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(54) Crutches.

(57) A single adjustment crutch has first and second telescoping tubular members (12 and 14), a handle - (30), a single bolt (26), and locking knob (40) for simultaneously affixing the handle (30) to one of the tubular members (12) and locking the two tubular members (12 and 14) against relative telescoping movements.

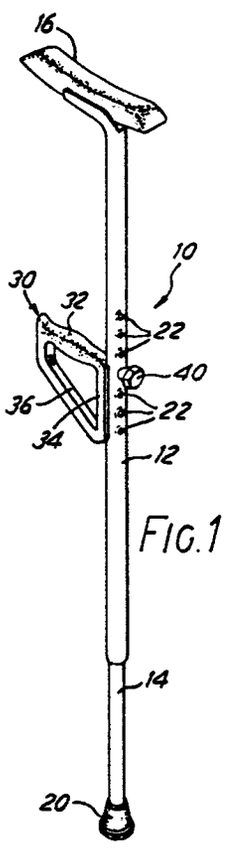

FIG.1

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CRUTCHES

The present invention pertains generally to the field of walking aids for invalids and is more particularly directed to an improved crutch of simplified construction.

In general, existing crutches consist of a vertical support, typically made of aluminum tubing or wood, and having an arm rest cushion or padding affixed to its upper end designed to fit under the arm pit of the user, and a handle attached to the vertical support at an intermediate point between the arm rest and a tip affixed to the lower end of the crutch.

Many existing crutches are provided with adjustment means which allow the crutch to be fitted to the physical requirements of different patients having varying body height and arm length. Such adjustment means typically include height adjustment which varies the overall length of the crutch from the arm rest to the lower tip, and a handle adjustment which allows the handle to be positioned at different points along the crutch for a particular crutch height adjustment.

While the precise means for making these two adjustments varies depending on the particular crutch design, until now these two adjustments were made separately and independently of each other by distinct adjustment devices. Typically, the hand grip could be adjusted by releasing a handle screw fastener, repositioning the handle along the crutch and tightening the fastener at the new location. The crutch length could also be adjusted by releasing a separate fastener, e.g., revolving a bolt extending through telescopically extendably crutch members, adjusting the relative position of the crutch members and securing the members at the new position with the corresponding fastener without disturbing the handle fastener in doing so.

One particular type of crutch presently in use, known as a single box axillary crutch is constructed around two telescoping tubular members with a handle affixed to an intermediate portion of the larger diameter tube. The relative telescoping extension of the two tubular members is adjustable by means of a locking pin mounted to one of the members and which fits into one of several axially spaced holes in the other member so as to interlock the two members against telescoping movement at one of several relative telescopic extensions to thus allow adjustment of the overall length of the crutch. The handle usually is a single piece tubular member which is secured in perpendicular relationship to the larger diameter tubular member of the crutch by means of a single bolt that extends axially through the handle and diametrically through one of several handle mounting holes in the tubular member. The position of the handle along the tubular crutch member can be changed by inserting the retaining bolt through any one of the several holes spaced along the tubular member and provided for this purpose.

It has been found desirable for purposes of economy and ease of adjustment to provide a crutch of this type in which the crutch length adjustment as well as the handle position adjustment can be effected by means of a single fastener. No existing crutch design meeting this requirement is known to this applicant.

The present invention meets the aforementioned objective by providing a single adjustment crutch having at least two telescoping tubular members, a handle, and a fastener simultaneously operative for securing the handle to one of the tubular members as well as for locking the two tubular members against relative telescoping movement. Desirably, the fastener also allows the selective positioning of the handle along the tubular member to which it is secured for a given relative telescopic extension, i.e. for a given overall length adjustment of the two tubular members. The fastener may comprise a single bolt extending through the handle and through aligned bolt holes in the two tubular members, and a bolt retainer such as a nut or a knob in which is formed a threaded bore. The bolt retainer is threaded onto the protruding end of the single bolt after passing which through the two tubular members to thereby draw and tighten the handle against the tubular member.

Desirably, a series of spaced apart bolt holes are formed in each of the telescoping tubular members such that several pairs of holes in the two telescoping tubes can be aligned simultaneously at each of several telescopic extensions of the two tubular members, i.e. for each of several different overall length adjustment of the two telescoping tubes. Thus, at each of these length adjustments, the single bolt may be inserted through any one of the aligned hole pairs, so as to provide a choice of position for the handle along the larger diameter tubular telescoping movement regardless of which of the aligned hole pairs the bolt is inserted through.

In a further aspect of the present invention, as improved handle construction is disclosed which is capable of bearing substantially greater loads than previous crutch handles notwithstanding the fact the improved handle is still retained to the crutch tubular member by a single fastener. The improved handle grip has a hand grip portion with an end proximal to the tubular member and an opposite end distal thereto, a support portion extending

downwardly from the proximal end parallel and adjacent to the tubular member and terminating in a lower end, and a brace portion connecting the distal end of the hand grip portion to the lower end of the support portion, so that weight bearing downwardly on the hand grip is transferred through the brace and the support portions against the tubular member to which is affixed the handle. The improved handle may take the form of a generally triangular frame in which is defined an interior hand opening. The improved handle structure may be secured to a tubular member of the crutch by means of a single bolt extending through the hand grip portion and through aligned holes in the telescoping tubular members.

A crutch embodying the invention will now be described, by way of example with reference to the accompanying diagrammatic drawings in which:

Figure 1 is a perspective view of the crutch;

Figure 2 is an exploded side elevational view of the crutch of Figure 1; and

Figure 3 is a fragmentary side elevational view illustrating the alignment of multiple hole pairs in the telescoping tubular members for a particular length adjustment of the crutch.

With reference to the drawings, Figure 1 illustrating s single adjustment crutch 10 comprising a first tubular member 12 within which is telescopically slidable a second tubular member 14 of smaller diameter. The upper end of the larger diameter tube 12 is provided with an axillary pad 16 designed and contoured to fit comfortably into a person's armpit. The upper end of the tube 12 is flattened and bent as best seen in Figure 2 and the arm rest 16 is attached to the flattened portion by means of fasteners 18. The lower end of the smaller diameter tube 14 is provided with a rubber tip 20 preferably made of a high friction material to resist sliding on smooth ground surfaces, and preferably of a resilient material such that no tapping or scrapping noises are produced by use of the crutch, and which also may serve as a shock absorbing device.

Turning now to Figure 2, the upper tube 12 has a first series of bolt holes 22 evenly spaced in an axial direction along the outer tube 12. Each bolt hole 22 includes diametrically opposed openings in the wall of tube 12 so as to allow a fastener bolt to pass diametrically through the tube 12. A second series of bolt holes 24 is evenly spaced in an axial direction along the inner tube 14. Each bolt hole 24 likewise, consists of diametrically opposed openings in the tube wall allowing passage of a fastener bolt diametrically through the member 14. While in most cases it would be desirable for the member 14 to be a hollow tube due to weight considerations, the member 14 may be a solid rod in which case the bolt holes 24 are bored diametrically through the solid rod member. The spacing between the bolt holes 22 in the outer tube is equal to the spacing between the bolt holes 24 in the inner tube member, and the diameter of the bolt holes 22 and 24 is similar.

As the inner tube 14 is telescoped within the outer tube 12, it is possible to bring at least some of the bolt holes 24 into alignment with bolt holes 22 as illustrated in Figure 3 for a number of different telescopic extensions of the two members 12 and 14, i.e. for different overall length adjustment of the crutch 10. Such alignment is obtained in stepwise increments equal to the spacing between adjacent bolt holes 24. Furthermore, at most of the relative telescopic extensions at which alignment of the holes is obtained, alignment of more than one pair of inner and outer bolt holes 24, 22 respectively is obtained, allowing a choice of through holes for insertion of a single bolt fastener 26. For example, the bolt 26 can be inserted through any one of seven aligned hole pairs as suggested by the parallel arrows B1 -B7 in Figure 3 to thereby lock the outer tube 12 and inner tube 14 against relative telescoping displacement.

It will be appreciated from Figure 3 that for each of several possible relative telescoping positions of the tubes 12 and 14, several bolt hole pairs 22, 24 will be in alignment, offering a choice of openings spaced axially along the tube 12 through which the single bolt 26 may be inserted both for retaining the handle 30 and for fixing the tubes 12 and 14 against telescoping movement. For each such given relative telescopic extension of the tubes it is therefore possible to position the handle 30 at one of several different locations along the tube 12 so as to optimize the handle location for the arm length of a particular crutch user, while simultaneously also fixing the overall crutch length by means of the bolt 26 as may best suit the height of that user.

As shown in Figure 2, the inner or lower tube 14 is desirably provided with a friction element 25 near the upper end of the tube and is disposed for making frictional engagement with the inner surface of the upper or outer tube 12 when the two tubes 12 and 14 are in telescoping relationship, so as to prevent the lower tube 14 from falling out while adjustment of the crutch length is being made. In a currently preferred embodiment the friction element 25 consists of a button, or equivalent element extending radially through a hole in the wall of tube 14 and spring loaded by a suitable internal spring 27 mounted within the tube for urging the friction element outwardly through its hole in the tube wall and thus into frictional engagement with the inner surface of the upper tube 12.

The crutch 10 further includes a handle 30 of improved design which incorporates a generally cylindrical hand grip portion 32 disposed with its main axis in perpendicular relationship to the upper tube 12. The hand grip portion 32. The lower end of the support portion 34 is connected to the distal end of the hand grip portion 32 by a brace portion 36. The hand grip, support and brace portions of the hand grip element 30 define a triangular structure as best appreciated in Figure 2 with an interior hand opening 38 which receives the hand of the user when gripping and curling around the hand grip portion 32. The brace portion 36 preferably rises at an angle from the lower end of the hand grip portion 32. The hand grip portion and the support portion connects the ends of the perpendicular portions at an angle, thus approximating a right triangle configuration. The hand grip portion 32 is bored axially for accepting a bolt fastener 26 which has a head end 42 and a threaded end 44 and which is sufficiently long to extend fully through the upper tube 12, and still protrudes sufficently on the side of the tube 12 opposite the handle 30 so as to be engaged by a bolt retainer such as a threaded, knurled knob 40 as shown in Figure 1. When the bolt retainer 40 is threaded onto the threaded end 44 of the bolt 26 and tightened against tube 12, the bolt head 42 is drawn against the handle 30 so as to urge the support portion 34 in parallel adjacent relationship against the tube member 12.

The surface of the support portion 34 which is adjacent the tubular member 12 is desirably contoured in concave cylindrical form so as to conform to the cylindrical outer surface of the tube 12. Such fitting of the support surface of the tube 12 is useful in preventing the handle 30 from rotating about the single fastener bolt 26 when the support surface is snuggly drawn against the surface of the tube 12 by means of the bolt 26 and retainer knob 40. Thus, when the handle 30 is secured to the tubular member 12, and the crutch user bears down on the hand grip portion 32, part of the downward force is transmitted through brace member 36 and the support portion 34 against the tubular member 12 so as to prevent the distal portion of the hand grip 32 from yielding under the weight bearing down on it. The single fastener bolt 26 is thus relieved of part of the force it would otherwise have to withstand, and which caused undesirable flexing of the handle in prior art crutch handles which were not braced in the fashion disclosed herein, but consisted simply of an elongated handle affixed in perpendicular relationship to a crutch tube.

The use of the improved handle 30 is not limited to the single fastener crutch construction shown herein but is equally useful in other crutch constructions wherein separate adjustment means are provided for fixing the overall length of the crutch, such as an additional bolt extending through aligned hole openings in the two telescoping tubes but independent from any handle retaining bolt.

Claims

1. A single adjustment crutch comprising at least first and second telescoping tubular members, and handle means, characterised by single fastener means (26, 40) operative for simultaneously affixing said handle means (30) to one of said tubular members (12 and 14) and locking said tubular members (12 and 14) against relative telescoping movement.

2. A crutch according to Claim 1, characterised in that said single fastener means (26, 40) is engageable with said tubular members (12 and 14) at any one of a plurality of axially spaced locations to thereby allow selective positioning of said handle means (30) along said one tubular member (12) for a given relative telescopic extension of said tubular members (12 and 14).

3. A crutch according to Claim 1, characterised in that said fastener means comprises a single bolt (26) extending through said handle means (30) and through aligned bolt holes in said first and second tubular members (12 and 14), and bolt retainer means (40) engageable with said single bolt (26) for securing said handle means (30) against separation from said one member (12).

4. A crutch according to Claim 3, characterised in that said bolt retainer means (40) is a knob threadable onto said single bolt (26).

5. A crutch according to Claim 3, characterised in that each of said tubular members (12 and 14) has a plurality of bolt holes (22, 24) defined therein, said bolt holes (22, 24) being spaced along each of said tubular members (12, 14) so that alignment of at least one pair of holes (22, 24) is obtained at each of a plurality of different telescopic extensions of said first and second members (12, 14), such that said single bolt (26) may be inserted through said least one aligned hole pair (22, 24) for locking the two members (12, 14) against telescoping movement while also affixing said handle means (30) to said one tubular member (12).

6. A crutch according to Claim 5 characterised in that a plurality of hole pairs (22, 24) are aligned in at least some of said telescopic extensions such that said single bolt (26) may be selectively inserted through any one of said plurality of aligned

hole pairs (22, 24) and thereby affix said handle means (30) at a selected point along said one member (12) while also locking said first and second members (12, 14) at a selected telescopic extension.

7. A single adjustment crutch comprising first and second telescoping tubular members, one of said tubular members having a plurality of bolt holes defined therein, and the other of said members having a bolt hole therein, said bolt holes being spaced along said tubular members so that alignment of the bolt hole of said other member with one of said plurality of bolt holes of the said one member is obtained at each of a plurality of different telescopic extensions of said first and second members and handle means; characterised in that said one member (12) also has a plurality of spaced bolt holes (22), and further characterised by a single bolt (26) extending through said handle means (30) and insertable through a selected one of said plurality of aligned hole pairs (22, 24) thereby to affix said handle means (30) at a selected point along one of said tubular members (12) while also locking said first and second members (12 and 14) at a selected telescopic extension thereby to fix the overall length of the crutch; and bolt retainer means (40) engageable with said bolt (26) for securing said handle means (30) against separation from said one member (12).

8. A crutch according to any one of Claims 3 to 7 characterised in that said handle means (30) comprise a hand grip portion (32) having an end proximal to said tubular member (21) and an opposite end distal thereto, a support portion (34) extending downwardly from said proximal end parallel and adjacent to said one member (12) and terminating in a lower end, and a brace portion - (36) connecting said distal end to said lower end such that weight bearing down on said hand grip portion (32) is transmitted through said brace portion (36) and said support portion (34) against said one tubular member (12) to thereby support said hand grip portion (32) against flexing.

9. A crutch according to Claim 8 characterised in that said single bolt (26) extends through a bore in said hand grip portion (32).

10. A crutch according to Claim 9 characterised in that said support portion (34) has a support surface conforming to the outer surface of said one tubular member (12) to thereby prevent rotation of said handle (30) about said single bolt (26) and to effectively transmit loading forces to said one member (12).

11. A crutch according to any one of Claims 8 to 10 characterised in that said hand grip portion - (32), said brace portion (36) and said support portion (34) define an interior hand opening (36) in said handle means (30).

12. A handle for attachment to a vertical member in a crutch, characterised in that said handle has a hand grip portion (32) including an end proximal to said vertical member (12) and an opposite end distal thereto, a support portion (34) extending downwardly from said proximal and parallel end adjacent to said vertical member (12) and terminating in a lower end, and a brace portion - (36) connecting said distal end to said lower end such that weight bearing down on said hand grip portion (32) is transmitted through said brace portion (36) and said support portion (34) against said vertical crutch member (12).

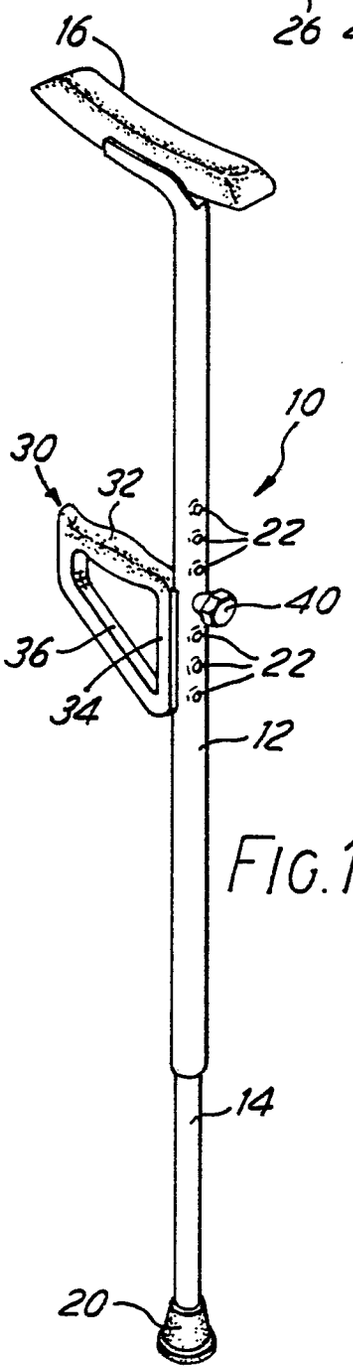

FIG.1

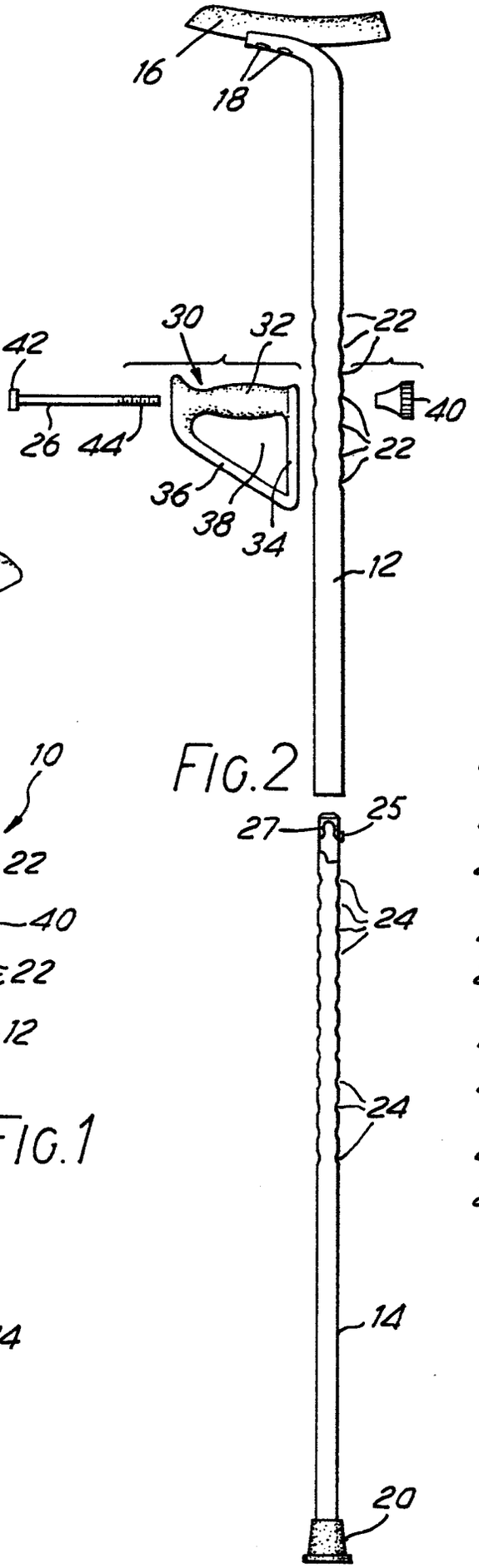

FIG.2

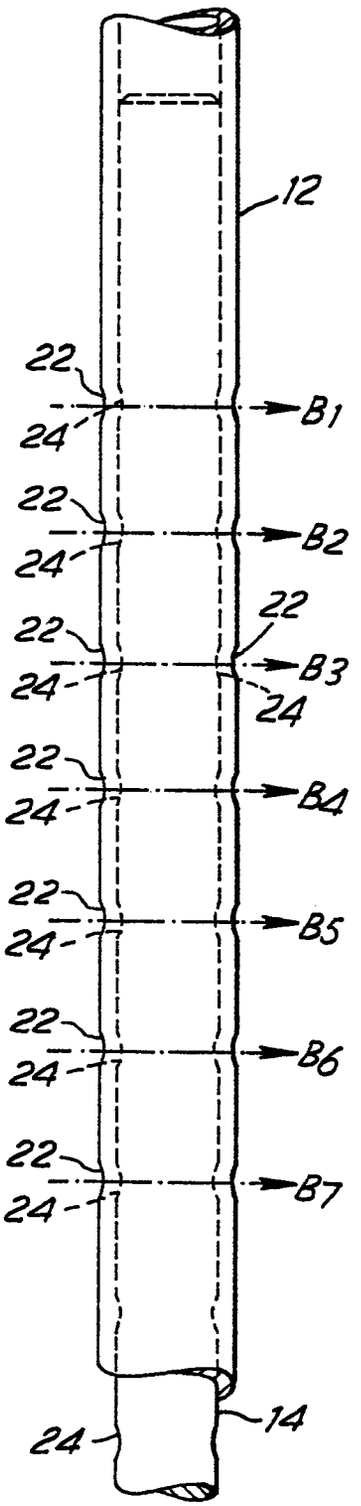

FIG.3