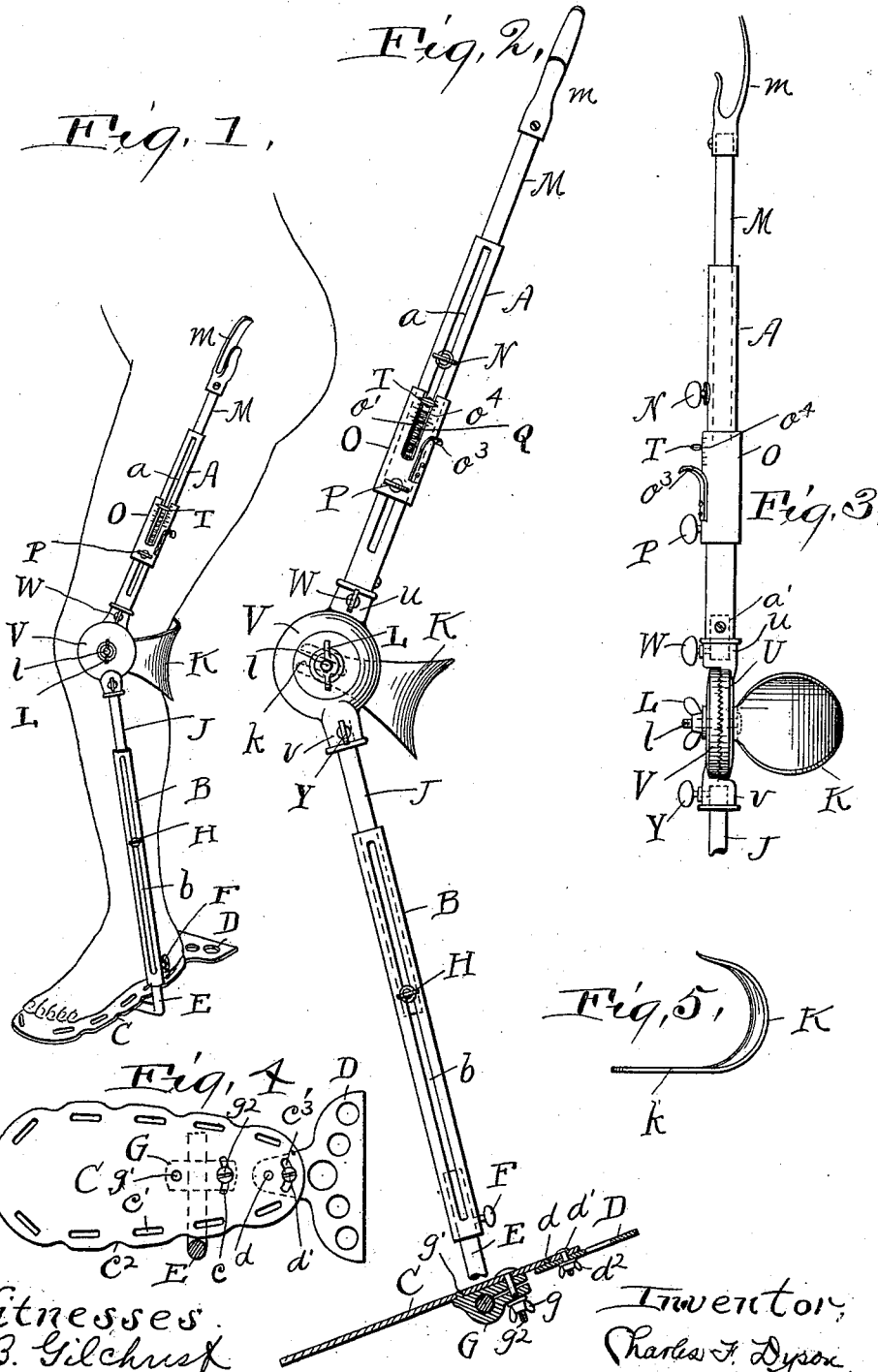


C. F. DYSON.
FRACTURE APPARATUS.
(Application filed Nov. 29, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
E. B. Gilchrist
R. E. Knowlton

Inventor:
Charles F. Dyson,
By his Attorneys,
Thurston & Bates.

UNITED STATES PATENT OFFICE.

CHARLES F. DYSON, OF HIRAM, OHIO.

FRACTURE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 649,237, dated May 8, 1900.

Application filed November 29, 1899. Serial No. 738,646. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. DYSON, a citizen of the United States, residing at Hiram, in the county of Portage and State of Ohio, have invented a certain new and useful Improvement in Surgical Appliances, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

When the long bones of the human body (femur, humerus, &c.) are fractured or dislocated, the muscles contract, tending to shorten the limb either by compacting broken fibers of the bone or causing one portion to slip past the other. The usual method of obviating this is to mechanically pull the parts into place, bind a splint about the limb, and attach a weight (to the patient's foot, for example) passing over the foot of the bed. The constant pressure of this weight for some weeks overcomes the muscles and maintains the limb the proper length. The object of the present invention is to do away with this weight and provide an apparatus which will be more certain and efficient and will not necessitate the patient's remaining in bed.

My appliance includes a rod extensible by means of a spring, adapted to be bound to the fractured limb, and having its spring adjustable as to force irrespective of the adjustable length of the rod. Thus when the rod is bound onto the limb and a force of five pounds, for example, is applied to the spring, as the limb (and with it the rod) stretches and this spring runs down in tension the spring may be again adjusted to supply the requisite force. Numerous adjustments and specific capabilities of the appliance are set out in the following description.

The invention may be best summarized as consisting of the combinations of parts hereinafter described, and set out in the claims.

In the drawings is shown the apparatus as applied when the femur is broken.

Figure 1 is a side elevation of the appliance, showing the position which the limb occupies. Fig. 2 is a side elevation on a larger scale, the foot-plate being in central section. Fig. 3 is a view of the upper portion of the appliance in elevation looking at right angles to Fig. 2. Fig. 4 is a plan of the foot-plate. Fig. 5 is a detail view of the knee support or

bracket. Fig. 6 is an enlarged longitudinal section through the upper member of the appliance, showing the spring. Fig. 7 is a perspective view of the gage-sleeve for the spring. Figs. 8, 9, and 10 are respectively cross-sections on similarly-numbered lines in Fig. 6.

The same letters of reference designate the same parts in each figure.

I provide two longitudinally-adjustable members adjustably hinged together at their ends, thus corresponding to the two long bones of the arm or lower limb. In the specific arrangement shown in the drawings one member is for the thigh and the other for the lower leg, and they are adjustably hinged at the knee. The upper member consists of the rod M, partly inside the tube A and adjustably secured thereto by a clamping thumb-nut N, which lies in a slot *a* in the tube A and screws into the rod M. The lower member similarly consists of the rod J, partly within the tube B, adjustably secured by the thumb-nut H, extending through the slot *b*.

The adjustable hinge at the knee is provided by the bolt *l* and thumb-nut L, which clamp together the two cooperating heads U and V, which have serrated faces and have tubular extensions *u* and *v*, into which take, respectively, a stud *a'*, extending from the tube A, and the end of the rod J. Thumb-nuts W and Y removably secure the rods A and J to these heads, while the same bolt *l* that holds the heads together secures a knee-bracket K adjustably in place by reason of the bolt-head lapping over the edge of a slot *k* therein, through which the shank of the bolt extends. At the lower end of the tube B is an L-shaped rod E, adjustably clamped thereto by the thumb-nut F and adjustably carrying on its horizontal arm the foot-plate C. This foot-plate is adjustable rotatively about the rod E and clamped thereto by the clamping-yoke G, which is tightened by the thumb-nut *g*. This yoke is pivoted to the foot-plate by having a stud *g'* extending into a hole therein, while the bolt *g*², on which the nut screws, takes into an arc-shaped slot *c* in the plate. Thus the plate may be adjusted as to location by the rod E and as to position in that location by the bolt *g*² and its nut.

Near the edge of the foot-plate are provided a series of slots *c'*, through which when the

patient's foot is small the ends of the bandage or suitable straps pass, securing the foot to the plate. When the foot is large, these straps will pass around the outer edge of the plate, lying in the notches c^2 therein.

In order to relieve the patient's heel from supporting any weight, a bracket D is adjustably secured to the foot-plate by having a stud d extending thereinto and a clamping-bolt d' , which takes through an arc-shaped slot c^3 in the foot-plate and carries at its end the thumb-nut d^2 .

As heretofore alluded to, the limb is put into such cast as desirable and the foot is strapped to the foot-plate, while a suitable strap lying in the fork m at the upper end of the rod M and passing around the thigh secures the upper end of the appliance in place. Assuming that the limb is properly in place and the upper and lower members properly adjusted as to position and length and the different thumb-nuts turned up tight, the spring-pressure is applied to supply the requisite extension and counter extension. This is accomplished as follows: Within the tube A is the head S, into which screws the thumb-nut P, passing through a hole o^2 in the slidable sleeve O, which surrounds the tube A. Loosely sliding through the head S within the tube A is the rod r , extending integrally from the loosely-slidable head R, and between the heads R and S lies the spring Q. Now as the sleeve O is drawn upward, as it may conveniently be by the finger-hook o^3 , the spring is compressed against the head R, which bears on the end of the rod M, the rod r sliding through the head S. Projecting from the head R through the slot a and an open-ended slot o' in the sleeve O is a removable pointer, which, registering with graduations o^4 on the sleeve O, indicates the amount of spring force attained. When the spring is thus compressed, the thumb-nut P is tightened, locking the sleeve O and head S to the tube A. If now the thumb-nut N, which, as heretofore stated, clamps the rod M to the tube A, is loosened, the spring-pressure is transferred to the rod M, and thus applied to the limb, tending to stretch it. The force which the spring thus applies to the limb will gradually accomplish its result of stretching out the limb, and as the spring-pressure accordingly decreases the pointer T will so indicate it on the graduation o^4 . The attendant or nurse thereupon tightens the thumb-nut N (temporarily locking the rod M to the tube A) and then loosens the nut P and draws up the sleeve O until the right spring force is again attained and then locks the sleeve O and loosens the rod M. Thus a substantially-constant extensible pressure is kept on the rod, preventing the shortening of the limb.

In case of a broken tibia the spring mechanism is transferred to the lower member of the device. This may be done by taking out the screw-pointer T and the thumb-nut P and sliding the heads R and S and the spring Q

(a pin r' preventing separation of the parts) out of the tube A and putting them into the tube B.

If a bone in the arm were broken, the spring mechanism and extensible members used would be similar, though the method of securing the rods to the body would be accordingly varied.

It will be observed that with my appliance all the adjustments required may be obtained by loosening the proper thumb-nuts, while the latter also allow the separation of the parts, so that the whole apparatus can be very conveniently put in a physician's small satchel.

Having described my invention, I claim—

1. In a surgical appliance, in combination, a pair of extensible longitudinal members clamped together at an adjustable angle, means for longitudinally adjusting either of said members independently, means for supplying to one of said members spring force tending to extend it, and means for adjusting such force independently of the amount of such extension or adjustment, substantially as described.

2. In a surgical appliance, in combination, a pair of extensible longitudinal members clamped together at an adjustable angle, means for longitudinally adjusting either of said members independently, one of said members consisting of a tube and a rod telescoping thereinto, a spring within said tube adapted to bear against said rod, and means for clamping the spring to the tube when under pressure against said rod, substantially as described.

3. In a surgical appliance, in combination, a pair of members hinged together, each adapted to be extended independently longitudinally, means whereby the free ends of said members may be bound in place upon a human limb, and a curved socket plate carried at the hinge and adapted to fit into and around the recess behind the joint of the limb, substantially as described.

4. In a surgical appliance, in combination, a pair of members hinged together each adapted to be extended independently longitudinally, means whereby the free ends of said members may be bound in place upon the human limb, a socket-plate carried at the hinge and adapted to fit into and around the recess behind the joint of the limb, and means for adjusting the angle of the two members and for adjusting the position of the socket-plate with reference to the hinge, substantially as described.

5. In a surgical appliance, in combination, a tube, and a rod slidable within the same, means for clamping the rod to the tube, a spring within the tube bearing against the rod, and means for adjusting the pressure of said spring, substantially as described.

6. In a surgical appliance, in combination, a tube, a rod whose end telescopes therewith, a spring within the tube bearing against the rod with one end, a movable head engaging

said spring at its other end, means for compressing the spring with said head, and means for holding said head immovable within the tube, substantially as described.

5 7. In a surgical appliance, in combination, a tube, a rod within the tube and extending out beyond the same, a spring within the tube bearing against the rod, a sleeve slidable on the outside of the tube, means connecting
10 said sleeve with said spring whereby sliding of the sleeve may compress the spring to bear against the end of the rod, and means for locking said sleeve and said rod independently, substantially as described.

15 8. In a surgical appliance, in combination, a tube, a rod slidable longitudinally within the tube, a spring adapted to bear against the end of the rod, a head within the tube adapted to force said spring against the end of the
20 rod, a slot through the wall of the tube, and a pair of screws extending through said slot and screwing one into the rod and the other into said head, substantially as described.

9. In a surgical appliance, in combination,
25 a tube having a slot through its wall, a rod within the tube, a sleeve slidable on the outside of the tube, a spring within the tube adapted to bear against said rod, a thumb-screw passing through said slot and connecting one
30 end of the spring with the sleeve, there being an elongated opening in said sleeve, a graduated scale formed along said sleeve, and a pointer projecting through said slot and opening, and carried by the other end of the spring
35 and registering with said scale, substantially as described.

10. In a surgical appliance, in combination, a tube, a rod slidable within the same, a sleeve slidable on the outside of the tube, a pair of
40 heads R and S within the tube, a spring between said heads tending to hold them apart, a pointer carried by the head R and lying in a slot in said sleeve, and a clamping-screw passing through said sleeve into the head S,
45 substantially as described.

11. In a surgical appliance, in combination, a tube A having an elongated slot *a* through the wall thereof, a rod N extending within the same, the heads R and S within the tube,
50 the spring Q between said heads, means for preventing the separation of these heads and the spring, a sleeve O on the outside of the tube and having a slot *o'*, a clamping-screw passing from this sleeve through the slot *a* into
55 the head S, and a pointer passing through the slot *a* and secured to the head R and adapted to register with graduations on the sleeve O alongside the slot *o'*, substantially as described.

60 12. In a surgical appliance, in combination, a pair of longitudinally-adjustable members

clamped together at an adjustable angle, each member consisting of a rod telescoping with a tube, a spring within one of said tubes, means
65 for causing said spring to bear with adjustable force against the end of the rod therein, a scale indicating the amount of such force, the parts being so constructed and arranged that said spring and scale may be transferred
70 from one of said longitudinal members to the other, substantially as described.

13. In a surgical appliance, two longitudinal members adjustably clamped together, said clamping being by a bolt passing through two heads having serrated faces and a nut
75 screwing onto said bolt, combined with a bracket having a slot through which said bolt also passes, whereby said bracket is also rendered adjustable by loosening said nut, substantially as described. 80

14. In a surgical appliance, the combination, with a longitudinal member, of an adjustable foot-plate C carrying a clamp G adapted to adjustably clamp a rod and being
85 itself adjustable in another direction on the foot-plate by reason of being pivoted thereto and having a clamping-bolt *g'* extending through said clamp and foot-plate and occupying an elongated slot, substantially as described. 90

15. In a surgical appliance, a longitudinal member, a foot-plate adjustably secured to said member, said foot-plate being formed to receive the whole of the patient's foot and there being openings or recesses in it for receiving a bandage securing the foot thereto,
95 combined with another plate adjustably secured to the foot-plate and adapted to form a rest, substantially as described.

16. In a surgical appliance, the combination with a longitudinal member, of a foot-plate adjustably secured to said member,
100 means for holding a foot thereon, a rearwardly-projecting adjustable heel-plate having a straight edge and adapted to form a rest, substantially as described. 105

17. In a surgical appliance, the combination of a longitudinal member, an adjustable foot-plate secured thereto, and a rearwardly-projecting heel-plate pivoted to the foot-plate,
110 and means for clamping said two plates together which consists of a screw-threaded bolt carried by one of said plates and extending through an arc-shaped slot in the other and engaging a proper nut, substantially as described. 115

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

CHARLES F. DYSON.

Witnesses:

E. L. THURSTON,
P. E. KNOWLTON.