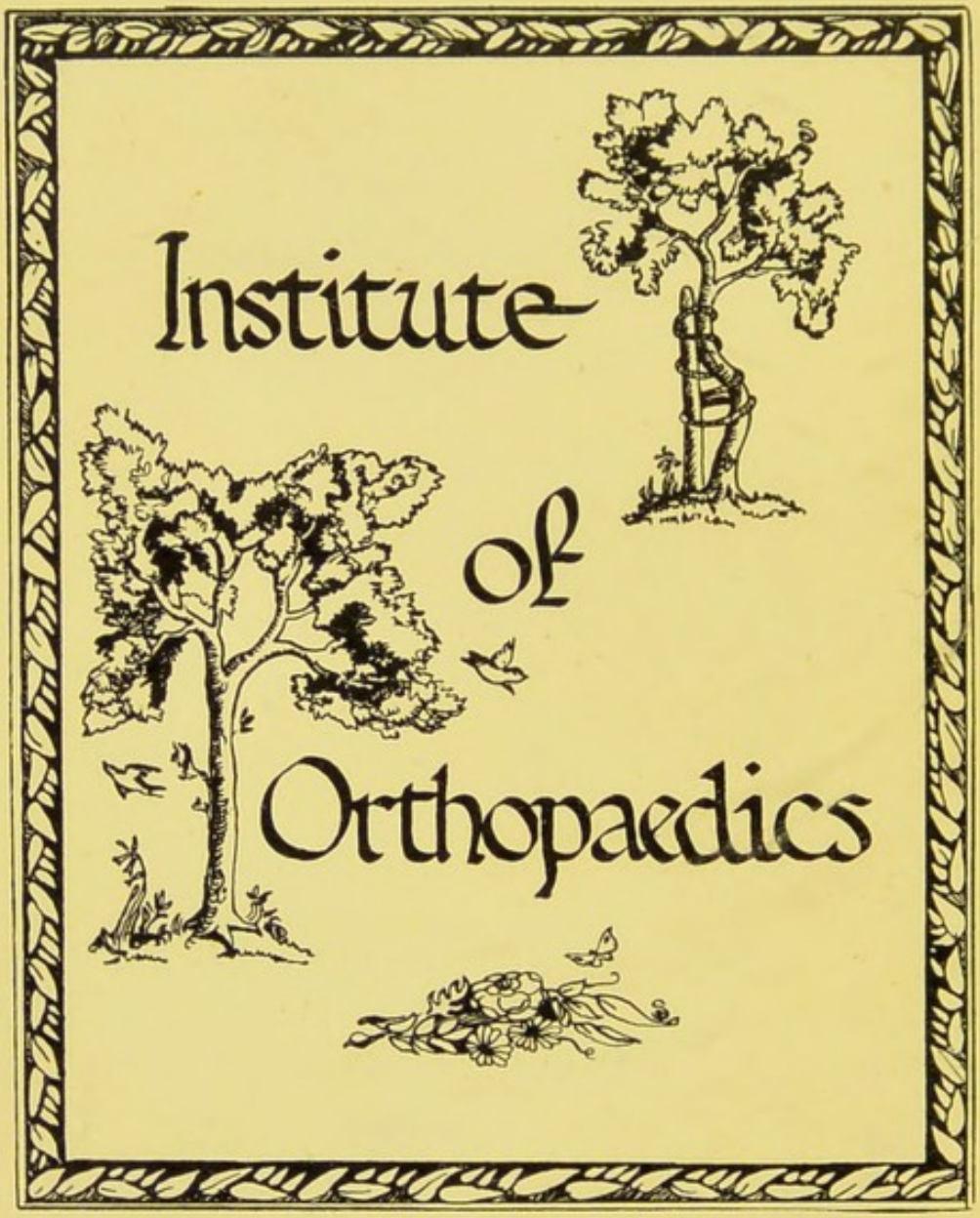
Mechanical exercise as a means of cure : being a description of The Zander Institute, London (7 Soho Square), its history, appliances, scope, and object / edited by the Medical Officer to the Institution.

Mechanical Exercise

A

Means of Cure



MECHANICAL EXERCISE

A MEANS OF CURE

BEING A DESCRIPTION OF

The Zander Institute, London

(7 SOHO SQUARE)

ITS

HISTORY, APPLIANCES, SCOPE, AND OBJECT

EDITED BY THE

MEDICAL OFFICER TO THE INSTITUTION

LONDON
J. & A. CHURCHILL
11 NEW BURLINGTON STREET
1883

1295

CONTENTS.

INTRODUCTION.

THE BENEFIT to health and strength obtainable by work in ordinary gymnasia is, as a rule, only available for those whose age and physical condition is equal to the strain which such exercises usually entail. Ladies, young girls, elderly men, and weakly persons of all ages and of either sex, are almost entirely precluded from such physical training, or have to avail themselves of it in such a modified form as to render its application almost nugatory. To meet this difficulty, and in order to provide healthy exercise without fatigue for such cases, Dr. Zander, of Stockholm, has invented a series of machines by means of which the several muscles, tendons, and ligaments of the body can, in due sequence, be brought into play, so gradually and so delicately as to render the exercise perfectly safe, even for the most confirmed invalid, or for the most delicate child.

These machines are graduated, and can be adjusted according to the strength and physical capacity of the person using them; most of them, in cases of debility, or where from accident or disease any particular movement of a limb has become impossible without assistance, can be worked either by some motive power or by the hand of the instructor.

This mechanical treatment has been found of the greatest benefit, not only to those who simply require gymnastic exercise, but also, as a therapeutic agent, in cases of rheumatism, lumbago, sciatica, stiff joints, some forms of paralysis, curvature of the spine, constipation, &c. It has also been used with considerable effect by Dr. Zander in sensibly *alleviating* such serious maladies as *certain kinds* of heart and lung diseases; persons suffering from such complaints being able without risk to take beneficial exercise by means of machines which are worked automatically.[1]

In the following pages will be found a short sketch of Dr. Zander's invention, a description of the various machines with their uses, and a list of the maladies most frequently treated by their means.

[1] The active movements are in such cases not less effectual than the passive ones, if used gently and prudently under medical direction.

Dr. Zander's system has now been in operation for one year in this country. The numerous cases[1] already sent for treatment by some of the most distinguished physicians and surgeons in London, and the very satisfactory reports afterwards received from them, show the confidence with which the medical faculty regard this new means of assisting and perfecting their efforts, and the successful results which it is capable of achieving.

[1] Over 300 cases were treated during the year.

MECHANICAL EXERCISE

A

MEANS OF CURE.

Among the various results obtained by the researches of modern science, none are of greater public and professional interest than those which have conduced in any way to alleviate human suffering and to preserve or restore health. In the early part of the present century Ling, of Sweden, invented his system of movement cure, in which passive movements, manual frictions, &c., were essential features. Ling's system has, when employed with due discretion, doubtless effected much good; but in England it has not met with very great favour. In order rightly to explain the principles upon which these exercises of Ling's were carried out, it may here be stated that all movements are divided into two great classes. Under the first heading, to which

the term *active* exercises is applied, come all such movements as those in which the patient obtains exercise for his muscles either by bending, stretching, or twisting his joints, whilst the attendant makes a certain resistance to such movement; or by himself offering resistance, whilst the attendant is operating on him in like manner. The second class comprises all the operations performed on the body, such as quick vibration of the muscles, rubbing, shampooing, and so forth, which do not call for any exertion whatever on the part of the person operated upon; to this class of exercise the term *passive* is applied. The object of all these movements is to produce wholesome vital activity and a harmonious development of the body.

To this handling and rubbing, however, many persons have a very decided objection, and are on this account unwilling to avail themselves of the benefit these exercises afford. This system of movement cure is, moreover, beset with other difficulties besides those already mentioned. It is possible that the patient may be unable correctly to estimate the amount of force suitable for him to use in the various movements, and may fail to derive benefit through under-estimating what strain he can bear; or, on the other hand, he may actually diminish his strength by over-estimating the exercise he is capable of en-

during without injury. The rubber also may be deficient in that tact, experience, and judgment which are requisite in order to accommodate the increase or decrease of the resistance to the varying strength of the patients upon whom he may be attending; and, however well trained, he must, at the end of an hour or two, be more or less fatigued, and his sensibility of touch and power be thus seriously impaired. These manual operations, to be really of use, require not merely that only such persons should be employed as are naturally endowed with the requisite qualities, and have gained dexterity by long and assiduous training, but that they should be available in such numbers as to obviate the inconvenience above alluded to.

Dr. Zander early in his professional career turned his attention to exercise as a means of cure; he soon became strongly impressed with the defects in Ling's method, and was struck by the difficulty not only of accurately adapting the amount of force to be used by the rubber or operator to the strength of the patient, but also of producing that slow and gradual increase in the use of the muscular power so necessary when employed as a therapeutic agent. To remedy these defects it occurred to him that human agency might be replaced by machinery, which, whilst it could always be accurately regulated to whatever

amount of force might be desirable, would remove at the same time the objection of those who disliked being handled by a professional shampooer. Acting upon this idea, Dr. Zander, some twenty years ago, began his experiments, and set about constructing machines so arranged as to exercise most of the different sets of muscles, and which should, during the operation, offer a resistance equivalent to the strength of the patient.

Three methods of obtaining resistance presented themselves: first, spiral springs; secondly, weights attached to cords running over pulleys; thirdly, levers with weights movable along them.

The spring was at once rejected, because the resistance of a spring increases continually as it is compressed or extended, and consequently at the end of any movement, when the muscular power is weakest, the resistance becomes strongest—a very dangerous arrangement, which might easily cause overstrain.

The weight attached to a cord was also rejected, because in this system the resistance is always the same, whereas the effective strength of a muscle varies during any movement, and in certain positions, therefore, the resistance would not be equivalent to it.

In the lever, however, Dr. Zander found what he

required. In nature the muscles act upon the bones on the lever principle, generally exercising their power least in the beginning and at the end, and most in the middle of the movement. By employing the lever, therefore, a power was obtained which, whilst conforming to the mechanism of the muscular system, could always be so regulated that the amount of resistance should be increased or diminished as desired.[1] By keeping careful note of the position of the weight on the lever, an accurate record of the development of the different muscles can be obtained.

Dr. Zander first tried his experiments on the pupils of a large school with which he was connected. He found as a result a marked increase of strength, even in the most delicate children, combined with a decided improvement in weight, appetite, and spirits. This led eventually to the opening of an Institution in Stockholm, furnished with twenty-seven machines, which have since been considerably improved and very largely added to.[2]

[1] In order to produce the amount of resistance suitable to any muscular force, the lever is graduated, and provided with a movable weight.

[2] So great and apparent to the Swedish people are the benefits derivable from this scientific exercise, that, at the present time, no less than four hundred of the inhabitants of Stockholm (a town whose total population is under 170,000) daily attend Dr. Zander's Institution.

By means of these ingenious machines Dr. Zander has put it in our power to treat a variety of ailments to which ordinary gymnastic exercise is inapplicable. It is well known that there are large numbers of persons who have been practically condemned to an inactive existence from the effects of rheumatism, paralysis, and other ailments, and whose general health has suffered in consequence. Had such persons been able to take advantage of Dr. Zander's apparatus, it is now an assured fact that their condition might have been sensibly alleviated. The necessity for some means of carefully exercising, or bringing into active play, stiff joints and enfeebled muscles, has long been made evident to medical men, who have often seen a case, successfully carried through its acute stages, come to an unfortunate standstill, or even degenerate, for the simple reason that mechanical means to further carry out the desirable exercise of joint or muscle did not exist. This is no uncommon result of fractures, dislocation of joints, deformities of joints, club foot, infantile paralysis, &c., and it is certain that such results may now be considerably modified by the careful use of Dr. Zander's machines, some of which have in fact been devised on purpose to meet the above-mentioned conditions. For weak people, young or old, gymnastics properly applied are as therapeutic agents unequalled.

We should see little or nothing of a majority of such painful maladies as spinal curvatures in girls, or of the numerous troublesome ailments of elderly people, were the simple and obvious measures of treatment by suitable exercise of different portions of the body more practised. There are, of course, numerous disorders in which treatment by exercise is impossible, yet there are a large number of minor, but distressing, ailments and conditions for which nothing is so effectual if scientifically applied.

For children the exercises are particularly suited, and the effects are little short of marvellous. Owing to the perfect adjustment of the machines, it is impossible for any overtaxing or injury to occur; and this is of course an essential consideration, and one about which parents are naturally anxious. Immediate medical supervision over all these points is necessary; indeed, it has been Dr. Zander's great wish and effort to give mechanical therapeutics a sound and scientific basis, which it is plain can only be done by attracting to this branch of medicine and surgery the attention, study, and practice of medical men.

Dr. Zander's machines were awarded a silver medal at the Paris Exhibition of 1878, and in 1879 they received the gold medal at the Scientific Exhibition in the same city. Institutions having all his

appliances have sprung up in other places, and have in all cases been productive of most excellent results. The latest of these is the establishment recently opened in London, at No. 7 Soho Square. Dr. Zander's machines, placed in well-furnished apartments, where every comfort that patients can require has been studiously attended to, are there available for professional study and general use.

The Institution contains thirty-three machines worked by the patients themselves for *active* exercises, and nineteen machines worked by an engine for *passive* exercises. As the movements are all performed with the aid of machines which never tire, the Institution is able to receive a much larger number of patients than any gymnastic establishment could accommodate, and by its moderate charges places its benefits within the reach of a large portion of the community.

Medical practitioners, if they desire it, have the opportunity of watching over, guiding, and directing the patients whom they may send to the Institution, and of retaining them under their sole charge. Ladies and gentlemen attending the Institution without such superintendence from their personal medical attendant, each receive special care from the medical officer in charge, and written directions, in which the machines to be used, and the force

to be applied, are clearly laid down.[1] With the view to providing medical men with means of testing the capabilities of the Institution, a limited number of free patients are admitted; any member of the profession is at liberty to send a patient when there is a vacancy.

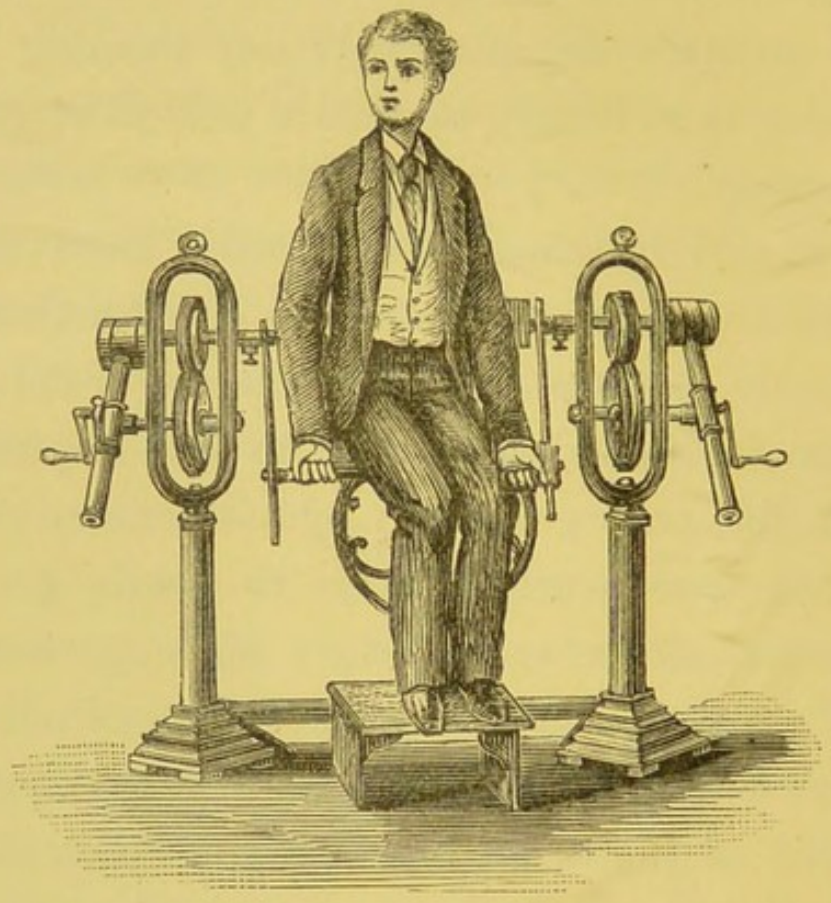
It should be clearly understood, however, that the establishment is intended not only for those who seek a cure for some particular disease or deformity, but also for those who desire to find a preventive against the evils generated by a sedentary life, and who are consequently anxious to obtain good and wholesome muscular exercise; such persons can look forward to attaining there a perfectly harmonious development of their muscular system.

A list of the definite complaints which are most frequently treated is to be found at p. 76. The following machines are in the Institution; they are divided into four classes:—

Class A. Machines principally applicable to the arms.
„ B. „ „ „ „ legs.
„ C. „ „ „ „ trunk.
„ D. Passive machines.

[1] As the Institution is intended to be an assistance to the medical profession, patients in all cases are particularly requested to consult their private medical advisers before and during each course.

A 1.



FLEXION OF THE FOREARMS. (*Active.*)

The handles of this machine are held quite loosely, with the arms hanging perpendicularly and the palms of the hands turned forwards; the arms are bent upwards as far as possible, and, after a brief interval are again brought down to a perpendicular position, resistance, adapted to the strength of the patient, being afforded by the adjustable weight at the side.

This machine acts on the muscles on the front of

the arms. The flexor muscles of the forearm and their tendons, which fix the hand, and the muscles of the back, which counteract the inclination of the trunk to bend forwards, are also acted upon.[1]

A valuable apparatus in stiffness of the elbow-joints or wasting of some of the muscles of the arms.

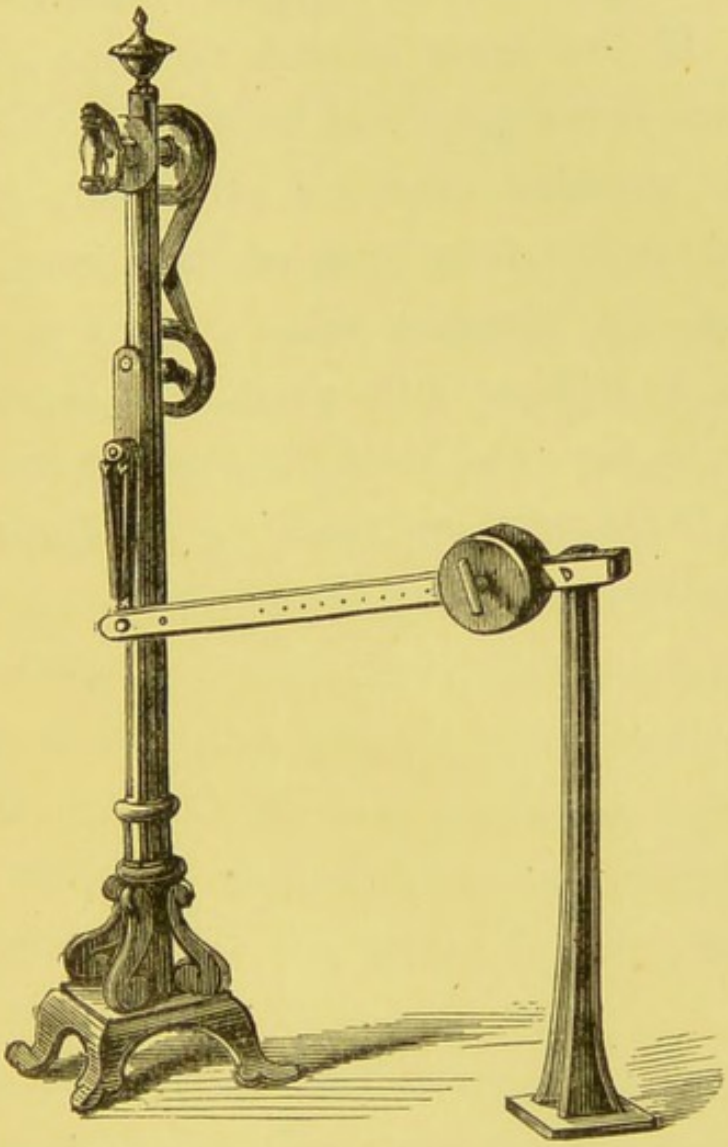
[1] In all cases (with one or two exceptions, for instance A 11 and A 8) where the patient is overcoming resistance or doing work, he should breathe out and *vice versâ*.

A 2.

EXTENSION OF THE FOREARM. (*Active.*)

THIS machine is exactly the reverse of A 1, both in appearance and action; at the commencement of the movement the forearms are bent upwards; when the movement is made, the arm is extended or put straight. It acts upon those muscles situated on the back side of the arm and the elbow-joint. The flexor muscles of the hands, the muscles of the back, and the muscles of the abdomen are also called into action.

A 3 *a*.



PRONATION AND SUPINATION OF THE FOREARM. (*Active.*)

THE machine is elevated to such a height that the patient can grasp the handle with his arm in a perfectly horizontal position. The arm must be held quite straight. The resistance of the weight on the

lever is then overcome by turning the handle forwards and backwards.

The hands can be rotated three-fourths of a circle. If the arms cannot be kept straight, the resistance is too great and must be diminished.

This machine exercises principally the muscles situated on the front side of the forearm, but also those of the shoulder-joint. *It is a very useful machine in stiffness of the wrist, as in chronic rheumatism, or in impaired mobility from fractures or other injuries to the wrist and forearm.* It affords a valuable means of strengthening the wrist.

A 3 *b*.

PRONATION AND SUPINATION OF THE FOREARM. (*Active.*)

THIS machine much resembles A 3 a, but a fly-wheel is substituted for the lever. When the handle is turned a fly-wheel is caused to rotate in a greater or less degree by means of cogwheels. The speed of the wheel tends to maintain the rotation after the arms have been turned as far as is possible; rotation, however, is stopped directly the muscles resist. The patient should not give greater speed to the wheel than can be stopped by easy muscular resistance. When the wheel is stopped, rotation is made in an opposite direction. If the strain is too great the handle is released at once.

This machine is intended to free the muscles of the arms by stretching them, and the capsules of the joints and ligaments, rather than to exercise their rotatory muscles.

The action of the machine is to increase the circulation in the arms.

A 4.

FLEXION (VERTICAL) AT THE SHOULDER-JOINT.
(*Active.*)

THE patient seats himself with one side leaning against a rest, the arm is stretched upwards above the head and grasps a handle which is attached to a lever; the arm is then carried outwards and downwards until it hangs perpendicularly by the side. It is afterwards again carried into the elevated position.

This machine acts upon many powerful muscles of the chest and back. The muscles of the side of the trunk which is being employed are called into action to fix that side and prevent the trunk being bent in an opposite direction.

This machine has been found of great value in stiffness and loss of power at the shoulder-joints.

A 5.

CLUB EXERCISE.

THE apparatus consists of ten pairs of clubs varying from one to ten pounds in weight, which are used in the ordinary manner.

A 6.

WRIST FLEXION AND EXTENSION. (*Active.*)

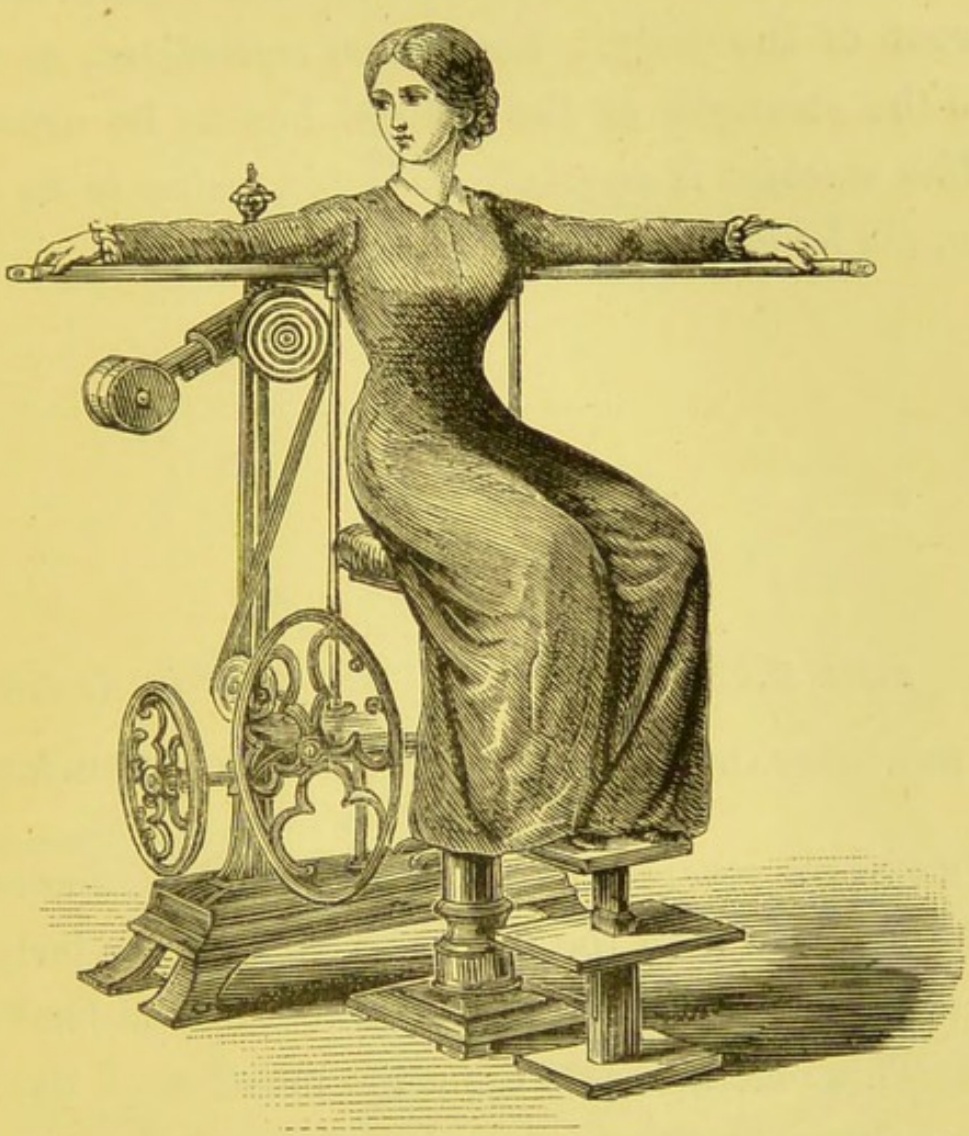
This machine exercises the muscles acting on the wrist, and also the wrist-joint.

The patient rests the forearms on the table; the hands grasp a handle in the manner shown above. Resistance is offered by the levers at the side of the machine to the hand being bent downwards; the

machine can also be so arranged as to offer resistance when the handle is being drawn upwards, as in extension of the wrist.

This machine is very useful for stiff, or rheumatic, wrists, or where there is wasting of the muscles of the forearms.

A 7.



FOR EXPANSION OF THE CHEST. (*Active.*)

HORIZONTAL FLEXION OF THE SHOULDER-JOINTS.

THIS machine tends greatly to develop the muscles on the front of the chest, and those of the shoulder-joint; it is an agent for gentle expansion of the chest.

The patient is seated on a chair, with the arms resting on shafts, as indicated above; the arms are then brought forward, so that the hands meet in front of the body. Resistance equivalent, as usual, to the strength of the patient has to be overcome. *This machine is especially valuable, owing to its action on the lungs, in both young and old people.*

A 8.

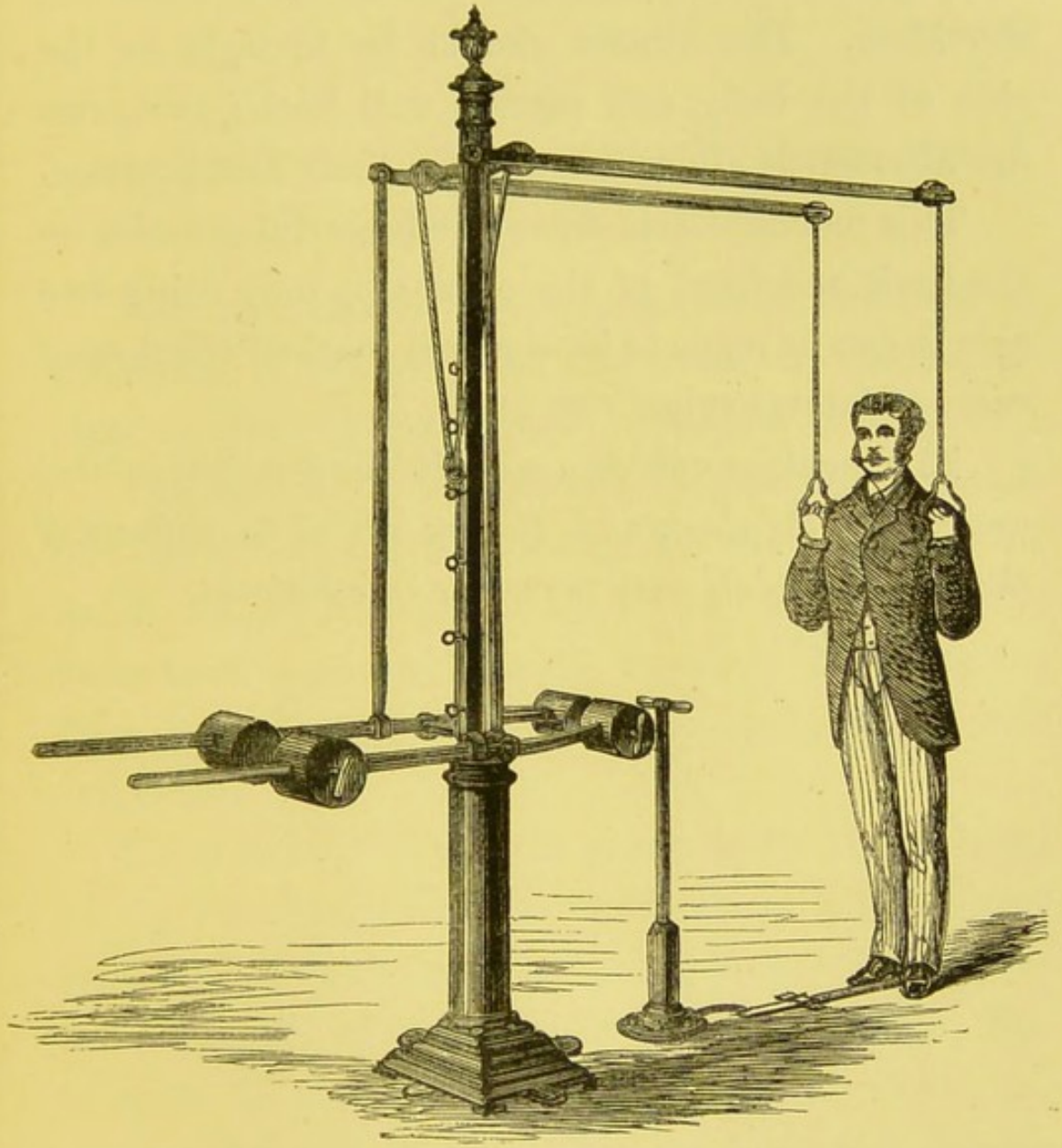
FOR EXPANSION OF THE CHEST. (*Active.*)

HORIZONTAL EXTENSION OF THE SHOULDER-JOINTS.

THE exact reverse of A 7; the patient commencing the exercise with the hands in front of the body, and ending with the arms turned outward and backward.

This machine acts upon the muscles of the back, and those on the posterior surface of the shoulder-joints; *it tends greatly to expand the chest.*

A 10.



FLEXION OF THE FOREARM AND SHOULDER-JOINT. (*Active.*)

The patient must place himself under the suspended handles, which he grasps with the arms stretched

upwards. The head must be held well up, and the chest thrown well forward. The arms are drawn down until the hands are on a level with the shoulders. The elbows should be brought to the side of the body, and carried well back; the arms are afterwards allowed to resume their first position.

This machine acts upon the powerful muscles on the back and front of the chest; by only using one arm it can be made to have a very marked effect upon cases of lateral spinal curvature.

This machine affords a splendid and well-regulated exercise for the chest, and is very useful in stiffness of the shoulder-joints with muscular enfeeblement.

A 11.

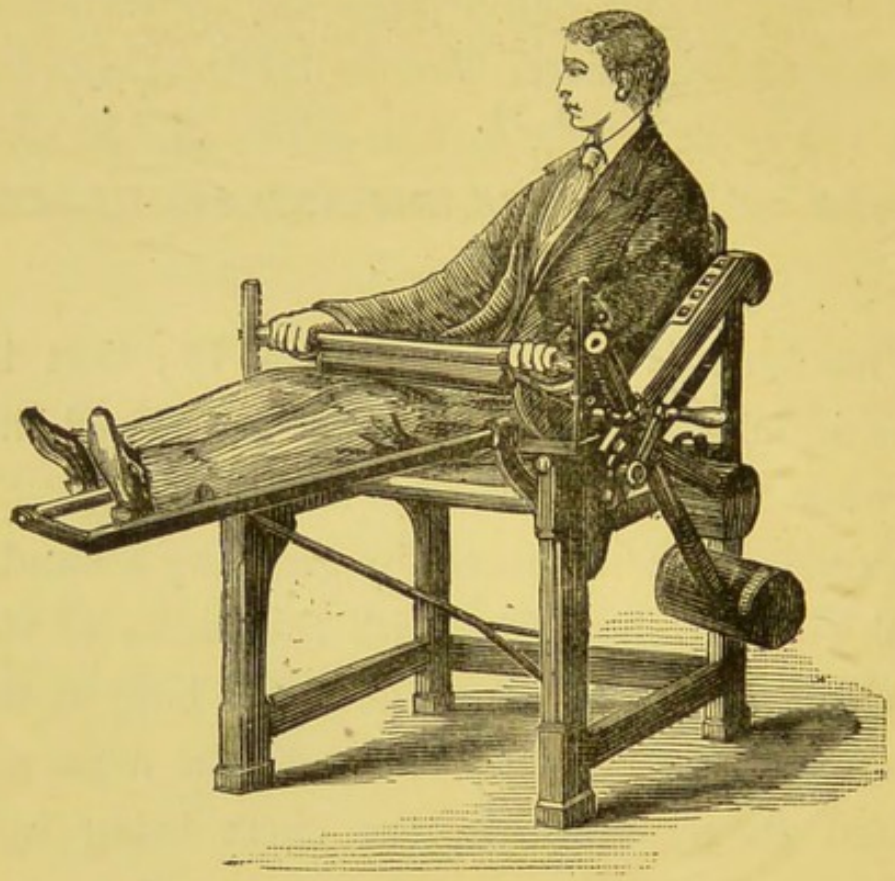
EXTENSION OF THE FOREARM AND SHOULDER-JOINT. (*Active.*)

This machine is the reverse of A 10; that is, resistance is offered when the arms are raised, instead of when they are drawn down, as in A 10.

The exercise is commenced by grasping a handle on a level with the shoulders, with the backs of the hands resting against the shoulders; the body at the same time is leaning slightly forward; the arms are then raised slowly upwards, the chest being well expanded.

The machine thus acts partly upon the muscles of the shoulder-joint, *i.e.* upon those which move the arms upwards, and partly on those which move the lower part of the shoulder-blade outwards. The muscles of the abdomen are stretched when the patient leans forward. *This machine also greatly tends to expand the chest, and affords excellent practice to shoulders weakened by rheumatism, dislocation or other injuries.*

B 1.



FLEXION OF THE LEG. (*Active.*)

THIS machine acts partly on the muscles situate on the back of the thigh, and partly on those of the calf; also upon the knee-joint.

The patient seats himself on the chair, while the legs lie stretched on the swinging frame in such a manner that the back part of the ankle is placed upon the padded rests. The knee-bar must fix the legs, immediately above the knee, firmly against the

chair. The hands should be placed upon the knee-bar as shown. The knees are bent until the lower part of the leg is at an acute angle with the thigh; the legs are afterwards again gradually allowed to come into the horizontal position.

This machine can be adapted to meet any weakness of both legs, or one only. *It is peculiarly adapted to procure a greater degree of movement in stiff knees.* It should be noticed that the strain of the weight of the body is removed during the exercise by the patient being in a sitting position.

B 2.

EXTENSION OF THE LEGS. (*Active.*)

This machine in appearance resembles B 1, but has exactly the reverse action.

The patient must seat himself on the chair, placing the legs so behind the swinging frame that the fronts of the ankles lie against the padded rests; the knees are extended, and the legs raised until they come into a horizontal position. They are afterwards brought again into a perpendicular

position. Weak persons should not at first exert themselves to bring the legs fully into the horizontal line. N.B.—This machine can be adapted to exercise one leg at a time.

This machine acts upon the muscles situate on the front of the thighs. The muscles of the back and outer parts of the thighs also come into play in order to fix the pelvis. In weaker persons even the abdominal muscles are employed. *It has been found an efficient machine in the treatment of stiffened knee-joints, and is very useful for the development of wasted muscles.*

B 3.

EVERSION OF THE FEET. (*Active.*)

THE patient, seated in a chair, has his legs stretched straight out before him, with the feet resting in sockets in such a position that the point of the foot is turned inwards. The feet are then turned outwards as far as the strength permits, when the weight is allowed slowly to draw them inwards. The legs must be kept quite straight. If it is desired to exercise the muscles for turning the feet inwards, the left foot can be placed in the right iron shoe, and *vice versâ*.

This machine acts chiefly upon the hip-joint and the muscles which lie behind it. It also acts, in a less degree, upon some of the muscles which are situated on the inner and front sides of the thighs. Motion at the ankle-joint is slight, only two muscles on the outer sides of the lower legs being brought into action. *The machine is very useful in counteracting the tendency of many children to turn the foot inwards in walking.*

B 4.

FLEXION OF THE HIP-JOINTS AND KNEES.

(*Active.*)

THE patient seats himself on a narrow chair, with one leg hanging over the side of the seat; a pad attached to a lever is so arranged as to fit immediately above the knee, so that resistance is offered to any flexion of the hip-joint.

This machine acts upon the muscles which lie in the pelvis and on the front sides of the spinal column, as also upon those of the front part of the hip-joints and thighs. *A very useful machine in the treatment of sciatica, and some affections of the hip-joint.*

B 5.

EXTENSION OF THE LEG AT THE HIP. (*Active.*)

The patient reclines upon a sloping couch, so arranged that the head is raised about 36 inches above the feet. In the centre of this couch is an opening which allows one leg at a time to pass through it, and move freely above and below. The foot of the patient is placed in a stirrup attached, as usual, to a lever, so that resistance is offered when the leg is to be depressed.

This machine acts upon the muscles of the front and back of the thighs, and the muscles of the hip. *It is extremely valuable in some cases of sciatica.*

B 6.

FLEXION AND EXTENSION OF THE ANKLE.
(*Active and Passive.*)

The patient seats himself in a movable chair, which is so adjusted that when the legs are perfectly straight the feet rest in iron sockets; the foot is now bent backwards and forwards.

This machine differs from most in the Institution, as it is not furnished with any mechanism by which a distinct resistance is offered during the exercise. The flexion and extension of the foot cause a fly-wheel to rotate, and the muscular work is measured by the number of revolutions, shown by a pointer moving along a scale, each number on which represents ten revolutions. *The apparatus is set in motion by the muscles of the lower leg, and has a marked effect upon them; it also tends greatly to stimulate the circulation in the lower extremities. Cases of stiff ankles or deformities of the feet are very successfully treated by this machine.* The degree of motion can be carefully graduated, increased, or diminished, according to the mobility of the joint.

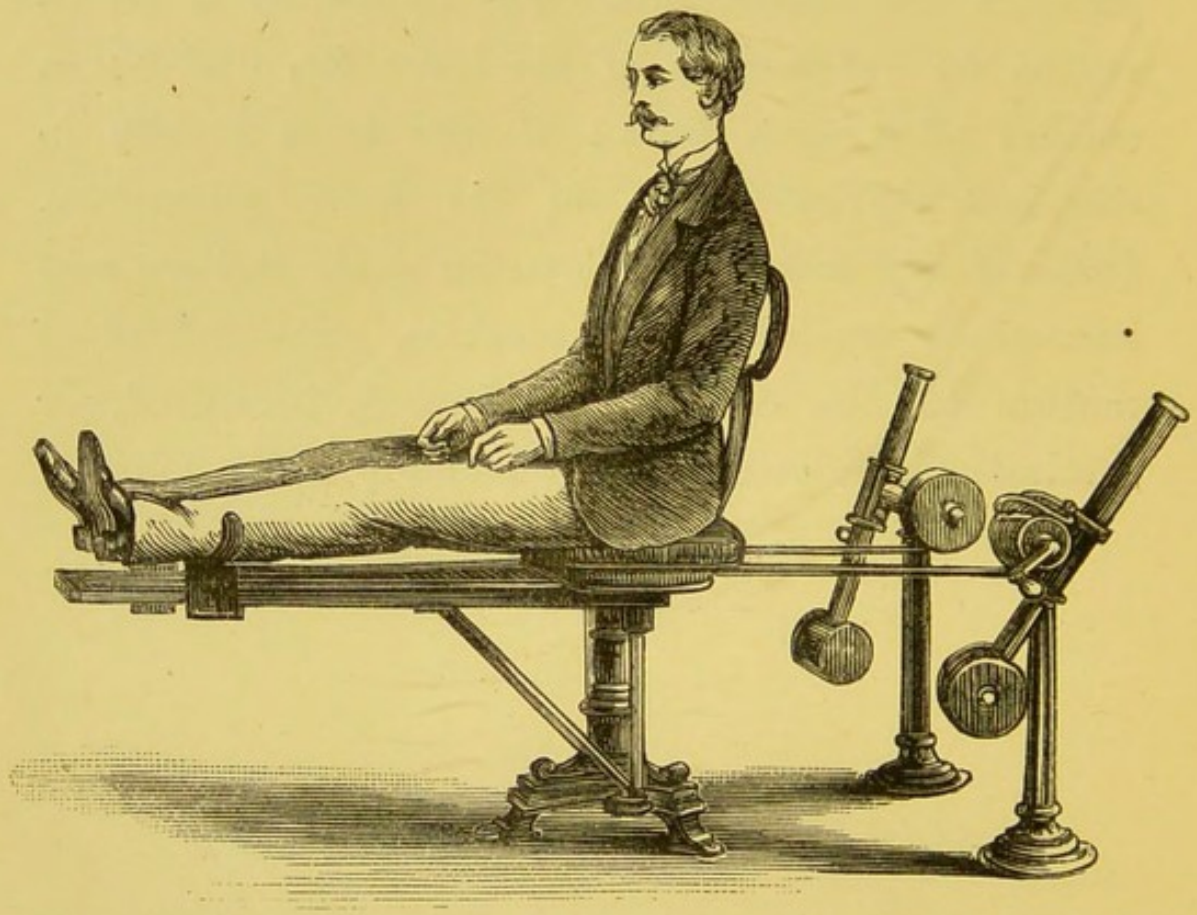
B 7.

ADDUCTION OF THE LEGS. (*Active.*)

This machine in appearance resembles B 8; the patient seats himself with his legs extended along the shafts; the resistance is so arranged as to tend to keep the legs apart; the patient has to overcome this, and bring the legs into such a position that the feet touch, as shown in the diagram.

This machine acts upon the muscles situate on the inside of the thigh. *It is a valuable apparatus for the treatment of some forms of hip-joint ailments.*

B 8.



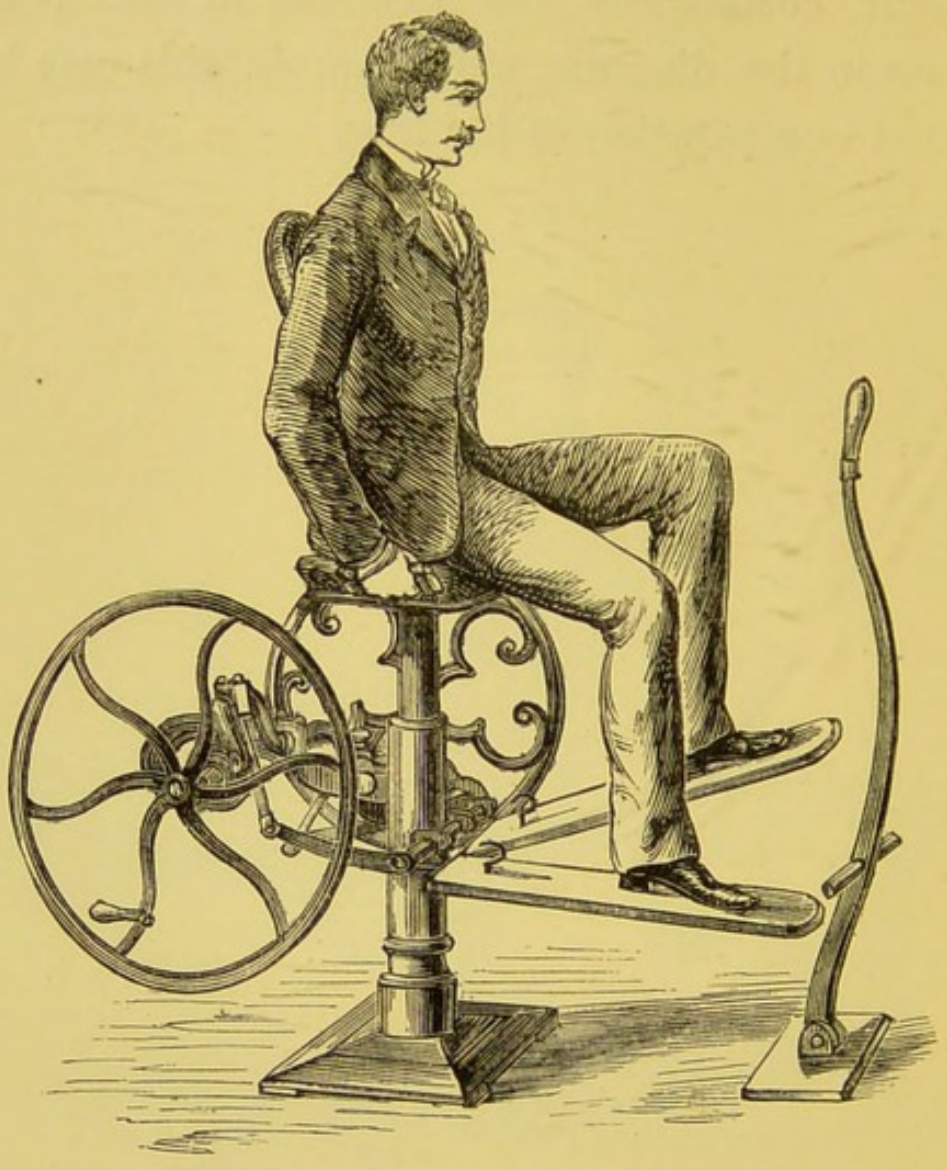
ABDUCTION OF THE LEGS.

An apparatus for bringing into action the muscles which abduct the legs; it consequently has an action on the hip-joint, *and is very useful in pro-*

curing a greater degree of movement in stiffness of that joint.

This machine is exactly the reverse of B 7; the patient commences the exercise in the position shown in the diagram, resistance in this case being offered to separation of the legs.

B 9.



THE VELOCIPEDE. (*Active and Passive.*)

THE feet are secured to the foot-boards, and the fly-wheel put in motion by the right hand, and the motion then maintained by the feet and legs. The

movements must be discontinued when slight fatigue is felt.

This machine acts at the same time upon the hip-, knee-, and ankle-joints, as also upon the muscles which extend and flex those joints. It increases the circulation in the legs and feet, and *furnishes a simple, yet effective and non-fatiguing, means of exercise for elderly persons.* The motion can be obtained without the exercise of any force on the part of the patient.

The degree of motion at the joints mentioned can also be exactly regulated.

B 10.

FLEXION OF THE KNEE- AND HIP-JOINTS. (*Active.*)

The patient stands in an upright position; a padded crutch, shaped like a horseshoe, fits across the instep, and is attached to the usual lever and weight; the leg must then be raised till the thigh is at right angles to the body, resistance being offered by the weight.

This machine *acts upon the muscles which flex the leg at the knee and hip-joints*, and also those on the front and back of the thighs and calves. It is thus a useful machine for increasing motion in a stiff hip.

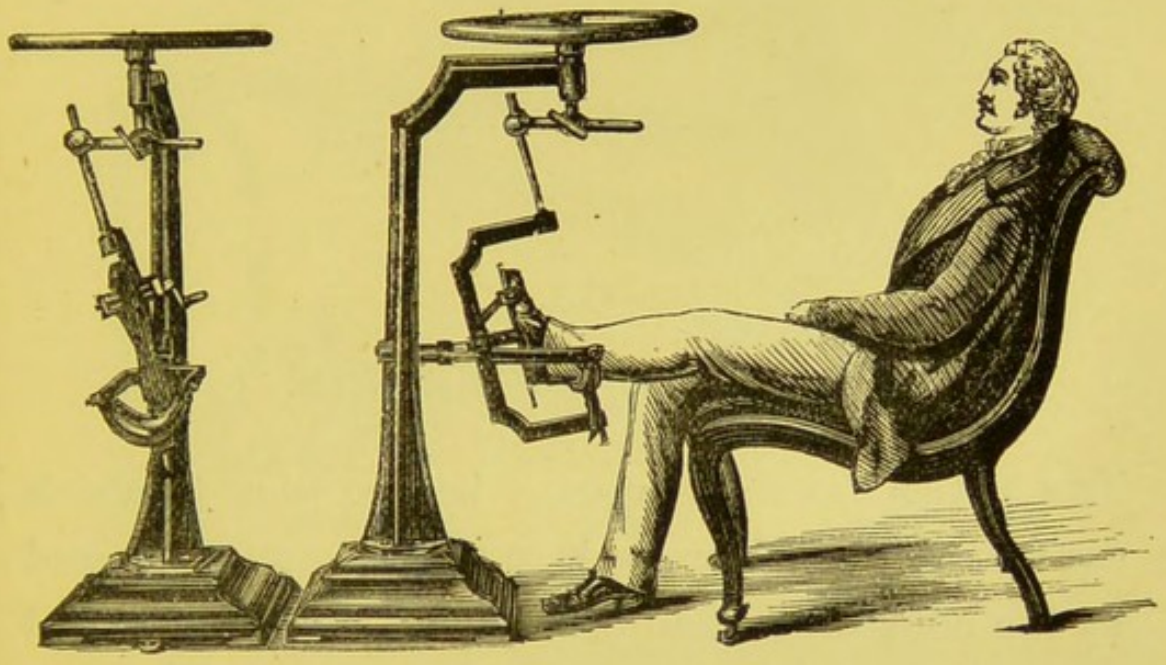
B 11.

EXTENSION OF THE ANKLE-, KNEE-, AND HIP-JOINTS. (*Active.*)

This machine is the reverse of B 10, the patient commencing the exercise with the knee in a bent position, while resistance is offered to the leg being straightened; subsequently it is gradually allowed to be again flexed as far as possible.

This machine *acts upon the muscles which extend the hip-, knee-, and ankle-joints*, and therefore upon the uppermost and back parts of the hip, as well as upon those muscles situated on the front of the thigh and the muscles of the calf.

B 12.



ROTATION OF THE ANKLE-JOINT.

(*Active and Passive.*)

THE patient must seat himself at such a distance from the apparatus that the leg is in a horizontal position during the exercise; the boot is tightly screwed to a movable foot-piece, and the foot is then bent forward as in B 6; by so doing a fly-wheel is set in motion, which causes a rolling motion in the ankle, the extent of which can be regulated at pleasure; the action is maintained by the extension of the foot.

This machine acts on the muscles which bend

and straighten the foot, and gives also a rotatory action to the ankle-joint; *it is of great value where any weakness of the ankle exists.*

C 1.

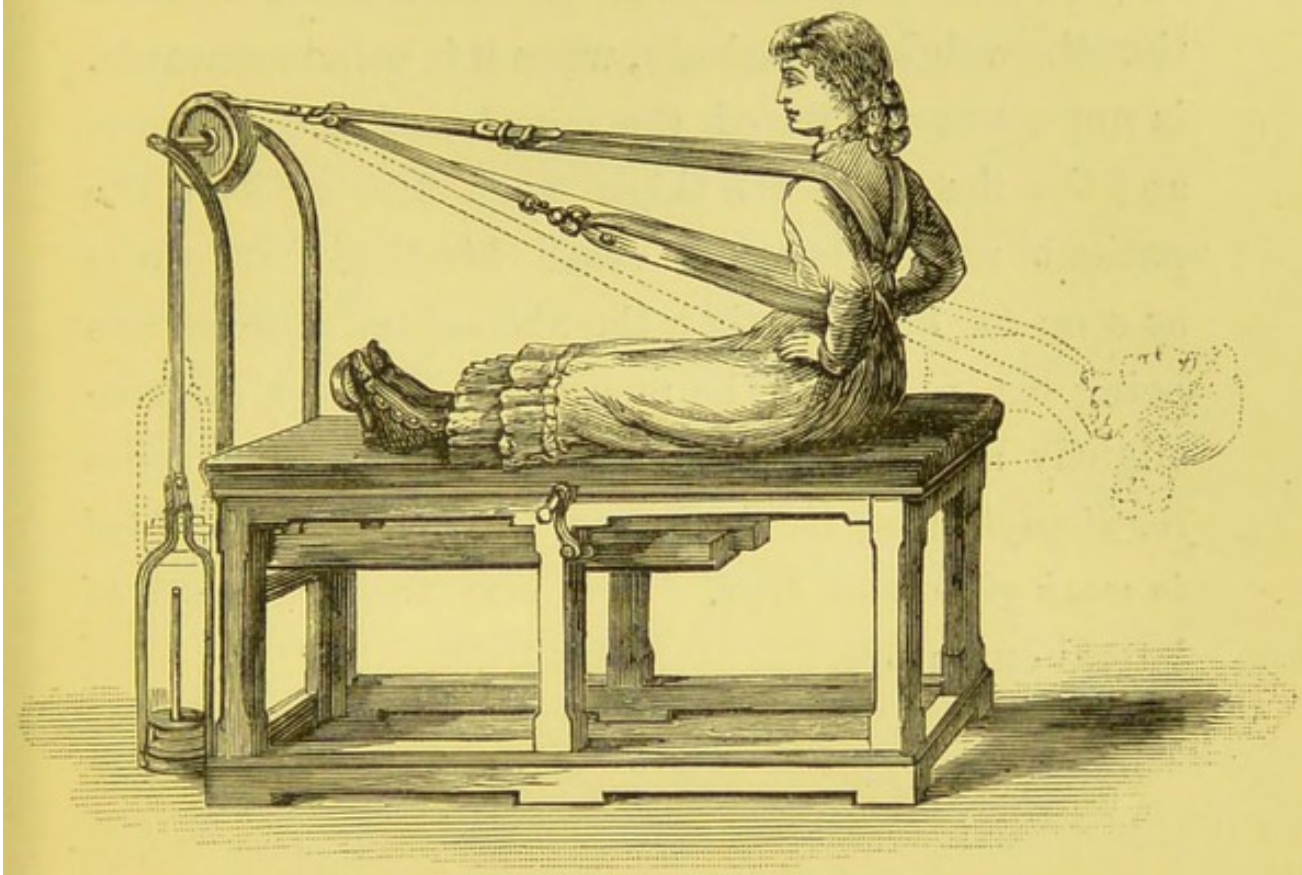
FLEXION OF TRUNK FORWARDS. (*Active.*)

THE patient reclines upon a bench, part of which can be raised or depressed, so that the angle formed by the body when leaning against it can be increased or diminished at will; the legs are fixed by means of a strap passing over the knee-joint; the hands are placed on the hips.

When the exercise is commenced, the patient raises himself into a sitting posture, from which he bends forward as far as possible, care being taken to keep the head well bent down; after a brief interval he straightens the body, and sinks slowly back on to the inclined plane.

This machine acts partly *upon the muscles of the abdomen, and partly on those which flex the thigh* on the abdomen, and also the muscles of the neck.

C 2.



EXTENSION OF THE TRUNK. (*Sitting position.*)

FOR STRENGTHENING THE BACK. (ACTIVE.)

THE patient sits on the bench as shown in the engraving, with the feet placed against the movable foot-board. The straps are then adjusted and the hands rested on the hips; the patient must bend backwards to an angle of about 45 or 60 degrees, and, after a brief interval, bend as far forwards as possible without flexing the knees.

This machine acts upon the muscles which stretch the body from the back of the neck down to the bend of the knee. If the resistance is so small that the weight of the body, when it is bent backwards, is not counterbalanced, the muscles of the abdomen and the flexors of the thigh come into action; the patient must therefore cease bending backwards as soon as he feels that the abdominal muscles are being contracted. The muscles of the neck are also slightly acted upon. *This is a very useful exercise for strengthening the back, and is particularly adapted to weak girls and boys.* It is very useful in cases of lateral curvature.

C 3.

ROTATION OF THE SPINE, UPPER PART. (*Active.*)

This machine is similar in construction to C 7, with this exception, that the lower part of the body is fixed, instead of the upper part, as in C 7.

The patient, having seated himself, places his feet on a foot-rest, and his arms in the crutches of the cross-bar (which must be placed as high as possible), fixing it between his arms and back.

Whilst the lower part of the body is kept fixed on the chair, the upper part of the body is moved from the side position, which it has first assumed, to a corresponding position on the opposite side; after a brief interval it is brought gradually into its original position.

This machine acts upon the muscles both of the abdomen and back. The muscles of the chest are also exercised, being used to fix the top of the back against the padded cross-bar. *This machine is very useful in cases of lateral curvature of the spine with rotation.*

C 4.

FLEXION OF THE TRUNK, FORWARDS. (*Active.*)

THE patient seats himself in a chair with a back to it, over which pass straps attached to a lever and weight. These straps being laid over and around the shoulders are crossed over the back and then grasped, one in each hand. The patient then places himself against the back-rest; drawing the straps tightly about him, he commences the exercise by bringing the body forward as far as he is able, at the same time overcoming the resistance offered by the weight, the back being kept straight as long as possible and then strongly flexed. The body is then allowed to move back again, the chest being kept well expanded.

This machine acts upon the flexors of the abdomen and thighs, *and powerfully upon the lungs in expiration. It is very useful in cases of sciatica and constipation.*

C 5.

EXTENSION OF THE TRUNK. (*Standing position.*)

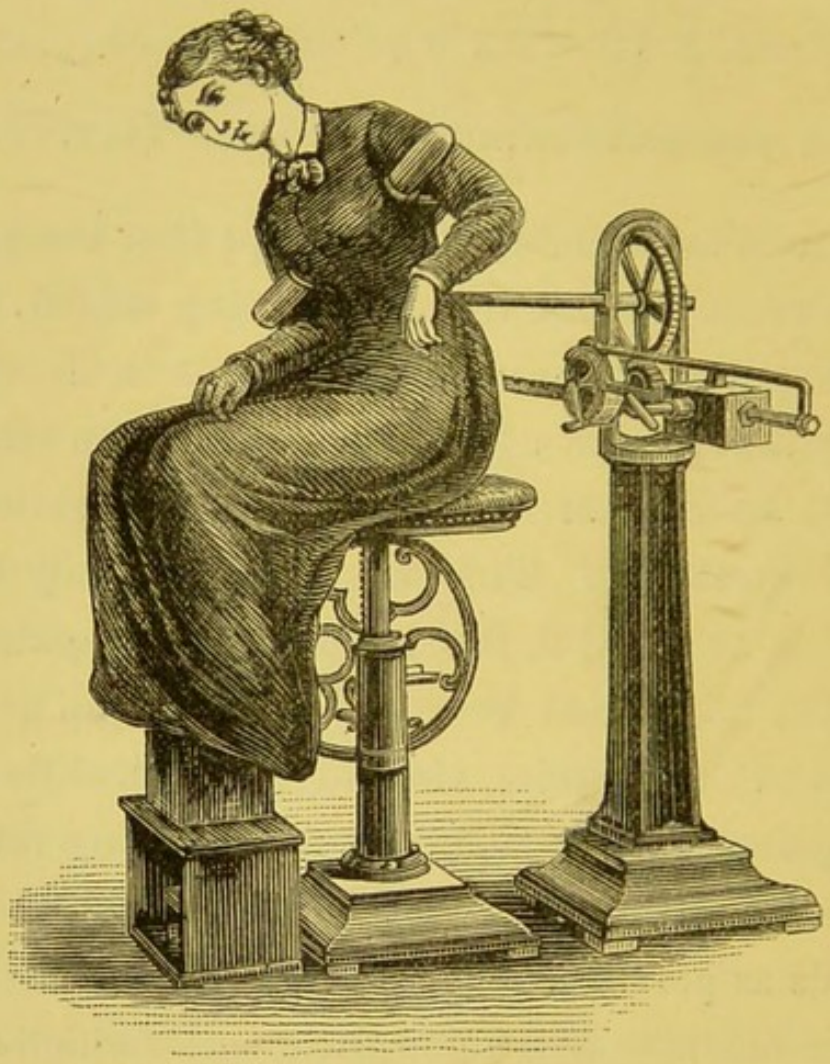
FOR STRENGTHENING THE BACK. (ACTIVE.)

THIS machine resembles C 2, except that the patient is in an erect position instead of being seated.

The patient places himself upon a footboard, resting his thighs against a leg cushion which is elevated or depressed until it presses against the tops of the thighs. The straps are then adjusted to the back as in C 2, the hands resting against the hips; the body must be carried back to an angle of about 45 to 60 degrees, the thighs meanwhile being kept against the leg-cushion. After having returned to an erect position the body must be carried as far forwards as possible.

This machine acts upon the muscles which extend the trunk from the neck as far down as the knee. *It is very useful, therefore, in correcting stooping, and some deformities of the spine. It is also extremely useful in expanding the chest.*

C 6.



LATERAL FLEXION OF THE TRUNK. (*Active.*)

An apparatus by which lateral flexion of the trunk can be made. It acts upon those muscles of that side of the trunk and back towards which flexion is made.

The patient places her back against the padded

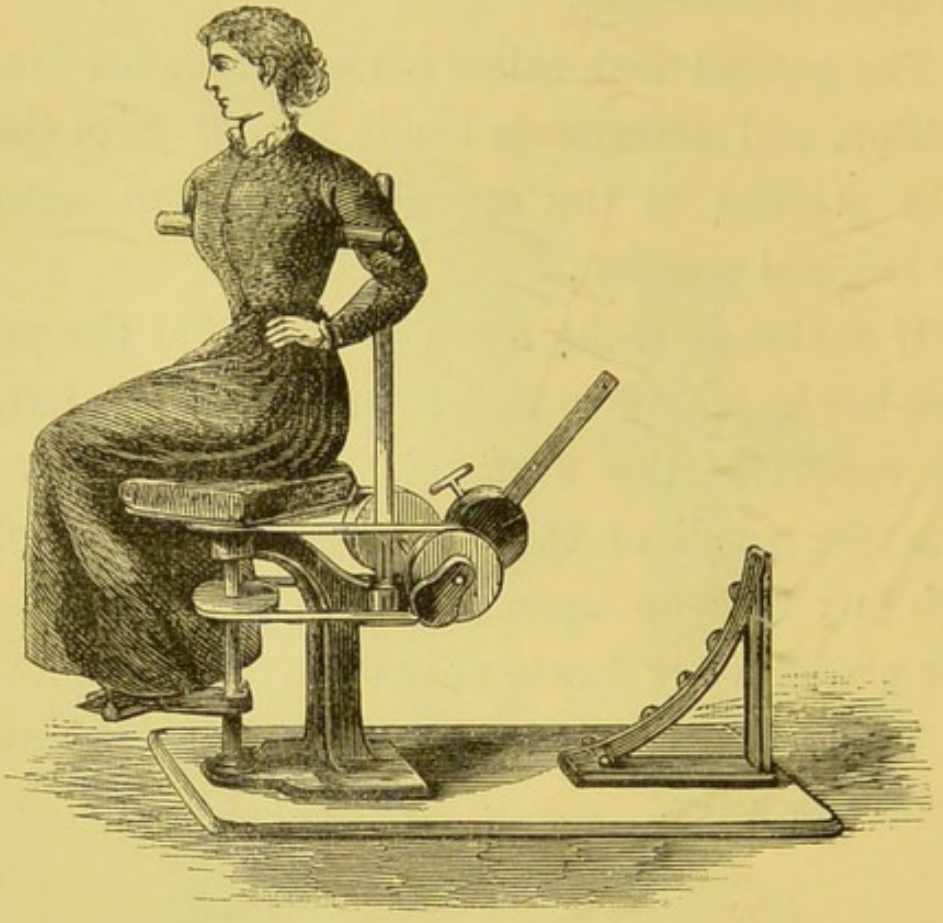
bar and fixes its extremities in the bend of the elbows; this bar is in direct communication with the lever and weight.

The patient first raises herself from her crooked position, and afterwards bends herself from the upright position to the opposite side, then resuming her original position.

If flexion is to be made to the right the padded lever-bar is placed so that it inclines to the left, and *vice versâ*. If the flexion is intended to act more upon the small of the back the cross-bar is placed high up; if more upon the upper part of the spine, it is placed lower down, near the axle.

This machine is of very great value in cases of lateral curvature.

C 7.



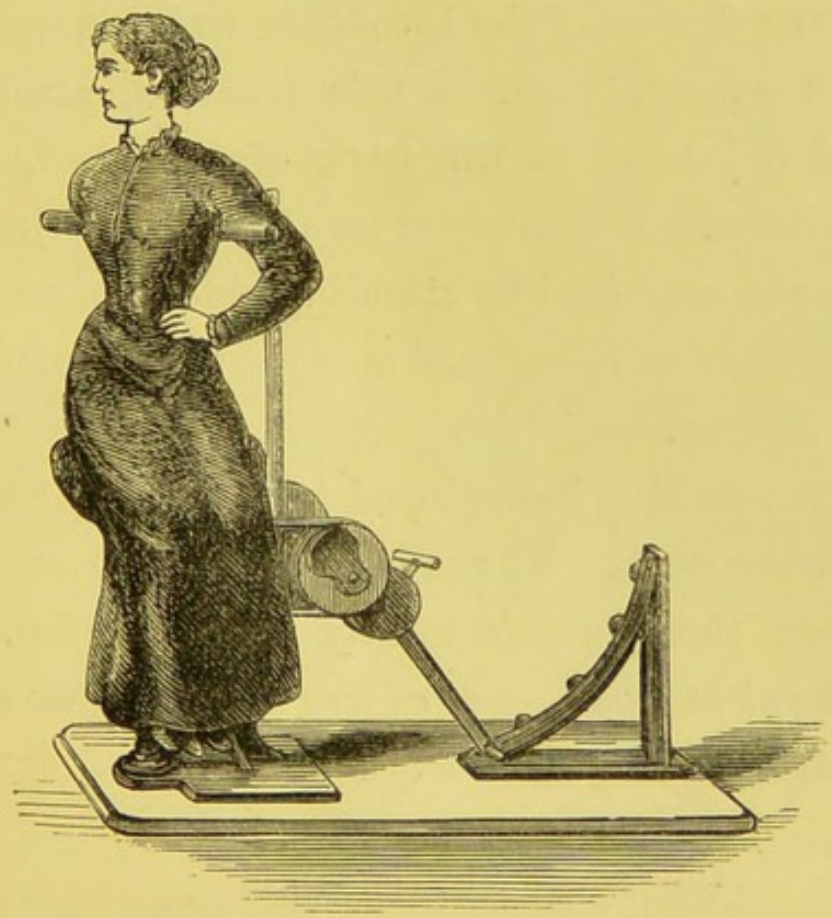
ROTATION OF THE SPINE, LUMBAR PORTION.
(*Active.*)

THE patient must seat herself with her feet on the iron rest, carry her arms backwards over the cross-bar (placed as high up as possible), and fix it between the upper part of her arms and back.

When motion to the right is to be employed, the seat is fixed by means of a spring-bolt 50° to the left, and *vice versâ*.

The upper part of the chest being fixed, the patient must turn to a corresponding position on the opposite side, as shown in the woodcut below.

This machine acts both on the muscles of the abdomen and those of the back. The muscles of the chest, which by means of the arms fix the upper part of the back against the padded cross-bar, are also acted upon. *This is a very valuable machine in some cases of lateral curvature of the spine when there is rotation of the lumbar vertebræ.*



C 9.

FLEXION AND EXTENSION OF THE NECK.

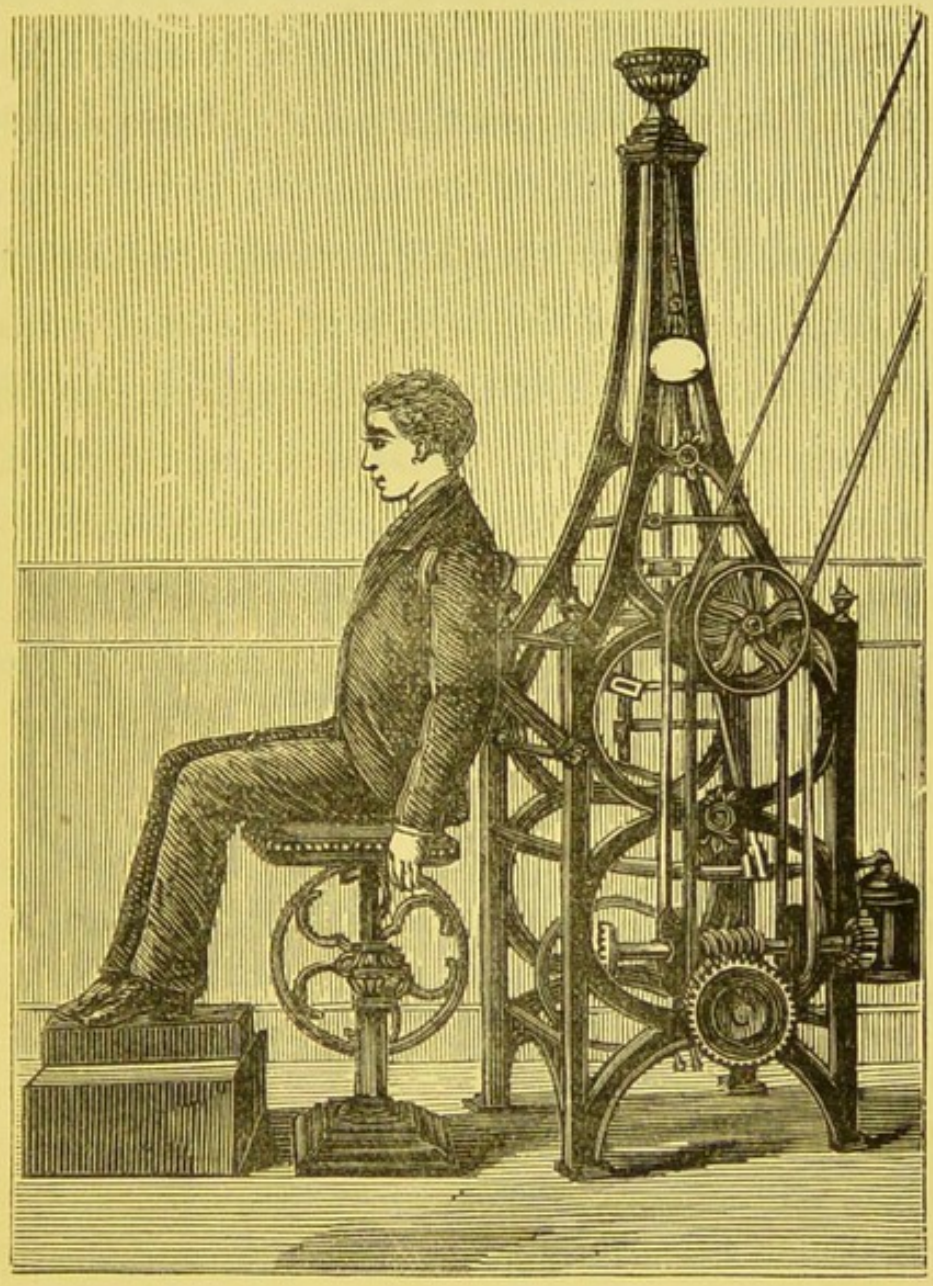
(*Active.*)

A SHORT bar, having a padded centre, is grasped by both hands and placed behind the head when bent forward; this bar is in direct communication with a lever and weight, so that resistance is offered to the head being bent backwards.

If the flexors of the throat are to be exercised the patient exactly reverses this position, placing the forehead, instead of the back of the head, against the cushion. The muscles on the side of the throat can also be exercised by standing sideways and pressing the cushion upon the side of the head, immediately above the ear.

This machine is employed to exercise the muscles around the neck. The muscles on the back of the neck are those which mostly need exercise. It is *very useful in some cases of wry neck, and in cases of rheumatism of the muscles of the neck.*

D 1.



'CHEST-EXPANDER.' (*Passive.*)

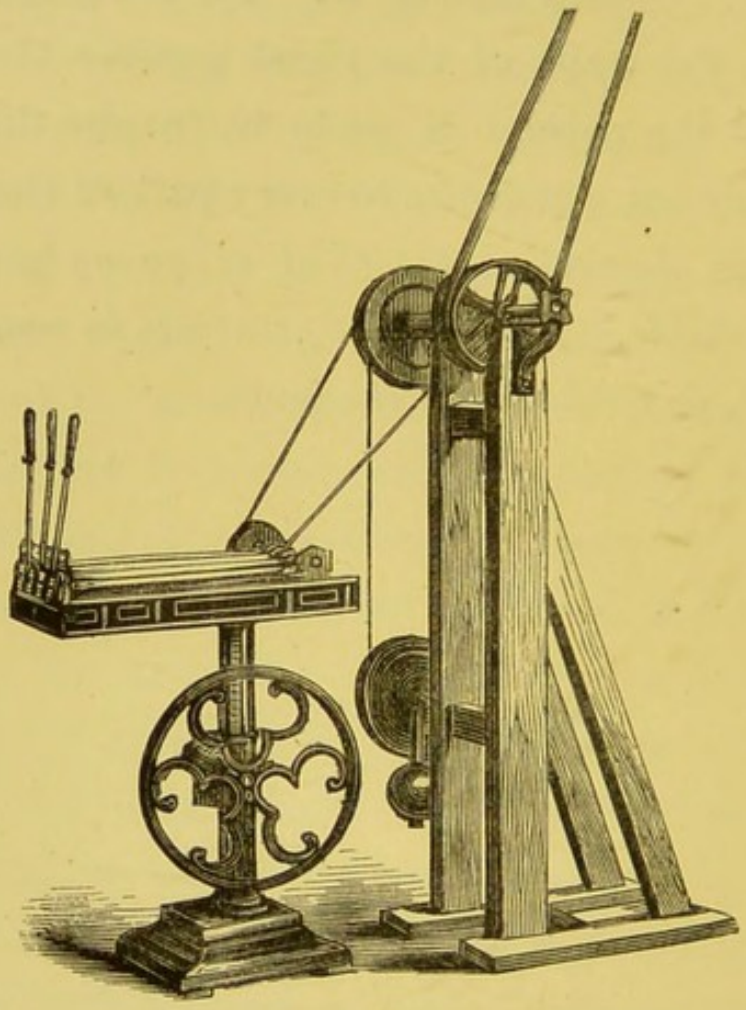
THE patient must seat himself upon the movable chair, and rest his back against the back-cushion placing his arms in the crutches—which are adjust-

able to the sides of the chest—without pressing against them. The chair is elevated or depressed until the crutches touch the armpits without pressure. The back-cushion is, as a rule, placed at such a height that its upper edge covers the points of the shoulder-blades. The strength of the exercise is indicated by five figures, the first of which marks the height of the chair, the second the height of the back-cushion, the third the position of the back-cushion, the fourth the pressure against the back-cushion, the fifth the elevation of the shoulders, which is increased in proportion as the regulator, which holds up the bent lever with the opposing weight, is moved forwards. When the exercise is to be employed for the first time, all the numbers should be low, especially No. 1. If a greater elevation of the shoulders be required, No. 5 is increased, and in the same way with regard to the other numbers. If one side of the chest is to be pressed forward more than the other, the back-cushion is placed against that side which is to be more especially exercised.

This machine extends the trunk and increases the capacity of the chest. This is effected by the shoulders being drawn upwards and backwards, whilst a padded cushion presses the back forward. The trunk is elongated, and the spine and the walls of the chest are stretched. After some seconds the

machine permits the chest to sink down, and the movement is then repeated. Persons who carry on a sedentary life respire very superficially; the walls of the thorax become too stiff, and make the respiratory functions laborious. By using the chest expansion the walls of the chest recover their elasticity, and the patient is made to inspire deeply, so that the air can penetrate to every part of the lungs; *its effect in developing the chest of young persons is very remarkable. It is also of great use in some forms of ailment, or weakness, of the lungs.*

D 2.



PERCUSSION MACHINE.

This machine consists of a series of small india-rubber hammers, which are made to strike the body in succession, and with considerable rapidity.

By raising or depressing the machine, the action can be transferred to any particular spot.

It produces a pleasant sense of warmth, and *is of special use in the treatment of neuralgia, rheumatism, or loss of muscular tone; it is, moreover, a valuable auxiliary in the treatment of some forms of dyspepsia.*

D 3.

PERCUSSION MACHINE.

THIS machine is the same as D 2, though somewhat differing in appearance; it is intended specially to act on the legs—*it is very valuable in sciatica.*

D 4.

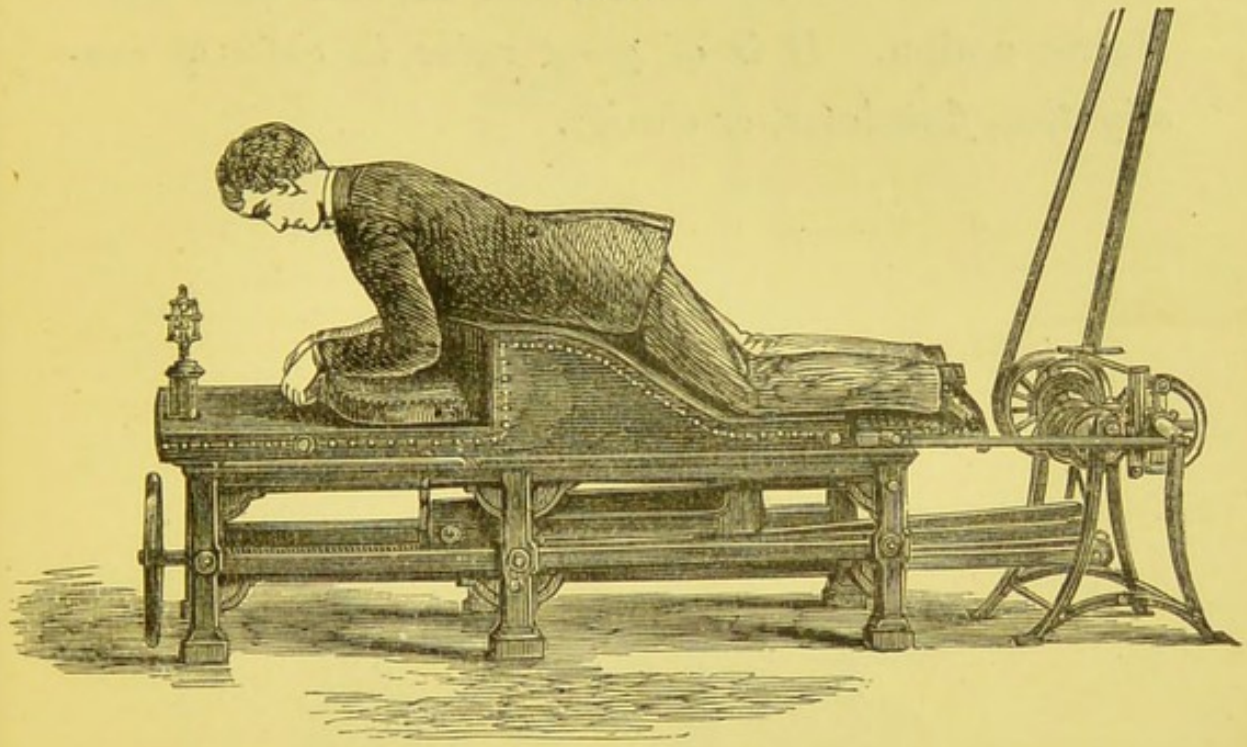
FOR 'PERCUSSION' OF THE HEAD. (*Passive.*)

THE patient sits on a movable chair, which is elevated or depressed until the head can be placed under several small india-rubber hammers, which are made to tap the head rapidly, the back being kept straight.

The patient must so move his head that all parts of the scalp may, as far as possible, be submitted to the operation. A light application is desirable at first.

This machine acts upon the scalp, the vessels of which are in relation with those of the brain. It increases the circulation both inside and outside the scalp, *and has a very good effect in some cases of headache and sleeplessness.*

D 5.



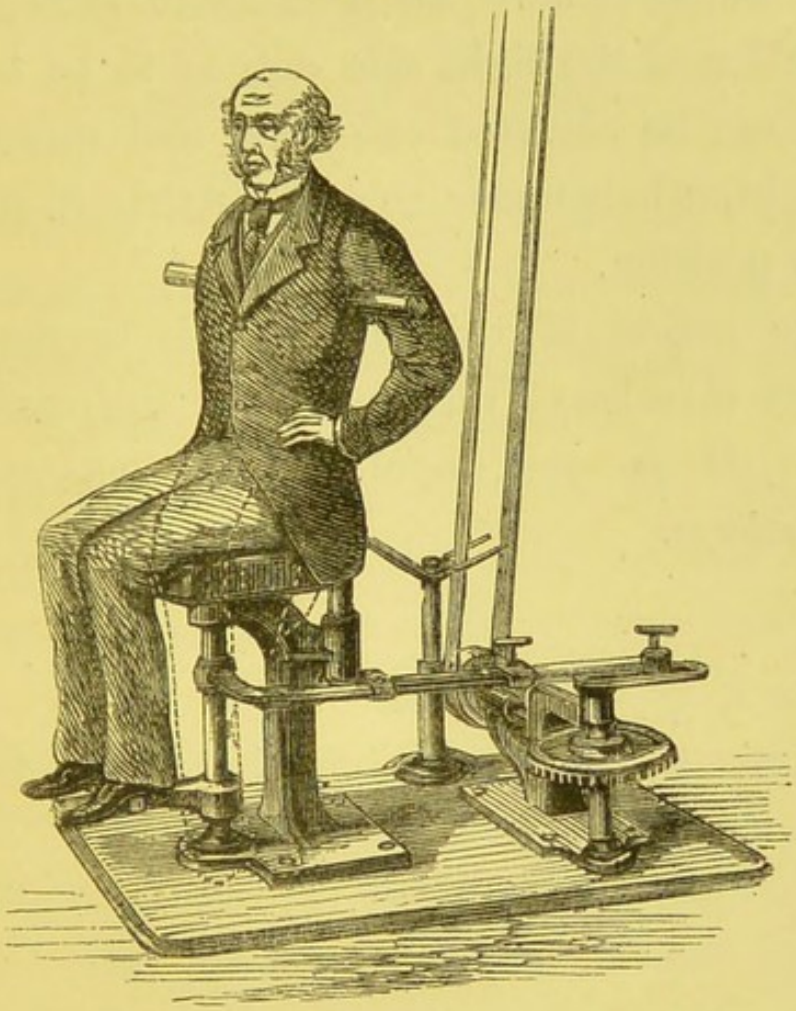
KNEADING MACHINE. (*Passive.*)

An apparatus for kneading the abdomen.

The patient lies down on the apparatus, as shown in the engraving, so that the abdomen is immediately over an aperture, through which a number of rollers work, so constructed as to imitate the motion of the hand in kneading. The elbows rest on the cushion on the front of the couch. The muscles of the abdomen must not be contracted. By turning the adjusting-wheel the depth of the kneading action, indicated by a pointer, is regulated.

This machine increases the circulation in the abdominal muscles. It also augments the flow of secretions in the intestines, and favours their peristaltic action. *It is of great value in cases of constipation, flatulence, or obesity.*

D 6.



ROTATION OF THE TRUNK, LOWER PART.
(*Passive.*)

THE patient seats himself upon the machine, as shown in the engraving, in such a manner that whilst the upper part of the trunk is fixed by means of the arms to a cross-bar, the lower part of the body and legs are turned from right to left, and *vice versâ*. The apparatus can be so arranged that rotation to

one side only may be made. If rotation to both sides is to be made, it is necessary that the seat should swing to an equal distance in each direction. If rotation to the right side only is to be made, the seat must be elevated one inch, and turned 30° to the right, a bolt under the seat fixing it in the required position.

The action of this machine is to stretch the rotatory muscles of the trunk, and ligaments of the spine. *It is very useful in cases of constipation and lumbago.*

D 7.

PELVIS OSCILLATION.

This machine in appearance somewhat resembles D 8, with the exception that the seat is made simply to oscillate backwards and forwards, and not in a circular manner, as in that machine.

The patient sits facing forwards, and whilst the upper portion of the body is kept as still as possible, the lower part is exercised by the action of the machine, which acts in various ways upon most of the muscles of the abdomen, and also upon the muscles of the thighs and back, whilst *increasing the peristaltic action of the intestines*, and *favouring circulation and secretion in them.* It acts in many ways, both from side to side and again in a backward and forward direction, according to the position of the patient on the seat; one side only can be exercised separately if desired, and in this form the machine is *valuable in cases of lateral curvature. It is also of great use in cases of sciatica.*

D 8.

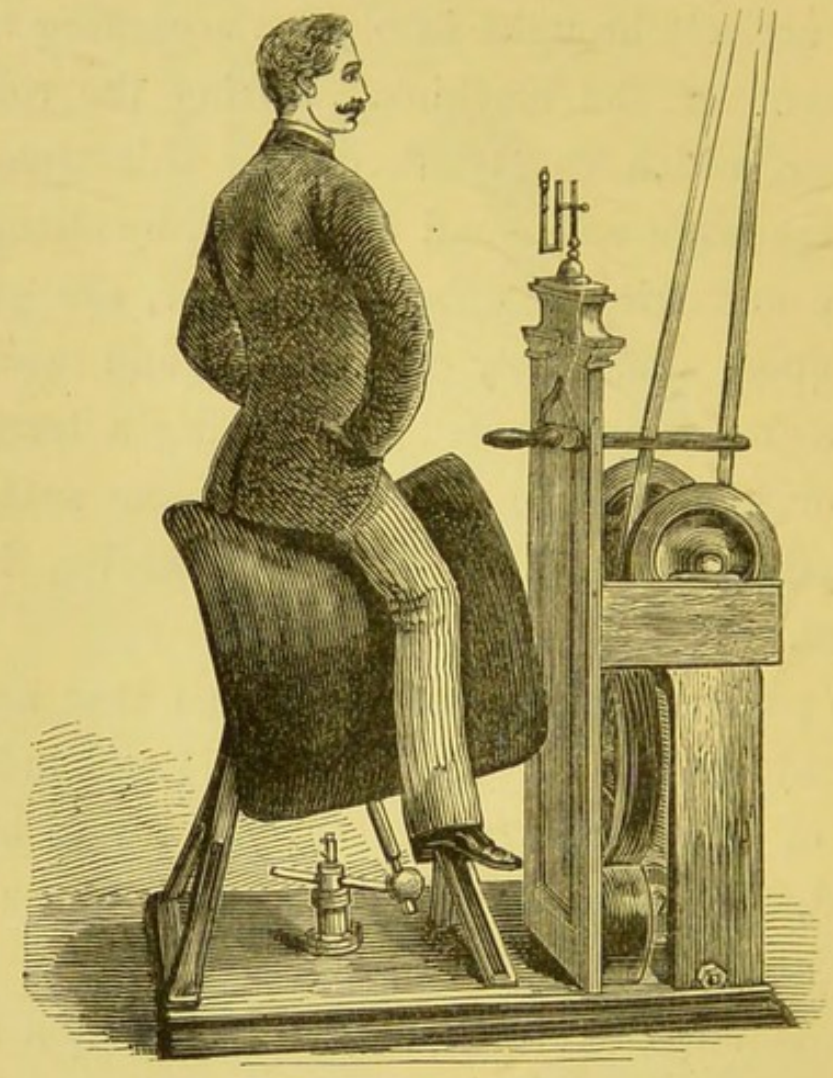
THE SIDE-SADDLE. (*Passive.*)

A MACHINE specially intended for the use of ladies. The seat upon which the patient sits is so arranged that by a successive series of movements the trunk is inclined in all directions. The patient must, in

order to maintain her equilibrium, bring into action all the muscles which balance the upper part of the body on the pelvis, these being successively and more or less actively brought into play, according to the adjustment of the machine. During the rotatory movement which the trunk during this time performs, the large and small intestines, by changes of pressure and friction upon each other, are greatly acted upon, and their circulatory and secretive functions much augmented; by moving a lever outwards or inwards the inclination of the seat, and consequently the amount of the exercise, is determined.

The patient must sit to the side, so that she can take hold with her right hand of the handle by means of which the apparatus is put into action, reversed, or stopped, and keep the upper part of the body as upright and still as possible. *This exercise is very useful in promoting the action of the intestines.*

D 9.



THE SADDLE. (*Passive.*)

An apparatus for acting upon the large and small intestines, and increasing their muscular, circulatory, and secretive functions.

The saddle, upon which the patient sits, as shown in the engraving, is so arranged that by a successive

series of movements his trunk is inclined in all directions. In order to preserve equilibrium, the muscles which balance the upper part of the body on the pelvis are brought into action in a degree proportionate to the angle at which the saddle is fixed. During the rotatory movement which the trunk performs, the large and small intestines, by friction upon each other, are greatly acted upon, and their muscular, circulatory, and secretive actions excited. This movement greatly strengthens the back and the muscles of the abdomen. By moving a movable lever beneath the saddle in or out, the extent of the inclination is regulated. The patient sits astride the saddle, facing the handle by which the action of the machine is adjusted, and must keep his body as straight and quiet as possible. *This machine has been found very useful in cases of constipation and indigestion; it is an efficient substitute for horse exercise.*

D 10 *a*.

FLEXION AND EXTENSION OF THE WRISTS.

(*Passive.*)

The patient sits with the forearm resting upon a table, and grasps a movable bar with both hands; this bar is so constructed as to move the hands upwards and downwards alternately. The amount of flexion or extension of the hands can be determined by a graduated crank as usual. The patient must seat himself, rest his forearms on the table of the apparatus, and take hold of the handles, the backs of the hands being turned upwards. The hands must be placed so far forwards that they can fully move beyond the edge of the table; if too far forwards or backwards a jerking action results. The flexor muscles of the fingers are slightly contracted on the handles; the extensors and flexors of the forearms remain perfectly passive.

This machine produces an alternate flexion and extension of the wrist. It frees the tendons of the hands, *increases circulation in the hands and forearms, and is a most valuable machine in stiffness of the wrist-joints.*

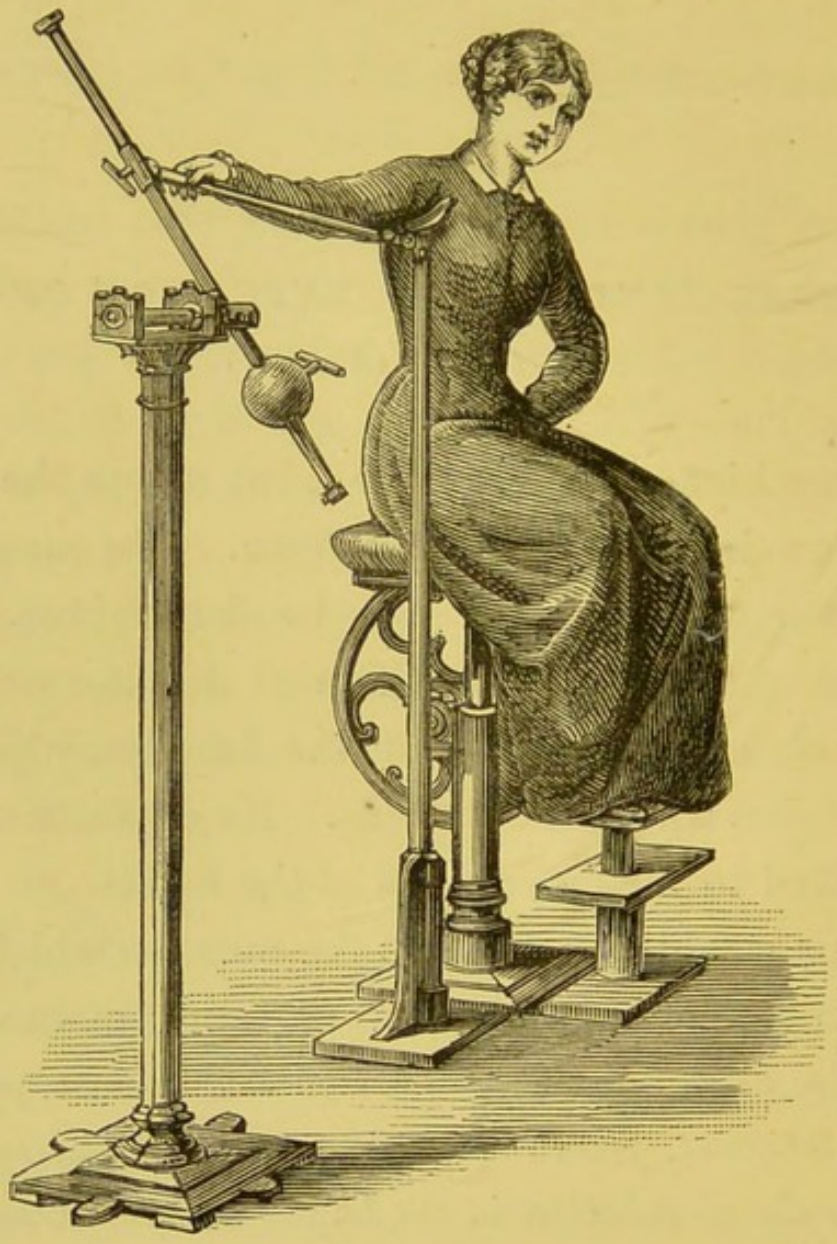
D 10 *b*.

LATERAL FLEXION AND EXTENSION OF THE WRISTS. (*Passive.*)

THIS machine resembles D 10 *a*, but moves the hands sideways instead of up and down. The amount of deviation of the hands can be determined. The patient must seat himself, rest his forearms on the table and take hold of the handles, which are turned inwards and outwards. No opposition must be offered to the movements of the hands.

This machine acts upon the muscles which move the hands horizontally inwards and outwards. *It acts also upon certain of the ligaments and capsules of the wrist-joint, frees the tendons of the hands, and increases the circulation in the hands and forearms.*

D 11.



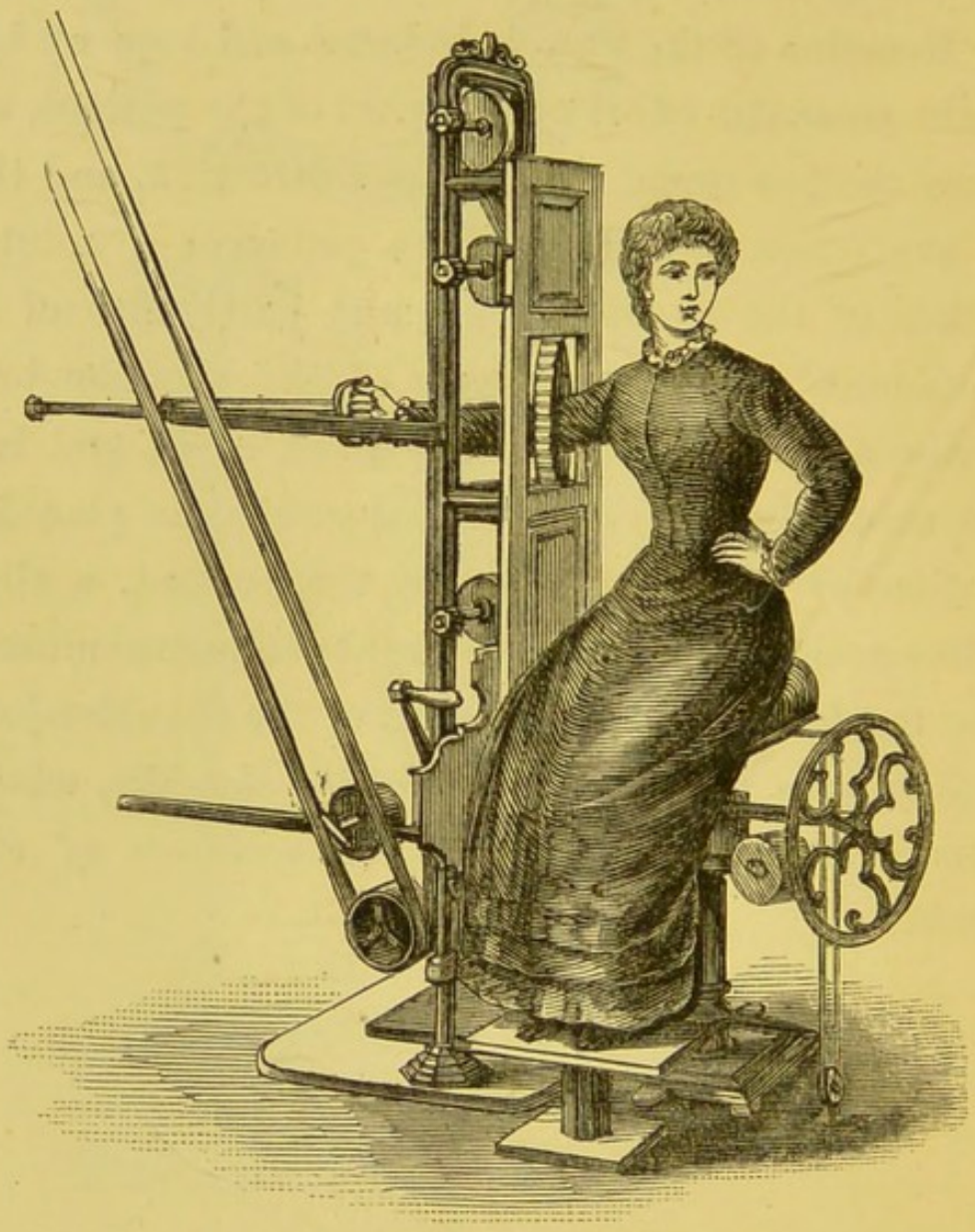
ROTATION OF THE SHOULDER-JOINT. (*Active.*)

THE patient seats herself, places one arm in the shoulder crutch and stretches it along the flying bar (which connects the shoulder crutch with the lever),

taking hold of it with the hand, as shown in the engraving. The chair is elevated or depressed until the crutch lies closely applied to the armpit.

Rotation of the arm is induced and kept up by a slight muscular effort on the part of the patient, who turns the bar round, first in one direction, and then in the other. This machine produces a rotatory action of the shoulder-joint, and partly also of the shoulder-blade. The capsule of the shoulder-joint, as also several muscles of the arms, chest, and back are acted upon. When the apparatus is placed in motion by muscular effort of the patient, a slight active action is produced in the above-named muscles. The machine induces a freedom of the shoulder-joint. *It is of great value in stiffness of the shoulder, whether from rheumatism, dislocation, or accidents of other kinds.*

D 12.



SHAMPOOING MACHINE FOR THE ARMS. (*Passive.*)

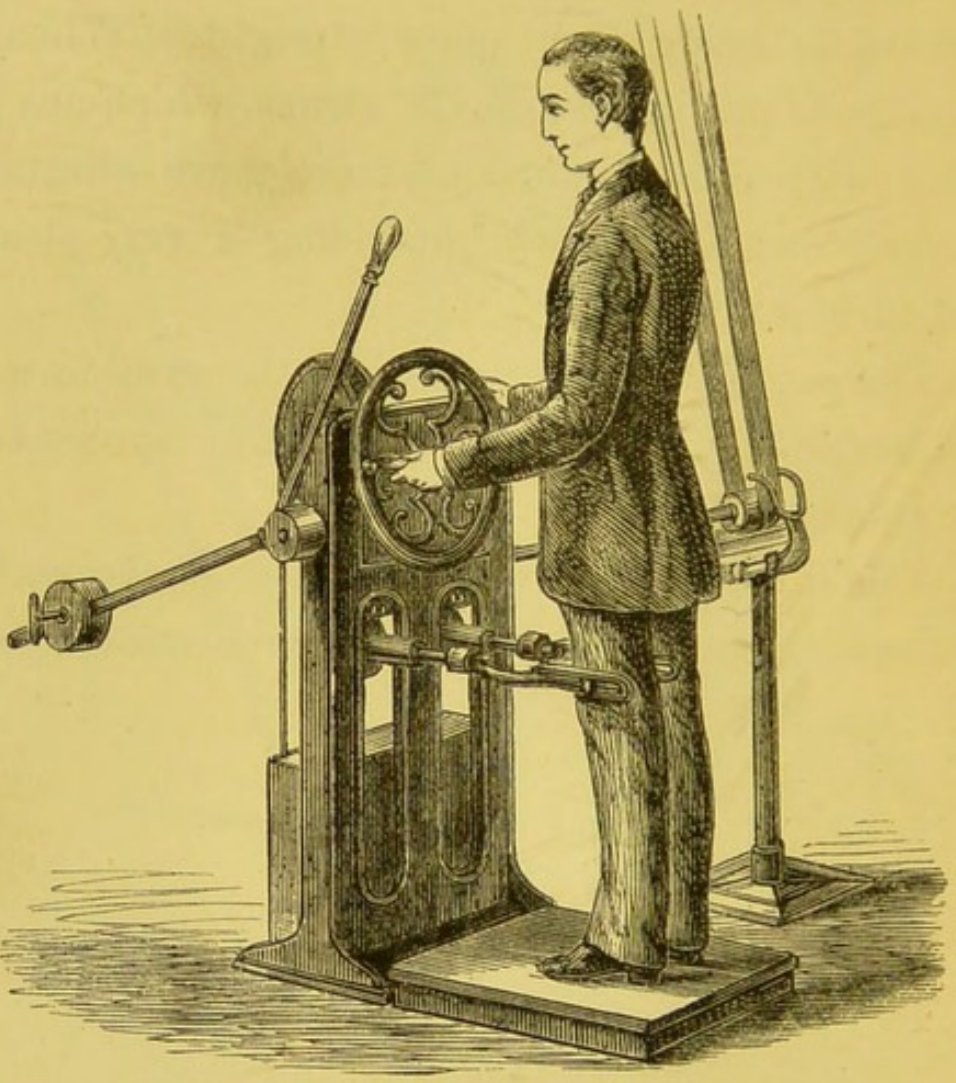
This machine acts upon the arms by rubbing and working their muscles, and so increases the circulation in them. The chair must be elevated or

depressed so that, when the patient is sitting upon it, the arm can be put through the rubbing-straps and the hand take hold upon the handle, the arm meanwhile being kept quite straight. When the machine is put in motion the straps, which are provided with a roughened surface, move alternately upwards and downwards, producing a very pleasant and effectual friction.

The patient pushes and twists the arm forwards and backwards, so that the whole arm is exposed to the rubbing action.

This is a valuable machine in cases of rheumatism, weakness of the arms, or where the circulation is feeble.

D 13.



SHAMPOOING MACHINE FOR THE LEGS. (*Passive.*)

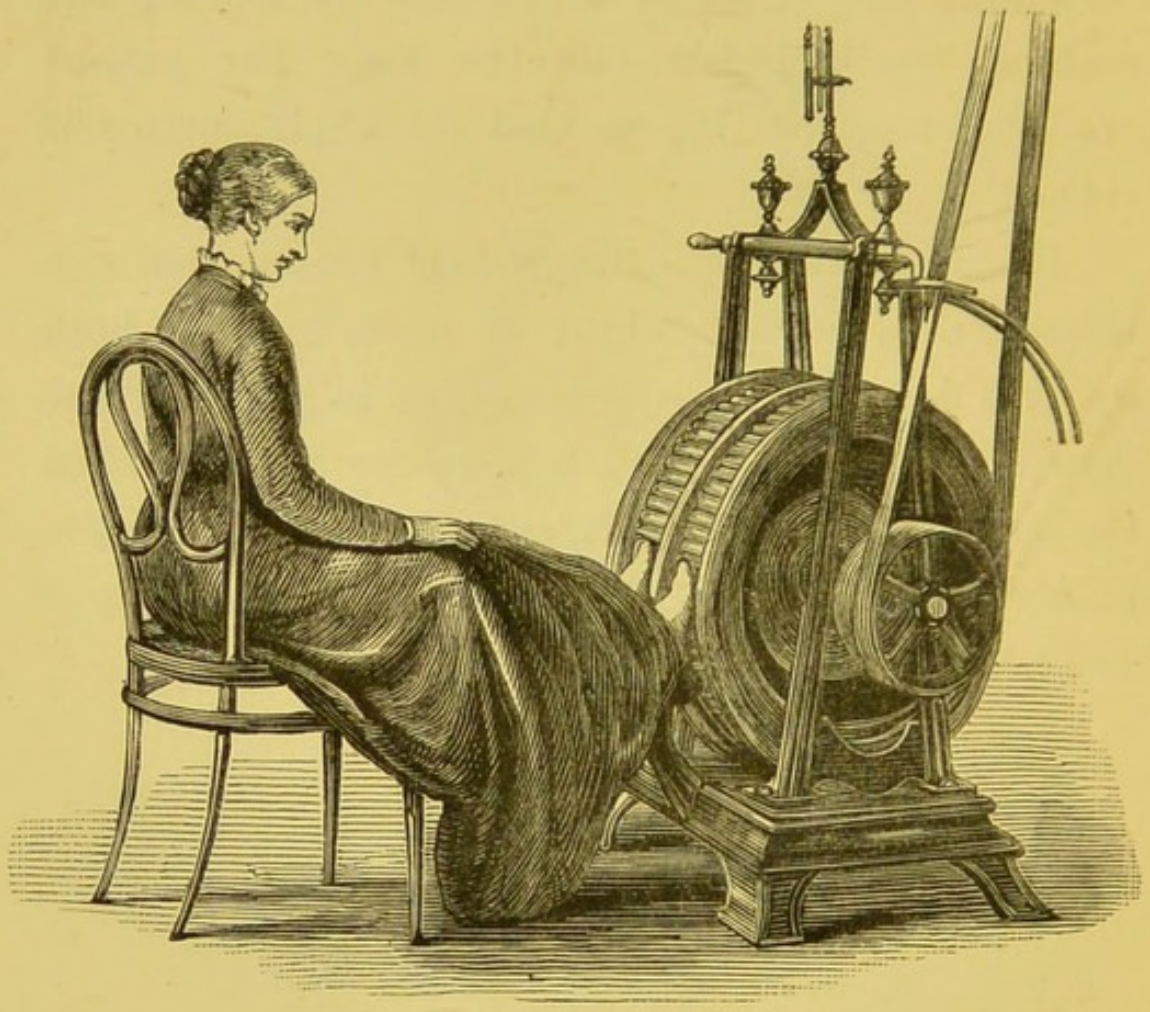
THIS machine acts upon the legs by rubbing and working their muscles. It can also be used for applying friction to the knee.

When the whole leg is to be rubbed this must be done only upwards, *i.e.* before the motion is begun,

the cushions must be placed as low as possible. Friction on a smaller surface should be made in both directions, and this can be effected by moving the cushions up and down on the leg. The patient may also turn his leg so that its whole surface is rubbed.

By turning the adjusting wheel the cushion can be fixed at a certain height or made to move both up and down. The patient stands in front of the machine and places the leg to be exercised between the cushions, *which imitate very effectually the action of a rubber's hands.* Its effect is similar to that of D 12.

D 14.



FRICTION MACHINE FOR THE FEET AND HANDS. (*Passive.*)

THIS apparatus consists of a wheel, the surface being covered with padded bars of chamois leather.

Friction of the hands is produced by placing them upon the large wheel, or by putting them between the padded flanges situate on a smaller wheel; in such cases the backs and palms of the

hands must be alternately pressed against the padding.

Friction of the feet is obtained by the patient seating herself on the sliding chair, placing the ankles on the cushion provided for that purpose, and steadying the soles of the feet against the wheel.

The legs must be kept perfectly straight. The movement lasts for one, two, or three minutes, as the case requires.

This machine acts upon the hands and soles of the feet, and produces a great glow and warmth in them. *This is a very valuable machine in cases of coldness of the feet and hands, and also in certain rheumatic affections.*

D 15.

ROLLING FRICTION OF THE BACK. (*Passive.*)

THE patient lies upon a sofa, through the back of which two padded wheels roll with a regular pressure along both sides of the spine. The motion has a sedative effect upon the superficial sensitive nerves. The apparatus can be so adjusted as to act upon the whole or different portions of the back. This apparatus *is especially useful in cases of over-sensitiveness of the spine, or where there is pain in the back or loins.*

D 17.

KNEADING MACHINE. (*Passive.*)

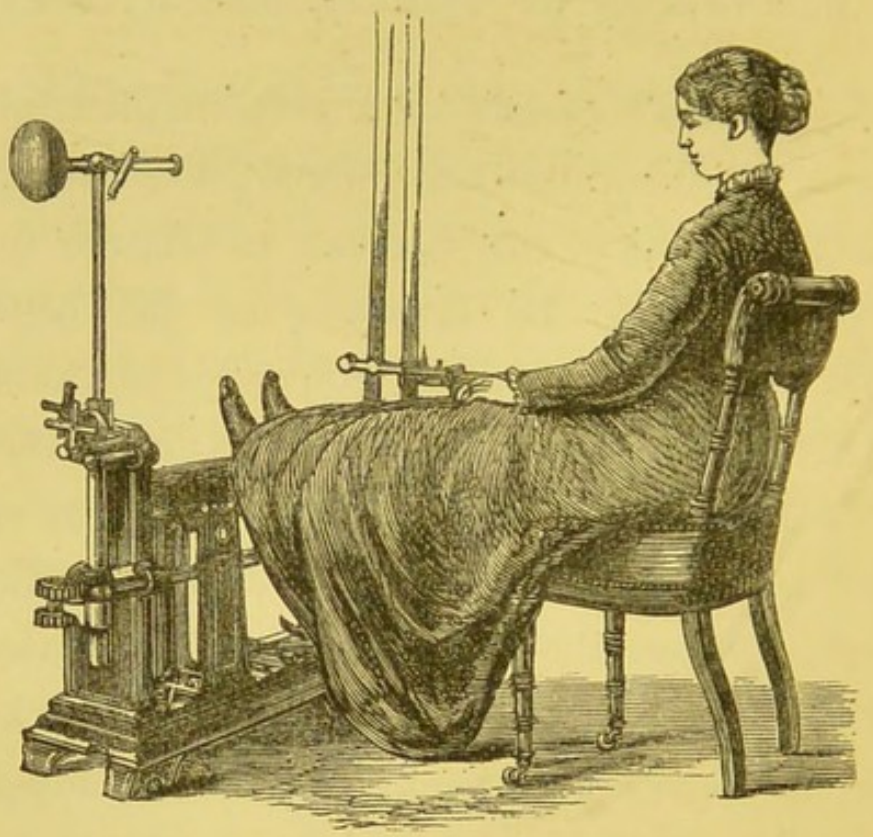
THIS machine is so constructed that two rollers are caused to rotate along the course of the large intestine, or colon. The pressure is so arranged as to produce a kneading action, and the rollers are adjustable to the requirements of each case. *It is a very useful apparatus in cases of loss of tone in the colon, constipation, &c.*

D 19.

ELEVATION OF THE PELVIS. (*Passive.*)

THIS apparatus consists of a sofa divided into two portions, the front part being fixed; the back part is so constructed as to rise and fall in angular motion. The patient must lie forwards on the bench so that the thigh rests on the front edge of the moveable part of the bench. The upper part of the body rests upon the elbows and forearms; these are carried so far forwards that the arms are in a perpendicular position. When the movable plane is elevated the trunk of the patient is raised upwards and backwards at the shoulders, and backwards at the hip-joints. At first the operation should be employed for ten times, and then gradually increased up to fifty. If the exercise is taken as an active motion it strengthens the abdominal muscles without causing any injurious pressure upon the pelvic contents. *If the patient lie on one side powerful flexion of the small of the back is obtained, in which case it becomes a valuable agent for the treatment of lateral curvature. It is also a useful machine in some forms of uterine maladies, and in hæmorrhoids.*

D 20.



VIBRATING MACHINE. (*Passive.*)

For increasing circulation in the feet and legs by means of rapid vibratory action. *Vibrating machine for shaking various parts of the body.* Shakings are especially valuable as curative agents on account of their well-defined physiological effects. On tired or aching muscles and nerves they have a very refreshing and relieving effect. Pain is often entirely subdued by a single shaking during some minutes.

Sensitive persons taking a foot-shaking feel a certain sense of coldness in the feet during the operation, but become soon afterwards warmer than before the movement. When taking a shaking on the os sacrum, one can easily feel that the walls of the rectum and the bladder vigorously contract, especially if they are full. Shaking of the chest or the throat facilitates the expectoration in catarrhs, and the absorption of pleural exudations. Shaking of the back between the shoulder-blades has a specific effect upon the action of the heart; it always makes its contractions less frequent and more effective. Persons suffering from nervous palpitation feel very much relieved after such a movement; the pulse has in one case been observed to fall from 130 to 90. In cases of fatty degeneration of the heart, when its action is weak and rapid, the back-shakings, together with such movements as facilitate the action of the heart by lessening the pressure of the blood in the arteries, are invaluable.

It must be clearly understood that the following list of complaints which can be cured, or sensibly alleviated, by the use of Dr. Zander's machines, is merely given as a guide, and does not in any sense comprehend the whole of the ailments to which they can be applied. Each patient is specially examined by the medical officer in charge of the Institution, who takes into consideration the various circumstances which surround each particular case, and then prescribes the combination of machines which he considers most suitable.

Machines selected from among the following are employed for

A COURSE OF GENERAL EXERCISE FOR MAINTENANCE OR IMPROVEMENT OF HEALTH IN YOUNG OR OLD PERSONS.

A 1, A 2, A 3, A 7, A 8, A 10, A 11, B 1, B 2, B 6, B 5, B 7, B 8, B 9, B 12, C 2, C 5, D 1, D 6, D 8, D 9.

RHEUMATIC AFFECTIONS, STIFFNESS OF JOINTS, SPRAINS, PARTIAL PARALYSIS.

(*a*) *Arms.*

A 1, A 2, A 3, A 4, A 6, A 7, A 8, A 10, A 11, D 10 *a* and *b*, D 11, D 12.

(*b*) *Legs.*

B 1, B 2, B 4, B 5, B 6, B 7, B 8, B 9, B 12, D 13.

CONSTIPATION.

D 5, D 6, D 7, D 8, D 9, D 17, with 'tapping' to abdominal walls.

SCIATICA.

B 4, B 5, B 9, D 6, D 7, D 8, D 9, with vibratory movements, and 'tapping' along course of nerve.

LUMBAGO.

D 6, D 8, D 9, D 15, 'tapping' to back.

CURVATURES.

A 10, B 10, B 11, C 2, C 3, C 4, C 6, C 7, D 1, D 6, D 19, &c.

FEEBLE CIRCULATION.

Footshaking, B 12, B 9, B 6, D 10 *a* and *b*, D 11, D 12, D 13, D 14.

OBESITY.

Those machines as for general exercise and massage by mechanical apparatus, viz.:—D 12, D 13, D 5, D 17, &c.

DEVELOPMENT OF CHEST IN YOUNG PERSONS, AND STRENGTHENING OF BACK.

A 7, A 8, A 10, A 11, D 1, C 2, C 5, &c.

CASES

SENT BY MEMBERS OF THE PROFESSION

FOR TREATMENT AT THE INSTITUTION DURING THE PAST YEAR.

(FROM THE MEDICAL PRESS AND OTHER SOURCES.)

---

1. *Sciatica.*

Mr. S., aged 84, consulted me on August 11, 1882, for a pain situated in the posterior portion of the right thigh over the great sciatic nerve, being most intense just below the great trochanter, and extending down to the knee-joint. Movement and pressure upon the nerve increased the pain. He had been suffering for more than two months prior to his visit to me. The pain was of a gnawing character; and, when he was in bed, the limb had a burning sensation, but to the touch was quite cold. During the early portion of the illness, the pain became most intense at 4 A.M. and 4 P.M. Shortly after he had been under my treatment, pain of a similar character attacked him close to the spine, on a line with the crest of the ilium, and corresponding to the third lumbar vertebra. His nights became disturbed, and he looked wan and ill. No assignable cause could be ascertained for these symptoms, except that, some months previously, he remembered stumbling over a stove, and, in the effort to save himself from falling, he twisted the muscles of his back; and since that time he had had more or less pain when walking.

The local treatment consisted of belladonna, chloroform, morphia, aconite, fomentations, turpentine, hot hip-baths, flannel bandages; and other remedies were tried, without producing any beneficial effect, or relieving the stiffness and inability to walk. The principal medicines given internally were arsenic, belladonna, and quinine. The arsenic relieved the burning sensation in the limb, and the quinine the periodic paroxysms of pain. After he had been under treatment for about six weeks, with the result above described, I advised him to try the treatment at the Zander Medico-Gymnastic Institute in Soho Square; and as the medical officer considered it a suitable case for the treatment, he undertook the case.

Mr. S. is now (November 4) able to walk in comfort for upwards of an hour, and there is only a slight tenderness on pressure at the previously painful spots. He is also able to rest well at night, and he has quite regained his usual health and strength. The medical officer writes me:—'The treatment consisted in rapidly "percussing" the affected parts every other day, and giving the hips and lumbar regions carefully regulated movements; this being done by machines of a very ingenious yet simple character. The apparatus employed consisted of, (*a*) a machine by which carefully graduated extension and flexion of the hips was made; (*b*) a machine by which the lumbar region was in like manner carefully rotated from side to side; (*c*) a machine by which very powerful friction and a kind of vibration or trembling was applied to the painful and adjacent parts. My reason for applying the above means was founded on observation. I had treated several cases before Mr. S. was sent by you, and had been very much struck by the results of the treatment. I had always thought that, for such ailments as lumbago, muscular rheumatism, and sciatica, as soon as the early acute symptoms had passed, no treatment would be so likely to be

successful as that of giving to the affected parts movements of at first a very slight degree, and then carefully increasing them. By means of Dr. Zander's appliances, such movements can be most exactly performed; and repeatedly they have accomplished what was desired. In the case of Mr. S., as often happens, the bad symptoms increased at first; and I had some difficulty in persuading him to continue the treatment. In a few days, however, the pain and stiffness began to disappear; he could sleep well, and very soon began to walk in a much more erect manner and without help. At the present time, after ten visits, he walks without sticks and without pain. Mr. S. seemed to find most benefit from the "trembling" machine. Whether this was the result of the friction or of some deeper physiological effect, I cannot say. The trembling or shaking has, however, a marked effect upon the circulation, increasing it in a striking degree; and it may be in this way that the good is done. There is no doubt, however, that the nerves are also powerfully influenced. In whatever way achieved, however, the cure was a most painless and satisfactory one.'

2. *Stiffness of knee-joint with wasting of muscle.*

Mrs. A., aged 45; inability to bend the knee beyond a right angle (consequent on rheumatic affection), with considerable muscular atrophy of the leg; cannot walk without crutches. After several months of treatment, she can now bend the knee several inches beyond a right angle, the muscles have increased considerably in bulk, and the patient can walk without any support.

3. *Muscular wasting.*

Mr. B., aged 20; very marked wasting of the muscles of both legs, consequent on angular curvature of spine. Patient,

even with steel supports to legs, cannot walk without help. After several months of treatment, by means of gentle muscular exercise, mechanical rubbing, &c., the patient can walk without any support, artificial or otherwise.

4. *Constipation.*

Mrs. C., aged 33; suffering from chronic constipation. This patient having to return home, visited the institution ten or twelve times only; the bowels, however, before her departure had begun to act very satisfactorily, and from a letter received afterwards the good effect had continued. This patient had tried all other means without avail.

5. *Spinal curvature.*

Miss D., aged 14; case of severe lateral curvature (right side). After six months the surgeon under whose care the patient is writes, 'Improvement of spine wonderful, and general health altered in a most satisfactory manner.' This patient is now so far cured that she is about to return to school at Brighton.

6. *Atony of colon, indigestion, anæmia.*

Mr. E., aged 45; suffering from fulness and weight after food, considerable flatulence, eructations, and constipation. On examination of the distended abdomen a loud splashing sound is obtained when the bowels are palpated; some distension of the stomach is also found. The patient has tried every other means known. After two months of steady treatment, by means of kneading and various exercises, the patient says 'he has never derived such benefit from any other method of treatment.' At end of six months he went to Brazil, having gained colour, and lost nearly all his bad symptoms.

7. *Lumbago, rheumatism.*

Earl of F., aged 64 ; pains across loins on and off for ten or eleven years ; rheumatic pains in muscles of legs ; has great difficulty in rising, walks lamely. After one month's treatment says, 'his friends remark upon his improvement,' and at end of three months says himself that 'he is better than at any time during the last twenty-five years.'

8. *Stiffness of shoulder (following dislocation) with atrophy of muscle.*

Mr. G. ; inability to lift arm, or indeed move shoulder-joint at all ; a little movement can be obtained by using some force, but it gives pain. After three weeks, cured.

9. *Writer's cramp.*

The account in last week's 'Journal' of the success which Professor Nussbaum has obtained in the treatment of this troublesome affection with his newly-invented 'bracelet,' induces me to send you a short note of a case lately under my care, in which great improvement resulted from a method of treatment which, so far as I know, is novel.

Among the ingenious machines of the Zander Institution, there are some which produce, as nearly as is possible by mechanical means, the effects of massage and friction as applied to the limbs. It occurred to me that possibly, by the combined use of these and other machines, results equal to those of M. Wolff might be obtained.

The patient was a lady, who for some years had suffered from spasm of the flexors of the fingers and wrist whenever she attempted to write. A variety of remedies had been

tried, without producing any decided improvement. By my advice, she began the use of various of the Zander machines, under the supervision of the medical officer of the Institution.

As the machines used have already been described in the 'Journal,' and as anyone who is interested can see them for himself at Soho Square, it is unnecessary for me to say more than that they are all intended to strengthen the weak extensors and abductors by rapid friction, vibration, or graduated exercise, both active and passive.

After ten visits, lasting about an hour each, the writing was tested; and sufficient improvement was found to have taken place to encourage us to persevere with the treatment. The spasm was postponed, and the movement of the hand along the paper was more even and continuous. After nineteen more attendances, my patient found that she could write four letters, of from three to four pages each, without the hand once 'turning over,' as she termed it; the separate letters were well formed, and the movements of the wrist free. Her friends stated that her writing was almost as good as it had ever been. Unfortunately, at this time Mrs. A. was obliged to leave town, and discontinue the exercises—the result being that in a very short time the cramp reappeared. She wrote to me then as follows:—'After I recovered from the fatigue of exercising, I wrote splendidly; but now the old feeling of absolute inability to make a letter has come back.' At the present time, after an interval of nearly three months, during which the exercises have not been resumed, some improvement still remains.

Although in this case the benefit obtained was only temporary, yet, whilst it lasted, it was so striking as to convince me that, had it been possible to continue the treatment for a longer period, permanent improvement, and possibly complete cure, would have resulted.

It is not desirable that the muscles should be exercised for too long at a time; they should not be fatigued. An hour, with an occasional rest, spent over the various machines from three to four times a week is, I think, sufficient. Writing should be abstained from on the days the exercises are practised, but it is not necessary to forbid it throughout the treatment.

OPINIONS OF THE PRESS

AND

LETTERS FROM FOREIGN MEDICAL MEN.

LANCET, *December* 17, 1881.

Mechanico-Therapeutics.

We have been favoured with an inspection of the principal machines in action, and were quite prepared to learn that they are very beneficial in many cases where passive exercise or various kinds of mechanical pressure are indicated. One machine in particular appeared to us no bad substitute for horse exercise, and would, with other apparatus, be available in many cases of atonic intestines, where horse exercise might be impracticable. The great advantage of the system is the power of finely graduating the force of the machines in adaptation to the strength of the patient, and of producing that slow and gradual increase in the use of the muscular power so necessary when employed as a therapeutic agent. The system of medico-therapeutics is said to be most valuable in spinal disease, in heart diseases, in stiffness of joints, intestinal atony and constipation, nervous palpitations, defective chest-expansion, &c. Its promoters are sparing no pains to make it a very promising addition to therapeutics, and we advise our readers to pay an early visit to the Institution.

The British Medical Journal, *March* 4, 1882.

The Zander Medico-Gymnastic Machines.

In the early part of the present century, Ling (in Sweden) introduced his system of 'movement cure,' which may be considered an elaboration of pre-existing gymnastics, in which passive movements, manual frictions, &c. formed essential features.

Dr. Zander, of Stockholm, has introduced a modification of Ling's system, which is more likely to be approved by the medical profession in this country. It consists in the application of machinery to effect the movements which were otherwise carried out manually, and Dr. Zander has evinced considerable mechanical ingenuity in the construction of the apparatus which he employs.

In Sweden, Zander's medico-gymnastics are thoroughly appreciated by all classes of society, and his Institution at Stockholm has been in active work for more than ten years. A medical gymnasium furnished with Dr. Zander's machines, and to be conducted upon his principles, is now opened in London, at 7 Soho Square, and we will describe some of the more important of the various apparatus, the working of which we have examined.

The greater number of the machines are, of course, intended to be applied to the muscles, although, as we shall see later on, many are employed for acting upon the viscera. One machine exercises the biceps, and another the triceps. The flexors and extensors of the forearm have also their special appliances. One particularly good apparatus was to be used for wrist-drop, and would doubtless prove a valuable aid to other treatment in this disease.

An excellent machine is one by which the flexors and

extensors of the legs and thighs are worked, the body being alternately raised and depressed at different distances from the treadles. Another somewhat similar one is intended for bringing out specially the powers of the psoas and iliacus; and an apparatus is used for exercising the pronators and supinators of the arms. Another set bring into play all the respiratory muscles in such a manner that even the scaleni and small muscles of the neck, and the platysma, can be felt distinctly contracting under their use. It is said that this set affords a valuable agent in phthisis, when, of course, combined with other modes of treatment.

Smaller machines, some worked by the patient and others by motive power from a gas-engine, rotate the feet or hands, extending and flexing them, and bringing all or nearly all the muscles of the part into play. Another more formidable machine, shaped like a horse, upon which the patient sits astride, has a forward and backward as well as a bilateral motion, which requires a firm grip by the thighs of the patient in order to prevent his being thrown from his seat. The strength of this machine can be varied at will. We should imagine it would be of infinite service to cavalry officers if produced with a more varied form of movement, in the same style as the 'mechanical horse' which was exhibited in London some years ago. This same machine acts most powerfully upon the abdominal muscles, and also upon the liver and other abdominal viscera, and would doubtless be a valuable adjunct in the treatment of chronic constipation.

Several machines are used for the various forms of spinal curvature, acting for the most part by drawing the trunk to the side required. There is also a couch upon which the patient lies in a prone position. It is divided transversely from side to side into two parts. The patient rests his arms upon the front part, and the back half is raised, elevating the centre of the body below the stomach. It is believed

that in this manner the blood is drawn from the anus down to the front of the body, and that by such means hæmorrhoids, &c., are benefited.

Some of the apparatus for rubbing are very complete. The rubbers can be applied to the arms or legs, and by motion of a handle can be made to attack the limb in any part of its length. We believe that these are really the most valuable of all; and their movement is so natural that, if the patient shut his eyes, he can almost imagine he is being shampooed by an experienced attendant at a Turkish bath. They will doubtless become of value in the treatment of cases of chronic rheumatism.

Some of the machines are for rapping or gently knocking different parts of the body. They certainly produce a decided effect in a very short time. One is for the liver, another for the colon, causing an immediate desire to defæcate. A third attacks the bladder, making the patient at once desire to micturate. These are intended for dyspepsia, constipation, and atony of the bladder. Other machines are intended for shaking the head and spine; another for rubbing the forehead with an india-rubber ball, in cases of neuralgia; another is to be applied to the larynx, to which it imparts gentle oscillation, intended for atony of the laryngeal muscles and vocal cords.

There are also machines for gently striking the patient on the back, arm, or any part of the body, producing a somewhat similar sensation to that of the rubbing machines. There are also revolving wheels, covered with flannel or leather. By applying the hands or feet to them, an agreeable sensation of warmth is produced, which is intended to rectify feebleness or other irregularities of the general circulation.

This gymnasium is especially intended for invalids—for those who, either from extreme debility or from heart-disease,

are unable to bear the fatigue of ordinary exercise. Many of the exercises for which the machines are constructed can be effected by the more simple methods employed at ordinary gymnasiums; but the advantages claimed for the elaborately constructed apparatus of the Medico-Gymnasium are that separate sets of muscles can be exercised by them, with a minimum of exertion to other parts of the body; and that the degree of force used by the patient can be regulated with exactitude. The apparatus for effecting passive movements have no counterpart in other gymnasia in this country; and we anticipate some very good results from the employment of these machines, if they be used in suitable cases only, and with discretion.

Dr. C. J. ROSSANDER, *Professor of Surgery at the Medical School of Stockholm, writes*:—

Stockholm: February 6, 1881.

I have much pleasure in giving the following testimony to the value of the Medical Mechanical System invented by Dr. Gustaf Zander of Stockholm, so much the more *as I have with great attention observed it from its origin and through all phases of its development, as I have profited by it myself, and also a great number of my patients, and as I am aware of the fact that its advantages are more and more recognised, not only by the public, but also by the medical practitioners and authorities in Sweden, and already in several foreign countries.*

It is now sixteen years since Dr. Zander first commenced with a few machines, and he has since been constantly engaged in enlarging and perfecting his system, so that he now has about fifty different machines and apparatus at work, which can be applied to almost every part of the human

body; about half of these are worked by machine power, and the remainder by the exertions of the patients themselves.

The great advantage of these machines above the common manual (Swedish) gymnastic is that they can with the greatest accuracy be regulated to the strength and requirements of each individual patient, and are entirely independent of the changing dispositions of even the best gymnasts, and that several and important motions are capable of being executed only by the means of these machines.

For persons in ordinary health the Medical Mechanical Gymnastic is extremely valuable in the respect that it affords to them an opportunity of preserving the normal physical state by exercise, and especially obviates the evils resulting from sedentary life. Elderly persons will derive great benefit from the means which it affords them of counteracting stiffening of the muscles and joints, and of aiding digestion.

By personal experience I know, and I have observed it by the patients I have sent to the Institution, that the system is eminently adapted for a great number of external affections —for which alone I am consulted as being a surgeon— diseases of the joints, sprains, rheumatism, indurations of the muscles, curvature of the spine, and deformities and inflammations of the sheaths of tendons. In some of these cases Dr. Zander makes simultaneous use of his machines and massage with the best success.

I have also observed that this system is on a large scale used for patients who suffer from internal diseases—namely, chronic heart and lung diseases, catarrhs of the throat and stomach, hæmorrhoids, uterine diseases, plethora abdominalis, habitual constipation, and so on. The increasing number of such patients and the confidence of the medical men still

more augmenting, prove the efficacy of the treatment of Dr. Zander.

About a third of the patients employ the system in order to have heart-disease cured, or at least the symptoms essentially mitigated; and persons even come from foreign countries for this purpose. The results seem to have been very good; in some cases that I have seen from the beginning, I have been convinced of the benefit of the cure; for instance, every symptom of fatty degeneration of the heart entirely removed, valvular diseases so much alleviated that the patients did not suffer any more, although the anatomical signs remained the same.

I should be very glad if this testimony, founded on conscientious observations, and entirely uninterested, could assist the extension and establishment of the system of Dr. Zander in other countries.

Dr. KARELL, *Physician to the Czar, in answer to a question as to the efficacy of the Zander Mechanical Gymnastic System in Russia, writes:—*

St Petersburg: January 1879.

Many thanks for your kind letter expressing a wish to obtain some information regarding Dr. Djakoffsky's Institution. Dr. Gustaf Zander (Dr. of Medicine and Surgery, and who has taken a degree in Anatomy and Physiology, and is, besides, a perfect genius in mechanics) has invented some wonderfully ingenious apparatus for exercising and strengthening the muscular system in all its functions, and these machines are all strictly founded upon anatomical principles.

By means of them every part or member of the body can be bent, extended, exercised, or set in motion, and at the same time, beginning with the weakest possible resistance, one can gradually increase it with mathematical precision in

accordance with the requirements of the muscles which are under treatment.

The object of the apparatus is to supersede the old Swedish 'massage' for invalids, and in this respect it carries out its purpose in the most complete manner, for while under the old system (massage) the resistance offered and the consequent increase of strength in the muscle treated never could be accurately controlled, these apparatuses give an exact record of the increase of strength in the muscle in question.

Dr. Djakoffsky, who has lived several years in Stockholm and is personally acquainted with Dr. Zander, established a similar Institution here a year ago, and had a special opportunity of showing the great value of this system by his treatment of many of the officers wounded last year.

Some of the most celebrated surgeons who have sent their patients to the Institution for treatment of similar complaints have been persuaded of its most favourable results.

The matter has secured so much notice that three similar Institutions have already been opened in Finland, in Helsingfors (to which the State gives an annual contribution of 6,000 *marks), and in Abo and Wiborg.*

LONDON : PRINTED BY
SPOTTISWOODE AND CO., NEW-STREET SQUARE
AND PARLIAMENT STREET