

Aug. 15, 1967

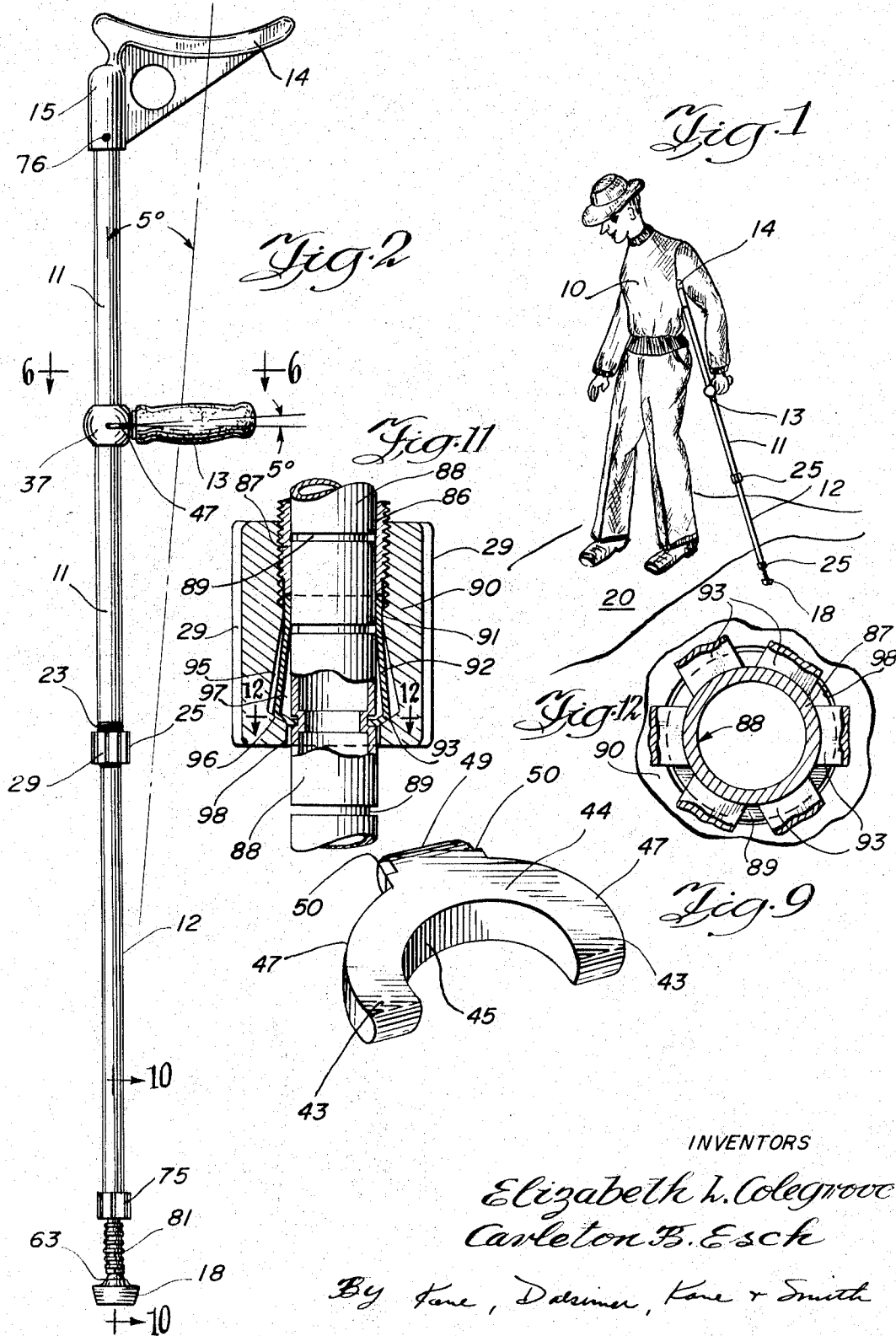
E. L. COLEGROVE ET AL

3,335,735

CRUTCH

Filed Sept. 14, 1965

3 Sheets-Sheet 1



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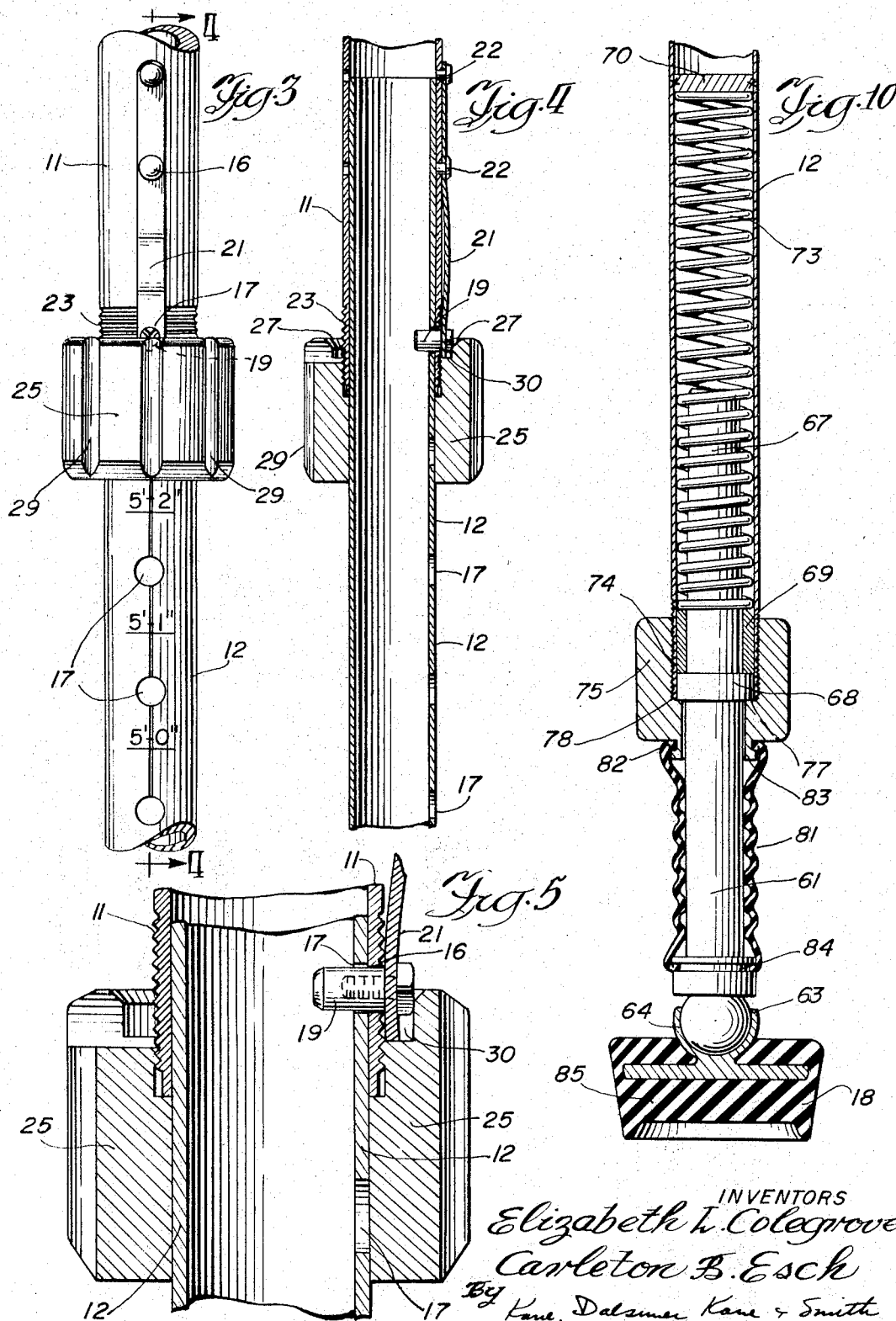
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CRUTCH

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3 Sheets-Sheet 2



INVENTORS
Elizabeth L. Colegrove
Carleton B. Esch
By Kane, Dalsimer, Kane & Smith
ATTORNEYS

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E. L. COLEGROVE ET AL

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CRUTCH

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Fig. 7

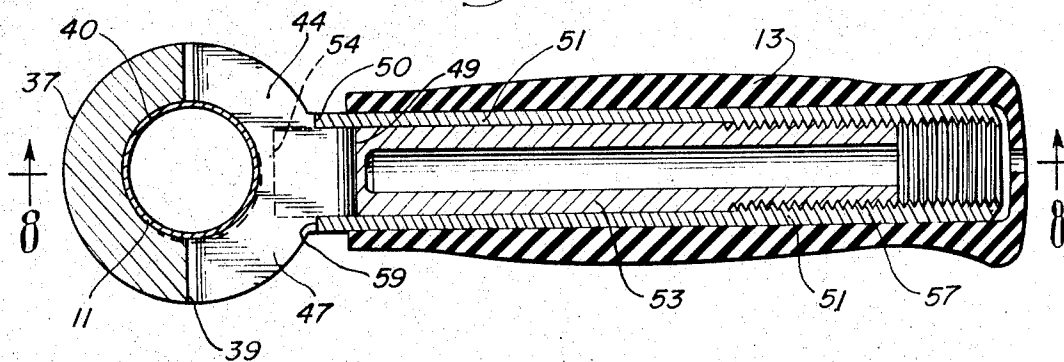


Fig. 8

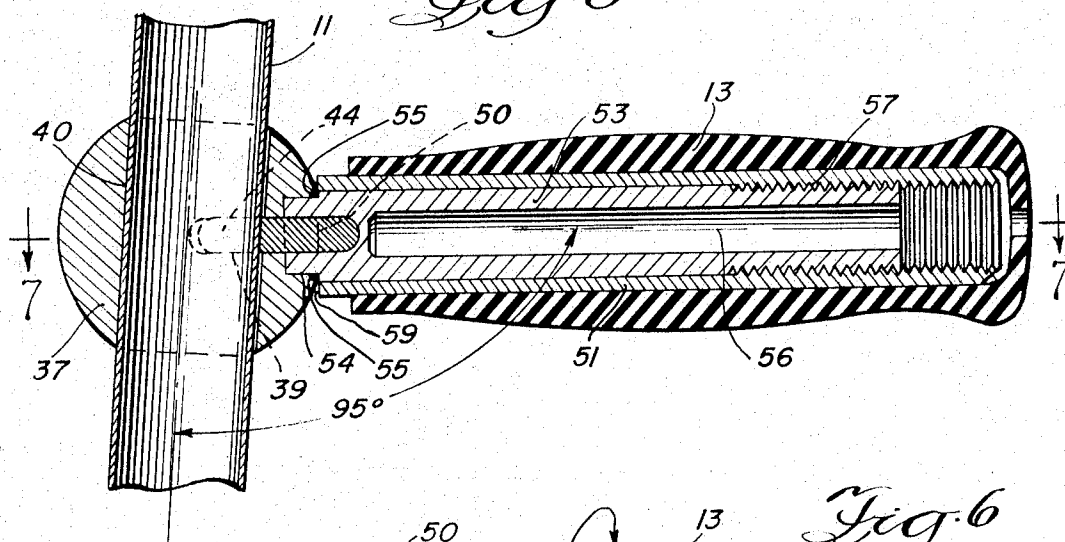
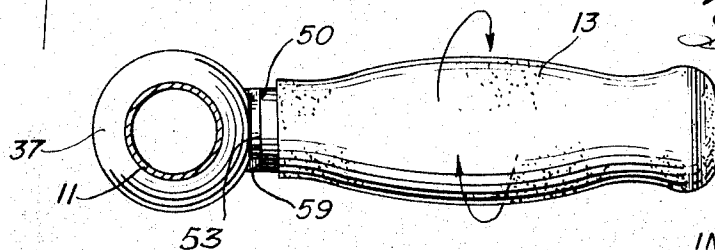


Fig. 6



INVENTORS.

Elizabeth L. Colegrove
Carleton B. Esch

By Kane, Dalsimer, Kane & Smith
ATTORNEYS

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3,335,735
CRUTCHElizabeth L. Colegrove, 18612 Crescent Drive, Anaheim,
Calif. 92805, and Carleton B. Esch, Costa Mesa, Calif.
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ABSTRACT OF THE DISCLOSURE

This invention relates to crutch structures designed to provide better balance, easier use and less shock in operation. The crutch structure is formed from telescoping members with an adjustable handle member positioned between the arm saddle and the pressure foot. The adjustable handle member surrounds the tubular shaft and provides for gripping the shaft substantially throughout its entire circumference. The handle member is offset relative to the shaft axis by a limited angle. The pressure foot is mounted in the lower end of the telescoping tubular section in a resilient mounting with a cover boot to prevent contaminants either from entering into the resilient support or oil or grease from the slidable member escaping.

The general nature of the invention

This invention relates to crutches.

The crutch structure with which this invention is concerned is designed primarily to insure a balanced component from the armpit saddle through the hand-gripping handle and thence to the foot, which serves as the pivot point for the crutch shaft. The bottom of the crutch shaft is connected to the foot through a ball and socket joint. This makes it possible to maintain the foot pad at all times flat to the surface upon which it is rested, regardless of the shaft angle. The crutch structure provides, in the region between the foot and the armpit saddle, a resilient cushioning and thereby reduces impact shock upon the user. At the same time the cushioning tends to give somewhat of a simulation of self-motivation and air-ride operation.

In the past, as far as applicants are aware, the commonly used crutches were made with a fixed separation between the armpit saddle and the gripping element upon which the user's hand is rested and upon which the weight is caused to bear in body and crutch movement. Further than this, it has been necessary that the gripping element adapted to be grasped by the hand of the user be aligned with the armpit saddle. Frequently, users of crutches have found this to be somewhat inconvenient. On many occasions locomotion would be easier were the two elements turned relative to each other. In addition, many times in the past those forced to use crutches are unnecessarily tired by reason of the continual shock transferred to them each time the crutch is moved with its foot member placed at a new location.

In an effort to overcome these defects, this invention provides a resiliently supported and universally turnable foot piece. The device to be described also embodies an adjustable hand gripper capable of being turned to various positions relative to the armpit saddle in order to make the crutch considerably easier to use. Further than this, the present invention provides for adjustability of crutch length, as well as selective separation between the element gripped by the user's hand and the armpit saddle.

Under the circumstances, the crutch here to be disclosed is generally of a universal character. The same crutch with minor adjustments may be used with equal facility by any of tall or short people, by those having long or

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short torsos, as well as by heavy or light weight individuals. In this way, a high-quality device is made available to the using public at relatively low cost since it is unnecessary to provide numerous designs to fit different individuals.

The drawings

The crutch, as here contemplated, will be best understood by making reference to the accompanying drawings forming a part of this disclosure, when these drawings are read in connection with the description to follow.

In the drawings, FIG. 1 is a schematic diagram showing the use of the crutch element in one preferred form;

FIG. 2 is an elevational view to show the crutch components in their assembled relationship relative to each other;

FIG. 3 is an elevation of a portion of the crutch shaft showing its two telescopically arranged components, together with fastening means for securing them in selected relative locations;

FIG. 4 is a sectional view taken on the line 4—4 of FIG. 3 looking in the direction of the arrows to show the locking means for the tubular shaft sections in further detail;

FIG. 5 is an enlargement of the locking means, as depicted in section by FIG. 4, which shows in further detail the arrangement for securing the two shaft members together;

FIG. 6 is a showing of the hand-gripping handle or holder adapted for positioning at selected locations on the crutch shaft;

FIG. 7 is an enlarged detail of the hand-gripping handle member representing a sectional view taken on the line 7—7 of FIG. 8;

FIG. 8 is a sectional view through the hand-gripping handle member of FIG. 7 taken on the line 8—8;

FIG. 9 is an isometric view showing the cam yoke member adapted for inclusion with the handle structure of FIGS. 6, 7 and 8 and which is adapted for tightening against the crutch shaft thereby to position the handle in a tight relationship to the shaft;

FIG. 10 is a sectional view taken on the line 10—10 of FIG. 2 looking in the direction of the arrows to show the resilient mounting of the foot section of the crutch and its adjustable attachment through a slide rod structure to the tubular crutch shaft;

FIG. 11 is an elevation view, partially in section, of a modified connector structure for locking the telescoping parts of the crutch shafts into selected length relationship; and

FIG. 12 is a section taken on the line 12—12 of FIG. 11 looking in the direction of the arrows to show the gripping yoke and fingers for holding the overall shaft length as selected.

General description of structure

If reference is now made to the drawings for a fuller understanding of the construction and principles, a crutch user 10 places the crutch element, comprising the telescopically arranged tubular shaft sections 11 and 12, so that the armpit saddle 14 is beneath the armpit. He then places his hand upon the handle member, generally designated 13, and rests the crutch foot 18 upon the ground 20. He can then move from place to place by using the crutch as a prop.

As can be seen more particularly from FIG. 2, the two telescopically positioned tubular shaft elements 11 and 12 are held with the tubular section 12 telescoped internally of the tubular shaft section 11. This arrangement will be explained more particularly in connection with the discussion of drawings FIGS. 3, 4 and 5.

An armpit saddle 14 is secured at the upper end of the tubular shaft section 11. The shaft section 12 is arranged to fit within a recess extending internally of the boss 15

in the armpit saddle. The elements are held together in any desired fashion, as by the securement pin or rivet 76. The handle member 13 is positioned in a slidable fashion on the shaft 11 between the saddle 14 and the region where the upper shaft 11 joins in the lower shaft 12. The handle is locked to the tubular shaft 12 in any selected location or separation from the saddle 14, and is more particularly set forth in the discussion of FIGS. 6 through 9 to follow. The handle can also be angularly oriented, as desired, relative to the armpit saddle.

The lower tubular shaft section 12 telescopes into the tubular shaft 11 for selected distances to determine crutch length. This is achieved by providing an opening 16 in shaft section 11 which is arranged for alignment with opening 17 in the tubular shaft section 12. The openings are substantially of like size. They are spaced longitudinally along the shafts in any desired fashion so that when the aperture of one shaft is positioned in registry with the aperture of the other shaft the combined crutch length of the crutch shaft can be selected to suit any user.

With registration of two apertures (see FIG. 5, for instance), a pin 19 may be passed through the registered openings, thereby to lock and fix the telescopic shaft relationship.

The locking pin 19 is carried upon a flat leaf spring member 21 which is appropriately secured, as by the rivets 22, to the outer crutch shaft 11. The leaf spring 21 normally tends to hold the pin 19 in a position removed from the shaft to which the leaf spring is secured. The lower end 23 of the outer tubular shaft 11 is threaded. A suitable fastening nut 25 is secured over the threaded end of the shaft. The fastening nut 25 is internally threaded to tighten on the threads 23 of the outer tubular shaft section 11.

The upper central surface of the fastening nut 25 has a tapered section 27 which tapers inwardly toward its center. When the pin 19 is pressed inwardly of two registered apertures of the outer and inner shafts 11 and 12 and the fastening nut is tightened or screwed onto the threads 23, the fastening pin 19 is forced inward of the tubular members by the wedge action created through the tapered section 27. As the nut is tightened on the threads 23 by turning, with advantage taken of the fluted sections 29 to make hand gripping of the nut easier, the fastening pin 19 is then forced into a position such that the leaf spring 21 is brought substantially flat to the outer surface of the upper tubular shaft 11. At this time the leaf spring wedges into a recess 30. When the nut is fully tightened the lower edge of the leaf spring contacts the bottom of the recess 30 and tight contact is established. The relative location and positioning of the two telescopic sections 11 and 12 of the shaft is thus determined and fixed. With the crutch in use force is exerted upon the shaft in such a way as to place the pin element 19 in shear. The described construction, however, eases this condition to some extent by distributing a portion of the load through the flat leaf spring 21 and the fastening means 22 by which the spring is secured to the tubular outer shaft. This provides adequate securement and the tightening precludes separation of the two elements.

Generally speaking, the apertures or openings 16 and 17 on the two tubular sections are arranged in vertical alignment relative to each other, but this is not in any respect essential. For strength, at times it is desirable that they be out of vertical alignment, although the vertical separation between adjacent apertures must be known in order thereby to determine the approximate correct height of the finally assembled device.

When the crutch element is in use, the armpit saddle is placed beneath the armpit of the user 10 at the same time the hand of the user grips the hand gripping element 13. Because of choices of different individuals for different separation between these elements and because of the fact that different users of about the same physical height may have arms or torsos of different lengths, it is desir-

able that the relative separation between the armpit saddle and the hand gripping member 13 shall be freely adjustable. To this end, the hand gripping element 13 is arranged to be adjustable along the tubular shaft section 11.

As formed, the securing means for the hand gripping element comprises a generally partially spheroidal component 37 through which an opening of approximately the outer diameter of the shaft 11 is provided. The component is assembled upon the shaft 11 prior to the time the lower tubular section 12 is secured and prior to the time the fastening and gripping means for holding the shaft sections together is assembled. In the alternative, these components may be put in place with the armpit saddle 14 removed from the upper end of the tubular shaft 11. When so positioned, the element (in a released position) is generally free to be moved up or down along the shaft length, but its distance is limited to the shaft length between the saddle and the region where the two sections join. The gripping arrangement must be capable of being fastened tightly enough to the shaft to support the user who grips the element by his hand. The partially spheroidal shaped fastening element 37 which surrounds the shaft has a slot 39 formed therein. The slot is used to hold a locking means for holding the handle position. The locking means extends in a direction substantially normal or perpendicular to the opening 40 through which the upper tubular shaft 11 is passed. The slot 39, as can be seen particularly from FIG. 8 is of a width sufficient to receive the outer end sections 43 of a gripping cam 44 (see also FIG. 9). The gripping cam 44 has an internal curved section 45 which has a radius corresponding substantially to the radius of the outer portion of the tubular shaft 11. The curvature of the outer surface 47 of the gripping cam 44 is made to correspond substantially to the curvature of the outer surface of the fastening element 37 surrounding the tubular shaft 11.

The inner cam surface 49 extends beyond the outer edge of the slot when in place. The surface 49 is substantially flat and extends beyond the shoulder sections 50 against which a tubular sleeve 51 within the handle 13 is adapted to bear. The sleeve forces the inner curved surface of the cam 44 against the outer surface of the tubular shaft 11 each time the handle is tightened. The cam element is locked into the spheroidal shaped fastening element 37 by a locking pin section 53, which fits within a recess 54 in the element 37, and which then surrounds the cam element 44. The element 37 is then appropriately welded, or otherwise secured, to the locking pin section 53 along the region 55, thereby holding the elements in generally desired relative position.

The locking pin section 53 is generally hollow, as shown at 56, and is threaded at its outer end 57. The outer threaded portion engages the internally threaded tubular element 51 in such fashion that when the handle section 13, which is securely fastened, as by a pin or other means (not shown), any turning of the handle will cause the edge 59 of the sleeve 51 to bear against the edge 50 of the cam. This movement forces the inner cam surface tightly against the tubular shaft 11 on one side and at the same time forces the tubular shaft 11 on one side and at the same times forces the tubular shaft on the opposite side against the curved recess 40 of the gripping member 37. When so positioned, the handle 13 is tightly held in any desired location along the shaft 11.

To loosen the handle and shift its location, it is merely necessary to rotate the handle in the opposite direction, which immediately loosens the cam force exerted upon the tubular shaft 11 and permits the making of adjustments.

When the crutch is in use, the handle section 13 will normally be tightened thereby to hold the internally curved section 45 of the gripping cam 44 tightly against the crutch shaft 11. Even if the handle should become loosened in use, the user will not note the effect when the crutch foot is placed upon the ground and the weight of the user is placed upon the handle to bear downward-

ly toward the ground. The positioning of the handle at the indicated slight angle with respect to the axis of the crutch shaft is adequate to insure that downward pressure of the handle against the shaft causes sufficient binding between the surface 45 and the crutch shaft to prevent slippage of the handle along the shaft.

The drawing diagrammatically shows that the axes of the tubular shaft 11 and the handle 13 are at an angle to each other which exceeds 90° by a small amount. This angle shown as exceeding a right angle by 5°, permits tighter adjustment and cam-locking action against the crutch shaft when pressure is applied through the threaded sleeve acting against it. Likewise, as is evident from FIGS. 1 and 2, the armpit saddle 14 at the top end of the crutch shaft 11 is arranged at a slight angle relative to the center line of the shaft. The off-center positioning of each of these elements is sufficient to preclude twisting or turning that might hurt the armpit.

The crutch structure also features a resiliently supported pressure foot 18 which is attached to a slide rod 61 through a ball and socket fitting, schematically shown at 63. Usually the ball 64 is secured to the lower end of the slide rod and the socket 65 is secured to the pressure foot. The slide rod 61 is positioned within the lower end of the tubular shaft 12 to extend internally thereof for a selected distance represented by the portion designated at 67. The slide rod 61 has a shoulder element 68 located between its ends. The tubular lower shaft 12 also has a dividing plate or partition 70 welded, or otherwise secured, transversely thereof in the region between the lowermost of the apertures 17 and the outer end thereof. Any shock resulting from setting the foot member down upon the ground surface is cushioned by a coil spring member 73 confined within the tubular shaft section 12 in the region between the closure 70 and the open end. The end of 67 of the slide rod which extends within the tubular shaft 12 and is positioned centrally of the coil spring until the lower end of the coil spring rests against the bushing surface 69.

The outer end of the tubular shaft 12 is threaded at 74. This end is capped by a tightening nut 75 which is internally threaded to fasten over the threads 74. The internal capping nut 75 has an internal shoulder 77 against which the shoulder element 68, as well as the outer edge 78 of the tubular shaft 12, is adapted to rest, with tightening. Tightening of the nut 75, which can be conveniently knurled or ribbed like the fastening nut 25, secures the slide rod 61 and tubular section 12 together. At the same time the slide rod section 61, at any time pressure is exerted thereon from the ball end member 64 in the direction toward the section 67, compresses the spring element 73 as the slide rod is moved internally thereof. This action serves to provide a shock cushioning effect which would otherwise result from abruptly resting the crutch foot on a surface for giving the user support. As soon as the crutch is lifted from the support surface, the spring pressure immediately forces the foot 18 outward and the operation is repeated.

It is usually desirable, because of the reciprocating nature of the movement of the foot 61, to provide some lubrication, thereby to permit easy movement of the slide rod 61 within the fastening nut, as well as the shoulder 68 within the interior of the tubular shaft 12. To preclude any possibility of the sliding action throwing of oil or grease a pliable sleeve or boot 81 is slipped over the outer end of the slide rod. The sleeve may be held resiliently within a groove 82 of the lower recess 83 of the fastening nut and by a similar type of component 84 at the lower end of the slide rod. The resilient nature of the sleeve 81 accounts for the change in position of the slide rod relative to the tubular shaft. The foot member 18 may be a rubber tip, as conventionally represented at 85, which the user rests upon the ground.

At times when it is undesirable to use the device as a crutch, the off-center positioning of the components

aids in making the device easy to grip and to hold. The device can serve as either a crutch or a cane. To provide the cane structure, it is usually desirable to remove the armpit saddle 14 and unlock the hand handle 13 and remove it from the shaft. Then by placing a suitable handle in the location of the armpit saddle, the component serves as a walking cane which is center balanced with the body. All adjustments (except removal of the saddle) as here described may readily be made merely by hand-turning the components with no need of operating tools being required for the users.

In a modified arrangement for establishing various selected lengths of the crutch shaft distance between the armpit saddle 14 and the pressure foot 18, reference may be made to FIGS. 11 and 12 in particular. In this arrangement, as in the showing of FIGS. 3, 4 and 5 in particular, the lower crutch shaft section is assumed to telescope within the upper shaft section. The arrangement of FIGS. 11 and 12 provides the lowermost end of the upper tubular crutch shaft 86 as an outwardly threaded element 87. The lower tubular crutch shaft section 88 is positioned to telescope within this threaded member.

Contrasted with the apertures of the FIG. 3 structure, the lower crutch shaft member 88 is provided with a series of uniformly spaced recesses 89. These may extend circumferentially of the shaft or they may, if desired, be discontinuous and spaced about the shaft. To preclude weakening of the tubular shaft section, the recesses or slots 89 (as can be seen from the sectioned portion of FIG. 11) are usually formed by a roller or embossing device capable of forming inwardly extending ridges or recesses but not weakening the tubular shaft itself. Generally speaking, the recesses would be spaced at distances generally comparable to the spacing of the apertures 17 as in FIG. 3, but the actual spacing is optional.

The circular recesses or ridges 89 make possible the selection and choice of crutch length. As in the already described arrangement, the two crutch shaft sections 86 and 88 are held together by a fastening nut 90 which is internally threaded and tightened to thread upon the threads 87 formed at the end of the outer tubular shaft section 86. The fastening nut is provided with fluted sections 29, thereby easily to be turned by hand to tighten it upon the outer end of the upper shaft 86. Immediately prior to fastening the upper and lower shafts 86 and 88 together, a gripping member comprising a circular collar element 91, with outwardly extending gripping fingers 92 turned inwardly at their outer end, as at 93, is positioned within the fastening nut through the opening 98 opposite that which threads upon the threaded section 87 of shaft 86. The collar member is then brought into abutment with the lower end of the threaded shaft, thereby to fix the position.

The fastening nut 90 has an inwardly sloping side 95 arranged to come generally opposite the gripping finger portions, 92. This sloping side, at a region designated 96, slopes inwardly rapidly, thereby to contact the outer end fingers 93 of the gripping member. As the gripping member is formed (see particularly the section of FIG. 12), six separate finger elements extend outwardly within the recess 97.

The gripping fingers 92 extending outwardly from the collar region 91 are usually of spring metal. They are so stressed to spring away radially from the axis of the collar section. When the collar section 91, with its gripping fingers 92, has been positioned within the fastening nut 90 so that the gripping fingers occupy the recess section 97 within the nut, it will be appreciated that, while the fingers extend inwardly, they do not extend beyond the periphery of the largest section of the lower shaft 88. However, when the shaft 88 is telescoped within the shaft 86, thereby to bring the recessed or grooved section 89 substantially opposite the outer ends of the fingers 93, the nut 90 can be tightened upon the lower threaded end of the shaft 86.

This tightening and threading of the nut forces the outwardly extending finger members 92 along the surface 96 (cut at an angle of about 30° to horizontal, that is, the plane of the groove 89) inwardly until the outer ends 93 thereof engage one of the recesses or grooves 89. Any further tightening causes pressure to remain on each of the fingers. As shown in FIG. 12, six separate gripping elements provide substantial securement of the two shafts in the selected telescoped relationship. The lower shaft 89 fits into the nut 90 through the opening 98, which is made sufficiently larger than the shaft to accommodate the collar 91 to which the finger members are attached.

Various modifications of the structure, of course, will be apparent to those skilled in the art to which the invention is directed and, therefore, it is to be understood that reasonable modifications which fall clearly within the spirit and scope of the teachings ought to be contemplated. In some instances, locking features not specifically a part of this disclosure are desirable particularly for the handle adjustment in order to preclude any likelihood of handle loosening during the course of use, which loosening might be sufficient to cause the user to fall by reason of a sudden change of position of the hand gripper.

Having now described the invention, what is claimed is:

1. A crutch structure comprising a tubular main member, a slide rod telescopically positioned in one end of the tubular main member and protruding therefrom for a selected part of its length, means for limiting the movement of the slide rod relative to the tubular member to maintain the telescopic relationship, resilient means tending to force the slide rod in a direction outwardly from the tubular main member to a limiting position and for exerting an opposing cushioning force against an end thrust tending to move the slide rod within the tubular member, a pressure foot member ball and socket joint means secured to the outer end of the slide rod for attachment to the pressure foot, said tubular main member having a pair of longitudinally spaced telescopically positioned sections provided with a plurality of registrable and alignable apertures longitudinally spaced therealong, resiliently pressed pin means to lock the said sections together with at least one aperture of each section in registry thereby to establish selectable lengths between the ends of the telescoped tubular sections, the center line axis of the tubular main member and that of the armpit saddle being non-parallel and a threaded fastening means for also locking the resiliently pressed pin means into the registering apertures.

2. A gripping member for attachment at selected locations to an elongated support comprising an anchoring unit having a passage therethrough of an internal contour

substantially like that of the periphery of the support, said unit having an elongated recess extending inwardly from one side in a direction toward the internal passage, a yoke member having a contour substantially like a portion of the internal contour of the support, a locking pin section extending outwardly from the anchoring unit for securing the yoke therein, and a gripping element surrounding the outwardly extending locking pin section and adapted to be moved relative to the anchoring unit to bring the yoke into engagement with the support thereby to secure the unit in selected positions relative to the support.

3. A crutch structure comprising a multi-section tubular main member formed of a pair of telescopically positioned sections, a slide rod telescopically positioned within one end of the said tubular main member, means for preventing detachment of the slide rod from the tubular member, resilient means normally tending to force the slide rod in a direction outwardly from the tubular member to a limiting position and for exerting an opposing cushioning force against an end thrust tending to move the slide rod within the tubular member, a pressure foot member connected with the outer end of the slide rod, an armpit saddle secured to the opposite end of the tubular member, means to lock the sections in spaced relationship to each other to establish a selectable distance between the saddle and the pressure foot, and a collapsible boot means between the pressure foot and the end of the tubular member in which the slide rod is supported, and an adjustable handle means supported between the ends of the tubular member.

References Cited

UNITED STATES PATENTS

190,392	5/1877	Weldon	135—52
1,197,375	9/1916	Hoff	135—50
2,568,654	9/1951	Neptune	135—49 X
2,620,025	12/1952	Powers	287—58 X
2,736,330	2/1956	Wood	135—49
2,842,387	7/1958	Della-Porta	287—58
2,963,930	12/1960	Clothier et al.	285—303 X

FOREIGN PATENTS

1,121,346	4/1956	France.
196,117	4/1923	Great Britain.

DAVID J. WILLIAMOWSKY, *Primary Examiner*.

HARRISON R. MOSELEY, *Examiner*.

P. M. CAUN, *Assistant Examiner*.