Oct. 13, 1936. R. L. RAIFORD 2,057,592

SPLINT

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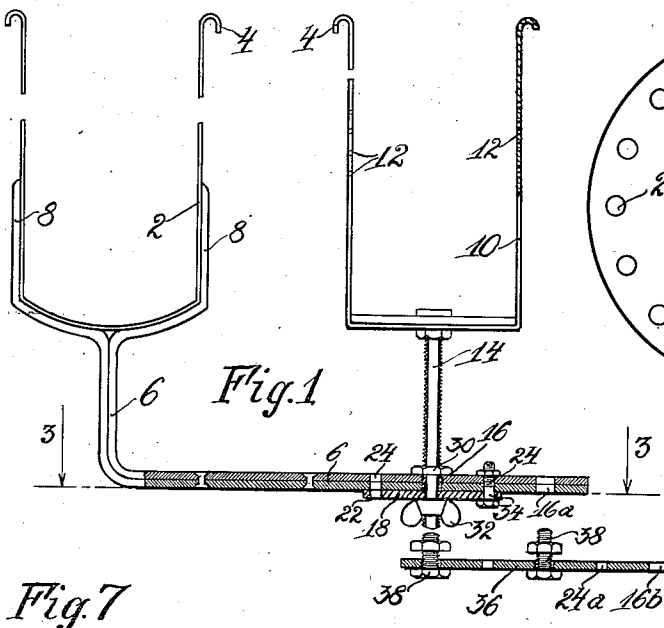


Fig. 1

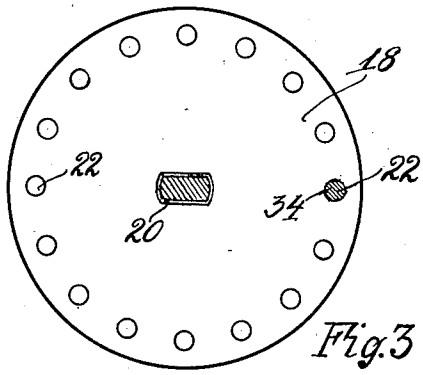


Fig. 3

Fig. 2

Fig. 7

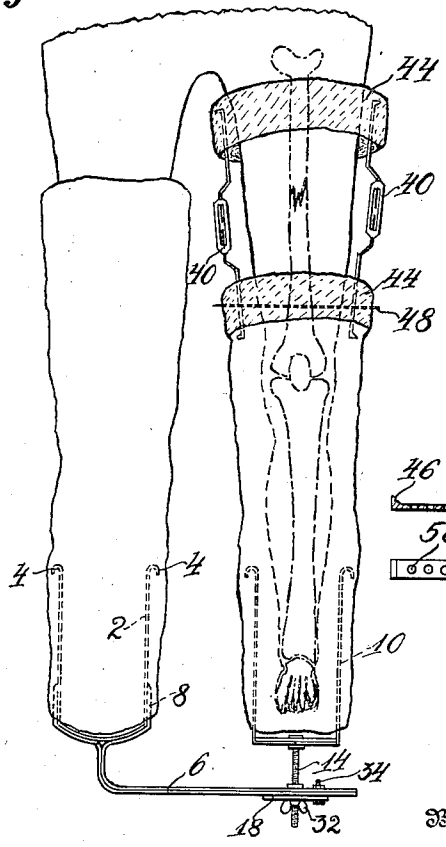


Fig. 4

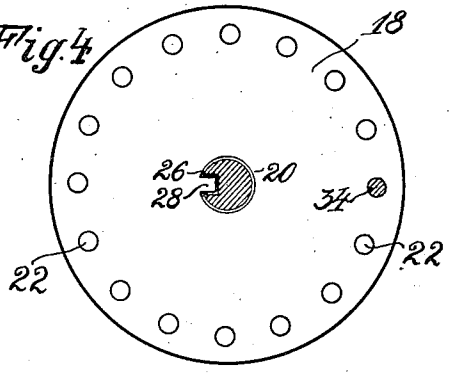


Fig. 5

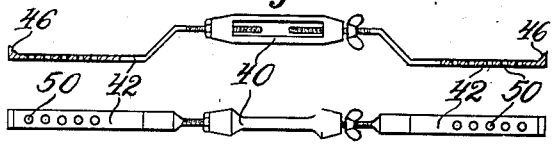


Fig. 6

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SPLINT

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7 Claims. (Cl. 128—84)

The present invention relates to surgical splints and particularly to such splints which are used for the treatment of fractures of the legs of a human body. The invention specifically relates to that type of splint, commonly called "well-leg splint" in the application of which both the fractured and the sound or "well" leg are immobilized and the sound leg is used as a support for the injured leg and the splint, as a base for the adjustment of the fractured bones, and as a support intended to bear the traction which is applied to the injured leg by means of the splint for a proper reduction of the fracture.

The invention further relates to devices to be used in cooperation with a splint as above described which are applied to the injured leg for supplementary adjustment of the fractured bones, to insure that they assume and retain their natural and correct position and to facilitate the knitting and healing thereof.

The new splint according to my invention is particularly designed to be used in certain types of unilateral fractures of the pelvis, in fractures in and around the hip joint, and, particularly when used in combination with the supplementary splint or adjustment device according to the present invention, in fractures of the shaft of the femur.

The principal object of the present invention resides in providing a splint of the type described above which is easily applied to the sound and to the injured legs, which is of simple and inexpensive construction.

Another object of the invention is to provide a splint of this type with means which greatly facilitate and ensure proper adjustment of the injured bones, thereby reducing the time of convalescence of the injured person.

I am aware of the fact that various kinds of splints of the "well-leg" type are known and used in actual practice. I have found, however, that these known constructions are generally impractical, difficult to adjust, expensive and cumbersome. I have also found that the adjustment devices of these known splints are often inefficient in operation and insufficient to straighten the contorted limbs so that they assume their normal and natural position.

To overcome these deficiencies, I have designed the present device which consists in its preferred form of construction of a large brace or bow which is securely fixed to the uninjured or "well" leg. Another or "traction" bow is secured in a similar manner to the injured leg and is connected to the well-leg bow through adjustable devices which act as spacing means and normally exert a pulling force upon the injured leg.

More specifically, an important object of the invention resides in providing an adjustment device which permits the rotation of the traction bow at various angles with respect to the well leg after the application of the entire device to the legs of the injured person, and a safe securement of this adjustment device, and of the injured leg, after its turning to the correct position.

Another object resides in providing a supplementary adjustment device or splint which is designed to cooperate with the main splint, to allow better and easier adjustment of the fractured bones, to accelerate the healing process and to reduce the time of hospitalization.

Other objects residing in the combination of parts, details of construction and the operation of the entire device will be apparent from the following detailed description and the drawing in which:

Fig. 1 is a front view of my invention in which certain elements are shown broken away to reduce the size thereof while other parts are shown in cross-section.

Fig. 2 illustrates an extension for the traction bar, shown in Fig. 1, in cross-section.

Fig. 3 is an enlarged cross-section along lines 3—3 of Fig. 1.

Fig. 4 is a view similar to Fig. 3 showing a modification of the traction bolt and the rotation disk.

Figs. 5 and 6 show a supplementary splint or adjustment device according to my invention in front and side views, respectively, which is used in combination with the main splint shown in Fig. 1.

Fig. 7 is a diagrammatic view illustrating the application of my new splint and of the supplementary adjustment device, shown in Figs. 5 and 6, to the legs of a person.

Referring to the drawing more in detail, 2 indicates a bow which is secured to the sound or well leg by means of a cast of plaster or similar material as shown in Fig. 7. The two arms of this well-leg bow 2 have turned-over portions 4 at their upper ends which act as anchors to prevent the withdrawal or loosening of the bow in the cast. A traction bar 6 having a bifurcated end portion 8 rigidly secured to the well-leg bow 2 is made of resilient material, such as steel, to act as a traction

spring. A traction bow 10 of a construction similar to well-leg bow 2 is secured to the injured leg likewise by means of a cast and turned over portions 4. A series of holes 12 are provided in the arms of this bow 10 for the insertion of bone pins, if required. A traction bolt 14, having screw threads thereon, is centrally secured at its upper end to traction bow 10 and passes through a hole 16 in traction bar 6, which permits rotation of bolt 14 relative to the traction bar. A rotation disc 18 having a central hole 20 therein through which traction bolt 14 passes, is provided with series of smaller holes 22 near the periphery thereof. Traction bar 6 carries similar holes 24 which, when disc 18 is properly adjusted, communicate with holes 22 of the disc. Traction bolt 14 may be made of flattened cross-section as shown in Fig. 3, or may be provided with a groove 26 as shown in Fig. 4, while hole 20 of disc 18 may be made of a shape corresponding with the cross-section of the traction bolt to prevent its rotation relative to the bolt. In the modification shown in Fig. 4, disc 18 is provided with a key portion 28 which slidably fits into groove 26 of bolt 14. Nuts 30 and 32 adjustably secure bolt 14 to traction bar 6 and prevent its movement in vertical direction with respect to the traction bar. Screw bolts 34 are inserted either through one or both holes 24 of traction bar 6 and through one or diametrically opposite holes 22 of disc 18 which communicate with holes 24. It is obvious that by simply removing screws 34 and after loosening screw 32, it is possible to rotate traction bow 10 together with rotation disc 18 and to secure the latter, and therefore also traction bow 10 and the injured leg, in its new position. It is also obvious that any number of holes 22 may be provided in rotation disc 18 to allow adjustment of the leg at various angles of rotation.

If it is desired to place the legs at a larger distance from each other than that shown in Fig. 1, bolt 14 may be inserted and secured in hole 16*a* at the end of traction bar 6. Still larger distances can be obtained by lengthening bar 6 by means of an extension bar 36 which may be attached to bar 6 by screws 38. To make various adjustments possible, a plurality of holes 16*b* for the insertion of bolt 14 and holes 24*a* for screws 34 are provided in this extension as shown in Fig. 2.

As pointed out above, traction bar 6 is made of resilient material and acts as a traction spring. If, therefore, traction bow 10 is drawn toward traction bar 6 by tightening of screw 32, traction bow 6 will exert a constant traction or pulling force upon the injured leg.

In the case of a fracture of the shaft of the femur, additional support and adjustment is often desirable. To attain this end, I provide turnbuckle arrangements as shown in Figs. 5, 6 and 7. Each of these supplementary adjustment devices may consist of a turnbuckle 40 which permits relative adjustment of angular bars 42. Rings of plaster 44, 44 may be provided on the injured leg above and below the fracture, respectively, and the end portions of bars 42 may be embedded therein. Projections 46 at the outer ends of bars 42 assure a better securement within plaster rings 44, 44. Bone pins 48 may also be passed through holes 50 of bars 42 to secure the fractured bones in position. In fractures of this type the injured leg is suitably placed in a plaster cast which extends from a point between the knee and the fracture to the sole of the foot. In such a case, the lower end portions of bars 42 are embedded in the upper end of the plaster cast which terminates in the plaster ring 44. The turnbuckles 40 and plaster ring 44 are thus rigidly secured to the main cast and the main splint. It will be obvious from the drawing that by tightening or loosening the two turnbuckles, the two portions of the fractured bone can be adjusted and straightened, and that the pull or traction exerted by the main splint can be amplified near the place of the fracture. In order to facilitate the adjustment of turnbuckles 40, bars 42 are bent at an angle and away from the fractured leg. This construction also permits an adjustment when larger portions of the upper leg are encased in a plaster cast than those shown in Fig. 7.

It is evident from the above disclosure that the special advantages of the present invention, particularly when compared to the known constructions of this type, chiefly reside in simplified, safer and more efficient construction, operation, and application to the legs of an injured person, that the costs of production of the device are considerably reduced due to its simplicity, and that furthermore, because of its efficiency of operation, the patient is subjected to less pain, the danger of reduction is avoided and the time of hospitalization reduced to a minimum.

What I claim is:

1. A splint comprising two elements each adapted to be secured to one of the legs of the human body, an arm of resilient material rigidly connected with one of said elements, and angularly adjustable means for connecting the other element to said arm.

2. A splint comprising two elements each adapted to be secured to one of the legs of the human body, an arm of resilient material rigidly connected with one of said elements, and angularly adjustable means for connecting the other element to said arm, said connecting means comprising a member secured to said second element and rotatable with respect to said arm, a second member mounted on said first member and non-rotatable with respect thereto, and means for securing said second member to said arm in any of a plurality of angular positions with respect to said arm.

3. A splint comprising two elements each adapted to be secured to one of the legs of the human body, an arm of resilient material rigidly connected with one of said elements, and angularly adjustable means for connecting the other element to said arm, said connecting means comprising a member secured to said second element and rotatable and slidable with respect to said arm, a second member mounted on said first member and slidable but non-rotatable with respect thereto, means for adjusting said first member longitudinally with respect to said arm, and means for securing said second member to said arm in any of a plurality of angular positions with respect to said arm.

4. A splint comprising two elements each adapted to be secured to one of the legs of the human body, an arm of resilient material rigidly connected with one of said elements, said arm having an opening therein, a member secured to said second element and passing through said opening, a disc non-rotatably mounted on said member adjacent said arm, said arm and disc

forming adjusting parts, one of said parts having a plurality of angularly spaced openings therein at equal distances from said first opening, the other part having at least one opening at the same distance from said first opening, and releasable means passing through the openings in both the parts for securing the parts together so as to permit angular adjustment therebetween.

5. A splint comprising two elements each adapted to be secured to one of the legs of the human body, an arm of resilient material rigidly connected with one of said elements, said arm having an opening therein, a member secured to said second element and passing through said opening slidably and rotatably with respect to said arm, a disc slidably but non-rotatably mounted on said member adjacent said arm, means for adjusting said member longitudinally with respect to said arm, said arm and disc forming adjusting parts, one of said parts having a plurality of angularly spaced openings therein at equal distances from said first opening, the other part having at least one opening at the same distance from said first opening, and releasable means passing through the openings in both the parts for securing the parts together so as to permit angular adjustment therebetween.

6. A splint comprising two bifurcated elements each adapted to be secured to one of the legs of the human body, an arm of resilient material rigidly connected with one of said elements, said arm having an opening therein, a rod rigidly secured to said second element and passing through said opening slidably and rotatably with respect to said arm, a disc slidably but non-rotatably mounted on said rod adjacent said arm, said disc having a plurality of angularly spaced openings therein at equal distances from said first opening, said arm having at least one opening at the same distance from said first opening, releasable means passing through the openings in both said arm and said disc for securing the parts together so as to permit angular adjustment therebetween, and means for adjusting said rod longitudinally to said arm and said disc.

7. A splint comprising two bifurcated elements each adapted to be secured to one of the legs of the human body, said elements having hook portions at their upper ends adapted to be secured within a plaster cast, an arm of resilient material rigidly connected with one of said elements, said arm having an opening therein, a non-circular threaded rod rigidly secured to said second element and passing through said opening slidably and rotatably with respect to said arm, a disc having a non-circular central opening therein, said rod passing through said central opening and vertically slidable but non-rotatable with respect thereto, said disc having a plurality of angularly spaced openings therein at equal distances from said first opening, said arm having at least one opening therein at the same distance from said first opening whereby the openings in said disc may be selectively registered with at least one of the openings in said arm when said rod and disc are rotated with respect to said arm, releasable means passing through the registering openings in said arm and disc for securing the parts together, and a pair of nuts threaded on said rod adjacent said arm and said disc, respectively, for adjustably securing said rod longitudinally to said arm and disc.

RUFUS L. RAIFORD.