

Dec. 15, 1931.

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1,837,037

THERAPEUTIC TRACTION APPARATUS

Filed Feb. 12, 1927

4 Sheets-Sheet 1

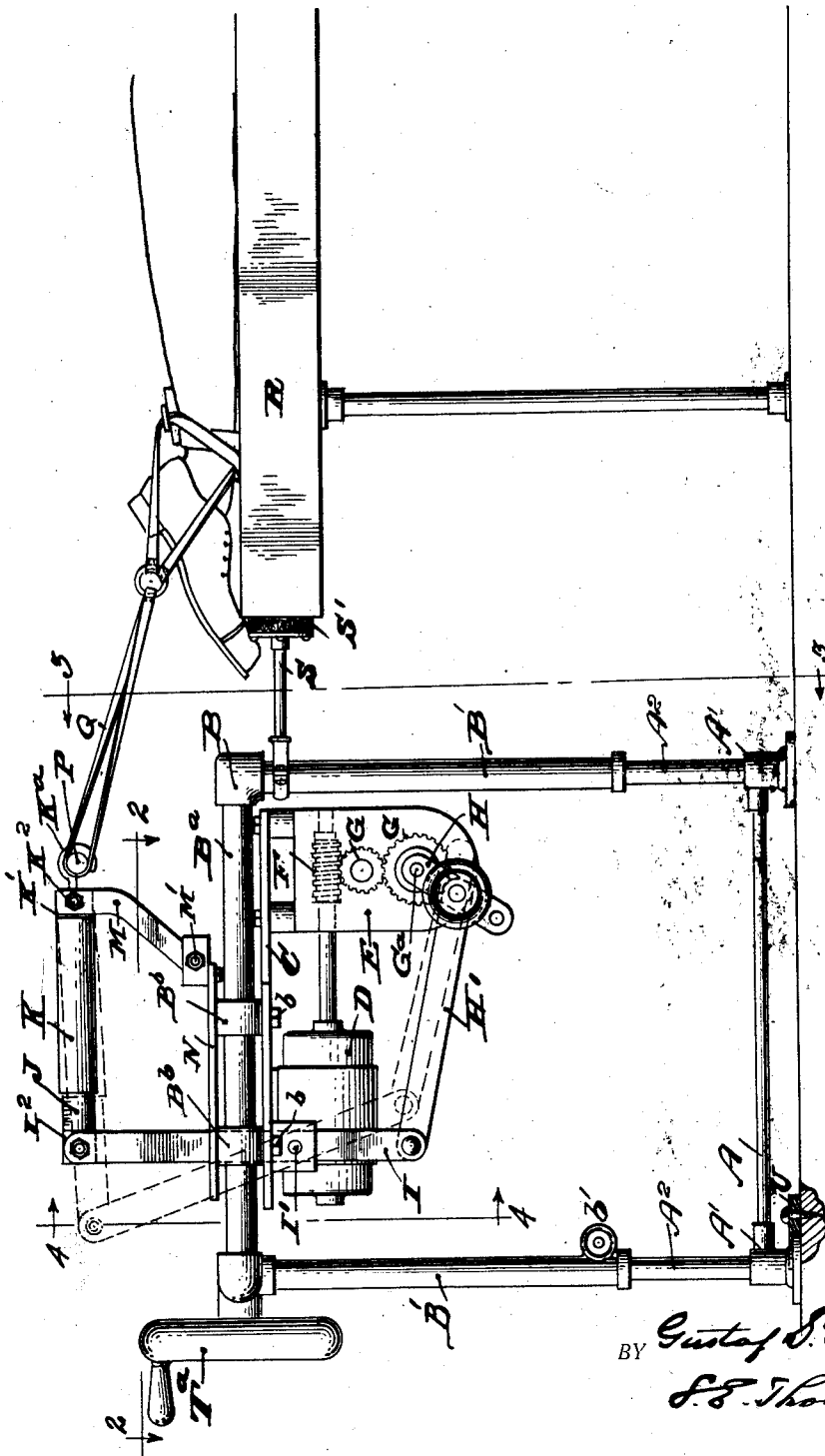


Fig. 1

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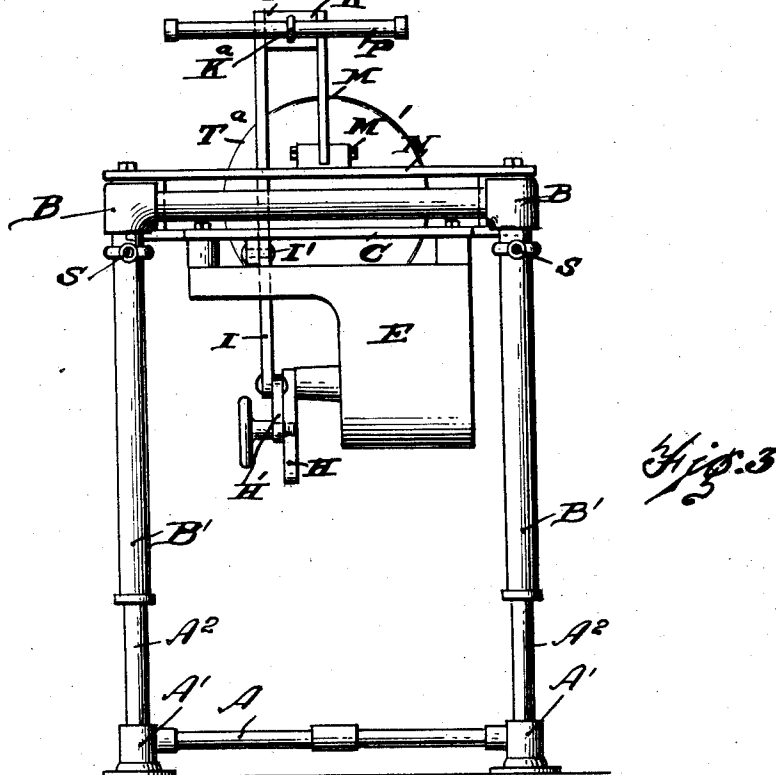
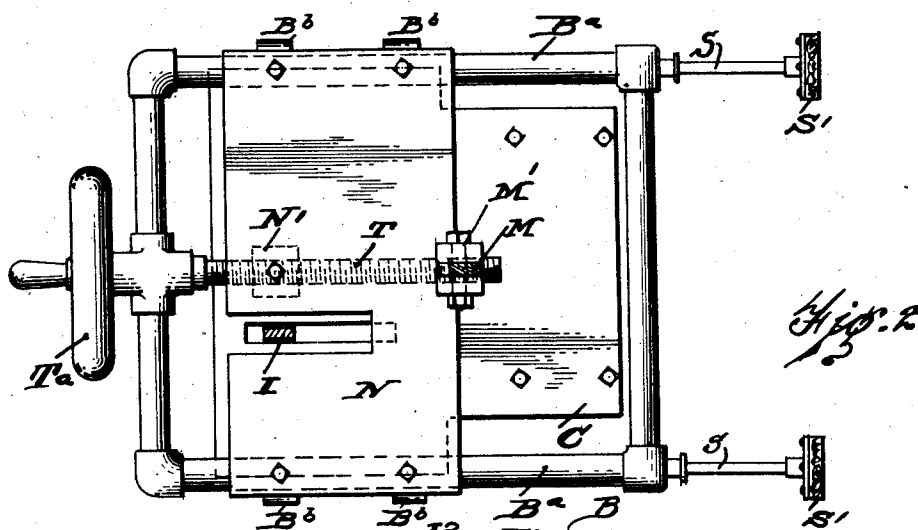
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4 Sheets-Sheet 2



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4 Sheets-Sheet 4

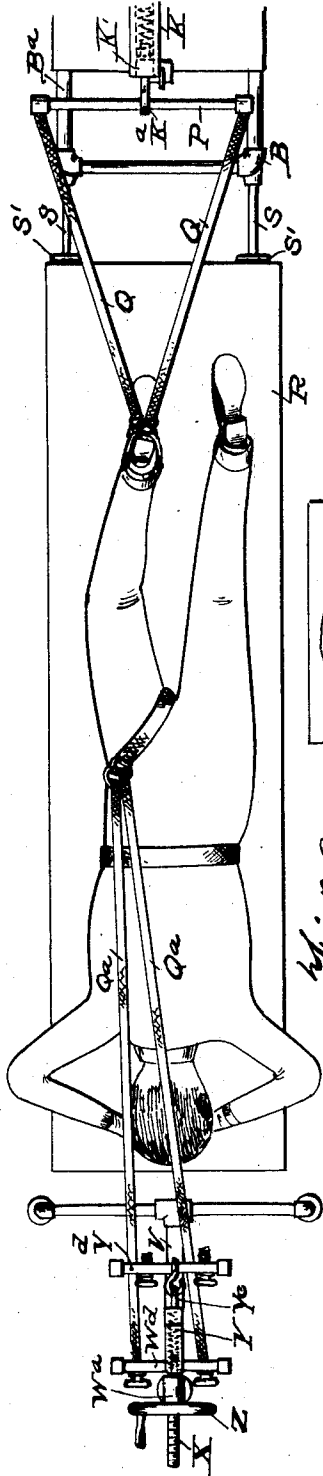


Fig. 8.

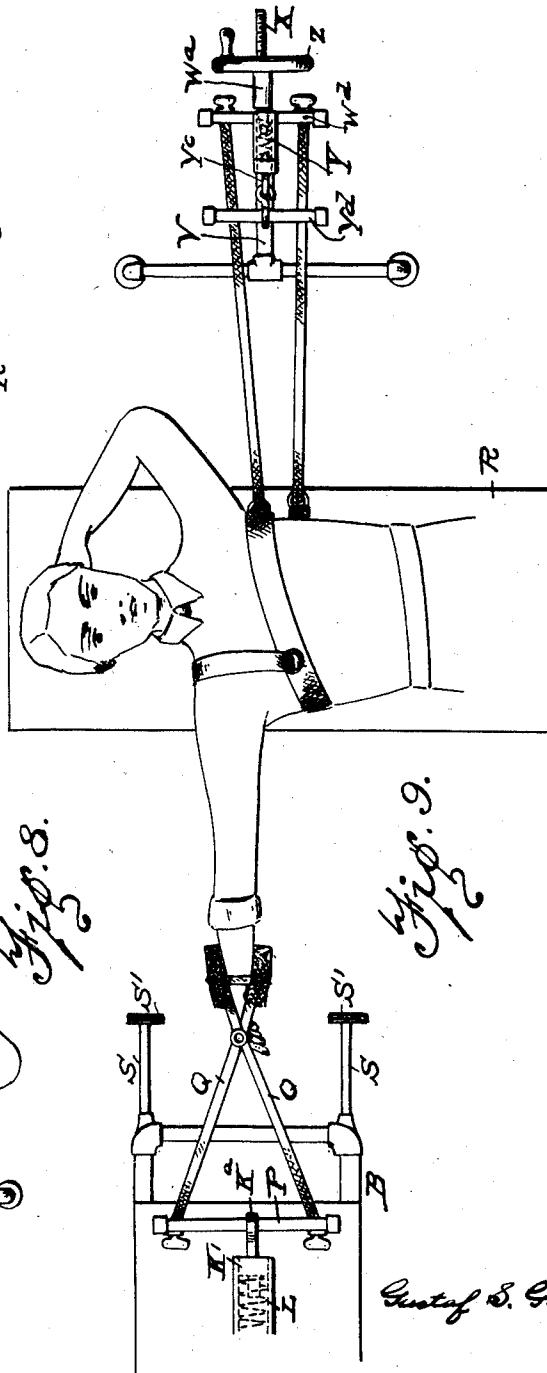


Fig. 9.

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UNITED STATES PATENT OFFICE

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THERAPEUTIC TRACTION APPARATUS

Application filed February 12, 1927. Serial No. 167,851.

My invention relates to a therapeutic traction apparatus shown in the accompanying drawings and more particularly described in the following specification and

5 claims.

The primary object of this machine is to restore full mobility in any joint of a patient's arms, legs, spine or other parts of the body.

10 It is well understood that contraction of the muscles, ligaments and tendons arising from nerve irritation or other causes often result in impaired mobility of the joints, and on account of this fundamental cause, many
15 mechanical devices have been constructed to produce a relaxation of the joints,—for example traction apparatus of a type including an adjustable therapeutic couch or operating table, on which the patient lies while
20 undergoing treatment, fitted with suitable harness or other devices adapted to engage the arms, legs or other parts of the body which in operation serve to produce elongation or relaxation of the joints. Apparatus
25 of this character is necessarily costly however, and frequently not adapted for the particular requirements of the patient or physician, and on account of the size of the apparatus cannot be conveniently stored
30 when not in use.

One of the objects therefore of the present invention is to provide a device in which the usual operating table or couch is eliminated, the apparatus being portable and adjustable
35 to accommodate itself for use in connection with any operating table or hospital cot.

It is therefore one of the objects of the present invention to place at the disposal of the general practitioner a relatively inexpensive apparatus for the purpose herein set
40 forth that may be used in connection with any operating table or hospital cot and which may be adjusted to meet the requirements of the patient and also adapting itself to the
45 operating table or cot in connection with

which it may be employed,—and when not in use may be stored so as to occupy a minimum space.

A further object of the invention is to provide means whereby muscular relaxation may
50 be obtained through the tractive operation of yieldable resilient means rhythmically applied,—embodying a plurality of graduated spring scales,—the tension of which is regulated in accordance with the resistance of the
55 muscles,—the “draw” or “pull” being thus constantly determined and if desired as steadfastly maintained at the predetermined load as the muscles relax under the pulling
60 action of the machine.

A further object of the invention is to provide the apparatus with suitable harness by which its operating parts may be coupled to
65 either an arm, leg, or other part of the body and that it may be placed either at the head or side of the operating table or bed most convenient for use without the necessity of disturbing the patient or the articles of furniture or equipment in the room to make the
70 apparatus available.

With the foregoing and other objects in view which will appear as the description proceeds, the invention further resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that
75 changes may be made in the precise embodiment of the invention herein disclosed without departing from the spirit of the same.

In the drawings accompanying this specification:

Figure 1 is a side elevation of one portion of the apparatus located adjacent the end of an operating table—a fragment of which is shown—showing it connected by a suitable
85 harness with the patient's leg.

Figure 2 is a horizontal sectional and plan view of the apparatus shown in the preceding figures taken on or about line 2—2 of Figure 1—the operating table being removed.

Figure 3 is an end elevation of the apparatus as viewed from the direction indicated by the arrows—see line 3—3 of Figure 1.

Figure 4 is a vertical fragmentary sectional elevation of the opposite side of the apparatus taken on or about line 4—4 of Figure 1.

Figure 5 is a detail view of one of the telescopic spring scales employed.

Figure 6 is a longitudinal sectional view through the scale, taken on or about line 6—6 of Figure 5.

Figure 7 is an elevation of the opposing or so-called "stationary" member of the apparatus used in conjunction with that shown in the preceding figures on the opposite side of the operating table or cot.

Figure 8 is a diagrammatic view indicating in a fragmentary way the respective co-operating parts of the apparatus located at opposite ends of a surgical table and respectively connected with the patient by suitable straps or harness.

Figure 9 is a similar diagrammatic view showing the apparatus located at the sides of an operating table and with a suitable harness connection between the apparatus and the body and forearm of the patient.

Referring now to the letters of reference placed upon the drawings:

A represents a rectangular frame provided at each corner with fittings A¹ from which rise standards A² telescoping within the downwardly extending sleeves B¹, of a rectangular frame B, which when adjusted are secured by clamping screws b¹. Directly beneath the horizontal members B² of the frame B and secured to the slidable fittings B³ by bolts b, is a platform C, to which is bolted an electric motor D,—its armature shaft extending into a gear housing E where it is fitted with a pinion F in mesh with a train of gears G to provide a suitable speed reduction for the shaft G^a journaled in the housing.

On the end of the shaft G^a is a crank arm H to which is pivoted a link H¹ connected with a rocking lever I, pivoted at I¹ to a hanger depending from the platform C. The rocking lever I at its upper end is connected with a fitting I², at the outer end of a graduated tube J telescoping in a sleeve K. Secured to the forward end of the sleeve K is a fitting K¹ to which one end of a spring L is attached, the other end of the spring being connected to the fitting I², on the end of the telescoping tube J. The fitting K¹ is pivoted on a bolt K² to a bracket M which is in turn engaged at M¹ to a platform N mounted upon the fittings B³ slidable on the members B² of the rectangular frame B.

Projecting from the fitting K¹ is a hook K^a supporting a transverse bar P to which is secured suitable harness Q for engagement with the leg or other part of the patient's

body. R denotes an operating table or cot on which the patient rests, and projecting from the depending sleeves B¹ of the frame B are adjustable thrust arms S, fitted at their outer ends with a pad S¹, adapted to bear against the end of the table or cot. T denotes a screw shaft supported in a suitable bearing provided in the frame and extending through a tapped block N¹ attached to the underside of the slidable platform N, is fitted with a hand wheel T^a, by which the shaft may be rotated to adjust the platform longitudinally in relation to the table R and to regulate the tension of the spring L lodged within the telescoping tubes J and K, whereby any predetermined "load" or "pull" desired may be applied to the patient and the tension adjusted to maintain the load as the muscles relax. U indicates a fitting secured to the floor overlapping the flange or footing of the frame, to secure the device against displacement.

Located at the opposite side or end of the operating table is the "stationary" portion of the apparatus shown in Figure 7, consisting of a floor frame V from which rises a standard V^a telescoping in the downwardly depending tube W to which it is secured by a clamping screw w when properly adjusted. The tube W at its upper end has a fitting W^a supporting a screw shaft X carrying at its outer end the sleeve Y of a spring balance scale similar to the device shown in Figures 5 and 6. Y^a is a graduated tube telescoping in the sleeve Y and at the end of the tube Y^a is a fitting Y^b provided with a hook Y^c supporting a transverse bar Y^d to which suitable harness Q—see Figures 8 and 9—fitted to the patient are connected. W^b is a bracket hook projecting from the sleeve W to receive the hook W^c supporting a second transverse bar W^d with which a harness (not shown) may be connected with the patient's head or body.

As indicated in connection with the "tractive" cooperating portion of this apparatus, shown in Figure 1, a suitable fitting U attached to the floor may overlap the flanges of the floor frame to secure this portion of the apparatus from displacement, as previously described.

Z is a hand wheel mounted on the shaft X by turning which the tension of the spring housed in the telescoping sleeve Y may be regulated.

Having indicated the several parts of the apparatus by reference letters, the construction and operation of the device will be readily understood.

Dependent upon the part of the body undergoing treatment, the patient after being placed on a suitable table or cot with the "tractive" and "stationary" parts of the machine in opposition and connected by suitable harness with the patient's body as in the manner indicated, the motor is started actu-

ating the rocking lever I, which through the action of the telescoping spring scales and connection through the harness with the patient's body, exerts a rhythmical "pulling" action and as the muscles relax, the load may be maintained or gradually increased by the manual adjustment of the screw shaft T until the full anatomical limit of the joints under treatment is secured.

For the purpose of this description it may be assumed that a stiff knee joint is under treatment. A harness with sufficient padding is first attached from the groin and hip of the affected leg to the second transverse bar W^a of the machine. Another harness is attached to the ankle,—in such manner that it will not slip down and pull upon the weaker ligaments of the ankle joint,—and to the transverse bar P of the opposing "traction" portion of the apparatus, located at the foot of the cot. Following a proper adjustment of the harness, the motor is started, and if a desired load of 200 pounds is employed the scale J at the maximum pull of the lever will indicate a load of 200 pounds which load however will in the course of a few minutes decrease to say 100 pounds, due to the rhythmic elongation and relaxation of the nerve element of the affected joint which being repeated every few seconds causes the contracted ligaments and tendons of the knee joint to gradually loosen up. The hand wheel T^a on the screw shaft is then adjusted taking up the 100 pound slack until the desired 200 pounds are again reached and as a result of the effect of this new "lead" additional and more deep going relaxation is established until finally the two bone ends of the joint are rhythmically separated from each other up to the anatomical construction of the joint.

During this operation the "lead" indicated on the scale of the machine will gradually lower until a full relaxation of all the soft tissue of the joint has been accomplished, whereupon the bones of the joint may separate under approximately a load of 50 pounds.

What has been said of the treatment of a knee joint will apply with equal force to the treatment of an elbow joint or other affected part,—except that suitable harness must be employed and connected with the affected parts and with the tractive and stationary portions of the apparatus.

Due to the fact the stroke of this apparatus is elastic producing a rhythmic elongation and relaxation of the affected parts which may be regulated for any desired frequency per minute,—the lessened resistance of the muscles and other soft tissue being duly registered on the scales at both ends of the machine, the slack thus gained is taken up by the adjusting screws to the original load with the effect that the machine thereby penetrates deeper into the joint or joints under treat-

ment at every time the slack produced from the relaxation of the muscles is produced.

Attention is again called to the fact that the pulling action of the apparatus is rhythmical and elastic due to the action of the springs and as previously indicated the main object of the invention is to restore full mobility in the joints of the arms and legs, or of the spine and different parts of the body by a systematic relaxation of the affected joints.

The patient may receive treatment while reclining upon an operating table or cot, or while seated in a suitable chair, the altitude of the machine being first adjusted to accommodate the patient.

Having thus described my invention what I claim is:

1. Therapeutic traction apparatus comprising a frame having guides, spaced apart upper and lower platforms mounted as a unit upon said guides for adjustment thereof, a rotatably supported screw extending between said platforms and connected therewith to move them upon its rotation adjustably over said guides, power mechanism carried by and depending below the lower platform, a rock lever pivotally mounted upon said platforms and extending above and below them, a driving connection between the lower end of the rock lever and said power mechanism adapted to rock said lever about its pivotal mounting, a telescoping spring tension connection having one end connected with the upper end of the rock lever, and a supporting standard pivoted at its lower end to the upper platform and at its upper end to the opposite end of said telescoping spring tension connection.

2. Therapeutic traction apparatus comprising a supporting frame, a motor carried by and supported below the frame, a rock lever pivotally mounted upon the frame to extend above and below the frame, driving mechanism connecting the motor with the lower end of the rock lever to rock the lever, a swinging standard pivoted at its lower end to the frame and extending upwardly therefrom, a tension spring connecting the upper end of the lever with the upper end of the standard, and a harness connected with the upper end of the standard to be tensioned thereby.

3. Therapeutic traction apparatus comprising a supporting frame, power mechanism carried by the frame, a pair of spaced apart swinging levers each pivoted to the frame, a tension spring connection bridging the free ends of said levers, and a driving connection between said power mechanism and one of said levers to drive the other lever through the spring tension connection, and a harness connected with the other lever.

4. Therapeutic traction apparatus comprising a support, a rock lever pivoted intermediate its ends to the support, a swinging stand-

ard pivoted at one end to the support, power
mechanism connected with one end of the rock
lever to rock said lever, a pair of telescoping
tubular members bridging the space between
6 the opposite end of the rock lever and the
free end of the swinging standard, one mem-
ber connected to the lever and the other mem-
ber connected to the standard, a tension
spring arranged within said members and
10 connected at opposite ends to the opposite
members forming a yielding driving connec-
tion therebetween, and a harness connected
to the end of the telescoping member carried
by a standard.

15 In testimony whereof, I sign this specifica-
tion.

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