No. 675,678. Patented June 4, 1901.

C. A. SCHOLDER.

MOVEMENT CURE APPARATUS.

(Application filed Dec. 11, 1900.)

(No Model.) 3 Sheets—Sheet 1.

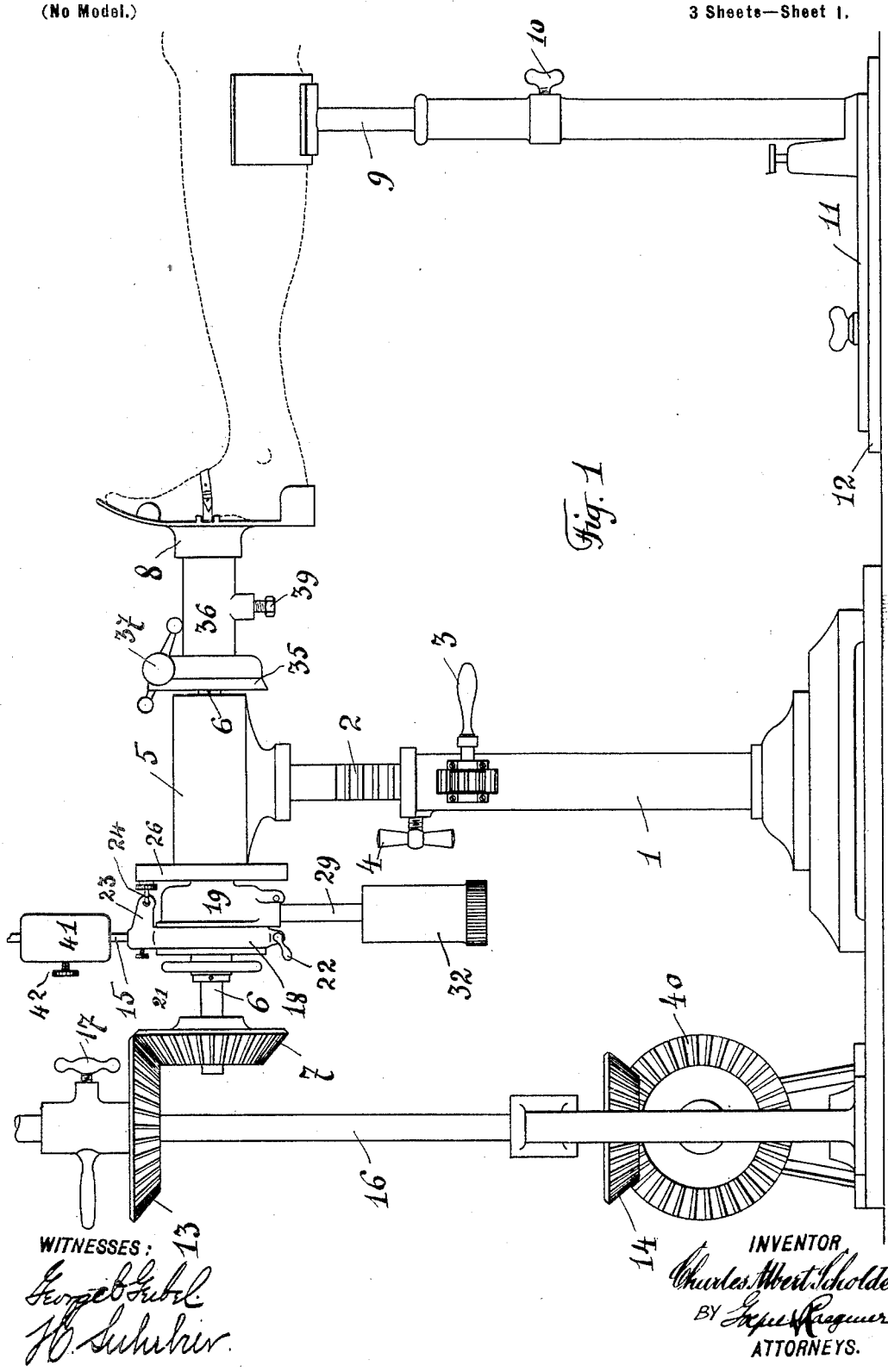


Fig. 1.

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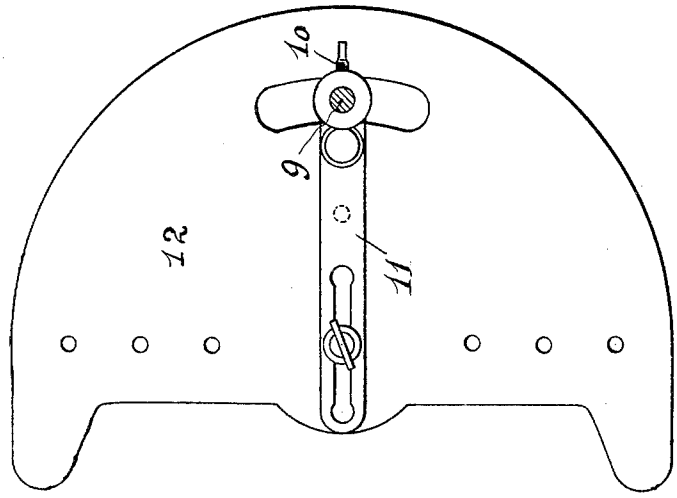
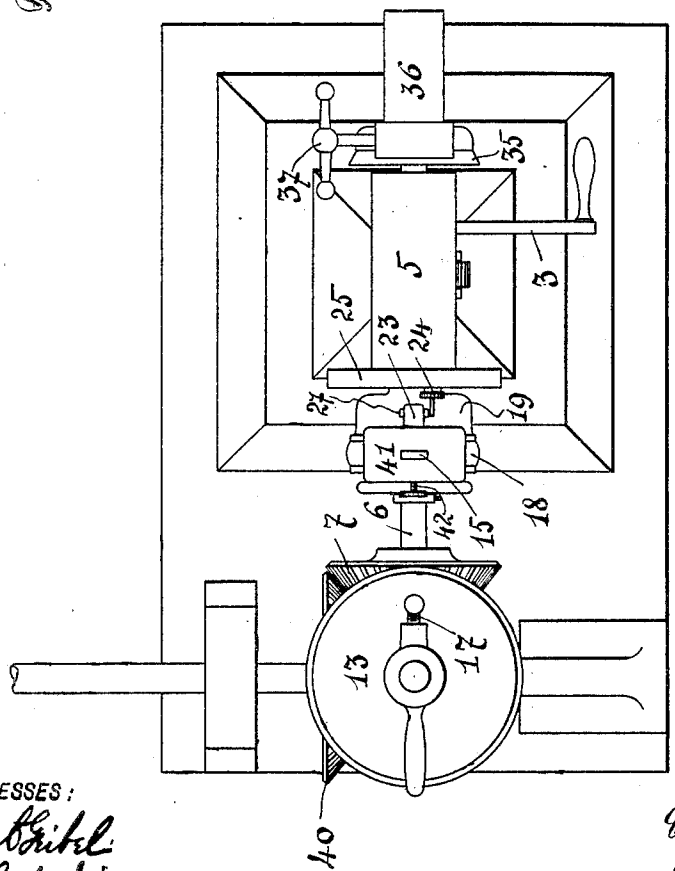


Fig. 2



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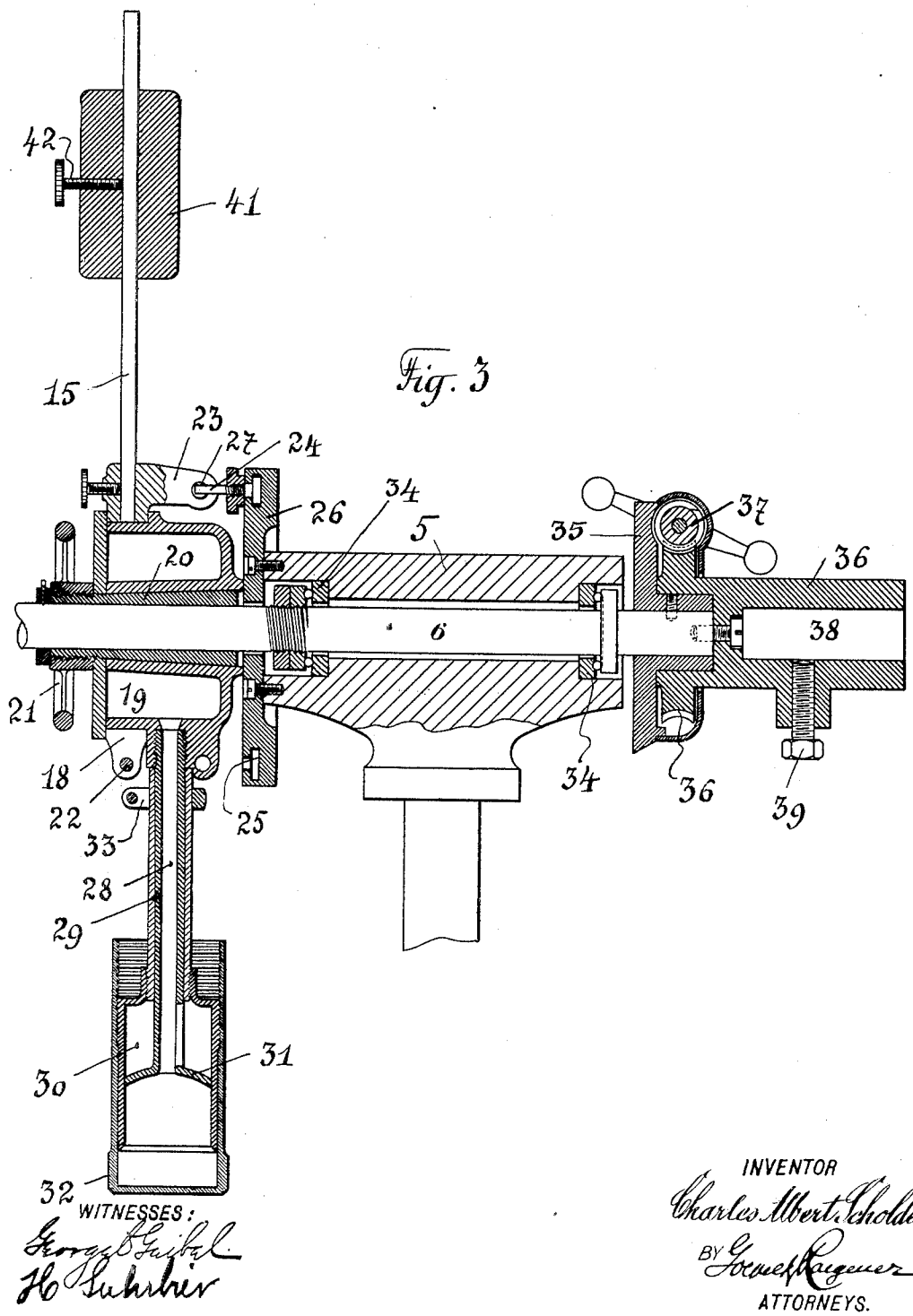
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(Application filed Dec. 11, 1900.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 3



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UNITED STATES PATENT OFFICE.

CHARLES ALBERT SCHOLDER, OF LAUSANNE, SWITZERLAND.

MOVEMENT-CURE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 675,678, dated June 4, 1901.

Application filed December 11, 1900. Serial No. 39,571. (No model.)

To all whom it may concern:

Be it known that I, CHARLES ALBERT SCHOLDER, residing in Lausanne, Switzerland, have invented certain new and useful Improvements in Movement-Cure Apparatus, of which the following is a specification.

This invention relates to improvements in apparatus for restoring to their natural flexibility and strength joints of the human body, and more particularly those of the extremities, which, owing to disease, lack of proper exercise, or other cause, have become weakened or affected with ankylosis. For remedying this condition of the joint it is desirable that the joint shall be "passively" bent by the application of exterior force, and also that it shall be "actively" bent by the exertion of the patient.

The object of my invention is to provide in one apparatus mechanical means for accomplishing the first of these ends and the proper resistance for the effective carrying out of the other; and for this purpose the invention consists of a movement-cure apparatus comprising a horizontal shaft rotatably mounted, means secured to one end of the shaft for receiving a portion of the human body, an annular receptacle upon said shaft, a tube extending from said receptacle at an angle to the shaft, a mercury-receptacle at the outer end of said tube, and a quantity of mercury in the latter receptacle; and the invention consists, further, of certain details of construction and combinations of parts, which will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of my improved movement-cure apparatus. Fig. 2 is a plan view; and Fig. 3 is a vertical central section through a portion of the operative mechanism, drawn on a larger scale.

Similar figures of reference indicate corresponding parts.

Referring to the drawings, 1 indicates a vertical standard provided with a longitudinal bore, in which is guided a rack 2, operated by means of a crank and pinion 3, suitably journaled in the standard. A set-screw 4 of the standard bears at its inner end against the rack for securing the same at any desired height. Secured to the upper end of the rack in any suitable manner is a head 5, in which is mounted, preferably in ball-bearing 34, a horizontal shaft 6, to which is fixed at one end a bevel-gear 7 and at the opposite end a shoe 8 or other device adapted to receive the foot, hand, or other desired part of the body. For supporting the limb when the foot is strapped to the shoe 8, as indicated in dotted lines in Fig. 1, an adjustable post 9 is secured in position at the desired height in its hollow standard by a set-screw 10, said standard being mounted upon a bed-plate 11, secured adjustably on the base-plate 12. The bevel-gear 7 meshes with a gear-wheel 13 upon a shaft 16, to which motion is imparted by means of gears 14 and 40, the latter mounted on a suitable driving-shaft. The gear-wheel 13 is loose upon the shaft 16, and to said gear-wheel is secured a sleeve provided with a suitable handle, a set-screw 17 in said sleeve bearing at its inner end against the shaft 16 for securing the gear to the shaft either in or out of mesh with the gear 7. Upon the shaft 6 is fixed a conical sleeve 20, on the outer threaded portion of which is located a hand-wheel 21, the hub of which is correspondingly threaded, said wheel serving by screwing up or unscrewing the same to secure to said shaft or release therefrom an annular receptacle 19. A split ring or collar 18, the two sections of which are secured together by the bolt 22, is arranged upon the receptacle 19, and from said ring extends at an angle to the shaft 6 a counterbalance-rod 15, carrying a counterweight 41, suitably secured in any position upon said rod by a set-screw 42. From the split ring 18 extends inwardly toward the head 5 a projection 23, adapted to abut against a stop 24, suitably secured in a circumferential slot 25 of a disk secured to the adjacent end of the head 5. A tube 28 extends from the receptacle 19 at an angle to the shaft 6, being secured to said receptacle in any suitable manner, and serves to connect the same with the interior of a mercury-box 30 at the outer end of said tube 28. A sleeve 29 is located upon said tube 28 and carries at its outer end a casing 31, which is provided with a screw-cover 32, said box 30, casing 31, and cover 32 forming a mercury-re-

ceptacle which is adjustable by means of the cover 32 as to the amount of mercury which it shall contain.

The shoe 8 is secured adjustably to the shaft 6 by means of a sleeve 36, having a worm-wheel at one end, which engages a worm 37, mounted upon a disk 35 of the shaft 6. A set-screw 39 secures to the sleeve 36 the shank 38 of the shoe 8. The sleeve 36 is secured in position upon the end of the shaft 6, so as not to slide off from the same, by means of a suitable connecting-screw between the end of the shank 38 and shaft 6, as shown in Fig. 3. By means of the construction described it is possible to adjust the shoe 8 or other equivalent device to any desired angle relatively to the shaft 6 and weight devices connected therewith.

The operation of my improved movement-cure apparatus is as follows: When it is desired to passively exercise the joint or joints affected, the foot or other portion of the body is secured to the shoe 8 or equivalent device. The gear 13 is permitted to mesh with the gear 7 and is secured to its shaft by the set-screw 17. The hand-wheel 21 is screwed away from the head 5, whereby the receptacle 19 is loosened upon the sleeve 20. Motion alternatively in opposite directions is then imparted by any suitable mechanism to the driving-shaft of the gear-wheel 40. This motion is transmitted directly by the power mechanism described to the shaft 6, and thence to the shoe 8, causing a rapid movement of the shoe in opposite directions. By this movement the ankylosed joint is bent as required with a rapid, uniform, and effective movement.

When it is desired to use the apparatus for the active exercising of the joint, the gear 13 is disconnected from the gear 7, being retained out of mesh therewith by set-screw 17, and the hand-wheel 21 is screwed up so as to force the receptacle 19 into contact with the sleeve 20, so that it will rotate with the shaft 6. The device 8 is so adjusted as to receive the part desired in its normal position when the mercury-box 30 is vertically below the receptacle 19. The stop 24 may be so set as to permit any desired length of swing in one direction. The split ring is then clamped to the receptacle 19. The weight 41 is set so as to counterbalance, to the extent desired, the weight of the mercury in the mercury-box 30. The patient now moves his foot so as to impart to the shaft 6 a partial rotation. The extent of this movement is entirely within his control, and it is obvious that the return swing in the opposite direction will, owing to the friction, be slightly less than the initial swing. The patient can by his own exertions swing the more or less counterbalanced receptacle in either direction to any extent which he desires, except as limited by the stop 24. The complete rotation and overturning of the receptacle is prevented, however, by the abutting of the ear 23, through its spring 27, with the stop 24 when, as shown in the drawings, said stop is fixed at the highest point. When during an oscillation the mercury-receptacle 30 arrives upon a level with receptacle 19, the mercury flows through the tube 28 into the receptacle 19 and remains there during the time that the mercury-receptacle 30 remains above the level of said receptacle 19. In other words, at the end of or near the end of each oscillation (when the oscillation is sufficient to raise the receptacle 30 above the level of the receptacle 19, as described) resistance due to the weight of the mercury is removed and strain upon the muscles is relaxed. Upon the return swing the mercury flows by gravity from the annular receptacle 19 back through the tube 28 into the receptacle. This increases the resistance again to the normal. The capacity of the mercury-receptacle is regulated by screwing the cover of the same in the direction required. The power which it is necessary that the patient should exert is regulated by this adjustment and by adjusting the mercury-receptacle at the proper distance from the receptacle 19 and shaft 6, which is accomplished by sliding the sleeve 29 upon the tube 28 either inwardly or outwardly and fixing the same in the desired location by means of a clamping-ring 33 and by adjusting the weight 41 upon its rod 15. By these adjustments the apparatus can be adapted to the requirements of any patient.

The advantages of my improved movement-cure apparatus are, first, that either active or passive exercising of the joint may be given, the apparatus being capable of ready alteration from one to the other; second, that for actively exercising the joint the resistance to be overcome by the patient can be adjusted within wide limits to suit his exact requirements; third, that the resistance at the beginning is small, that as it approaches the middle of the oscillation it increases, and at the end of the oscillation it decreases, which is in accordance with the physiological fact that any muscle is less capable of yielding a given energy at the beginning and end of its contraction than at the middle of the contraction, and, fourth, that by reason of the fact that a succeeding swing is never greater than the preceding one unless made so by the patient himself the patient acquires confidence, knowing that the entire movement is within his control.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A movement-cure apparatus, consisting of a horizontal shaft rotatably mounted, means secured to said shaft for receiving a part of the human body, an annular receptacle secured to said shaft, a mercury-recep-

tacle, and a tube connecting the annular receptacle with said mercury-receptacle, and extending at an angle to the shaft, substantially as set forth.

2. A movement-cure apparatus, consisting of a horizontal shaft rotatably mounted, means secured to said shaft for receiving a part of the human body, an annular receptacle secured to said shaft, a tube extending from said receptacle at an angle to the shaft, a mercury-receptacle, and a sleeve secured to said mercury-receptacle and adjustable on said tube, substantially as set forth.

3. A movement-cure apparatus, consisting of a horizontal shaft rotatably mounted, means secured to said shaft for receiving a part of the human body, an annular receptacle secured to said shaft, a mercury-receptacle, a tube connecting the annular receptacle with said mercury-receptacle and extending at an angle to the shaft, a counterbalance-rod secured to said shaft and extending at an angle therefrom, and a counterweight on said rod, substantially as set forth.

4. A movement-cure apparatus, consisting of a head, a horizontal shaft rotatably mounted therein, means secured to said shaft for receiving a part of the human body, an annular receptacle secured to said shaft, a mercury-receptacle, a tube connecting said receptacles and extending at an angle to the shaft, a collar secured upon said annular receptacle and provided with a projecting ear, a stop, and means for securing said stop on said head at any desired point in the path of said ear, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

CHARLES ALBERT SCHOLDER.

Witnesses:
ELMER SCHNEIDER,
G. IMER.