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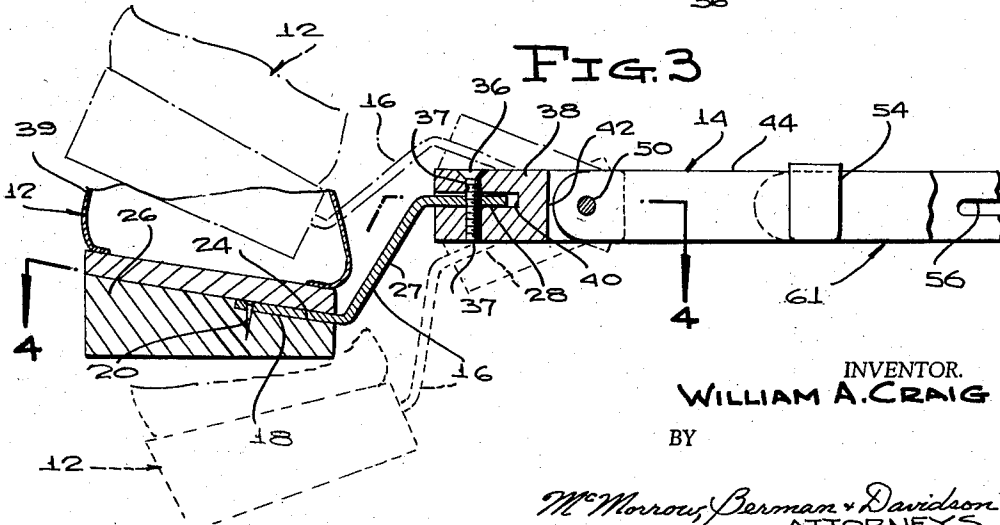
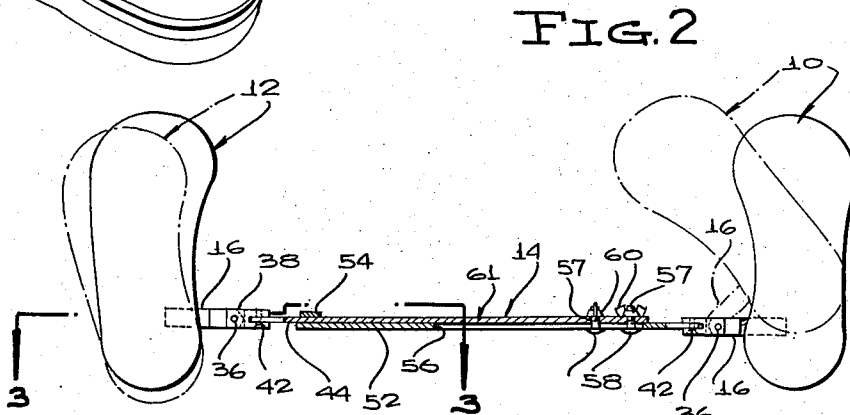
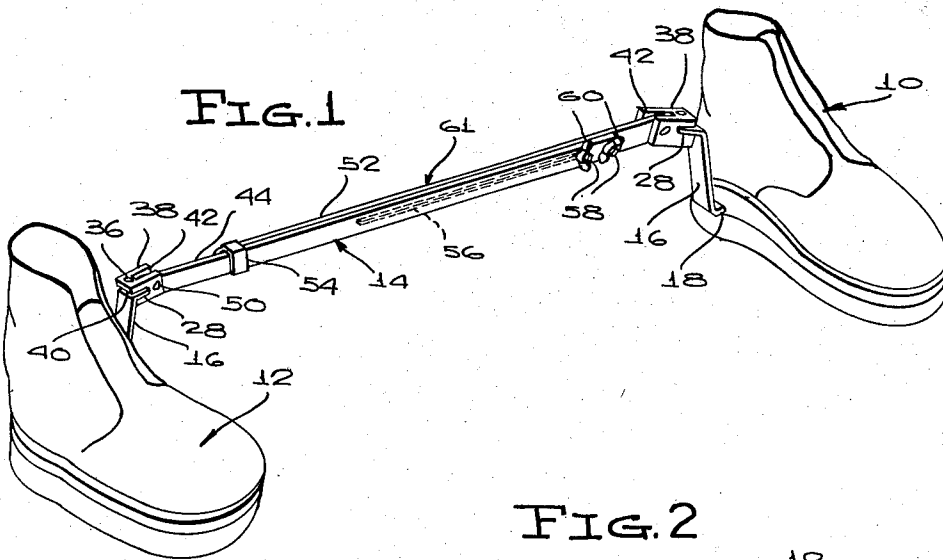
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ABDUCTION WALKING SPLINT

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ABDUCTION WALKING SPLINT

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8 Claims. (Cl. 128—80)

This invention relates generally to walking splints or related apparatus for correcting congenital and other disorders of the hip in childhood.

The correction of a child's hip disorder generally involves an extended treatment, requiring the use of specially designed splints. In this connection, it is desirable, of course, that walking splints be designed since the required corrective action might quite possibly be expedited in this way. Walking splints, however, in turn produce another problem, that is, the matter of permitting sufficient freedom of physical activity while still advancing the necessary corrective action.

Most usually, the splint used in congenital dislocation and dysplasia problems is one known as a "Poinsettia" bar. This is rigidly fixed to the shoes and is not primarily a walking splint. Rather, it is designed for use as a so-called night splint, that is, one which is worn by the child while he is sleeping, for the purpose of maintaining a predetermined separation of the legs to produce the desired corrective action, during the night hours, while the child is at rest.

Another abduction splint, which can be used as a walking splint, is one which is fashioned simply by joining two channels of aluminum which strap to the inner side of the patient's leg. Yet another walking splint is a bar, generally made of stainless steel or the like, which is bent to conform to the inside of the leg, and which is fastened to the legs through the medium of thigh cuffs. While this splint is alleged to be satisfactory for use as a walking splint, it is exceedingly difficult to envision normal walking, considering the fact that the splint involves the use of a rigid bar extending from one ankle up to the crotch and down to the other ankle. Even in instances in which the patient might attempt to walk while wearing a splint of this type, there is reason to believe that there will be an excessive amount of friction from the leg and thigh cuffs during ambulation.

These constitute, so far as is known, the splints which are in conventional use today in situations of the character described above. The main object of the present invention, accordingly, is to provide an abduction walking splint, which will not have the disadvantages noted above, and which will be so designed as to permit the patient, to walk, run, climb stairs, or sit comfortably in a chair.

A further object is to provide a walking splint of the character described which, though having all the functional mobility described above, will be so designed that weight on the hip is always borne in the protective, abducted position.

Yet another object is to provide a walking splint which will maintain a wide separation of the legs, while at the same time allowing for a normal range of hip flexure and extension.

Still another object is to provide a splint which will be of the "between-shoe" type, will be so designed as to allow for ankle motion, and at the same time will limit certain rotational movements of the leg while en-

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couraging others, in a manner that will cause it to uniquely but with high efficiency discharge its intended function of correcting of childhood hip disorders.

A further object is to so form the splint that the between-shoe distance can be swiftly and easily adjusted, with readjustments being effected whenever desired, all without disturbance of the rotational or pivotal movements referred to above.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a perspective view of a walking splint of the type described;

Figure 2 is a bottom plan view of the splint, the dotted lines showing different positions to which the shoes may move from their normal, full line position;

Figure 3 is an enlarged, longitudinal sectional view substantially on line 3—3 of Figure 2, showing one of the shoes in its normal position in full lines, and in different positions to which it may be swung in an up-and-down direction, in dotted lines;

Figure 4 is a longitudinal sectional view on the same scale as Figure 3 taken substantially on line 4—4 of Figure 3, with the shoe being shown in full and dotted lines in its normal and in a forwardly swung position of adjustment to which it is movable during normal use of the splint; and

Figure 5 is an enlarged, fragmentary, exploded perspective view of one end of the splint with the shoe removed.

Referring to the drawing in detail, the walking splint constituting the present invention includes a pair of right and left corrective shoes which in a typical embodiment of the invention would be identically but oppositely constructed. This, of course, is not necessarily true in every instance, since the particular disorder may be such that one shoe, might, perhaps, be built up or shaped differently from the other.

In any event, the left shoe has been designated at 10 and the right shoe at 12, and designated generally at 14 is a connecting assembly extending between the shoes and adjustable as to its overall length in a manner to be described in detail hereinafter.

Since the connections at the ends of assembly 14 to the respective shoes are identical, the description of one will suffice for both. Referring particularly to Figures 3 and 5, a connecting bracket 16, formed of rigid bar material, has a downwardly offset, flat outer end portion 18 which is fixedly secured to the shoe by nails 20 or equivalent fastening elements, passing through spaced openings 22 of said outer end portion. Outer end portion 18 is snugly engaged in and fills a shallow recess 24 opening laterally inwardly as shown in Figure 3, formed in the top surface of a built-up sole 26 of the shoe. The intermediate portion 27 of bracket 16 is inclined in a direction upwardly from outer end portion 18, and thus merges into an upwardly offset inner end portion 28, the inner end surface of which is bluntly pointed in a manner shown to particular advantage in Figure 5, producing at the inner end of the portion 28 a first edge 30 disposed at an obtuse angle to a second edge 32. Edge 30 extends at an angle of 10 degrees to a line A shown in Figure 5 and perpendicular to the longitudinal median line of bracket 16. Edge 32 is at an angle of 45 degrees to said line A. The edges constitute abutments or stops in a manner to be described in full detail hereinafter.

Substantially centrally disposed in the inner end portion 28 is an aperture 34, receiving a connecting screw 36 that extends through an aperture 37 of a connector block 38 of elongated, rectangular configuration. Block 38 has a slot 40 opening upon the outer end and upon the opposite side surfaces of the block, said slot 40

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being adapted to snugly receive the inner end portion 38 as clearly shown in Figure 3. The apertures 37 of the block 38 open into the slot 40, and thus, on extension of the portion 28 into the slot, the screw 36 is extended through the registering apertures 34, 37, being threadedly engaged in the lower one of the apertures 37 (see Figure 3).

The bracket 16, and hence the shoe, is thus connected to the block 38 for pivotal movement about the axis defined by the screw 36, this being a first axis about which the shoe is swingable.

It may be noted from Figure 3 that the upper 39 of each shoe is tilted laterally inwardly, when the shoe is disposed in contact with a horizontal surface, that is, in its full line position of Figure 3. In other words, the sole 26 is so built up as to have a top surface that is transversely tilted, to decline in a direction laterally inwardly of the shoe. Again, this particular disposition of the upper may be varied in a particular case, but in a typical instance, such as that shown, the construction results in the outer end portion 18 being inclined slightly out of the horizontal, while portion 28 is in a horizontal plane, when the shoe is in contact with the horizontal support surface.

As shown in Figure 3 and in Figure 5 block 38 at its inner end has a second or inner slot 42. Slot 42 opens upon the inner extremity of block 38, and upon the top and bottom surfaces of the block, that is, the slot 42 is disposed in a plane normal to the plane 40.

Extending at its outer end into slot 42 is an elongated bar member 44, having an opening 46 registering with openings 48 of block 38 to receive a connecting screw 50 the length of which is perpendicular or normal to that of screw 36. A second bar member 52 extends in longitudinally contacting relation to member 44, and at one end has a keeper or guide 54 in which member 44 slides. An elongated, longitudinal slot 56 of member 52 registers with a pair of longitudinally spaced openings 57 of member 44 (Figure 2) and extending through the registering slot and openings 56, 57 are bolts 58 carrying wing nuts 60. Thus, on loosening of the wing nuts, the bar members 52, 44 can be relatively longitudinally adjusted, thus to extend the overall length of the connector assembly 14. Members 44, 52 together constitute an elongated, straight connector bar generally designated 61, and adjustable as to length in the manner previously described herein.

It will be seen that a between-shoe walking splint is provided, which is swiftly and easily adjustable as to the distance between the shoes, by loosening of the wing nuts 60 and by the subsequent relative longitudinal adjustment of the bar members 44, 52. Further, it will be observed that at each end of the connector bar of the device, there are provided universal connections resulting from the provision of the blocks 38 and the normally related screws 36, 50. However, while there is an unlimited, so to speak, movement of the shoes about horizontal axes extending in a fore-and-aft direction laterally inwardly from the shoes at a short distance from the shoes, these being the axes defined by the screws 50, movement of the shoes about the axes defined by the screws 36 is limited in a predetermined manner. Considering this movement, which may be broadly termed movement of the shoes in a fore-and-aft direction, it will be observed that on movement of the shoe forwardly from its full line position of Figure 4, said movement of the shoe will be limited to a swinging thereof to but not beyond the forwardly swung dotted line position of the shoe shown in Figure 4, this also being the position shown in dotted lines for the shoe 10 in Figure 2. The forward swinging of the shoe, thus, is limited to an angular travel of 45 degrees about the pivot axis defined by screw 36, due to the fact that the edge 32 moves into alignment with and abuts against the inner end wall of slot 40,

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when the shoe is swung forwardly to the specified position.

Rearward swinging movement of the shoe about the axis 36 is also limited, but is permitted to a substantially lesser degree than the forward swinging movement about the same axis. This is shown in dotted lines for the shoe 12 in Figure 2, and it will be observed that the rearward swinging movement of each shoe is limited to a 10 degree angular travel about the axis 36, from the normal shoe position shown in full lines in the various figures of the drawing. This is due to the fact that when the shoe is swung rearwardly, the so-called 10 degree edge 30 now moves into alignment with and bears against the inner end of the slot 40.

The forward swinging movement of the shoe is termed an internal rotation, and it will be noted that the shoe has an internal rotation of no more than 45 degrees, and an external rotation, that is a backward swinging movement about the axis 36, of no more than 10 degrees.

There is however, free up-and-down swinging movement of the shoe, that is, a free side-to-side ankle motion of the foot wearing the shoe, about the axis 50. This is shown in Figure 3, in which it is shown that the shoe can swing upwardly or downwardly from its full line, normal position in this figure, about the axis 50. The up-and-down swinging movement, of course, of the shoe is permitted in any position to which the shoe is externally or internally rotated about the axis 36.

It has been found in practice that there is a high degree of functional mobility in the walking splint, and maximum comfort, without, however, loss of the desired corrective action. Weight on the hip is always borne in the protective abductive position and the splint has been found to operate satisfactorily in making corrections in congenital dislocation and dysplasia problems.

It sometimes happens that a child may have knock-knee deformity in addition to the above mentioned hip disorders. However, the incidence of knock-knee deformity in the presence of a hip problem of the character described, that is, a problem for which the splint is intended to be used, is not great. This is mentioned in view of the fact that it has been observed that a child wearing the type of splint illustrated and described, may tend to develop more knock-knee deformity if he already has a deformity of this type. Thus, however, is true as well of other "between-shoe" splints and is well recognized in the medical profession. It is known that possible aggravation of any knock-knee deformity may necessarily result when a child is permitted to walk in a "between-shoe" splint. It must be accepted, however, that aggravation of this deformity would generally be preferred to the permanent continuance, without attempts at correction, of hip disorders of the character previously described herein.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. In a device for the correction of hip disorders, a walking splint of the between-shoe type comprising: a connector bar; a pair of connector blocks pivotally attached to the opposite ends of the bar for swinging movement about parallel axes extending transversely of the bar substantially in a fore-and-aft direction, whereby to permit up-and-down swinging movement of the connector blocks; and a pair of brackets pivotally connected to and extending outwardly from the respective blocks

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and adapted for the attachment of shoes thereto, said brackets pivoting on the connector blocks about axes normal to the first named axes.

2. In a device for the correction of hip disorders, a walking splint of the between-shoe type comprising: a connector bar; a pair of connector blocks pivotally attached to the opposite ends of the bar for swinging movement about parallel axes extending transversely of the bar substantially in a fore-and-aft direction, whereby to permit up-and-down swinging movement of the connector blocks; and a pair of brackets pivotally connected to and extending outwardly from the respective blocks and adapted for the attachment of shoes thereto, said brackets pivoting on the connector blocks about axes normal to the first named axes, said brackets having downwardly offset outer end portions fixedly connectable to the shoes.

3. In a device for the correction of hip disorders, a walking splint of the between-shoe type comprising: a connector bar; a pair of connector blocks pivotally attached to the opposite ends of the bar for swinging movement about parallel axes extending transversely of the bar substantially in a fore-and-aft direction, whereby to permit up-and-down swinging movement of the connector blocks; and a pair of brackets pivotally connected to and extending outwardly from the respective blocks and adapted for the attachment of shoes thereto, said brackets pivoting on the connector blocks about axes normal to the first named axes, said brackets having inner ends formed with abutments limiting swinging movement of the brackets about the last named axes in opposite directions.

4. In a device for the correction of hip disorders, a walking splint of the between-shoe type comprising: a connector bar; a pair of connector blocks pivotally attached to the opposite ends of the bar for swinging movement about parallel axes extending transversely of the bar substantially in a fore-and-aft direction, whereby to permit up-and-down swinging movement of the connector blocks; and a pair of brackets pivotally connected to and extending outwardly from the respective blocks and adapted for the attachment of shoes thereto, said brackets pivoting on the connector blocks about axes normal to the first named axes, said brackets having inner ends formed with abutments limiting swinging movement of the brackets about the last named axes in opposite directions, said blocks having slots opening upon their outer ends receiving the respective brackets, the inner end walls of the slots forming stops engaging the abutments in opposite extreme positions to which the brackets are swung about the last named axes.

5. In a device for the correction of hip disorders, a walking splint of the between-shoe type comprising: a connector bar; a pair of connector blocks pivotally attached to the opposite ends of the bar for swinging movement about parallel axes extending transversely of the bar substantially in a fore-and-aft direction, whereby to permit up-and-down swinging movement of the connector blocks; and a pair of brackets pivotally connected to and extending outwardly from the respective blocks and adapted for the attachment of shoes thereto, said brackets pivoting on the connector blocks about axes normal to the first named axes, said brackets having inner ends formed with abutments limiting swinging movement of the brackets about the last named axes in opposite directions, said blocks having slots opening upon their outer ends receiving the respective brackets, the inner end walls of the slots forming stops engaging the abutments in opposite extreme positions to which the brackets are swung about the last named axes, said abutments of each bracket comprising side-by-side end edges at the inner end of each bracket, each end edge of a bracket being at a predetermined angle relative to the longitudinal median line of the bracket for engaging the stop of the connector block, on swinging movement of the bracket an angular distance about the last named pivot axis equal

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to the angle which the associated abutment edge bears to a line normal to the longitudinal median line of the bracket.

6. In a device for the correction of hip disorders, a walking splint of the between-shoe type comprising: a connector bar; a pair of connector blocks pivotally attached to the opposite ends of the bar for swinging movement about parallel axes extending transversely of the bar substantially in a fore-and-aft direction, whereby to permit up-and-down swinging movement of the connector blocks; and a pair of brackets pivotally connected to and extending outwardly from the respective blocks and adapted for the attachment of shoes thereto, said brackets pivoting on the connector blocks about axes normal to the first named axes, said brackets having inner ends formed with abutments limiting swinging movement of the brackets about the last named axes in opposite directions, said blocks having slots opening upon their outer ends receiving the respective brackets, the inner end walls of the slots forming stops engaging the abutments in opposite extreme positions to which the brackets are swung about the last named axes, said abutments of each bracket comprising side-by-side end edges at the inner end of each bracket, each end edge of a bracket being at a predetermined angle relative to the longitudinal median line of the bracket for engaging the stop of the connector block, on swinging movement of the bracket an angular distance about the last named pivot axis equal to the angle which the associated abutment edge bears to a line normal to the longitudinal median line of the bracket, one abutment edge of each bracket being at an angle of 10 degrees to said line normal to the longitudinal median line and the other being at an angle of 45 degrees to said line normal to the longitudinal median line, said abutment edges being so disposed as to permit external rotation of the bracket through a maximum of 10 degrees and internal rotation to a maximum of 45 degrees.

7. In a device for the correction of hip disorders, a walking splint of the between-shoe type comprising: a connector bar; a pair of connector blocks pivotally attached to the opposite ends of the bar for swinging movement about parallel axes extending transversely of the bar substantially in a fore-and-aft direction, whereby to permit up-and-down swinging movement of the connector blocks; and a pair of brackets pivotally connected to and extending outwardly from the respective blocks and adapted for the attachment of shoes thereto, said brackets pivoting on the connector blocks about axes normal to the first named axes, the brackets having outer end portions comprising the parts of the brackets to which said shoes are connectable, the connector blocks being swingable about the first named axes upwardly and downwardly from an intermediate position in which said connector blocks extend outwardly from the connector bar substantially in longitudinal alignment therewith, said outer end portions of the brackets being offset downwardly from the connector blocks and connector bar in said intermediate position of the connector blocks, said first and second named axes being offset laterally inwardly from said outer end portions of the respective brackets.

8. In a device for the correction of hip disorders, a walking splint of the between-shoe type comprising: a connector bar; a pair of connector blocks pivotally attached to the opposite ends of the bar for swinging movement about parallel axes extending transversely of the bar substantially in a fore-and-aft direction, whereby to permit up-and-down swinging movement of the connector blocks; and a pair of brackets pivotally connected to and extending outwardly from the respective blocks and adapted for the attachment of shoes thereto, said brackets pivotally on the connector blocks about axes normal to the first named axes, the brackets having outer end portions comprising the parts of the brackets to which said

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shoes are connectable, the connector blocks being swingable about the first named axes upwardly and downwardly from an intermediate position in which said connector blocks extend outwardly from the connector bar substantially in longitudinal alignment therewith, said outer end portions of the brackets being offset downwardly from the connector blocks and connector bar in said intermediate position of the connector blocks, said first and second named axes being offset laterally inwardly from said outer end portions of the respective brackets, said connector blocks, and the full length of the connector

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bar, being offset wholly from the outer end portions of the brackets in an upward direction.

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