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2,808,052

TRACTION BRACE

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2 Sheets-Sheet 1

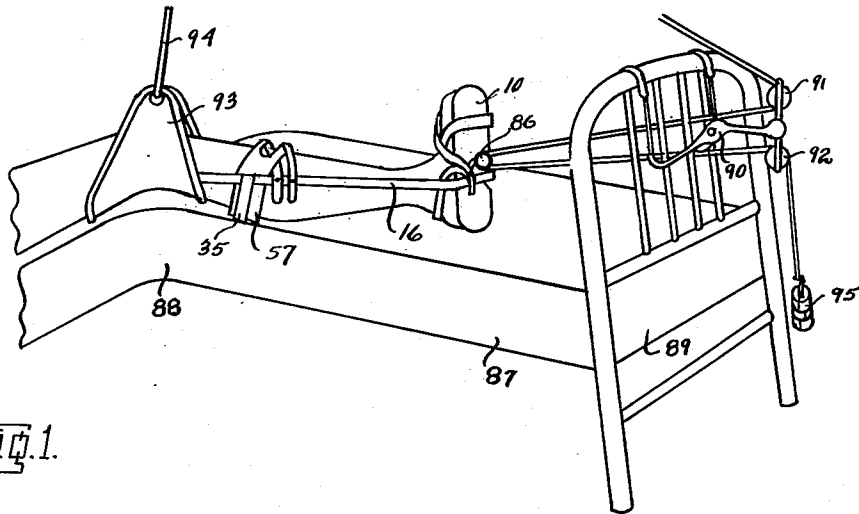


Fig. 1.

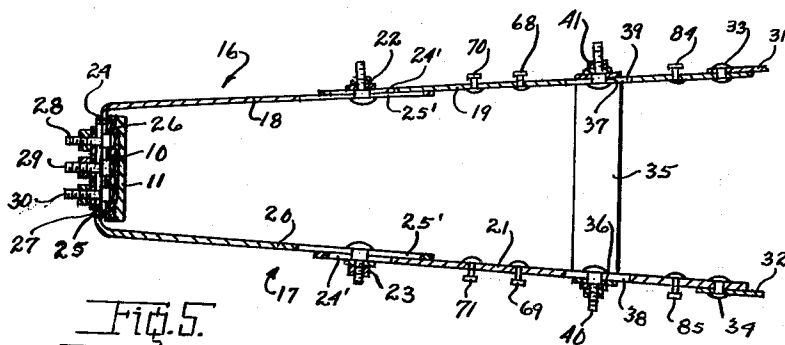


Fig. 5.

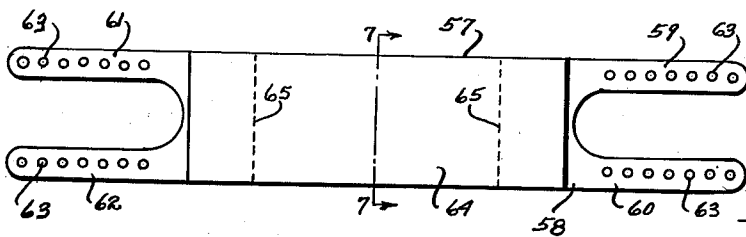


Fig. 6.

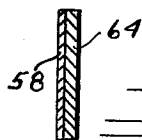


Fig. 7.

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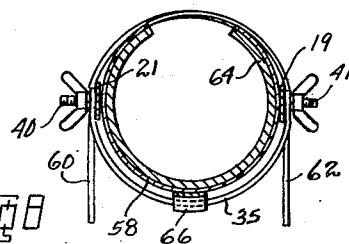
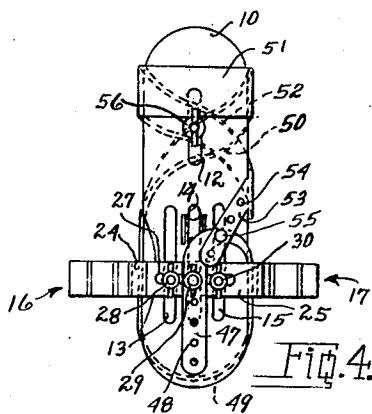
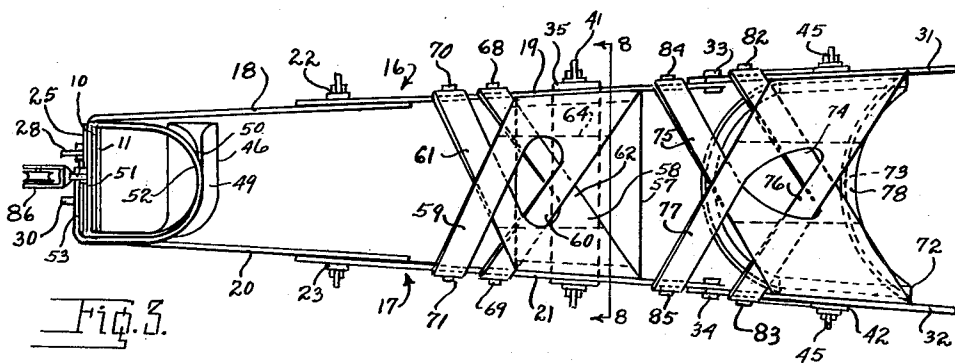
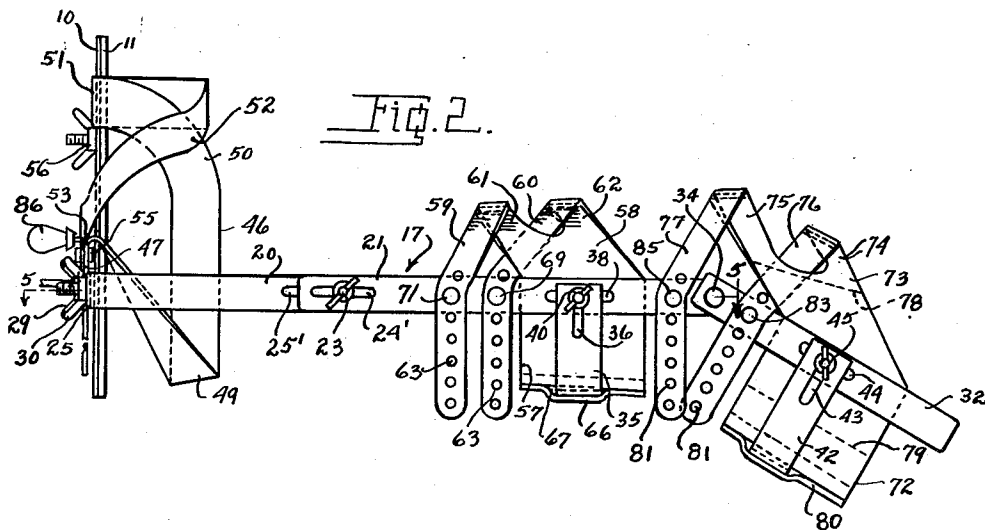
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2 Sheets-Sheet 2



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TRACTION BRACE

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5 Claims. (Cl. 128—85)

This invention relates to improvements in a traction brace, that is, a brace for attachment to the leg of a patient so that a traction weight may be applied thereto.

It has been found that patients complaining of low back pain while possibly having sciatic involvement most probably have a disc injury with probable protrusion which must be treated to obtain relief. While a number of patients thus afflicted may be relieved and possibly cured by other treatments, such as rest, reclining on a hard bed, that is, with a board beneath the mattress, casts or a brace around the afflicted portion of the back, a large number of patients require the traction treatment.

In the past the use of traction was applied directly to the leg of the patient and a weight of five to ten pounds employed; this direct application may be and is generally called "skin traction." In this operation the leg is shaved, washed with soap and painted with a tincture of benzoin. Skin plaster tapes were then applied directly to the skin and elastic bandages were likewise utilized for relatively immobilizing the leg and to provide a means whereby the weight is attached to the patient's foot. This method of traction was often complicated with irritation of the skin from the skin plaster tapes and the swelling of the ankles due to the pressure of the elastic bandage or bandages, and in a number of cases allergic reaction to the plaster tapes resulted. A dermatitis with blister and painful sensation often resulted and the traction had to be removed so that treatment for the dermatitis for a few days could be given. This was time consuming and expensive to the patient due to loss of time from work and the extended hospitalization.

By the present invention there is provided a brace which can be applied to a patient's leg to obtain the desired results without any of the above detrimental effects and yet obtain the same or greater results.

It is, therefore, the principal object of the present invention to provide a traction brace for application to the leg through which the traction weights are attached.

A further object of this invention is to provide a traction brace for accomplishing the foregoing object that is adjustable to a large variety of sizes so that a large number of patients with different sized legs may be accommodated and whereby the brace is re-usable instead of having a one-time use as the previous practice.

A further object of this invention is the provision of a traction brace that will accomplish the foregoing objects that is extremely light in weight for thereby reducing to a minimum any discomfort that may accompany the use of the brace.

A further and specific object of the present invention is the provision of a traction brace that can be applied in a minimum of time to the patient and does not require any preparation of the skin of the patient in order to use or wear the brace, the brace being securely fastened in position by flexible means that in no wise interferes with nerve cords or centers, blood flow or vessels, utilizing instead the muscles of the patient for the attachment

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thereof and through which a minimum of discomfort to the patient results.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification considered in conjunction with the accompanying drawings forming a part thereof and it is to be understood that any modifications may be made in the exact structural details there shown and described, within the scope of the appended claims, without departing from or exceeding the spirit of the invention.

In the drawings:

Fig. 1 is a semi-diagrammatic view illustrating the traction brace of the present invention in operation.

Fig. 2 is a side elevation of the traction brace of the present invention.

Fig. 3 is a top plan view of the traction brace of Fig. 2.

Fig. 4 is an end elevation of the traction brace as seen from the left hand end of Figs. 2 and 3.

Fig. 5 is a longitudinal sectional view through the major portion of the traction brace as seen from line 5—5 on Fig. 2, the lacings being omitted for clearness in illustration.

Fig. 6 is a plan view of a brace attaching member which may be termed a lacing.

Fig. 7 is a transverse sectional view through the lacing of Fig. 6, as seen from line 7—7 on said Fig. 6.

Fig. 8 is a transverse sectional view through the brace as seen from line 3—3 on Fig. 3.

Throughout the several views of the drawings, similar reference characters are employed to denote the same or similar parts.

The traction brace of the present invention comprises a foot or sole member or plate 10 which may take any appropriate form in plan, such as illustrated in Fig. 4, and to which is secured, for the comfort of the patient, a relatively soft lining 11. Extending through the foot or sole plate 10, longitudinally and downwardly of the toe thereof, is an elongated aperture 12 while extending through the said plate 10, longitudinally and upwardly of the heel thereof, are, preferably, three elongated apertures 13, 14 and 15. The plural elongated apertures 13—15 are to insure complete anchorage of the parts and it is to be understood that a single central aperture, such as 14, is all that is really needed except for this condition.

Extending upwardly from each side of the foot or sole plate 10 is a brace side, respectively indicated, each as a whole, as 16 and 17. The brace side 16 is composed of a lower element 18 and an upper element 19, and the brace side 17 is similarly composed of a lower element 20 and an upper element 21. As seen in Fig. 3, the elements of the brace side 16 are overlapped and secured in such position by a wing or thumb nut 22 and the elements of the brace side 17 are similarly overlapped and secured in overlapped position by a wing or thumb nut 23. The overlapping of these parts is variable, wherefore, each of the side brace upper elements is provided with an elongated aperture 24 while the lower elements of each side brace is provided with an elongated aperture 25. It is through the said apertures that the clamp bolts 22 and 23 extend.

It should be noted that the traction brace of the present invention may be used on either the right leg or the left leg, with equal facility and while the brace side 16, as will presently be described, is attached directly to the foot or sole plate 10, it is to be understood that the brace side 17 may instead be so positioned. Accordingly, the lower element 18 of brace side 16 has its lower end bent to be substantially at right angles thereto, as indicated at 24 and as seen most clearly in Fig. 3, and lies against the under surface of said foot or sole plate 10. The lower element 20 of brace side 17 likewise has its

lower end 25 bent at substantially a right angle and is disposed on the portion 24 of brace side 16. Each of these overlapped portions is provided with an elongated aperture, respectively indicated by the reference numerals 26 and 27, and are positioned so as to cross the elongated apertures 13—15 of the foot or sole plate 10.

These parts are secured to one another by means of bolts and wing nuts 28, 29 and 30, respectively, extending through elongated apertures 13, 14 and 15 and the overlapped apertures 26 and 27 of the brace sides foot sections 24 and 25.

It was stated above that the foot sections 24 and 25 of brace sides 16 and 17 are substantially at right angles, it is understood that this angle is not strictly a right angle since, as is well known, the calf of a human leg is of greater transverse dimension than the similar dimension of the foot and ankle wherefore said brace sides 16 and 17 slightly, outwardly diverge as clearly illustrated in Figs. 3 and 5. It will further be noted that through the elongated aperture 26 and 27 of the brace sides foot members 24 and 25, the said brace sides may be adjusted outwardly of one another. It will further be noted that due to the elongated apertures 13—15 in the foot or sole plate the said brace sides 16 and 17 may be unitarily actuated longitudinally of said foot or sole plate to align the said brace sides 16 and 17 with the patient's leg and at the same time have proper support on the said foot or sole plate 10.

The brace sides 16 and 17, in practice, extend from the foot or sole plate 10 to a point substantially in alignment with the knee joint and from which points extend brace thigh sides 31 and 32. The thigh side 31 is connected by a pivot 33 with the upper end of the brace side 16 while the thigh side 32 is connected with the upper end of the brace side 17 by a pivot 34. The axes of the pivots 33 and 34 are, substantially, in alignment and in use are positioned through the adjustment of the leg brace sides upper and lower elements to be in alignment with the knee joint so that the leg of the patient may be disposed at a reasonable and comfortable angle to the patient's thigh, diagrammatically illustrated in Fig. 1.

The upper ends of the leg brace sides 16 and 17 are spaced from one another through a tie or semi-cylindrical band 35. The band 35 has its ends connected to the leg brace sides upper elements 19 and 21, this connection being such that the said band is adjustable longitudinally of the said leg brace sides and toward and from said sides, or transversely of the brace. Any suitable or desirable means may be employed for effecting this connection, that seen in the drawings consisting of an elongated aperture 36 and 37 extending downwardly, respectively, from each of the upper or free ends of the band 35. The said elongated apertures 36 and 37, respectively, overlap an elongated aperture 38 and 39, respectively, extending longitudinally of said leg brace side upper element 21 and said leg brace side upper element 19. Extending through said overlapped and registering apertures are clamp bolts each with a wing or thumb nut 40 and 41.

The thigh sides 32 and 33 are similarly spaced by a tie or semi-cylindrical band 42 having extending downwardly from each of its upper ends a similar elongated aperture 43 which coincides and registers with an elongated aperture 44 in the said thigh sides 31 and 32. Clamp bolts each with a wing nut 45, and similar to clamp bolts 40 and 41, extend through the ends of the band 42 and thigh sides 31 and 32 for securing the parts to one another. The semi-cylindrical band 42, similar to the band 35, is adjustable longitudinally of the said thigh sides 31 and 32 as well as toward and from said thigh sides.

In practice, the patient's foot is strapped or secured to the foot or sole plate 10 through a suitable strap or lacing. As is illustrated in the drawings, this lacing consists of a single member 46 having at one end a tongue

47 provided with a plurality of apertures 48 through which it is attached to the central clamp bolt 29 of the foot or sole plate 10. The lacing 46 extends from the said clamp bolt 29 beneath the brace side 17 to encircle the back of the foot above the heel, as at 49. The lacing 46 then passes over the patient's instep as at 50 to extend below the foot or sole plate 10, as at 51. The lacing 46 then passes over the upper face of the foot, as at 52, whereupon the said lacing is again provided with a tongue 53 containing apertures 54. The tongue 53 is secured to the tongue 47 through a suitable securing means such as a double-headed button 55. It should be noted that the tongue securing means instead of a button may be a screw with a suitable clamping wing or thumb nut.

The portion 51 of the lacing 46, that passes beneath the foot or sole plate 10, is held in a definite position with respect to the upper part of the foot, which may be identified as at a point between the instep and toes of the patient. In order to effect this positioning of said lacing portion 51, there is provided an abutment outwardly projecting from the foot or sole plate 10. This abutment conveniently takes the form of a bolt and thumb or wing nut 56 extending through the elongated aperture 12 of the said foot or sole plate 10, wherefore said abutment is adjustable longitudinally of the said foot or sole plate for properly positioning the lacing to properly arrange the portions 50 and 52 thereof which are on the upper surface of the foot.

From the foregoing it will be readily appreciated that the foot lacing is adequately secured to the foot or sole plate and that the said lacing is adjustable longitudinally of the foot to the most appropriate position for securing the foot in its proper or desired position.

The brace sides 16 and 17 are adapted to have their upper ends secured to the patient's leg, preferably, just above the calf muscle or where the calf tapers toward the knee with the major portion of the calf below the attachment. This attachment of the said brace sides is effected through a flexible member which may be conveniently termed a calf lacing 57.

The calf lacing, as illustrated in Figs. 6 and 7, comprises a body member 58 of a tough material such as leather with its one end terminating in tongues 59 and 60 and its other end terminating in similar tongues 61 and 62. Each of the tongues 59—62 is provided with a plurality of apertures 63. Secured to the inner face of the lacing body portion 58 is a relatively soft liner 64, such as cotton wadding or the like, with said parts being secured to one another through suitable lines of stitching 65.

The lacing 57 is positioned with respect to the brace sides 16 and 17 through the tie or semi-cylindrical band 35, for which purpose the said lacing is provided with a strap 66 providing a passageway 67 therebetween through which the tie or semi-cylindrical brace 35 passes. It should be noted that this connection is a loose one so that the lacing may be adequately and securely attached to the leg without binding the leg through said band.

In practice, and as noted above, after properly positioning the tie or band 35, the lacing is secured in the following manner:

With reference to Fig. 3, the body portion 58 underlies the leg and the tongues are brought to the upper surface thereof whereupon the tongue 62 is pulled downwardly across the leg in a relatively tight clamping position and through one of its apertures 63 is secured to a button or protuberance 68 outwardly projecting from leg brace side upper element 19. The opposite tongue 60 is then downwardly and laterally extended, being in a direction opposite to that of tongue 62, whereupon and through one of its apertures 63, it is secured to a button or protuberance 69 outwardly projecting from leg brace side upper element 21. The tongue 61 is then downwardly drawn or pulled across the leg in substantially the same direction as tongue 62 and through one of its apertures 63 is secured to a

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button or protuberance 70 outwardly projecting from leg brace side upper element 19. The remaining tongue 59 is then downwardly drawn or pulled across the leg in substantially the same direction as tongue 60 and through one of its apertures 63 is secured to a button or protuberance 71 outwardly projecting from leg brace side upper element 21.

It will be noted that the lacing 57 is securely attached to the patient's leg at a point above the calf so that the downward pull and, as later will be made clear, the traction weight, is against the leg calf muscle in exerting its traction pull. It will further be noted that the lacing 57 has its tongues 59-62 overlapped with respect to one another for thereby more thoroughly and completely securing the lacing 57 against displacement.

The thigh sides tie or semi-cylindrical band 42, similar to the band 35, carries a lacing indicated in general by the reference numeral 72 which is similar to the lacing 57 except that it is longer and wider since it operates on a larger portion of the leg, namely, the thigh. The said lacing 72, therefore, comprises a body portion 73 of flexible material, preferably leather, with one end provided with tongues 74 and 75 and its other end provided with tongues 76 and 77. Secured to the inner surface of the body member 73 is a soft liner 78 in the form of cotton wadding and secured in position by one or more lines of stitching 79. The lacing 72 is retained in position by the semi-cylindrical band 42 through a strap 80 secured to the exterior of the lacing 72 and providing a passageway for the said brace in the same manner as above described for the lacing 57 and its band 35.

The lacing 72 is secured to the patient's thigh in much the same manner as the lacing 57 is secured to the patient's leg below the knee, namely, by having the tongue 74 through an aperture 81 therein secured to a button or protuberance 82 outwardly projecting from the thigh side 31. It will be noted that the tongue 74 is downwardly drawn around the thigh before being attached to its button 82. The opposite tongue 76 is similarly outwardly and downwardly drawn over the thigh and attached to a button or protuberance 83 outwardly projecting from the thigh side 32. The tongue 75 is then downwardly drawn and passes below the knee to be attached through one of its apertures to a button 84 outwardly projecting from the leg brace side upper element 19. The remaining tongue 77 is likewise downwardly drawn and, like the tongue 75, is disposed below the knee to be attached through one of its apertures to a button or protuberance 85 outwardly projecting from the leg brace side upper element 21.

It will be noted that the lacing 72, similar to the lacing 57, is secured in position under tension which extends in a downward direction or toward the patient's foot. It will further be noted that the said lacing 72 is arranged so that the pull is against the patient's knee, more particularly against the leg muscles at the back thereof and below the knee, wherefore no nerves or nerve centers or blood vessels are interfered with.

Secured to the foot or sole plate 10, preferably through the bolt and nut 29, therefore at the same point of attaching the brace sides 16 and 17, is the shank of a pulley assembly 86 and through which the traction weight is applied in the usual manner.

In Fig. 1 there is illustrated a method frequently employed for applying a traction weight to a patient's leg. As there shown, use is made of a hospital bed 87 having a break 88 substantially at the knee of the patient. Attached to the footboard 89 of the bed is a bracket 90 having mounted thereon a pair of pulleys 91 and 92. The patient's knee is conveniently, and for comfort, disposed in a sling 93 to which is attached one end of a cable 94.

In practice, the cable 94 passes over a pulley, not shown, and depending from a fixed portion of the room or a second bracket carried by the bed, with said cable 94 then passing around pulley 91 to and around pulley as-

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sembly 86 and finally to and around pulley 92, beyond which its other end carries the weight 95.

As will readily be understood since the patient is held against movement by the bed 88 and the sling 94, the weight tending to affect such movement of the patient, the weight 95 merely exerts a pull on the patient's leg, such pull is resisted by the patient with the result that there is a tendency to elongate the spinal column. This pull, or traction, effects the slight separation of the vertebra and particularly the one where the disc has been misplaced thereby relieving the pressure from the disc for, first, relieving the patient of pain and, second, permitting the disc to return to its normal natural position. It has been found that, depending upon the severity of the injury, after a period of time the said displaced and damaged disc returns to normal position and is healed by nature since the damaging pressure is relieved therefrom, and that after said period of time the patient is released to resume his normal occupation.

It will be noted that the traction brace of the present invention together with the several attaching devices or lacings all tend to cooperate with the traction weight for securing the brace in position and cause the weight to function in a normal desired manner in the treatment of the patient's back injury.

While the traction brace has been described for use with back ailments in which the vertebra disc has been displaced, it should be noted that the brace may also be employed where it is desired to have the patient partially immobilized. The brace is also employable for the correction of mild contractions and the relief of pain from muscular spasms as well as using it for traction in the condition of hip and upper femur fractures. The brace may also be used in post-operative treatment of hip prosthesis and as a splint for the leg. It will further be noted, from the foregoing, that the objects initially set forth have been accomplished.

What is claimed is:

1. A traction brace comprising a foot plate, a leg frame side secured to and upwardly extending from each side of the foot plate, means adapted to pass beneath the user's leg connecting said leg frame sides to one another at a point intermediate the foot plate and outer ends thereof, thigh frame side pivotally connected to the outer end of each leg frame side, a flexible lacing carried by the leg frame sides connecting means adapted to pass over the user's leg and secured to a point toward the foot plate on the opposite leg frame securing said leg frame sides to the leg of a user, and additional means, respectively, connecting the thigh frame sides and foot plate to the thigh and foot of the user.

2. A traction brace comprising a foot plate, a leg frame side secured to and upwardly extending from each side of the foot plate, means adapted to pass beneath the user's leg connecting said leg frame sides to one another at a point intermediate the foot plate and outer ends thereof, a flexible lacing carried by said leg frame sides connecting means adapted to pass over the user's leg and secured to a point on the foot plate on the opposite leg frame securing the leg frame sides to the leg of a user, a thigh frame side pivotally connected to the outer end of each leg frame side, means adapted to pass beneath the user's thigh connecting said thigh frame sides to one another at a point upwardly of the pivotal connections thereof with the leg frame sides, a flexible lacing carried by said thigh frame sides connecting means adapted to pass over the user's thigh and secured to a point toward the foot plate on the opposite thigh frame securing the thigh frame sides to the thigh of the user, and means for securing the foot plate to the foot of the user.

3. A traction brace comprising a foot plate, a leg frame side secured to and upwardly extending from each side of the foot plate, means adapted to pass beneath the user's leg connecting said leg frame sides to one another at a

point intermediate the foot plate and outer ends thereof, a flexible lacing carried by said leg frame sides connecting means adapted to pass over the user's leg and secured to a point on the foot plate on the opposite leg frame securing the leg frame sides to the leg of a user, a thigh frame side pivotally connected to the outer end of each leg frame side, means adapted to pass beneath the user's thigh connecting said thigh frame sides to one another at a point upwardly of the pivotal connections thereof with the leg frame sides, a flexible lacing carried by said thigh frame sides connecting means adapted to pass over the user's thigh and secured to a point toward the foot plate on the opposite thigh frame securing the thigh frame sides to the thigh of the user, and a flexible lacing carried by the foot plate for securing the foot of the user to said foot plate.

4. A traction brace comprising a foot plate, a leg frame side secured to and upwardly extending from each side of the foot plate, means adapted to pass beneath the user's leg connecting said leg frame sides to one another at a point intermediate the foot plate and outer ends thereof, a flexible lacing carried by said leg frame sides connecting means adapted to pass over the user's leg and secured to a point on the foot plate on the opposite leg frame securing the leg frame sides to the leg of a user, a thigh frame side pivotally connected to the outer end of each leg frame side, means adapted to pass beneath the user's thigh connecting said thigh frame sides to one another at a point upwardly of the pivotal connections thereof with the leg frame sides, a flexible lacing carried by said thigh frame sides connecting means adapted to pass over the user's thigh and secured to a point toward the foot plate on the opposite thigh frame securing the thigh frame sides to the thigh of the user, a flexible lacing carried by the foot plate for securing the foot of the user to said foot plate, each of said leg frame sides leg and thigh frame sides securing lacings including apertured tongues, and outwardly projecting protuberances from said leg and thigh frame sides for reception in said lacing tongues apertures.

5. A traction brace comprising a foot plate, a leg frame

side secured to and upwardly extending from each side of the foot plate, means adapted to pass beneath the user's leg connecting said leg frame sides to one another at a point intermediate the foot plate and outer ends thereof, a flexible lacing carried by said leg frame sides connecting means adapted to pass over the user's leg and secured to a point on the foot plate on the opposite leg frame securing the leg frame sides to the leg of a user, a thigh frame side pivotally connected to the outer end of each leg frame side, means adapted to pass beneath the user's thigh connecting said thigh frame sides to one another at a point upwardly of the pivotal connections thereof with the leg frame sides, a flexible lacing carried by said thigh frame sides connecting means adapted to pass over the user's thigh and secured to a point toward the foot plate on the opposite thigh frame securing the thigh frame sides to the thigh of the user, a flexible lacing carried by the foot plate for securing the foot of the user to said foot plate, each of said leg frame sides leg and thigh frame sides securing lacings including apertured tongues, outwardly projecting protuberances from said leg and thigh frame sides for reception in said lacing tongues apertures, and said foot plate securing lacing terminating in apertured tongues, a protuberance associated with the foot plate receivable in said tongues apertures for securing same in position.

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