

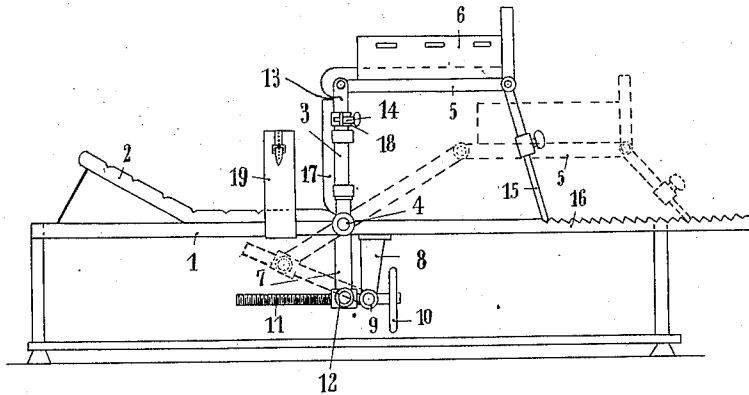
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APPARATUS FOR USE IN THE TREATMENT OF FRACTURES OF THE THIGH OR UPPER LEG.

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Witnesses:

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# UNITED STATES PATENT OFFICE.

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APPARATUS FOR USE IN THE TREATMENT OF FRACTURES OF THE THIGH OR UPPER LEG.

1,044,424.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, MORIZ ROTHENBERG, physician, a subject of the King of Prussia, residing at Grossbeerenstrasse 58, in the city of Berlin, in the Kingdom of Prussia, in the German Empire, have invented certain new and useful Improvements in Apparatus for Use in the Treatment of Fractures of the Thigh or Upper Leg; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to an apparatus for use in treating patients with fracture of the upper part of the leg or thigh, patients who have undergone an operation on the hip joint, and those who have undergone an operation on the abdomen.

Up to the present the methods followed in the endeavor to arrive at a satisfactory treatment of fractures of the thigh have not led to any successful result. It is a well known fact that almost all fractures, owing to the great power of the large leg and hip muscles, and particularly of the large four headed leg extensor muscle, "musculus extensor cruris quadriceps" and so when the patient finally recovers there is always a danger of the contraction or bending of the extremities. Consequently the first essential of a sound recovery is the proper fixing in position of the parts at the fracture and the maintaining of them constantly in that position. Hitherto maintenance of the proper position has been effected by overcoming the pull of the muscle or of the quadriceps in particular exerted at the point of fracture by applying a counter-pull. Up to the present, however, no one has succeeded in accomplishing that in a reliable fashion. With the means actually in use it is not possible to prevent a yielding, that is to say, to prevent the patient as he lies from slipping downward as a result of the pull exerted by a weight. Further, the tractive power of the quadriceps and of the other large muscles of the leg is so great that it can be overcome only by use of a counter-weight so large that the patient could not stand its action.

With the knee completely or partially straight, and with the hip straight, the muscles are kept constantly contracting, and instead of endeavoring, as hitherto, to over-

come their tractive power by applying a counter-weight at the patient's foot, the present invention proceeds to get rid of the contraction position, particularly of the quadriceps in the first place, by bringing the leg into a position in which the muscle remains out of action,—that is to say, the position in which it would be with the knee bent. To effect and to maintain the straight position, or respectively the drawn out position, of the bones, which can easily be got with the quadriceps muscle slack, we act upon the parts at the fracture not by introducing a weight into the system of forces, but by taking advantage of the proper weight of the patient's body.

The above problem is completely solved by the stretching apparatus that forms the subject of the present invention. In that apparatus the musculus extensor cruris quadriceps is kept sufficiently relaxed, owing to the way in which the patient is caused to lie, with the result that its point of origin and its point of attachment are brought to the same distance apart at which they were before the fracture. That is attained by fixing the bent knee with the lower part of the thigh on to a rod or rail fitted high up, while the upper portion of the leg or thigh assumes a direction inclined downward with more or less acuteness, and the trunk of the patient, attached to the bent hip, forms the load or weight that draws out or straightens the thigh bone fixed to the hip and knee. When the bone has been perfectly straightened and occupies exactly its normal length, it is fastened and secured in position so that it cannot move, by means of screws and other arrangements.

The invention is shown by way of illustration in the accompanying drawing which is a side view of the same.

On the longitudinal rods 1 of the frame work there is the pillow 2 for supporting the upper part of the body and the head of the patient. That pillow can be adjusted in the usual way for any desired and suitable position. On both sides of the longitudinal rod 1 there are fitted levers 3 that move about the point 4. On the long arms of these levers there is hinged a board 5 that serves to support the lower part of the leg. The two lower parts of the legs must be buckled firmly so that they will not yield and so a leg case 6 is provided for them on

this board. The second lever arm 7 of the two armed lever 3 can be moved into and fastened at any desired inclination up to 90°, by means of a suitable arrangement. For that purpose a socket 9 is mounted on an arm 8, and in the socket a screw spindle 11 is set so that it will turn. A hand wheel 10 is provided for the screw spindle. That spindle catches into a nut 12 that is fastened with a link on to the lever arm 7, so that when the nut is turned the lever arm 7 can be caused to approach the arm 8 or remove farther away from it as desired. By that movement it is possible to bring the arms 3 into an upright position as shown by solid lines, or into any desired position as indicated by dotted lines.

The position in the drawing in solid lines is the one selected at the commencement of the treatment. The lower parts of the legs are buckled fast into the leg cases 6 and are bent at right angles at the knee joint, while the upper parts of the limbs, which in the first place hang down vertically, form a right angle at the hip joint with the upper portion of the body which lies horizontally. At that point of the operation the lever arm 3 must be of such length that the upper part of the body along with the haunch will be suspended and move freely to start with. It must not be supported by the pillow 2 too soon. The upper part of the body should not get that support until the broken thigh has attained the same length as the unbroken thigh of the uninjured leg. The length of the lever arms 3 must therefore be measured in the first place according to the sound leg. To make it possible to fix that length the lever arm 3 consists of a tube in which the rod 13 is fitted so that it will slide and so that it can be fixed by a clamp. It is well to have that rod provided with a scale. The free end of the board that is hinged on for supporting the lower part of the limb should be provided with telescoping bars 15, and arranged so that they can be fixed in notches of the longitudinal rods 1. The object is to adjust the board 5 at any desired height and with any inclination—at the commencement of the treatment, horizontal, but inclined later on, for the special purpose of securing the bending of the knee joints. The thigh to be treated is kept between bars, and bars 17 are fastened for the purpose on the lever arms 3. The fastening is effected by means of buckles 18 which pass around the lever arms 3 and which allow of the rods or bars 17 being bent back, also of their being taken away altogether, so as to leave the thigh free for treatment and to enable one to control the proper position of the parts at the fracture at any moment. The bars themselves are made as slide-bars so that their length can be altered.

In order effectually to prevent any in-

jurious movement of the patient, say by raising the pelvis or the small of the back, a belt 19, as wide as a hand and made to buckle, is fitted on each side of the pillow. That belt prevents the pelvis moving upward and away from the couch. After a few days when it is evident that the parts at the fracture, which have been properly set with respect to one another, offer a sufficient guarantee for the commencement of their union, one may gradually proceed to alter the right angled position of the knee and haunch, particularly as there is hardly any risk of any subsequent displacement of the parts at the fracture, because the ends of the thigh remain fixed at a uniform distance, notwithstanding any bending of the joints. In that way one will soon be able to improve the position of the patient, although from the commencement it is one that he can stand very well. In this connection it is a point of particular importance that the stiffening of the knee joint, which has hitherto occurred very frequently owing to the patient lying for weeks in a stiff position, is hereby avoided.

This apparatus can be used in connection with a great number of other cases, apart from the treatment of broken thigh bones. It will be found serviceable principally in the subsequent treatment of dislocation of the hip where an operation has been performed or the parts have been set, as owing to the fact that the lower leg cases can turn, the rotation of the head of the limb and the adduction of the thigh in the hip is rendered possible. This treatment can be carried on regularly without any movement of the pelvis. A matter of special importance is the applicability of this apparatus for purposes of defecation and removal of the urine from all patients or patients who have been operated upon, for it is essential in their cases that the pelvis and the abdomen should be at rest as much as possible.

This apparatus is the first that allows of the introductions of pans of any sort, and the necessary cleansing after defecation without any trouble or discomfort whatsoever even with the heaviest patients, and the patients do not require to be held by the hand or to be lifted up. The pelvis remains unmoved and undisturbed and the patient does not alter his position in bed.

The apparatus is equally serviceable and convenient in dealing with bed-sores on the small of the back. Owing to the raised position of the knee joints it is easy to keep the small of the back suspended and clear of the bedding, so that the patient never lies with the sore surface in contact with the couch.

It is also possible to cleanse and bind the sores without trouble, without pain to the patient, and as often as desired. Such a po-

sition is agreeable and painless for the patient, and it is more advantageous than laying him on rubber cushions.

The apparatus may also be employed for the treatment of the wounded in war, and for the removal of all with injuries to the legs, as fractured lower extremities can be put into it with perfect safety and the certainty that they will not move; and at the same time no pain is caused to the patient. The apparatus can be laid on any stretcher. It is easy to handle and can be carried about easily.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In an apparatus of the character described, the combination of a frame; a support for the patient mounted on said frame; a horizontal support for the leg of the patient; telescoping bars pivotally connected to said leg support, and swingingly supporting said leg support on said frame; and devices connected with one pair of said telescoping bars adapted for holding the leg support in different adjusted positions, substantially as described.

2. In an apparatus of the character described, the combination of a frame; a support for the patient mounted on said frame; a horizontal support for the leg of the patient; levers pivotally supporting said horizontal support at one end on said frame; arms pivotally mounted on the horizontal support at the other end thereof and having adjustable engagement with said frame; and means for moving the first-named levers to adjusted position, whereby to position said adjustable support, substantially as described.

3. In an apparatus of the character described, the combination of a frame; a support for the patient mounted on said frame; a pair of horizontal supports for the legs of the patient; levers pivotally connecting said horizontal supports at one end with the supporting frame; arms pivotally secured to said supports at the opposite end and having adjustable engagement with said supporting frame; said first-named levers hav-

ing an extension projecting below the supporting frame; and a screw adjusted device connected with said lever extension for moving the same whereby to adjust said leg supports, substantially as described.

4. In an apparatus of the character described, the combination of a frame; a support for the patient mounted on said frame; a pair of horizontally disposed leg supports; levers pivotally connecting said leg supports at one end to said frame; arms pivotally connected with said leg supports at the opposite end thereof; said frame having notches adapted to support said arms for the different adjusted positions of said leg supports; means for adjusting said arms and said levers vertically; said levers having a downwardly disposed extension; an arm secured to the frame; and a screw shaft journaled on said arm and having threaded engagement with said lever extension whereby to position said leg supports to different positions, substantially as described.

5. In an apparatus of the character described, the combination of a frame; a support for the patient mounted on said frame; a pair of laterally disposed leg supports of trough shape in cross section; levers pivotally connecting said leg supports at one end with said frame; arms pivotally secured to said leg supports at the opposite end; said frame provided with a plurality of notches adapted for engaging with the free ends of said arms; said levers and arms comprising telescoping sections whereby said leg supports may be vertically adjusted; said levers having a downwardly disposed extension provided with a threaded sleeve; an arm rigidly secured to said frame; and a screw shaft journaled on said rigid arm and having threaded engagement with said sleeve whereby to move said leg supports to different positions and to secure the same, substantially as described.

In testimony whereof, I have affixed my signature, in presence of two witnesses.

MORIZ ROTHENBERG.

Witnesses:

WOLDEMAR HAUPT,  
HENRY HASPER.