United States Patent

[11] 3,523,526

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[54] **ADJUSTABLE SPLINT ADAPTER**
10 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **128/80**
[51] **Int. Cl.** **A61f 3/00**
[50] **Field of Search** 128/80, 583, 584, 585

[56] **References Cited**

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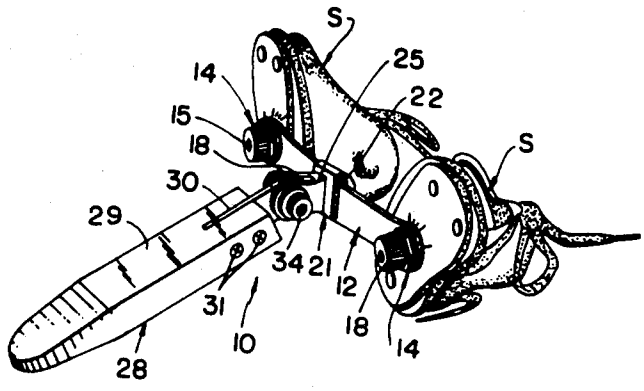
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ABSTRACT: The adapter comprises a rigid transverse cross bar to opposite ends of which infant's shoes are rigidly attached, with the toes of the shoes pointing divergently upwardly and outwardly; and the cross bar has a forwardly elongated supporting prop of a tongue-like nature fixedly mounted thereon by a clamp between the shoes for adjustment in a vertical plane at 90° to the bar. The prop extends at a slight downward angle from the bar for acute-angled engagement with a horizontal surface. A second similar prop, extending in an opposite direction from the cross bar may be provided.



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FIG.1

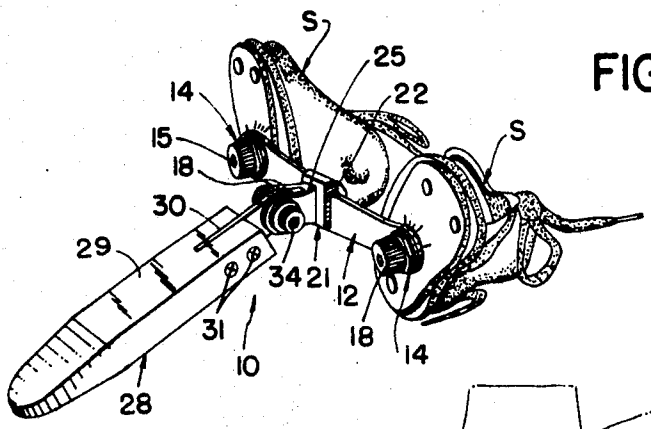


FIG.2

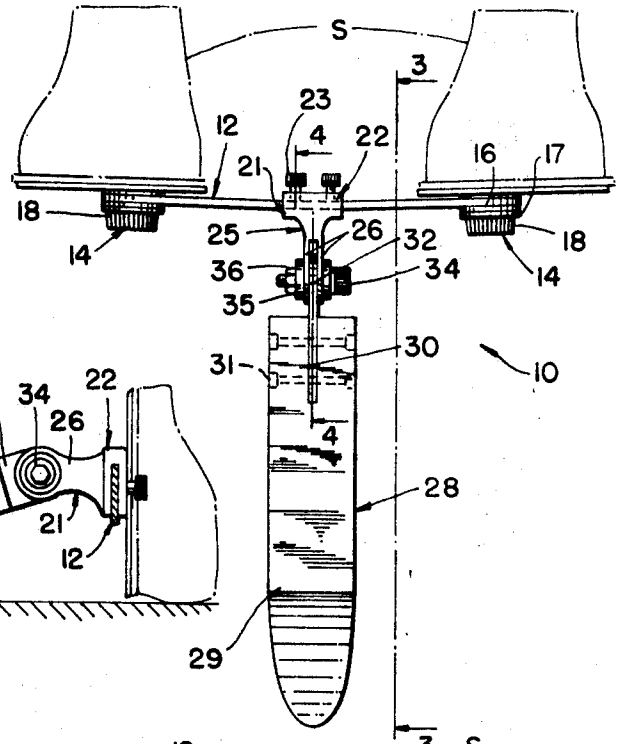


FIG.3

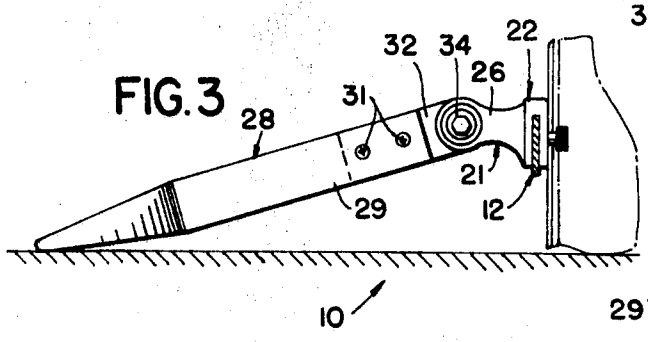


FIG.4

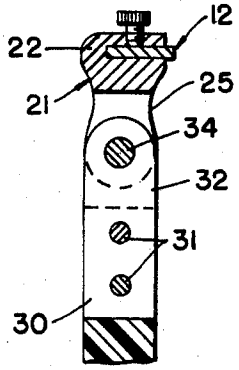
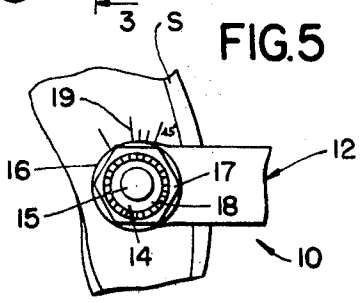


FIG.5



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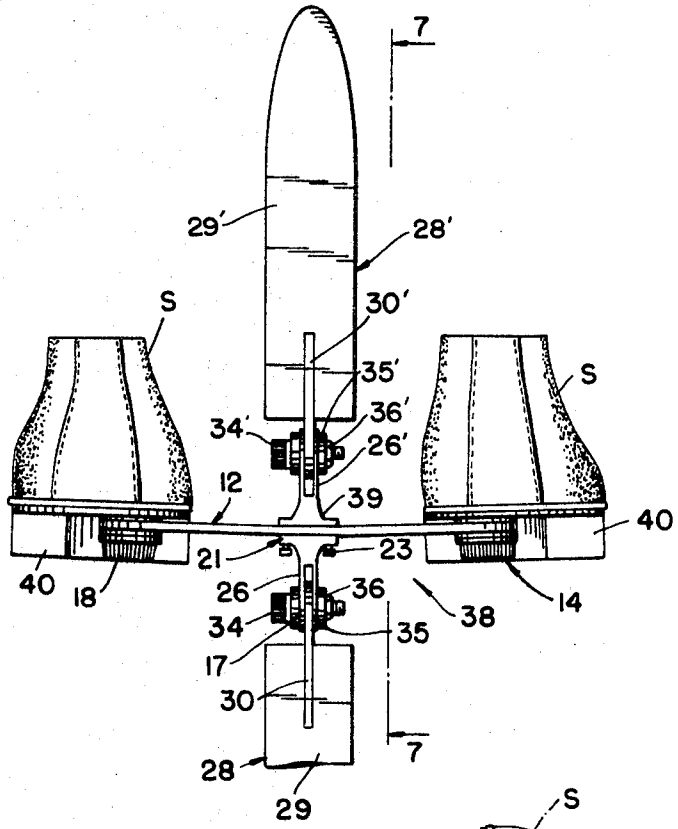


FIG.6

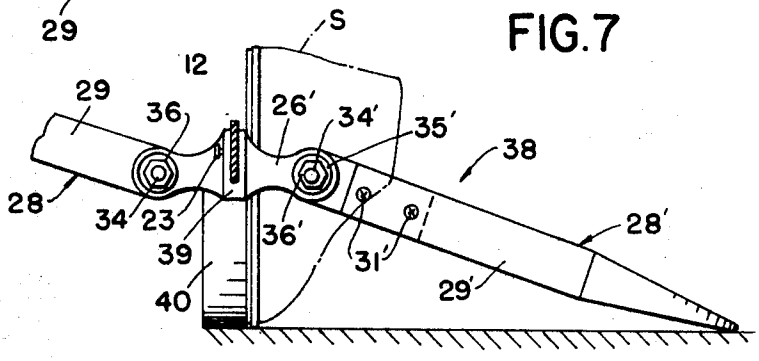


FIG.7

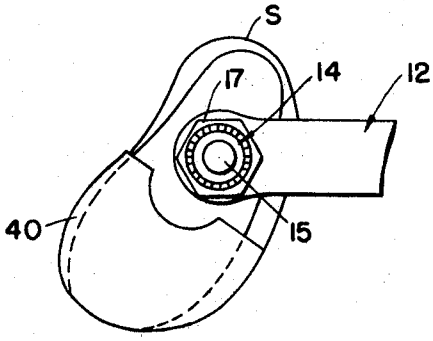


FIG.8

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ADJUSTABLE SPLINT ADAPTER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention concerns itself with the correction of the deformity in an infant, at birth, in regard to an abnormal position and shape of the foot, known as clubfoot. One of three manifestations of this deformity is a so-called plantar flexion of the foot at the ankle, so that the foot points downward; and this condition is the one which the improved splint of the invention is primarily designed to correct. However, the other manifestation of deformity, i.e., an inversion of the foot, or rolling in of the sole so that the soles of the feet face each other, and an adduction of the forefoot, or pigeon-toe deformity, may well also yield to treatment by the improved device.

2. Description of the Prior Art

The Dennis Brown splint represents, to my knowledge, the state of the art at present, being in the form of a rigid crossbar to which the infant's shoes are rigidly clamped in outwardly divergent relation to one another. However, as indicated above, the objective of such a splint is in considerable measure combatted and frustrated by the infant's urge to point his toes, thereby denying exercise to the heel cord such as is, in my opinion (confirmed by professional opinion), necessary to correctively treat the clubfoot.

SUMMARY OF THE INVENTION

As indicated above, the device of the invention is, in summary, represented in its most preferred embodiment by a generally cross-shaped structure, a crossbar part of which is rigidly, though adjustably, bolt-secured at its ends to the infant's shoes, approximately at the instep zone thereof. In regard to the basic improvement, a stem of the device is in the form of a tongue-like prop disposed at **90°** to the crossbar and adjustably clamped on a bracket fixed at the center of the latter, and, when the infant is prostrate on its back, the prop inclines downwardly at a mild angle of, say, **15° - 20°** from coplanar relation to the crossbar. Thus, with the shoe heel and forward tip of the prop resting upon a floor or like support surface, the sole of the shoe is positively forced backwards, tensing the heel cord in a manner which the infant instinctively resists by trying to point its toes forward. This, as intended, simulates a heel and toe walking action, forcing the alternate tensioning and relaxation of the heel cord, with corrective results. Accordingly, the need for surgery to correct the clubfoot, attended by danger in the use of anesthetics, is avoided or, in the event surgery is performed, post-operative recovery is assisted.

Should the infant roll over onto its stomach, a refinement on the basic improvement contemplates the provision of a second prop disposed oppositely of the first, so as to force a similar exercising action in this posture.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a device incorporating the essential invention, as applied to a pair of infant's shoes;

FIG. 2 is a top plan view of the device, the general position of the shoes being indicated in dot-dash line;

FIGS. 3 and 4 are views in transverse vertical section along line **3--3** and **4--4**, respectively, of **FIG.** 2; and with the prop and crossbar of the device in a coplanar relation to one another;

FIG. 5 is a fragmentary view showing provision for the adjustable clamping of one end of the crossbar of the device to a shoe;

FIG. 6 is a view similar to **FIG.** 2, showing a refined embodiment including a second tongue or prop to cope with the situation in which the infant turns face downward;

FIG. 7 is a fragmentary section on line **7--7** of **FIG.** 6; and

FIG. 8 is a view similar to **FIG.** 5, showing the optional use of an adapter clog to assist the infant in standing when the device of the invention is removed.

DESCRIPTION OF PREFERRED EMBODIMENTS

The splint adapter of the invention, generally designated by the reference numeral **10**, is shown as being comprised of a rigid, transversely elongated crossbar **12** which is equipped at its ends with like clamping units **14**, by which it is rigidly secured to an infant's shoes in the instep zone of the latter, with the shoes pointing divergently outwardly. In the manner of the Dennis Brown splint, each unit **14** comprises, as shown in **FIG.** 5, a threaded stud **15** projecting through the sole of the shoe and through an opening at the end of bar **12**, with a washer **16**, hex nut **17** and knurled lock nut **18** applied to stem **15** in that order outwardly of bar **12**. The shoe sole is calibrated at **19** (**FIG.** 5) to indicate a rough angle of adjustment of the shoe relative to crossbar **12**, which angle is pre-set and maintained when nuts **17** and **18** are taken up tightly on the stud **15**.

A bracket **21** is provided, including an U-shaped mounting element **22**, which mates over crossbar **12** at the center point of the latter, being rigidly secured thereon by a pair of lock nuts **23** threaded into one of the legs of element **22** to bear against the bar; and, integrally connected with clamp bracket **22**, there is a forwardly projecting pivot element **25** having a slotted tongue at **26**, within which a forwardly projecting, tongue-like prop **28** of the device **10** is pivotally mounted.

To this end, a plastic body **29** of prop **28** has a pivoting plate **30** inset into the rear end thereof, and locked up to body **29** by screws **31**; and plate **30**, projecting rearwardly of the body has an apertured pivot portion **32** transversely aligned with apertures in the pivot portions **26** of the element **25** of mounting bracket **21**. The aligned apertures receive a knurled screw **34**, with washers **35** applied to the latter externally of element **25** and a nut **36** threadedly applied to screw **34**.

Accordingly, loosening of the screw **34** permits a desired angular adjustment of the tongue-like prop **28** downwardly from a coplanar relationship with the crossbar **12**, which permits the application of the desired rearward force on the shoes S at the crossbar **12** and connecting bracket **21**. In a typical application, the angularity of prop **29** will be, say, **17°**, or in a general range of **15° - 20°**. The effect is illustrated in **FIG.** 3. Of course, if desired, the prop **29** and crossbar may be coplanar as suggested in **FIG.** 4; however, the invention primarily contemplates the exertion of mechanical opposition to the natural tendency of the infant to stretch its toes forwardly which, if unopposed, deprives the heel cord of repeated tensional exercise, as contemplated under the principle of the invention.

It is entirely possible that the infant may successfully thwart the purpose of the embodiment of **FIGS.** 1 -5 by the simple expedient, once strength is attained, of rolling onto its stomach. Accordingly, the basic structure is further refined by provisions shown in **FIGS.** 6, 7 and 8 to impose, in this face downward posture, a restraint similar to that in effect when the child is on its back. To this end, a second tongue-like prop facing oppositely of prop **28** is provided and, since most of the structural refinements of the device of **FIGS.** 6- 8, which is generally designated **38**, duplicate those of the basic device **10**, they are designated by corresponding reference numerals, primed; and further detailed description thereof is dispensed with.

The device **38** has its crossbar--engaging mounting bracket, specially designated **39**, altered to provide a second slotted tongue **26'** facing oppositely of the tongue **26** at **90°** to the length of crossbar **12**; and a second pivoting plate **32'** is received within the furcation of tongue **26'**, being locked in an adjusted position therein by screw and nut means **34'**, **36'**. The second prop **28'** substantially duplicates the first, save for being inclined from crossbar **12** in the opposite vertical sense, although at about the same mild angularity, as appears in **FIG.** 7.

The child having rolled (or been placed) face-downward finds its effort to point its toes clockwise (**FIG.** 7) to be resisted by the prop **28'**; and in repeating the effort produces the desired beneficial exercising of the heel cord.

FIGS. 6- 8 also show an optional provision of a relatively thick toe clog **40** on each shoe S to afford, in coaction with the crossbar-attaching clamp unit **14** on the shoe, a desired stability assisting the infant to stand upright when the props **28** and **28'** are removed.

I claim:

1. A device for use in the corrective treatment of clubfoot, comprising a pair of shoes having sole means and a transversely elongated member having first means rigidly securing the same to the sole portions of a shoe encasing the clubfoot, with the toe-to-heel direction of the shoe being transverse of the length of said member, and a second member extending away from said transverse member and said sole of the shoe, said second member having means to connect the same rigidly to said first-named member to extend forwardly of the latter at an acute angle to the connecting means.

2. A device for use in the corrective treatment of clubfoot, comprising a pair of shoes having sole means and an elongated transverse cross member having first means rigidly securing the same to a shoe encasing the clubfoot, with the toe-to-heel direction of the shoe being transverse of the length of said member, and a longitudinally extending member forward of said cross member, said longitudinally extending member having second means to connect the same rigidly to said cross member to extend forwardly of the latter at an acute angle to the connecting means, said connecting means including means for an adjustment of the longitudinally extending member in a plane transverse of the cross member.

3. The device of Claim **2**, in which said cross member extends on opposite sides of said longitudinally extending member.

4. The device of Claim **3**, in which said cross member extends on opposite sides of said longitudinally extending member said second means including a bracket adjustably mounting the longitudinally extending member and rigidly secured to said cross member between said shoes.

5. The device of Claim **4**, in which said longitudinally extending member is an elongated, tongue-like prop.

6. The device of Claim **4**, in which said longitudinally extending member is an elongated, tongue-like prop having means to secure the same to said bracket in fixedly adjusted position at an acute vertical angle to and in a plane at **90°** to said cross member.

7. The device of Claim **1**, and further comprised of another member generally similar to said forward member and in fixed relation to the latter, said other member extending in the opposite direction from said first-named member.

8. The device of Claim **2**, and further comprised of another member generally similar to said longitudinally extending member and in fixed relation to the latter, said other member extending in the opposite direction from said cross member.

9. The device of Claim **4**, and further comprised of another member generally similar to said longitudinally extending member and in fixed relation to the latter, said other member extending in the opposite direction from said cross member.

10. The device of Claim **6**, and further comprised of another member generally similar to said prop and in fixed relation to the latter, said other member extending in the opposite direction from said cross member and having similar means to adjust it in a plane transverse of the cross member.