

Dec. 4, 1962

G. T. DERBY
LEG AND FOOT SUPPORT

3,066,322

Filed March 8, 1960

2 Sheets-Sheet 1

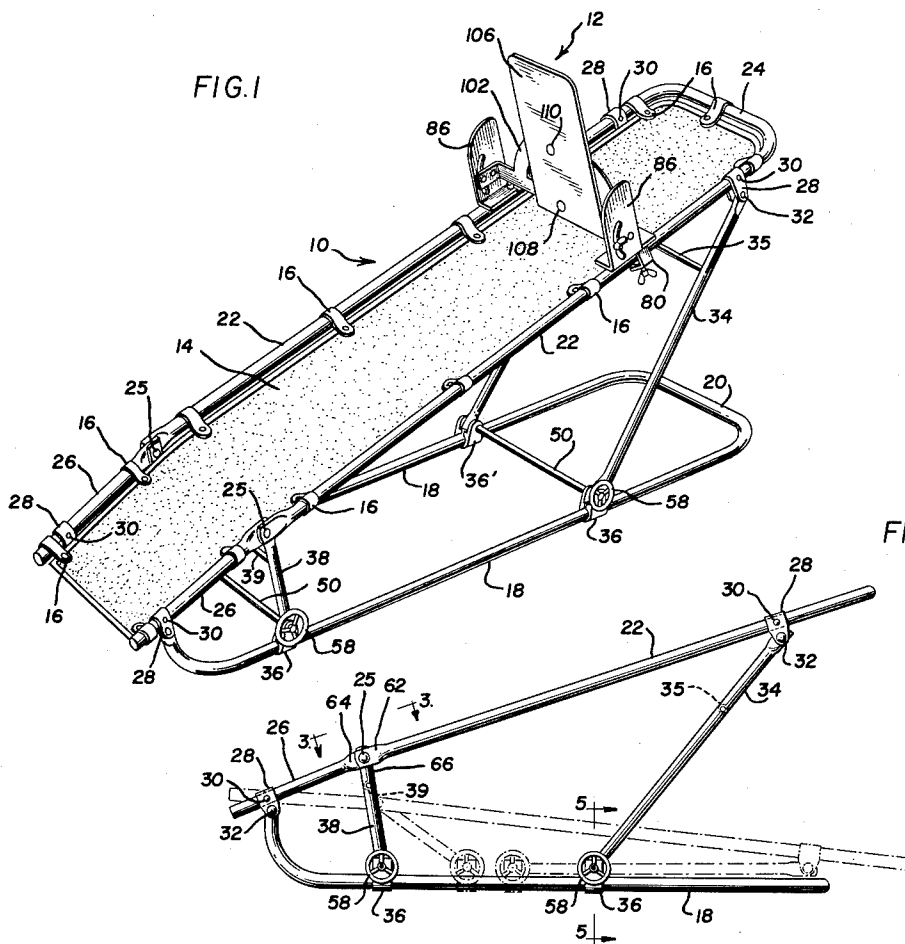


FIG. 2

FIG. 4

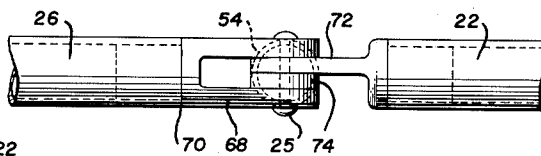
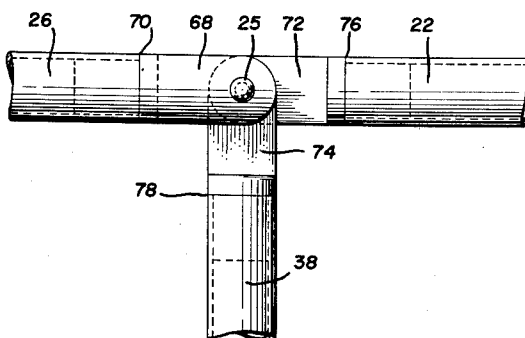


FIG. 3

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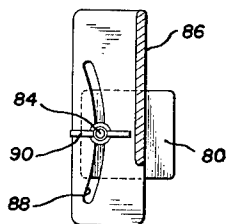
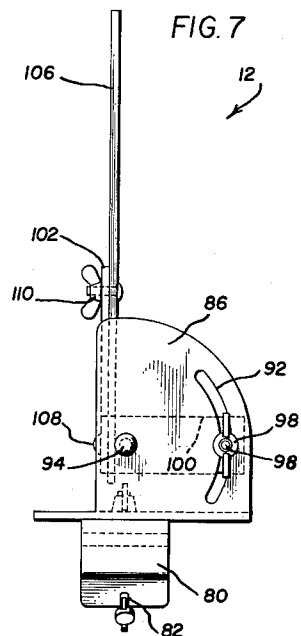
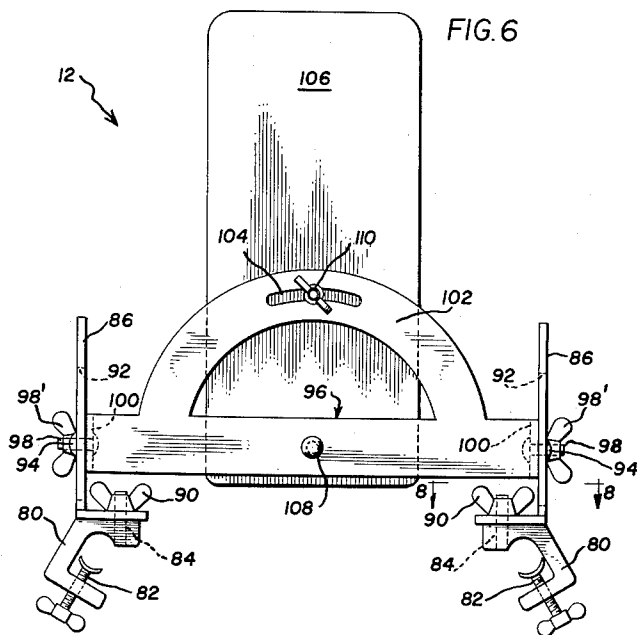
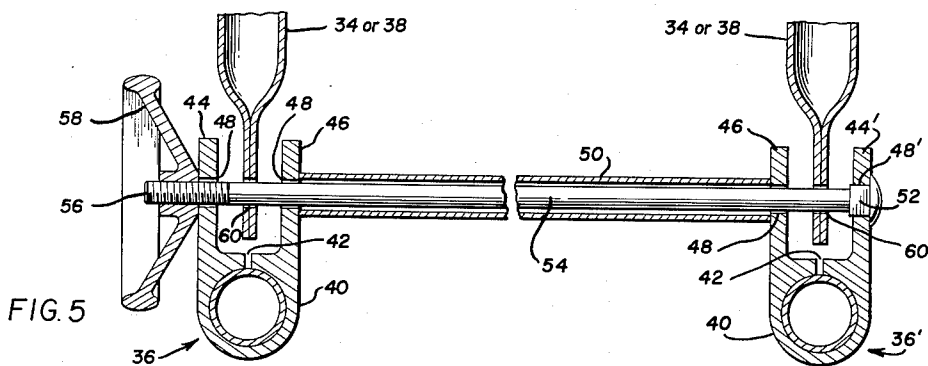
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2 Sheets-Sheet 2



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1

3,066,322
LEG AND FOOT SUPPORT
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Filed Mar. 8, 1960, Ser. No. 13,484
9 Claims. (Cl. 5—327)

This invention relates to a portable and collapsible leg and foot rest and more particularly to an improved leg rest adapted for use by a person in a reclining position to elevate one or both legs and to which may be attached a foot support adapted to immobilize the patient's foot in any required position for beneficial therapy in cases of infantile paralysis or other disease or injury.

It is frequently necessary to rest the legs of a reclining convalescent person in an elevated or inclined position. Heretofore, leg rests for this purpose have involved complicated supporting structures for permanent attachment to the bed, or have not been capable of separation and storing in a confined location. Further disadvantages of available leg rests include: their inability to collapse for storage while not in use, and their complexity of design and structure which renders them expensive to manufacture. The conventional leg rests when provided a foot rest have been constructed to permit immobilization of the foot in limited positions and therefore are not suitable for complete therapeutic treatment involving immobilization of the foot at unusual angles to the leg. This is particularly so in fracture cases and in diseases such as infantile paralysis which causes relaxation of the posterior leg muscles permitting the foot to fall without muscle support. To overcome this effect, known as dorsiflexion, the patient's foot must be held in a plane generally transverse to the axis of the leg and tilted upwardly toward his head. Other diseases and injuries or conditions make it necessary to immobilize the foot at other angles.

It is the primary object of this invention to provide an improved leg rest having a simplified construction and thus rendering it inexpensive to manufacture, lessening its weight for increased portability and use in different places, and by making it readily collapsible for storage in limited space when not in use.

It is an important object of the invention to provide a separate foot rest which is readily attachable to a leg rest and adjustable by a universal joint type of construction to turn in all directions and thus immobilize the foot of the patient at any required angle.

Another object of the invention is to provide a leg rest so constructed as to permit selective adjustment and positioning of the leg support through a wide range of elevations and inclinations with respect to the base of the device.

A further object of the invention is to provide a combined leg and foot rest of skeletonized construction to lessen the weight and cost while increasing the portability and having a detachable flexible covering to support the leg of the patient.

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawings, wherein like reference characters indicate like parts throughout the several figures and in which:

FIG. 1 is a perspective view of a leg and foot rest constructed in accordance with the present invention; ,

FIG. 2 is a side elevation of the leg rest frame;

2

FIG. 3 is an enlarged fragmentary plan view of a modified construction taken substantially on line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary side elevation of the modified portion shown in FIG. 3;

FIG. 5 is an enlarged fragmentary sectional view taken on line 5—5 of FIG. 2;

FIG. 6 is an enlarged end elevation of the foot rest alone;

FIG. 7 is a side elevation of the foot rest, and FIG. 8 is a sectional view taken on line 8—8 of FIG. 6.

Referring now to the drawings in more detail, FIG. 1 illustrates a preferred embodiment of the combined leg and foot rest which embodies a leg rest generally designated by the numeral 10 and a detachable foot rest generally designated by the numeral 12. The leg rest 10 comprises a skeleton frame having an upper leg supporting section and a base section adjustably supporting the upper section. The base section has parallel side members 18 joined by at least one end member 20. Preferably these frame members are formed of standard tube sizes of a light weight metal such as aluminum to reduce the weight of the leg rest to a minimum.

The upper leg supporting frame section is likewise formed in skeleton fashion of tubular members. Preferably this frame is formed of two sections spaced longitudinally and pivoted to each other in a manner to be explained hereinafter. The uppermost section comprises parallel side members 22 joined by an end member 24. The lowermost section comprises tubular side members 26 connected by pivots 25 with and forming extensions of the side members 22. The leg of the patient is adapted to be supported on the upper frame section by a flexible fabric or other sheet material 14 which is detachably secured to the frame members 22, 24, 26 by means of snaps 16 or other suitable fastenings.

The leg supporting upper frame section is angularly disposed to the base section, the side members 18 of which are upturned at one end and the lower end of the upper section is pivotally attached to the upturned ends of the tubular base side members 18 by means of inverted U-shaped clamps 28, FIGS. 1 and 2, which are secured by rivets 30 to the members 26. The lower ends of clamps 28 embrace the ends of base members 18 and are pivoted thereto by rivets 32. Similar clamps 28 are affixed by rivets 30 to the upper ends of the frame members 22 and by pivots 32 to the upper ends of a pair of braces 34 connected by a cross brace 35. The lower ends of braces 34 are pivotally secured to sliding clamps 36, 36' which embrace the side members 18. A similar pair of clamps 36, 36' are utilized near the other ends of the side members 18, and are pivotally secured to the lower ends of a shorter pair of braces 38 connected by a cross brace 39 whose upper ends are connected to the upper frame section at the pivot connection between the side members 22 and 26.

As may be best seen in FIG. 5, preferably the clamps 36, 36' each comprise a tubular loop portion 40 having a slot 42 adapted to embrace one of the tubular base side members 18, and a pair of upwardly disposed ears 44, 44' and 46 having aligned openings 48, 48' therein. Each pair of clamps 36 are rigidly connected and may be simultaneously released, secured and moved to adjust the inclination of the leg rest sections by a single control. The inner ears 46 of each pair of clamps 36, 36' are connected by a tube 50 the ends of which surround the openings 48 in said ears. The opening 48' in the outside ear 44' of clamp 36' is enlarged and squared to snugly receive the squared internal shoulders 52 of an elongated carriage bolt 54 whose head juxtaposes the outer surface of such ear. The bolt 54 extends through the tube 50 and its threaded end 56 projects beyond the outer ear

3

44 of clamp 36 and threadedly receives an adjusting hand wheel 58. The bolt 54 passes through openings 60 in the flattened ends of braces 34 and 38 to pivotally support each brace between the pair of ears of each clamp.

The upper ends of braces 38 are pivotally joined to the same pivots 25 which secure the tubes 22 and 26 together. One means for accomplishing this is to flatten the meeting ends of the tubes 22, 26 and 38 as indicated at 62, 64 and 66, respectively. A rivet 25 may then be loosely inserted through aligned openings in the flattened ends to pivotally connect the three tubes. Another embodiment of this three-way pivot joint is illustrated in FIGS. 3 and 4 and employs a yoke 68 of cast aluminum or other suitable material which is welded to the end of tube 26 as indicated at 70. The tubes 22 and 38 are each provided with cast tongue members 72, 74 which are also welded to the ends of their respective tubes at 76 and 78. The tongues 72 and 74 are inserted in the yoke 68 and pivotally connected by the rivets 25 which pass through the tongues and the yoke.

The foot rest 12 which may be attached to the side members 22 of the inclined leg support is shown in detail in FIGS. 6-8. For purposes of ready attachment and detachment, the foot rest includes a pair of outwardly inclined C-clamps 80 having locking screws 82 threaded through their lower branches and manipulatable by hand wings. The upper surfaces of clamps 80 are flattened to seat a pair of L-shaped brackets 86 each having an arcuate slot 88 in its base. Threaded studs 84 extend upwardly from the C-clamps 80 and pass through the slots 88 and the brackets 86 are adjustably secured to the C-clamps 80 by wing nuts 90 on the studs 84.

The vertical arms of brackets 86 are also provided with arcuate slots 92. A horizontally disposed U-shaped bracket 96 is tiltably secured to and between the brackets 86, the bracket 96 having side arms 100 each of which is secured to a bracket 86 by means of a pivot and stud 98 riding in slot 92 and lockable therein by a wing nut 98'. The base or cross portion of bracket 96 is preferably provided with a coplanar upstanding semicircular extension 102 having an arcuate slot 104. A foot plate 106 is tiltably and adjustably secured to the base of bracket 96 by means of a pivot 108 and a releasable fastener 110 which rides within slot 104.

It is evident from the described construction that the foot rest 12 includes in its support structure three mutually perpendicular walls or planes comprising the two arms of the L-shaped brackets 86 and the base of bracket 96. Each of these walls may be turned or tilted by reason of the arcuate slots and fasteners included therein. As a result, the plate 106 to which the foot of a convalescent is secured by gauze bandage, adhesive tape, straps, or the like may be turned about each of three perpendicular axes and fixed at any desired inclination.

In using a device constructed as described, the leg rest 10 may be utilized with or without a foot support 12. By merely loosening the two hand wheels 58 and sliding the clamps 36 toward each other along base tubes 18, the leg support members 22, 26 together with braces 34 and 38 may be collapsed substantially onto the upper surface of the base to occupy a minimum space for storage, as shown in phantom lines in FIG. 2. When it is desired to use the leg rest for a convalescent, lying in a prone position, it is necessary only to spread the clamps 36 on member 18 until the desired inclinations of the leg support members 22 and 26 are obtained and to fasten the clamps 36 in such adjusted positions. Normally the articulated sections of the leg rest are positioned so that the pivotal axis through rivets 25 falls just under the knee joint of the convalescent. When this is so, the lower leg may be supported by frame members 22 inclined either upwardly or downwardly with the patient's leg bent at the knee.

4

It will be readily apparent that upon manipulating the single hand wheel 58 toward the bolt head, the clamp ears 44, 46 will be squeezed together and the slots 42 reduced to clamp members 40 and the pair of braces 34 or 38 in a desired position. When the hand wheel 58 is manipulated to loosen the grip, the clamp ears will spring apart enabling both clamps 36, 36' to be moved simultaneously along the frame tubes 18 and thus adjust both braces 34 or 38 to another position with respect to the base.

The foot rest 12 may be attached by simply placing the C-clamps 80 over the leg support sides 22 and fastening the screws 82. The foot plate 106 may then be adjusted by tilting in any direction and fastened at the desired angle by means of the wing nuts 90, 98' and 110. This may be done before or after the foot of the patient is taped to plate 106. Since the bases of L-shaped clamps 86 rest on and are parallel to the plane of leg supports 22, the foot of the patient may be tilted as by a universal type joint at any angle, or about three perpendicular axes one of which includes or is parallel to his leg. Thus the foot plate may be comfortably adjusted to accommodate various persons ranging from those who are pigeon-toed to those who are slue-footed. If the circumstances of fracture or disease warrant, the foot may be immobilized in a position turned to the right or left, tilted backward or forward and twisted inwardly or outwardly with respect to the leg.

The described and illustrated foot and leg rests are suitable for the support of one leg of a patient. It is evident that by merely widening the structure and adding a second foot plate with its own adjustable supporting brackets, the device may be readily modified to support both legs of the patient.

Although certain specific embodiments of the invention have been shown and described, it is obvious that many modifications thereof are possible. The invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

What is claimed is:

1. A light, collapsible, leg rest comprising a framelike base including elongated side frame members, an elongated leg support including a pair of longitudinally disposed sections, first means pivotally connecting said leg support sections, second means pivotally connecting one end portion of the leg support to one end portion of said base, a first pair of braces, third means pivotally and adjustably connecting said braces respectively at one end to said base side frame members to slide therealong to various fixed positions, the other ends of said braces being pivotally connected to said leg support sections by said first means, and a second pair of braces pivotally connected at their ends to said leg support at a position remote from said first means, and fourth means pivotally and adjustably connecting the other ends of said second pair of braces respectively to said base side frame members to slide therealong to selected positions and vary the height and inclination of said leg support sections with respect to the base, at least one of said third and fourth means comprising a pair of clamps each having a loop portion and a pair of upstanding ears, the ends of the associated pair of braces being disposed respectively between the ears of each clamp, a spacer sleeve separating said pair of clamps, aligned openings in said clamp ears and the ends of said associated pair of braces, a single tie member passing through said aligned openings and spacer sleeve, and manually operable means releasably engaging said tie member at one end only to secure said pair of clamps and spacer sleeve together and lock the loop portions of said clamps to said base side frame members.

2. A leg rest according to claim 1 wherein said tie member comprises a carriage bolt headed at one end and threaded at the other with noncircular shoulders adjacent said head and snugly received by the opening in the respective ear to prevent turning of said bolt, said manually

5

operable means threadedly engaging the threaded end of said bolt.

3. A leg rest according to claim 2 wherein said leg support sections each include side frame bars, and said first means pivotally connecting the leg support sections and the first pair of braces comprises end portions of the side frame bars of one of said support sections formed into yokes, the connected ends of said braces and of said side frame bars of the other leg support section being flattened and received in said yokes, and pivots piercing said flattened ends and supported in the sides of said yokes.

4. A light, collapsible leg rest comprising a framelike base including elongated side frame members, an elongated leg support including a pair of longitudinally disposed sections, first means pivotally connecting said leg support sections, second means pivotally connecting one end portion of the leg support to one end portion of said base, a first pair of braces, third means pivotally and adjustably connecting said braces respectively at one end to said base side frame members to slide therealong to various fixed positions, the other ends of said braces being pivotally connected to said leg support sections by said first means, and a second pair of braces pivotally connected at their ends to said leg support at a position remote from said first means, and fourth means pivotally and adjustably connecting the other ends of said second pair of braces respectively to said base side frame members to slide therealong to selected positions and vary the height and inclination of said leg support sections with respect to the base, said foot rest comprising a pair of clamps adapted to removably embrace said side frame members of a leg support section, a pair of L-shaped brackets having parallel arcuate slots in both walls, means for detachably and adjustably securing said brackets to said clamps engaged in one pair of said slots, a U-shaped bracket connecting said pair of L-shaped brackets, clamps securing the legs of said U-shaped bracket and engaged in the other pair of slots, a foot plate pivotally secured to the base of said U-shaped bracket, said U-shaped bracket base having an arcuate slot, and means engaged in said base slot for adjustably clamping said foot plate in a selected position.

5. A foot rest comprising support means including a pair of C-clamp members adapted to embrace supporting frame members, a pair of L-shaped brackets each having arcuate slots in both their walls, retaining screws respectively extending from said C-clamp members through one pair of said slots, a U-shaped bracket connecting said pair of L-shaped brackets and having its legs respectively secured in the other of said pair of slots, a foot plate for support of the sole of a foot pivotally secured to the base of said U-shaped bracket, said U-shaped bracket base having an arcuate slot, and means in said base slot for adjustably clamping said foot plate in a selected position about its pivot.

6. An adjustable leg rest comprising a base formed of tubular members, an elongated leg support, means for adjustably securing said leg support at various heights and inclinations with respect to the base and including a pair of spaced braces each pivotally secured at one end to the leg support, and means embracing said tubular members for pivotally and slidably connecting the other ends of said braces to said base whereby to enable movement of the braces along the base without lifting for adjustment in selected positions and with a minimum of jarring of a patient's leg during said adjustment, said last named means including means for unclamping, sliding

6

and clamping both braces of said pair in unison by manipulation of a single operating element.

7. A light, collapsible leg rest comprising a framelike base including elongated, tubular side frame members in a horizontal plane, an elongated framelike leg support including a pair of longitudinally disposed sections each having side bars, flexible leg supporting means removably attached to said sections for supporting a patient's leg, a first pair of brace bars, pivots freely connecting the adjoining ends of the leg support section side bars and one end of one brace bar on each side of the leg support, pivots connecting the other end portions of the side upturned bars of one leg support section to the upturned ends of said base frame members, clamp means embracing said tubular members and pivotally connected to the other ends of said braces and slidable longitudinally on said tubular base frame members without lifting with respect thereto for selective adjustment therealong to secure said braces at selected angles for supporting their connection to said leg support sections at desired elevations from said base, a second pair of braces pivotally connected at their ends to said leg support at a position remote from the connection between said leg support sections, and clamp means embracing said tubular members and pivotally connecting the other ends of said second pair of braces respectively to said tubular base frame members to slide longitudinally therealong without lifting to selected positions, whereby the adjustment of said first and second pairs of braces to different positions along the base frame members varies the height and inclination of said leg support sections with respect to the base.

8. A leg rest according to claim 7 in combination with a foot rest removably attached thereto and turnable through selected angles about three mutually perpendicular axes one of which coincides with the inclined axis of the leg support section to which the foot rest is attached, said foot rest comprising support means, a plate against which the sole of a foot may be fastened, means between said support means and said plate for adjusting said plate to a selected position by rotation in any direction and including separate plate supports having three mutually perpendicular surfaces, each of said surfaces being provided with arcuate slots, and means for clamping the plate in said selected position and connecting said plate and supports adjustably and releasably in said slots.

9. A foot rest comprising support means, a plate against which the sole of a foot may be fastened, means between said support means and said plate for adjusting said plate to a selected position by rotation in any direction and including separate plate supports having three mutually perpendicular surfaces, each of said surfaces being provided with arcuate slots, and means for clamping the plate in said selected position and connecting said plate and supports adjustably and releasably in said slots.

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