Nov. 20, 1956 H. N. MAGIDA 2,771,089

CRUTCH

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FIG. 1

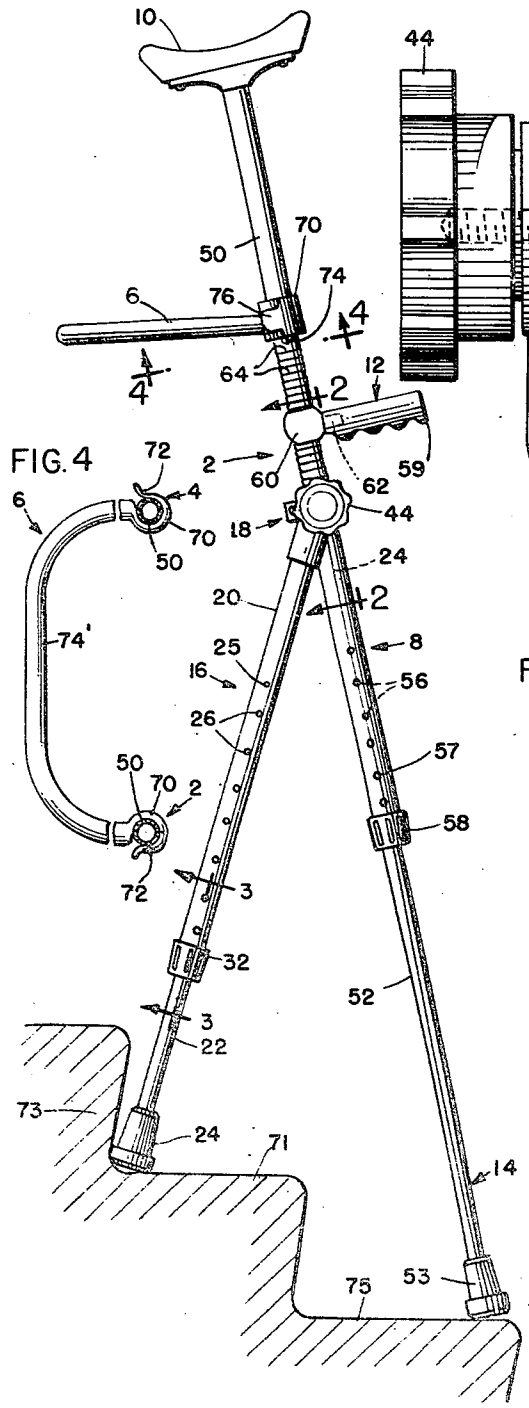


FIG. 2

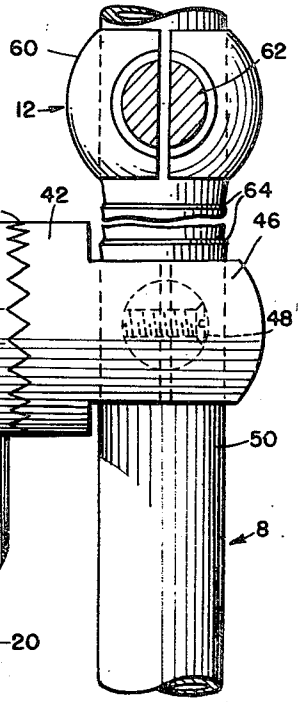
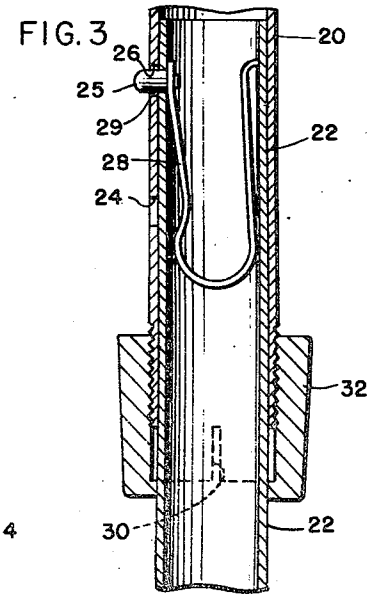


FIG. 4

FIG. 3



INVENTOR.
HERBERT N. MAGIDA
BY
Russell E Harris
ATTORNEY

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FIG. 5

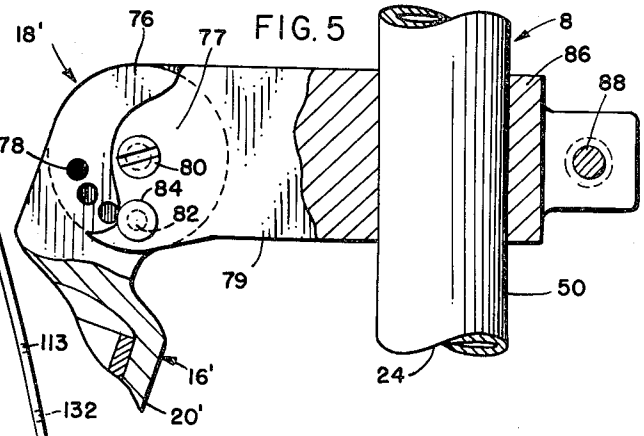


FIG. 6

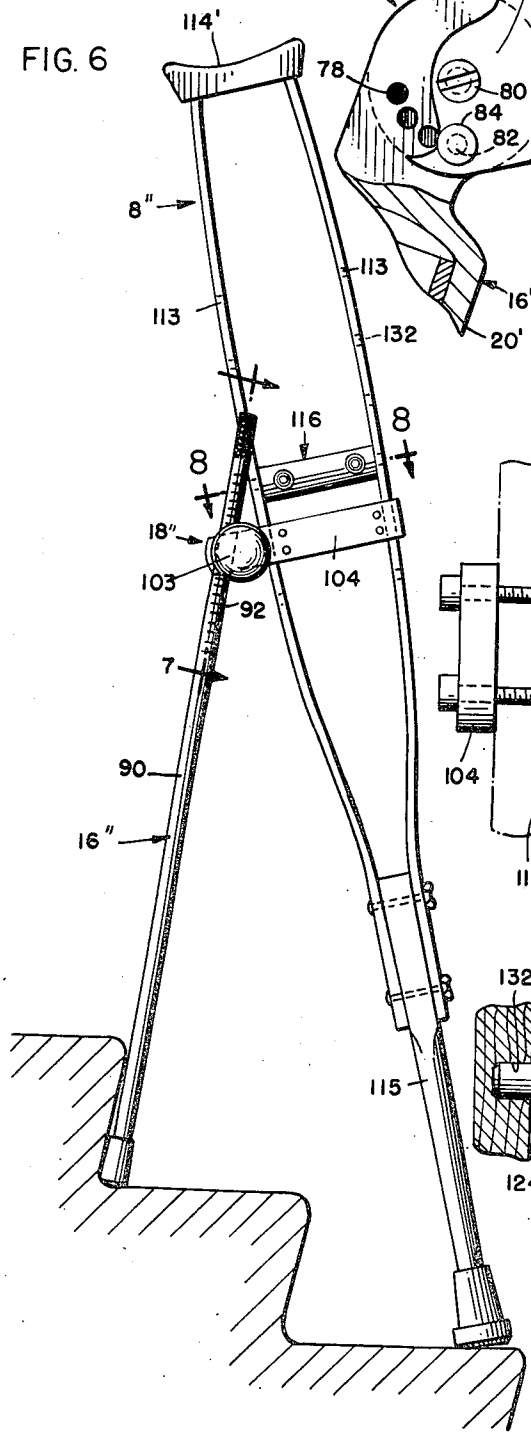


FIG. 7

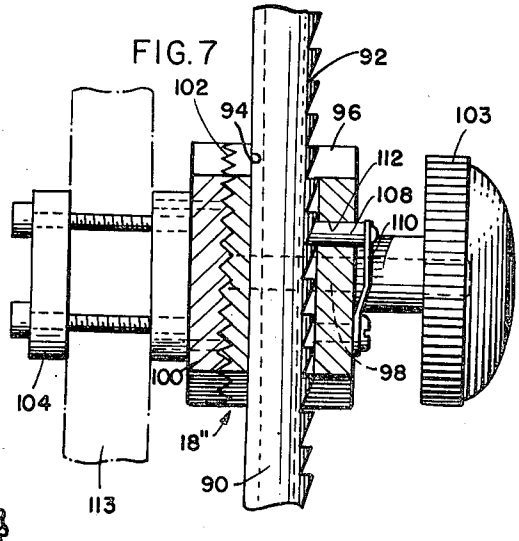
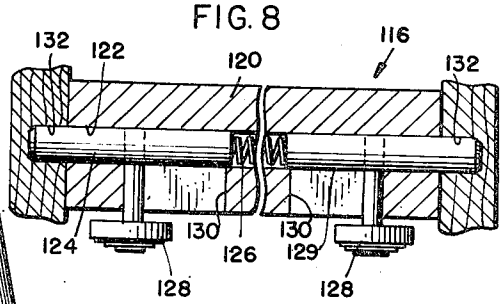


FIG. 8



INVENTOR:
HERBERT N. MAGIDA
BY Russell C Hall

ATTORNEY

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CRUTCH

Herbert N. Magida, Chicago, Ill.

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12 Claims. (Cl. 135—50)

This invention relates to walking crutches which are particularly adapted to aid crippled people in ascending and descending stairs and other elevated surfaces.

It is well known that paraplegics and other persons suffering from the loss or impairment of their legs find it difficult if not impossible to ascend and descend stairs. Those crippled persons who are able to ascend or descend stairs with the aid of crutches of the type preceding this invention invariably feel insecure because of the difficulty in bracing themeselves securely while moving between steps.

One object of the invention is to provide a walking crutch which enables the operator to ascend and descend stairs and the like with a minimum of effort; another object of the invention is to provide a crutch which facilitates the ascending and descending of stairs by enabling the operator to support himself securely while moving from one stair to another; still another object of the invention is to provide a crutch of the above character which is adjustable so that the crutch may be utilized to ascend and descend stairs of different sizes.

A further object of the invention is to provide a crutch which may be used in the normal manner on flat surfaces and which is adjustable quickly and easily into a crutch particularly suitable for use in ascending and descending stairs.

Another object of the invention is to provide a crutch of the above character which may be constructed from crutch frames of conventional design; another object of the invention is to provide an attachment for a crutch which may be easily connected to a crutch frame of conventional contruction so that a composite crutch structure results which may be used in the normal manner on flat surfaces and which may be adjusted quickly into a crutch which is particularly adapted to aid an operator in ascending and descending stairs of various sizes.

One difficulty sometimes encountered by a person proceeding up or down stairs with the aid of a pair of crutches of conventional design is that the crutches often sway laterally as the operator boosts himself up on the crutches in moving from one stair to another. This situation is particularly acute and dangerous in going down the stairs. By properly balancing his weight, an operator may reduce appreciably or eliminate this sway. A certain skill is required, however, which the operator may not possess. Accordingly, another object of the invention is to provide a novel crutch construction which minimizes or prevents lateral sway between a pair of crutches.

Other objects of the invention include the provision of a crutch of the above character which is light in weight, occupies a minimum of space when in use and when stored in an unused condition, and which is simply constructed and inexpensive to manufacture.

In accordance with one form of the invention, an auxiliary supporting member is associated with a crutch

frame of more or less conventional construction. The auxiliary supporting leg is pivotally connected to the crutch frame preferably at a point substantially removed from both ends of the frame, and locking means is provided for selectively locking the auxiliary supporting leg in any one of a number of angular positions. The distance between the pivot axis and the ground-engaging end of the auxiliary supporting leg is also variable so that the crutch may be readily adjusted for use on stairs of varying sizes. The angle and length of the auxiliary supporting leg is preferably adjusted so that in ascending the stairs, the main crutch frame tilts forward from a vertical and the auxiliary supporting leg extends downward from an intermediate region of the crutch frame and braces against the junction of the next stair and the riser at the rear thereof. The ground-engaging end of the main frame portion of the crutch preferably rests on the stair immediately below the one being climbed at a point near the front thereof so that the points of support are as widely spaced as possible to provide a footing of maximum stability. In descending the stairs, the frame and auxiliary supporting leg may be oriented in substantially the same position used to ascend the stairs.

Where a person is so crippled that the above-mentioned lateral swaying of the crutches becomes particularly important, a cross bar is preferably releasably connected between the crutches to join them rigidly together to prevent or materially reduce the lateral sway. Otherwise the cross bar may be omitted to reduce the weight of the crutches, and to enable the crutches to occupy a minimum space when not in use.

The elevation of the hands required for maximum comfort in walking with crutches on a flat surface may be different from that which is necessary to obtain the necessary leverage in proceeding up or down stairs. Accordingly, a horizontally extending hand gripping bar may be provided which is adjustable in elevation.

Other features, advantages and objects of the invention will become apparent upon reference to the specification to follow and the drawings wherein:

Fig. 1 is a side elevational view of one embodiment of the invention showing the orientation of the parts of a pair of crutches in stair-ascending or descending position;

Fig. 2 is an enlarged fragmentary elevational view of one of the crutches, as viewed in the direction of the arrows 2—2 in Fig. 1;

Fig. 3 is an enlarged fragmentary sectional view of one of the crutches as viewed along section line 3—3 in Fig. 1;

Fig. 4 is a sectional view taken along section line 4—4 of Fig. 1;

Fig. 5 is a fragmentary vertical side sectional view of a modified form of crutch;

Fig. 6 is a side elevational view of a still further modification of the invention;

Fig. 7 is an enlarged fragmentary sectional view of a portion of a crutch shown in Fig. 5, taken along section line 7—7; and

Fig. 8 is a fragmentary enlarged sectional view taken along section line 8—8 of Fig. 5.

Refer now to the drawings where similar reference numerals indicate similar elements throughout.

The embodiment of the invention illustrated in Figs. 1 through 4 comprises two laterally spaced crutches 2 and 4 secured together by an anti-sway cross bar 6. The crutches and cross bar are preferably made of aluminum or other light weight metal. Each of the crutches includes a crutch frame 8 having an armpit engaging saddle member 10 at one end, a handle bar assembly 12, and an extendible leg 14 at the other end.

An extendible auxiliary supporting leg assembly **16** is secured to the side of each frame **8** by means of an adjustable pivot coupling **18**.

The auxiliary supporting leg assembly **16** and the attached adjustable pivot coupling **18** form an integral unit which may be attached quickly and easily to the frame **8**. This is important when the auxiliary leg assembly **16** is to be distributed to persons who have previously obtained the main crutch frame **8**.

The leg assembly **16** includes an upper aluminum tubular body **20** and a lower aluminum tubular body **22** which is slidably received within the upper tubular body **20** to vary the overall length of the leg assembly. A suitable rubber cap **24** is telescoped over the bottom of the lower tube **22** to form a ground-engaging end therefor.

Means is provided for locking the lower tubular body **22** into a number of axial positions. This means includes a depressible pin **25**, carried by the lower tubular body **22**, which is extendible through one of a series of longitudinally spaced perforations **26** in the upper tubular body **20**. The pin **25** is urged through an aperture **29** in the lower tube by a resilient band **28** secured within the lower tube. The lower edge of the upper tubular body **20** is slitted at **30** and an internally tapered nut **32** is threaded onto the bottom of the upper tubular body to press the slitted lower end thereof tightly around the lower tubular body **22**.

The top end of the tubular body **20** is connected to the adjustable pivot coupling **18**. This coupling includes a cylindrical boss **36** connected to the upper end of the outer tubular body **20**. The boss is pivotally received over a pin **40** which extends axially from a disk member **42**. The opposed faces **41** of the boss **36** and the disk member **42** are serrated so as to be interlockable with each other. A knob **44** is threaded over the end of the pin **40** and presses the boss **36** into interlocking engagement with the disk member **42** to secure the leg assembly in a fixed position. When it is desired to vary the angle between the auxiliary leg **16** and the crutch frame **8**, the knob **44** is loosened, the boss **36** is moved axially away from the disk member **42** and the auxiliary supporting member is moved to its desired position. The knob **44** is then tightened, forcing the head member into interlocking engagement with the disk member portion **42**.

The disk member **42** may be secured in any suitable manner to the crutch frame **8** as by means of a split collar **46** which is of a size to telescope over the crutch frame **8**. The split ends of the collar are tightly secured together around an intermediate portion of the frame **8** by a screw **48**.

The crutch frame **8** may be made from aluminum tubular stock, as is the auxiliary supporting leg assembly **16**. As shown, the frame comprises an upper tubular body **50** telescoped over a lower tubular body **52** which carries a rubber ground-engaging cap **53** at the bottom end thereof. The lower tubular body is adjustable within the upper tubular body **50** to vary the overall length of the crutch frame in the same manner as the crutch frame in Figs. 1–4. Thus, the lower portion of the upper tubular body **50** is slitted at its bottom end and is provided with a series of spaced apertures **56** which receive an outwardly urged pin **57** extending from the lower tubular body **52**. An internally tapered threaded collar **58** is provided which clamps the slitted end of the bottom of the tubular member **50** about the lower body **52**.

The handle bar assembly **12** is mounted on the upper tubular portion **50** of the frame **8** and includes an internally threaded handle bar **59** and a split collar **60** which surrounds the frame body **50**. The collar has a split, tapered neck **62** which threadedly receives the handle **59** thereover. The diameter of the internally threaded portion of the handle bar is slightly smaller than the normal diameter of the neck **62** so that the handle bar forces the collar **60** tightly about the frame

body **50**. Axially spaced annular notches **64** are formed in the body **50** to provide annular shoulders on which the bottom of the collar **60** may rest to prevent axial slippage between the collar **60** and the crutch frame. The elevation of the handle bars is adjusted by loosening the handle bars **59** from the neck **62** and moving the collar into another position on the frame where the collar can be clamped about a different notch **64**.

The anti-sway crossbar **6**, which extends between the crutches **2** and **4**, may be formed from a piece of aluminum tubing which is bent into a U-shape. The ends of the crossbar **6** may be secured to the upper tubular bodies of the crutch frames **8** by means of a pair of C-shaped rigid collars **70** which closely surround the lateral sides and rear of the frame body **50** to prevent relative lateral movement therebetween. The end of each collar has an outwardly curled resilient clasping finger **72** which is deflected outward to permit the entry of a frame body **50** into the collar. The crossbar may thus be attached or removed quickly and easily from the crutch frame. The collars **70** rest on pins **74** extending from the frame bodies **50**. The intermediate portion **74'** of the bross-bar is spaced an appreciable distance forward of the crutch frame so that it does not interfere with the body movements of the operator.

When the crutch assembly shown in Figs. 1 through 4 is utilized for walking on a flat surface, the auxiliary supporting legs **16** may be swung down and locked into a position where they are in line with the upper tubular body portion **50** of the crutch frame. The crossbar **6** may be removed from one of the crutches and hung from the side of the other crutch by any suitable means (not shown). The handle bar assembly **12** is adjusted to a height which is most comfortable. When the crutches are to be used to aid a person in climbing stairs, the auxiliary supporting legs **16** are swung out from the crutch frames **8** and locked at the proper angle so that the ground-engaging caps **24** and **53** may engage respectively steps at different elevations. The lengths of the auxiliary legs **16** may be adjusted if necessary. The crossbar **6** may then be snapped into the position shown, if needed.

The ground-engaging caps **24** and **53** should be located as far apart as is practical. In the example illustrated, the ground-engaging end **24** of the auxiliary supporting leg **16** is in a position where it abuts the rear of a step **71** and the adjacent riser **73**, while the ground-engaging end **53** of the main frame **8** engages the front of the lower step **75**. The inclined of the main frame **8** is preferably such that the armpit engaging saddle **10** is located above the upper step **71**. The handle bars **59** may be raised into a position where the arms of the operator are bent so that upon stiffening his arms he may shimmy himself up over the saddle **10** onto the step **71**. Then the crutch assembly is quickly positioned so that the ground-engaging end **24** rests at the rear of the next step to be climbed and this process is repeated until all of the steps have been climbed.

To adjust the crutch in walking down the stairs, the auxiliary supporting member **16** may be swung rearwardly of the main crutch frame **8** so that the crutch may have an orientation similar to that shown in Fig. 1. In such case, of course, the anti-sway crossbar **6** would be positioned so as to face down the stairs and, if desired, the handle bar assembly **12** may be swung around to project forwardly of the crutch frame if this position of the handle bar assembly is preferred.

It should be understood that the crutch assembly shown may be utilized in a multitude of different ways, depending upon the particular choice and skill of the operator. Also, the skill of the operator may make the crossbar **6** unnecessary.

The auxiliary supporting member **16** provides a solid two point support for each of the crutches, and the anti-sway bar **6** prevents any appreciable swaying of the crutch.

Reference should now be had to the embodiment shown in Fig. 5. The crutch there shown is similar to that described in Figs. 1–4 except for the auxiliary supporting leg assembly **16'** and the pivot coupling **18'**. In the embodiment of Fig. 5, the auxiliary supporting leg **16'** is pivotally supported to the front of the crutch frame, rather than to the side thereof, as in the embodiment of Figs. 1–4, and about an axis spaced substantially forward of the crutch frame, considering the crutch in the position where it is used for walking up stairs. The auxiliary supporting member **16'** is similar to the auxiliary supporting member **16** previously described except that the upper portion **20'** of the outer tubular body is provided with a disk **76** having a series of apertures **78** falling along the circumference of a common circle. A pivot bolt **80** pivotally supports the disk **76** between the spaced ears **77** formed at the end of an arm **79**. An aperture **82** in one of the ears **77** is in register with one of the apertures **78** of the disk **76**. The defining walls of the aperture **82** threadedly receive a screw **84** which extends into one of the apertures **78** to lock the auxiliary supporting leg assembly **16'** in a fixed position. The position of the auxiliary supporting member **16'** may be varied by removing the end of the screw **84** from the aperture **78** and pivoting the leg into a position where the screw **84** is in line with another disk aperture **76**. The screw **84** is then rotated to extend the end thereof into the aperture **78**.

The other end of the bifurcated arm **79** terminates in a split collar **86** which is secured to the tubular body **50** of the crutch frame by a screw **88**. This embodiment provides a more rigid crutch structure than the embodiment of Figs. 1–4.

Refer now to the embodiment shown in Figs. 6 through 8 which shows another modified form of the invention. In this embodiment, a modified auxiliary supporting leg **16''** is connected to a crutch frame **8''** by a modified pivot coupling **18''**. The leg **16''** comprises an aluminum tube **90** having a series of longitudinally spaced notches **92** formed in one side of the top end portion of the leg. The leg extends through and is slidably received in a complementary bore **94** formed in a cylindrical member **96** making up part of the pivot coupling **18''**. The cylindrical member **96** is pivotally supported on a pin **98** extending from a disk member **100**. The opposed faces of these members are serrated at **102** so as to be interlockable. A knob **103** is threaded over the pin **98** to press the members into interlocking engagement with one another. The disk member **100** is secured to a bracket **104** which clamps onto the crutch frame **8''**. The leg **90** is thus adjustable into a number of angular positions relative to the frame **8''**, in a manner similar to that described in connection with the pivot coupling **18** of Figs. 1–4.

Means is provided to adjustably secure the leg **90** in a number of axial positions within the bore **102**. The means includes a pin **108** urged by a spring **110** through a transverse aperture **112** in the member **96** and into the bore **94** to engage the notches **92** on the supporting leg to retain it in place. The supporting leg **16''** may be slid within the bore **94** when the pin **108** is removed from the notches. The distance which this supporting leg extends from the pivot coupling **18''** may be varied by rotating the leg so that the notches **92** are brought out of engagement with the pin **108**. The supporting leg may then be moved axially within the bore **102** to adjust the leg to the proper length. The leg is locked into position by rotating the leg to bring the notches into engagement with the pin **108**.

The crutch frame **8''** comprises a pair of wooden frame members **113** joined at the top by an armpit engaging saddle **114'** and at the bottom by a depending supporting leg **115**. A handle bar assembly **116** is provided which may be elevated to a number of different positions. To this end, the handle bar assembly **116** includes a cylindrical handle bar **120** which has an axial cylindrical bore

122 therethrough which receives a pair of axial locking pins **124**. A spring **126** is located within the bore **122** and between the inner ends of the locking pins so that the pins are urged outwardly to a position where the outer edges thereof project beyond the ends of the cylindrical bar **120**. The locking pins may be completely telescoped within the cylindrical body **120** by means of a pair of headed members **128** which laterally extend from the locking pins **124**. Longitudinal slots **130** are formed in the cylindrical bar **120** which receive the shanks of the headed members **128**. The slots **130** provide clearance for the axial movement of the members **128** so that upon pressing the members **128** toward one another the ends of the locking pins **124** may be recessed within the handle bar **120**. A series of cylindrical apertures **132** are formed on the inner faces of the crutch frame members **113** into which the end of the locking pins **124** may extend to secure the handle bar assembly into any number of positions on the frame.

The crutch shown in Figs. 6 through 8 is used in the same manner described in connection with the embodiment of Figs. 1 through 4 and a further explanation is therefore not necessary.

It should be nnderstood that numerous modifications may be made of the specific embodiment above described without deviating from the broader aspects of the invention.

I claim:

1. In combination with a walking crutch frame having a ground-engaging end, auxiliary supporting means having a bottom supporting end, means for pivotally connecting said auxiliary supporting means to said crutch frame at a point spaced a substantial distance from both ends of the crutch frame, locking means for fixing the angle between said crutch frame and said auxiliary supporting means, and means for selectively varying the distance between the bottom end of the auxiliary supporting means and the pivot axis thereof.

2. In combination with a walking crutch frame having a ground-engaging end, auxiliary supporting means having a bottom supporting end, means for pivotally connecting said auxiliary supporting means to said crutch frame, locking means for fixing the angle between said crutch frame and said auxiliary supporting means, and means for selectively varying the distance between the bottom end of the auxiliary supporting means and the pivot axis thereof.

3. In combination with a walking crutch frame having a ground-engaging end, an auxiliary supporting means, said auxiliary supporting means having respective portions which are in sliding telescopic relationship with each other so that the overall length of said auxiliary supporting means may be varied, means for locking said telescoped portions into a selected position, means for pivotally connecting said auxiliary supporting means to said crutch frame, and locking means for fixing the angle between said crutch frame and said auxiliary supporting means.

4. In combination with a walking crutch frame having a ground-engaging end, an auxiliary supporting means, a pivot supporting means secured to the crutch frame and selectively lockable in a number of pivot positions, an aperture in said pivot supporting means slidably receiving said auxiliary supporting means, a series of longitudinally spaced notches on one side of said auxiliary supporting means, and retaining means extendible into said aperture for engaging said notches to hold said auxiliary supporting means in a fixed position within said aperture, said auxiliary supporting means being disengageable from said retaining means by rotating the same within said aperture to bring said notches out of engagement with said retaining means.

5. In combination with a walking crutch frame having a ground-engaging end, an auxiliary supporting means, a pivot supporting means secured to the crutch

frame and selectively lockable in a number of pivot positions, an aperture in said pivot supporting means slidably receiving said auxiliary supporting means, a series of longitudinally spaced notches on said auxiliary supporting means, and retaining means extendible into said aperture for engaging said notches to hold said auxiliary supporting means in a fixed position within said aperture.

6. An attachment for use with a crutch frame to facilitate the ascending and descending of stairs and the like, comprising an auxiliary supporting member having a slender bottom end, first means pivotally supporting said auxiliary supporting member, second means associated with said first means for locking said auxiliary support member in a number of selectable pivot positions, means for varying the distance between the bottom end of said auxiliary supporting means and the pivot axis therefor, and means for attaching said pivot supporting member to a crutch frame.

7. An attachment for use with a crutch frame to facilitate the ascending and descending of stairs and the like, comprising an auxiliary supporting member, first means pivotally supporting said auxiliary supporting member, second means associated with said first means for locking said auxiliary support member in a number of selectable pivot positions, and means for attaching said first means to a crutch frame.

8. An attachment for use with a crutch frame to facilitate the ascending and descending of stairs and the like, comprising an auxiliary extendible supporting member, means pivotally supporting said auxiliary supporting member comprising a pair of cooperating interlockable disk members and a pivot pin secured to one of the disk members and rotatably receiving the other disk member, releaseable means for bringing said disk members into interlocking engagement to prevent the relative rotation thereof, and means associated with one of the disk members for connecting the same to a crutch frame.

9. An attachment for use with a crutch frame to facilitate the ascending and descending of stairs and the like, comprising an auxiliary supporting member, a pivotable member selectively lockable in a number of pivot positions, an aperture in said pivotable member slidably receiving said auxiliary supporting member, a series of longitudinally spaced notches on one side of said auxiliary supporting member, and retaining means on said pivotable member which is extendible into said aperture for engaging said notches to hold said auxiliary supporting means in a fixed position in the aperture, said supporting means being disengageable from said retaining means by rotating the same within said aperture to bring said notches out of engagement with said retaining means.

10. An attachment for use with a crutch frame to facilitate the ascending and descending of stairs and the like, comprising an auxiliary supporting member, a pivotable member selectively lockable in a number of pivot positions, an aperture in said pivotable member slidably receiving said auxiliary supporting member, a series of longitudinally spaced notches on said auxiliary supporting member, and retaining means on said pivotable member which is extendible into said aperture for engaging said notches to hold said auxiliary supporting means in a fixed position in the aperture.

11. The combination comprising a pair of laterally spaced crutch frames, a pair of supporting legs associated with each crutch frame and having bottom ends which are at different elevations, the supporting legs associated with each of the crutch frames being disposed forwardly of the other supporting leg of the same frame, and a horizontally disposed U-shaped crossbar extending between said crutch frames for rigidly securing the two together, the intermediate or crosswise extending portion of the crossbar being substantially in front of the crutch frames to provide clearance for bodily movement of the user.

12. The combination comprising a pair of laterally spaced crutch frames, each of said crutch frames having an armpit engaging member at one end and the other end constituting a ground-engaging end therefor, a crossbar extending between said crutch frames for rigidly securing the two together, said cross bar having C-shaped rigid collars on the opposite ends thereof which embrace said respective crutch frames and are seated on laterally extending portions associated with said crutch frames, and resilient clasping fingers extending from said collars and resiliently embracing said crutch frames to permit the ready removal and insertion of said cross bar on said crutch frames.

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