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2,690,176

SPREADER FOR LEG BRACES

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FIG. 2.

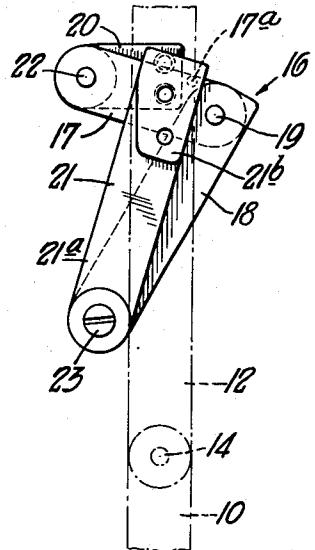


FIG. 1.

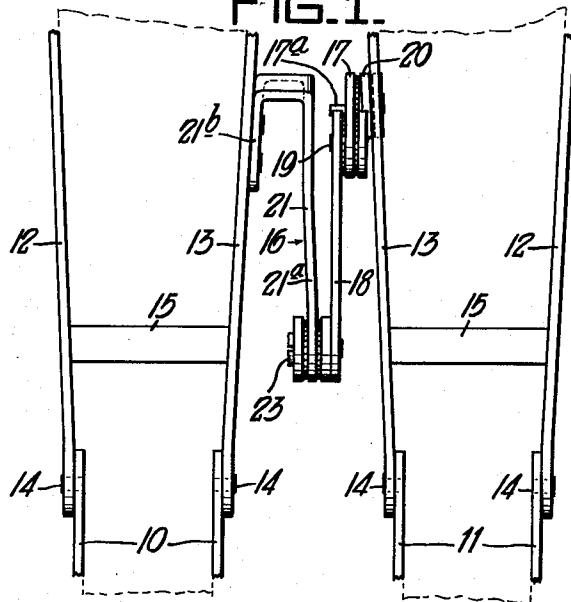


FIG. 3.

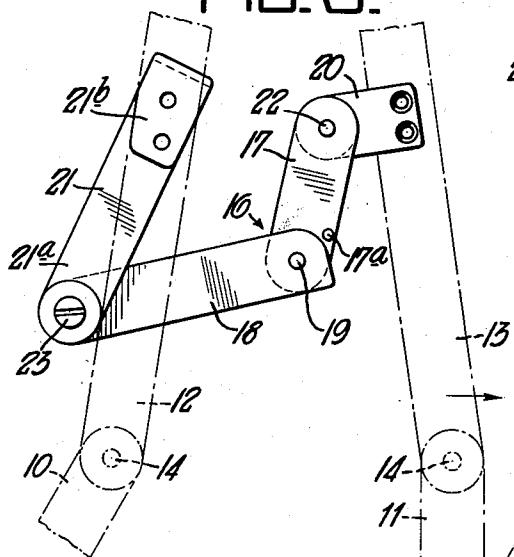
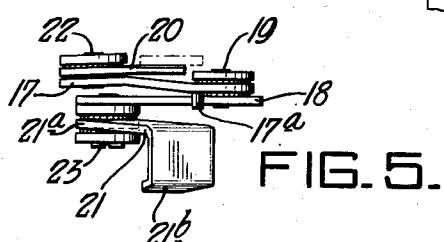
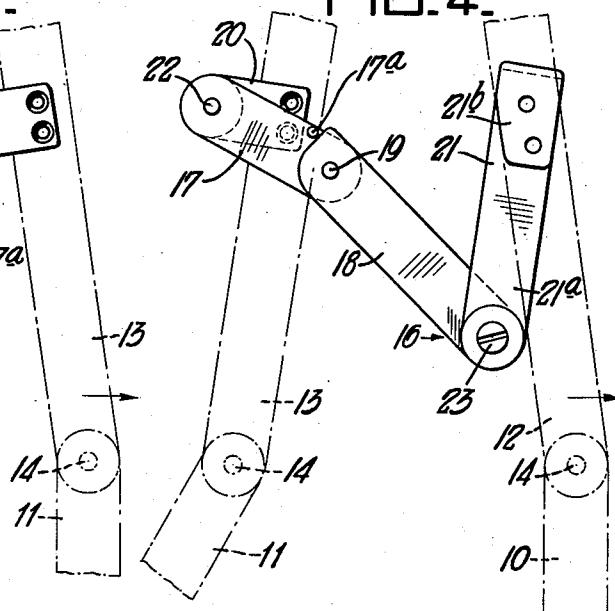


FIG. 4.



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## SPREADER FOR LEG BRACES

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Application September 8, 1952, Serial No. 308,347

6 Claims. (Cl. 128—80)

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This invention relates generally to orthopedic appliances and, more particularly, to an improvement in leg braces.

Leg braces such as are used by victims of cerebral palsy and poliomyelitis ordinarily comprise inner and outer metal straps for each leg, jointed at the knee, the outer straps sometimes being pivoted at their upper ends to a pelvic band. The inner straps are attached to the outer straps by metal bands adapted partially to encircle the legs. Braces of the type described thus possess little or no resistance to lateral movement of the legs of the user relative to each other. A tendency to such movement is quite common in cerebral palsy cases, the condition being known as adductor contracture or spasticity of the adductor muscles which results in inability to keep the legs apart. Because of this tendency, the joint between the outer straps and the pelvic band must be of the ball-bearing variety since a plain pivot joint would bind. Such ball-bearing joints are the costliest parts of leg braces. Attempts have accordingly been made to provide a spreader or stay effective to hold the braces of the two legs in properly spaced relation. No device yet proposed, however, has been successful so far as I am aware, probably because of the difficulty of incorporating the necessary lateral rigidity with sufficient anterior-posterior or "fore-and-aft" flexibility to permit free use of the legs in walking.

I have invented a novel spreader for leg braces which satisfies all the special requirements involved. The object of the invention primarily is to provide a spreader which will effectively hold the braces for the two legs in properly spaced relation yet permit free forward and backward movement thereof as in walking. A further object is to provide a compact spreader which will fit between the legs of the user without causing interference with standing, walking or sitting. A still further object is to provide a simple structure which is smooth-working and non-locking. Yet another object is to provide a spreader affording space to accommodate the crotch of the user's garments so as to prevent excessive wear.

In a preferred embodiment of the invention, I employ a toggle linkage having one end pivoted to a bearing bar fixed to the inner strap of one of the braces. The other end of the linkage is pivoted to the lower end of a bearing bar of inverted L-shape secured to the inner strap of the other leg brace. When the legs of the user are parallel, one link is generally horizontal and the other approximately vertical.

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A complete understanding of the invention may be obtained from the following detailed description and explanation which refer to the accompanying drawings illustrating the preferred embodiment. In the drawings,

Fig. 1 is a front elevation showing the spreader mounted on a pair of conventional leg braces;

Fig. 2 is a side elevation showing the position of the spreader when the braces are parallel;

Fig. 3 is a side elevation showing the position of the spreader when the far brace is moved forward and the near brace backward;

Fig. 4 is a view similar to Fig. 3 showing the braces in reversed position; and

Fig. 5 is a plan view.

Referring now in detail to the drawings, leg braces 10 and 11 are constituted by outer straps 12 and inner straps 13 hinged at 14 to permit bending of the user's knee and provided with the usual hinge-locking sleeve (not shown). The upper portion of the straps of each brace are connected by a metal band 15 adapted partially to encircle the user's leg. A similar band (not shown) connects the lower portions of the straps of each brace. The structure described so far is conventional and forms no part of my invention.

My novel spreader for leg braces indicated generally at 16 is essentially a toggle linkage, composed of links 17 and 18, the common pivot thereof being designated 19. Link 17 is pivoted at its other end to a bearing bar in the form of a short flat bar 20 fixed horizontally to the inner strap of brace 11 above the knee joint and extending rearwardly thereof. A bearing bar 21 in the form of a flat bar of inverted L-shape longer than bar 20 is secured vertically to the inner strap of brace 10 with its upper end at about the same level as piece 20, the remainder extending downwardly along the strap 13 and at a small angle thereto. The pivot joints 22 and 23 connecting the links to the bearing pieces, as well as joint 19, are ball bearings of substantial diameter, e. g., three-quarters of an inch, accurately made and snug fitting, whereby the linkage is free from lateral lost motion and readily resists large lateral forces, while remaining entirely flexible for elongating or collapsing movement in the fore-and-aft plane.

Fig. 3 shows how the linkage elongates when one leg brace is advanced ahead of the other. Fig. 4 shows the position of the links when the positions of the braces are reversed. Link 17 has a laterally projecting stop pin 17a adjacent pivot 19 and the end of link 18 is shaped to engage it when the links are at an angle of about 10°. This

limits elongation of the linkage before it approaches close to dead-center position which would lock it and prevent collapse.

Bearing bar 21, as clearly shown in Fig. 1, has its main body portion 21a offset from the portion 21b secured to the leg brace. The space between the two portions affords clearance for the crotch of the user's garments, preventing it from being caught in the pivot joints or otherwise subjected to excessive wear.

Joint 23 is permanently affixed in its entirety to bearing bar 21 and a screw extending from the bearing is removably threaded into a tapped hole in link 18. This permits the spreader to be opened up or disconnected for purposes of sanitation, exercise or walking trials without the aid of the spreader.

It will be apparent from the foregoing that the invention serves its intended purpose very effectively, maintaining the leg braces in properly spaced relation laterally, whatever their relative positions in the anterior-posterior plane. That is to say, whether the leg braces are at an angle or parallel to each other, they are prevented from coming together, yet they are entirely free for change of angular relation. The device is very simple, furthermore, involving only simple pivot joints which can be made smooth-working and trouble-free. None of the parts ever makes a complete revolution so there is no requirement that their movement follow a predetermined path. Utmost freedom to the user is thus assured. The spreader is small enough in transverse dimension to fit between the legs when in normal position and does not cause interference with either standing or walking.

In addition to keeping the legs apart, my spreader also positively controls the leg movements in walking thus establishing a walking pattern so definitely that the usual pelvic band may in many cases be omitted from the braces, making them lighter and less expensive. Even where it is necessary to retain the pelvic band, the invention makes it practical to use a plain bearing at the hip joint instead of a ball-bearing joint, thus materially reducing the cost of the braces. My spreader also prevents the braces from twisting by reinforcing them against lateral stress.

Although I have illustrated and described but a preferred embodiment of the invention, it will be understood that changes in the details of construction may be made and I intend to cover all such changes as fall within the spirit of the invention and the scope of the appended claims.

I claim:

- 5 1. A spreader for maintaining in properly spaced relation a pair of leg braces each including inner and outer straps and knee joints, comprising a first bearing bar secured to the inner strap of one leg brace above the knee joints and extending from said inner strap of said one brace in the anterior-posterior direction, a second bearing bar secured to the inner strap of the other leg brace at substantially the same level as the first and extending generally along said inner strap of said other brace toward the knee joint thereof, and a pair of toggle links pivotally connected together at one end, the other end of one 10 of said links being pivoted to the first bearing bar adjacent the outer end thereof and the other end of the other of said links being pivoted to the second bearing bar adjacent the lower end thereof.
- 15 20 2. A spreader as defined by claim 1 characterized by co-operating stop means on said links, respectively, effective to arrest extension of the links when they are still at a substantial angle to each other.
- 25 3. A spreader as defined by claim 1 characterized by an anti-friction joint connecting said second bearing bar and said other link, said joint being mounted in its entirety on one of them and separable from the other.
- 30 4. A spreader as defined by claim 1 characterized by said second bearing bar, throughout the greater portion of its length, being spaced a substantial distance from the strap to which it is secured, thereby affording a space for accommodating the crotch of a garment worn by the user of said braces.
- 35 5. A spreader as defined by claim 1 characterized by said second bearing bar being substantially longer than the first.
- 40 6. A spreader as defined by claim 5 characterized by said one of said links being shorter than said other of said links.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,847,823	Dresser	Mar. 1, 1932
2,632,439	Hickerson	Mar. 24, 1953

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OTHER REFERENCES

Orthopaedic Appliance Atlas, copyrighted 1952 by the American Academy of Orthopaedic Surgeons, Inc., received in Scientific Library April 10, 55 1952. Page 536.