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TRACTION SPLINT

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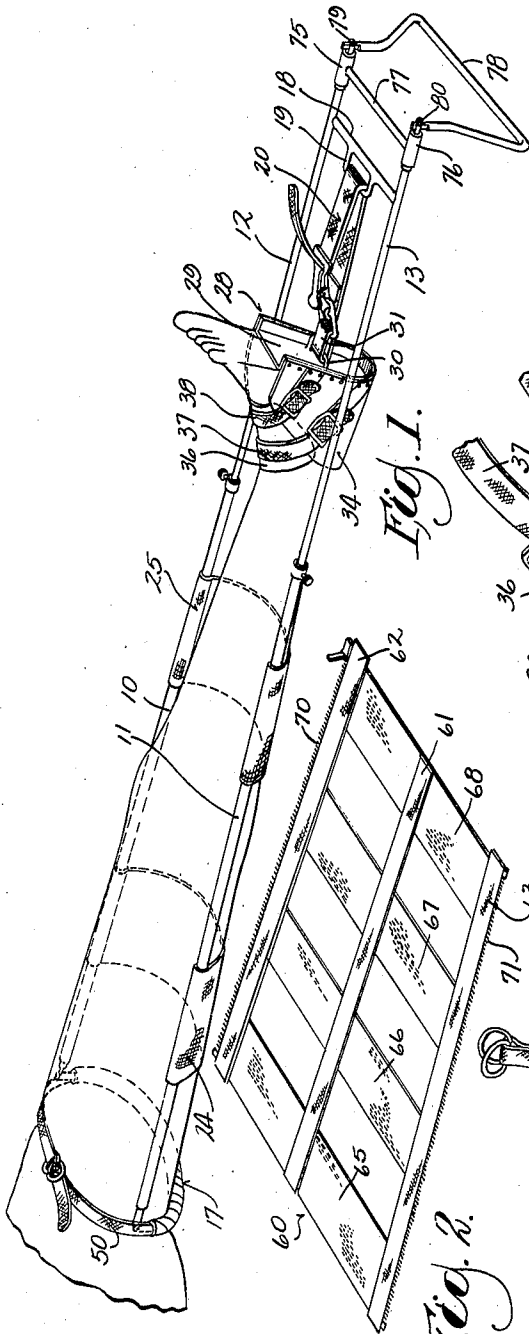


Fig. 1.

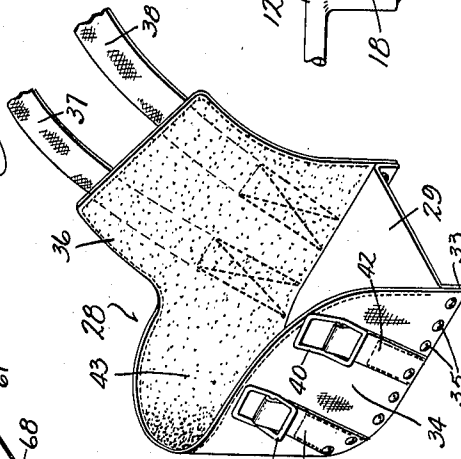


Fig. 2.

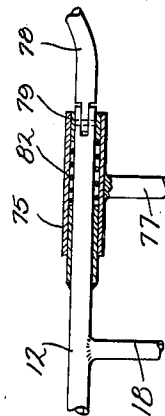


Fig. 3.

Fig. 4.

Fig. 5.

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TRACTION SPLINT

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6 Claims. (Cl. 128—84)

This invention relates to improvements in traction splints.

It is a primary object of the invention to provide a simple, light-weight, readily portable splint, particularly adapted for first aid emergency use, such, for example, as in ambulance service, as well as for hospital care.

Another object of the invention is to provide a light-weight, telescopically adjustable traction splint with improved means for the positive application of a traction force to a fractured limb, said means being independent of gravity, not dependent upon crank mechanism, and not apt to be rendered inoperative under rough treatment during transportation or use.

A further object is to provide a traction splint with a split sleeve of resilient material, said sleeve being adapted to encircle the frame of the splint and the leg of a user to effect comfortable support for the fractured limb, with a minimum of shock transmission to the fracture during transportation of the patient. In other words, a part of the splint, adapted to encircle the user's leg and be joined by slide fastener means, is provided with inherent tension of a predetermined magnitude at the factory, said tension being applied to the user's leg upon application of the part.

A further object resides in the provision of improved means for supporting the free end of the device above the body supporting surface, when desired.

Still another object is to provide improved means for securing the upper end of the device to the thigh of a patient.

Further objects are to improve and simplify traction splints for one or more of the objects above stated, especially as applied to traction splints adapted for portable use, while still other objects will be apparent to those skilled in the art upon an examination of the drawing, specification and claims.

In the drawing:

Figure 1 is a view in perspective of the improved traction splint in use.

Figure 2 is a perspective view of an improved elastic bandage adapted to encircle the leg of a patient.

Figure 3 shows, partly in section, the construction of an improved thigh engaging band.

Figure 4 illustrates a preferred foot receiving saddle in perspective.

Figure 5 is a fragmentary detail, partly in section, of the tilting and locking mechanism associated with the free end supporting bracket.

Like parts are identified by the same reference characters throughout the several views.

As shown in Figure 1, the device includes a pair of elongated rigid tubular members 10 and 11, having reduced elongated rigid members 12 and 13, respectively, telescopically joined therewith to provide longitudinal adjustment of the device to permit use on legs of varying sizes and to minimize length during storage. As shown in Figure 3, members 10 and 11 may be of unequal length to position an interconnecting semi-circular spacer strap 17, diagonally in conformity with the shape of the upper thigh at the crotch and under the buttocks of the patient. Strap 17 is pivotally connected to the members to permit use on either leg.

A cross bar 18 connects outer portions of rods 12 and 13 near the ends thereof, said bar being provided with a bracket 19 through which a footman strap 20, later described, projects. Tubular members 10 and 11 are connected by webbing slings 24 and 25, having hemmed margins mounted in slidable relation in respect to the members to allow the desired positioning thereof as governed by the size and shape of the patient's leg.

A boot 28, which may be applied directly to a patient's foot or over his shoes, has a U-shaped base portion 29 provided with an outwardly extending bracket 30 engaged by a loop 31, which provides a connection between the footman strap 20 and the stirrup. Base portion 29 is preferably of metal to withstand the tensioning strains of the footman strap. Portion 29 has depending marginal flanges 33 to which a leather counter portion 34 is fastened by rivets 35 to project upwardly therefrom.

Counter portion 34 has an integrally extending portion 36 forming an instep flap and carrying straps 37 and 38 for engagement with buckles 39 and 40, respectively, said buckles being anchored by means of straps 41 and 42 to flange 33 by suitable rivets. The boot is provided with a heavy felt lining 43. During use, the heel and instep portion of a patient's foot is disposed within the boot, with straps 37 and 38 encircling the instep exteriorly of the instep flap, which extends over the instep to engage the opposite side of counter portion 34.

Because the patient's thigh rests on sling 24 and a portion of the leg below the knee rests on sling 25, the leg is longitudinally supported, and the traction tension applied to the boot provides positioning of the foot. Either the footman strap 20 or the connecting link 31 is of elastic material for the purpose of absorbing shocks during

transportation of the patient and to provide adjustable traction against the pull of the leg muscle for maintaining the fractured bones in proper alignment, said traction force being regulated through adjustment of the footman strap.

Because the tension of strap 20 tends to displace the device in a downward direction along the leg of the patient, it is important to provide means at the upper end of tubular members 10 and 11 which will positively prohibit such displacement with a minimum of discomfort to the patient. To accomplish this purpose, semi-circular spacer bar 17 includes a metallic strip portion 45, having the ends thereof pivoted at 46 and 47 to the upper end of tubular members 10 and 11, respectively.

A flexible strap 50 extends along metallic portion 45 between the pivoted ends thereof to strengthen the binding ring for the traction pull. A tube-like housing 51 of resilient material, which may be a section of rubber hose, encloses both the metallic portion 45 and the strap 50, a suitable winding of tape 52 being preferably applied about the hose to prevent displacement of the hose and strap. Strap 50 is preferably provided with a pair of rings for the tightening thereof about the patient's thigh in order to permit the release of the thigh without movement of the limb. Strap 50 and the hose-like conduit 51 are so positioned with respect to the metal yoke 45 that no metal contacts the patient during use, regardless of tension applied to the structure. Moreover, the entire yoke and associated parts are reversible upon the pivotal connection of the yoke with the side members of the splint so that the splint may be inverted for use on either leg with its shorter side innermost in either case. The whole apparatus is symmetrical for use with either side uppermost.

After the leg has been disposed within the device, slings 24 and 25, and saddle boot 23 properly adjusted, strap 50 tightened, and the proper amount of tension applied to the footman strap 20, a resilient retaining sleeve 60 (Figure 2) is applied about the leg, said bandage extending from a portion of the thigh below the crotch to a position substantially at the ankle of the patient. Sleeve 60 includes a longitudinal center strip 61 and side marginal strips 62 and 63, all of which are preferably non-elastic, the side marginal strips being convergent toward the patient's ankle; and a plurality of elastic cross strips 65, 66, 67 and 68.

Strips 62 and 63 are provided at the outer margins thereof with slide fastener means 70 and 71, adapted for mutual engagement along one of the members 10, 11, during use, the center longitudinal strip 61 being disposed along the opposite tubular member. Preferably the sleeve is applied in a manner whereby cross strap 65 encircles the thigh intermediate the knee and the crotch, strap 66 encircles the knee, strap 67 encircles the calf, and strap 68 encircles the ankle. The cross straps are preferably of a webbing material, having sufficient elasticity and at the same time sufficient tension to hold the patient's leg snugly, regardless of variation of leg sizes within a normal range for which the splint as a whole is adapted. While the bandage is possessed of insufficient tension to detrimentally retard blood circulation, it may quickly and easily be periodically removed to promote the user's comfort, or replaced for cleaning, which is an important feature of the bandage. If swelling occurs at the

point of fracture the sleeve expands to prevent stoppage of blood circulation.

The outer terminal of slide members 12 and 13 are provided with spring-pressed sleeves 75, 76, connected by a cross bar 77. A supporting stirrup 78 is pivoted at 79 and 80 to the terminal of slide rods 12 and 13, respectively, said spring-pressed sleeves 75, 76 being biased into a position to prevent relative pivoting of the stirrup in respect to the rods when the stirrup arms are aligned with the rods, as shown in Figure 5, and to maintain the stirrup in right angular relation to rods 12, 13 when the stirrup is moved to the position shown in Figure 1, to maintain the user's foot above the supporting surface.

The stirrup may easily be changed from one position to the other by movement of rod 77 and the connected sleeves 75 and 76 toward the footman strap to compress helical springs 82 carried within sleeves 75, 76 intermediate suitable abutments. The stirrup may also be positioned to extend upwardly from rods 12, 13 in right angular relation thereto, as, for example, when it is desirable to support the outer end of the device by hanging. The stirrup is preferably aligned with the telescopic rods, whereby the device requires a minimum of storage space.

The reduced extremities of the stirrup 78 are received into notches in the ends of the bars 12, the notches being sufficiently deep to receive the portions of the stirrup which project beyond the fulcrum pins 79 and 80 so that, when the stirrup is aligned in the plane of the brace, the diameters of the brace bars and the stirrup extremities are approximately uniform over all and the sleeves 75 and 76 engage over the extremities of the stirrup to preclude pivotal movement thereof with respect to the brace rods 12 and 13. When, on the other hand, the stirrup is turned to either of its right angle positions respecting the brace, as shown in Fig. 1, the ends of the sleeves 75, 76 will laterally engage the stirrup extremities both above and below the respective fulcrum pins 79, 80, thereby again fixing the stirrup in position.

The above described improved traction splint is adapted to be manufactured at low cost, to require a minimum of storage space, to operate efficiently on patients with varying leg sizes, and to be particularly applicable in emergency or field work or hospitals, where the normal hospital facilities are not immediately available. The device is particularly adapted to be constructed of one of the recently developed light weight but strong alloys, reduction in weight being extremely important in some instances, especially when transported by aeroplanes, or when forming a part of a medical kit to be manually carried. It is highly important that the device is so constructed that it will properly operate even when the patient must lie on the ground for an extended period of time.

I claim:

1. A device of the character described including a framework having a pair of elongated rods and means maintaining the rods in spaced relation, adjustable supporting means at one end of the frame, said means comprising a supporting stirrup provided with pintle means spaced from its extreme ends and pivotally connecting the stirrup to the rod ends, whereby to allow positioning of the stirrup either in the plane of the rods or in a plane normal thereto, and means slidable in respect to the rods and engageable about the pivoted ends of the stirrup when the

stirrup is moved to the plane of the rods, whereby to lock the stirrup in respect to the rods, said slidable locked means being adapted to abut the pivoted portions of the stirrup at both sides of the pivot pintles when the stirrup is normal to the plane of the rods.

2. The device of claim 1, wherein said stirrup locking means comprise sleeves loosely mounted on the rods adjacent to the stirrup pivot, and spring means disposed within each sleeve to urge the sleeve toward the stirrup, whereby said sleeves are biased to at least partially enclose the pivotal connection to lock the stirrup in respect to the rods when the stirrup is brought into the plane of the rods, said sleeves abutting side portions of the stirrup when the stirrup is normal to the plane of the rods.

3. A traction splint comprising an elongated frame having side members between which the leg of the patient is positioned, a cross brace spacing said members below the patient's foot, and means for binding the opposite end of the frame to an upper thigh portion, sleeves slidable with respect to the side members near the end thereof below the cross brace, a supporting stirrup having spaced ends pivoted at points inset from their extremities to the respective ends of said side members adjacent the slidable sleeves, the said side members and stirrup ends having mutually recessed portions in engagement adjacent their pivotal connection and being of substantially uniform overall diameter whereby to permit the sliding of the sleeves over the adjacent pivoted portions of the stirrup ends when said ends are aligned with said side members, and means biasing said sleeves toward the pivoted stirrup ends, whereby to provide means for locking the stirrup in the plane of the side members or in a plane normal thereto.

4. An extensible splint applicable alternatively to the patient's right or left leg and comprising the combination with a substantially planiform frame comprising side tubes and rods telescopically adjustable therein and a cross connection between said rods at their outer ends, of a saddle pivoted to the tubes of said frame adjacent the ends thereof remote from said rods and movable between operative positions substantially at right angles to the plane of the frame and projecting alternately at opposite sides thereof, said saddle including an oblique offset whereby its respective pivotal connections to said tubes are offset longitudinally of the frame for shortening one side of the frame at the inside of either leg of the patient, according to which side of the frame is uppermost, sling means connected between said tubes and affording sufficient slack to receive a patient's leg between said tubes, said sling means being flexibly invertible to project downwardly irrespective of the inclusion of the frame, means associated with the respective tubes for holding the telescopically extensible rods in adjustment, a boot between said rods adapted for connection with a patient's foot, traction means invertibly connected with the cross connection between said rods and connected with said boot, whereby said boot may be applied operatively to the patient's foot in either operative position of the

frame, and a supporting bracket for the outer ends of the rods in pivotal connection therewith for movement between positions of projection from opposite sides of said rods at substantially 90 degrees to the plane of said frame, said bracket having an intermediate position substantially in said plane, and sleeves retractibly slidable upon said rods into engagement with portions of said bracket and releasably adapted to maintain said bracket selectively in any of said three positions, of a split sleeve comprising elastic web means adapted to extend under predetermined tension about said tubes and the intervening leg of a patient supported on said slings, said web means being of such peripheral extent as to be incapable of enveloping the patient's leg without stretching and being provided with free end portions having complementary slide fastener elements extending longitudinally of the frame for the connection and tensioning of said web means, and a slide fastener operatively associated with one of said elements for engagement with the other.

5. A traction splint comprising an elongated frame having side bar members between which a patient's limb is positioned, means connecting said side bars members at longitudinally spaced points, at least one such connecting means being offset from the plane of said members to receive the patient's limb, flexible slings connected with the respective members and of such length as to sag therebetween, whereby to provide support for the patient's limb when the limb is disposed between the members, and a resilient sleeve applicable about the patient's limb and the side rods and slings, said sleeve comprising a pair of completely detachable tapes provided with slide fastener connection substantially throughout their length, said tapes registering with one of the side rods of said frame, a third tape registering with the other side rod of said frame, and a plurality of resiliently yieldable cross members connected at their ends to the tapes first mentioned and centrally connected to said third tape and extending about the patient's limb and the respective side bars under tension, whereby to position the patient's limb between the side bars cooperatively with the support provided the limbs by said slings.

6. A surgical leg splint comprising a rod adapted to extend along each side of the leg from the upper thigh to a position below the foot, thigh encircling strap means engaging the upper rod ends to prevent displacement of the rods under tension, tension means adapted for connection between the foot and the rods to extensibly bias the leg against the contraction of the muscles therein, leg supporting slings mounted intermediate the rods and adjustably axially thereof, and a resilient sleeve applicable about the leg to enclose the rods and said leg supporting slings, said sleeve comprising longitudinal members adapted to be positioned along the rods and a plurality of resilient cross members connecting the longitudinal members and adapted to resiliently position the leg in respect to the rods and slings.

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