

[54] **ORTHOPEDIC DEVICE**

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[58] Field of Search **135/47.5, 49, 54-59**

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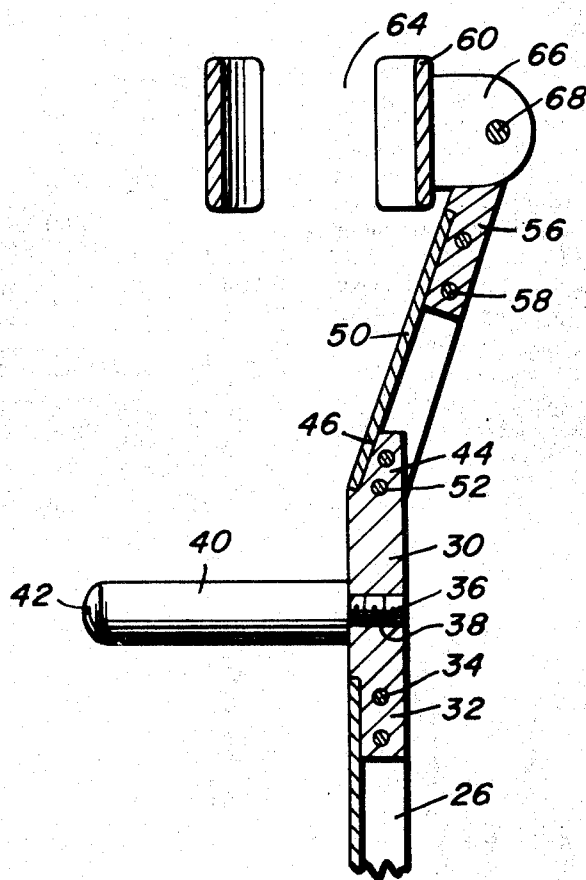
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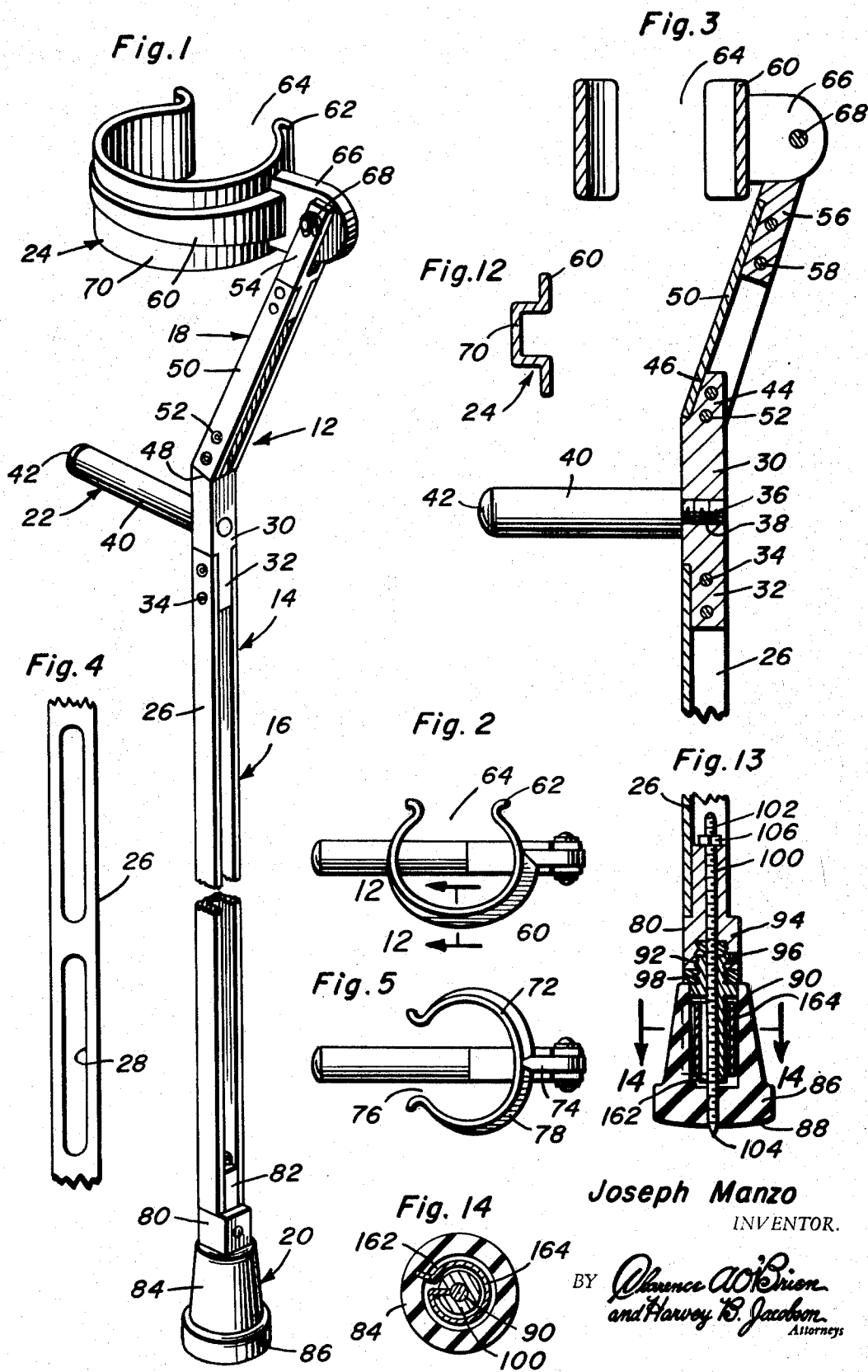
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ABSTRACT

An orthopedic device in the form of a crutch or cane assembly with the crutch including a lower column and an upper column forming a continuation thereof together with a handle or handgrip at the upper end of the lower column and a forearm engaging cuff at the upper end of the upper column and the cane including an upward extension from the handle having a wrist engaging cuff thereon. By constructing the assembly of structural components which are capable of disassembly and interchange with other structural components having selected dimensions and configurations, the assembly may be employed as a crutch in which the cuff engages the forearm or as a cane in which the cuff engages the wrist for stabilization thereof.

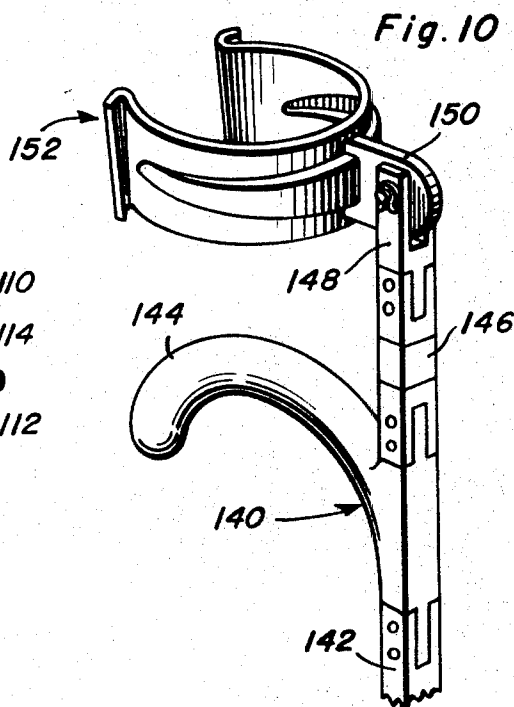
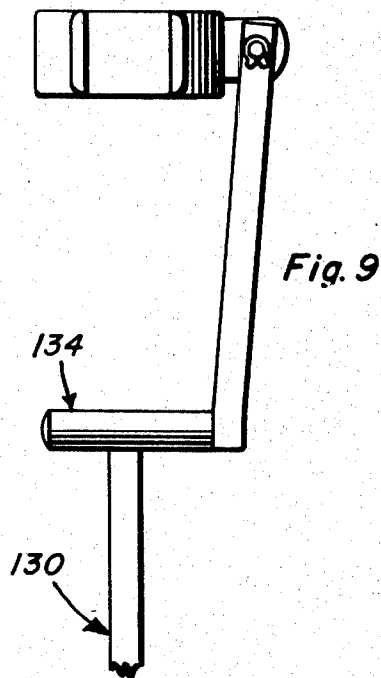
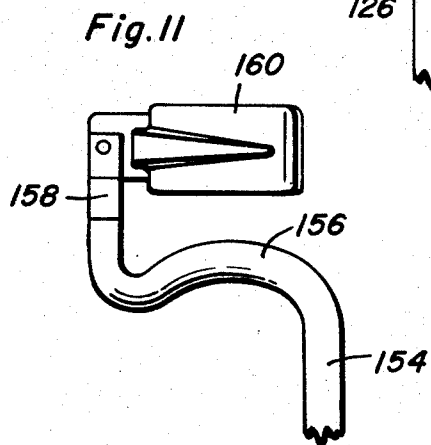
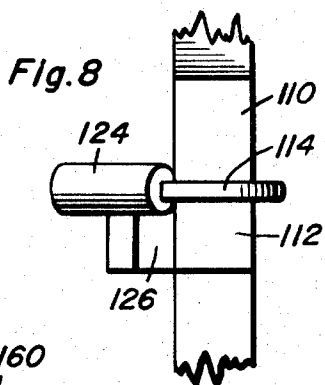
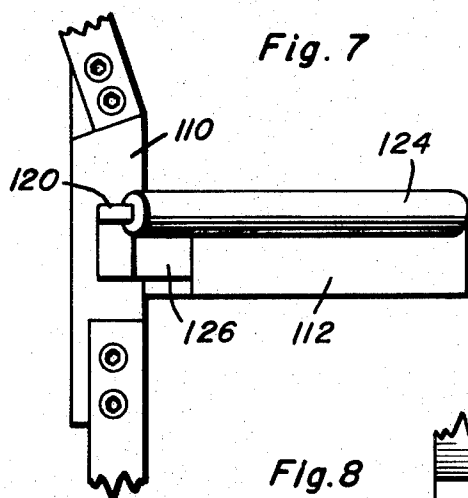
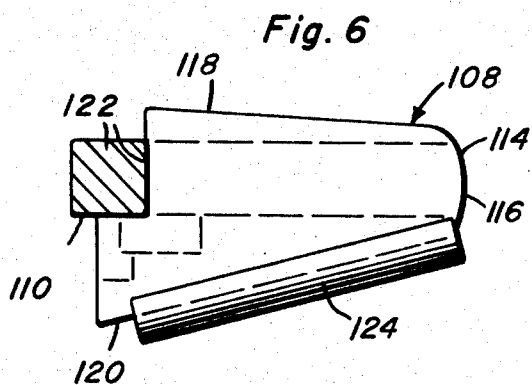
8 Claims, 14 Drawing Figures





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ORTHOPEDIC DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to orthopedic devices and more particularly to a crutch and cane assembly incorporating in its construction a column constructed of structural components which may be easily but securely assembled thus enabling custom construction of the appliance by selection of appropriate components with such components including a handle assembly which may be separable and constructed in various shapes, sizes and configurations and a cuff which may be oriented for engagement with the forearm when the assembly is provided in the form of a crutch and engage the wrist when the assembly is provided in the form of a cane.

2. Description of the Prior Art

Crutches presently commercially available include the bow type having a pad at the upper end thereof engaging the arm-pit, a handgrip at the central portion thereof and a rubber tip at the lower end thereof with the main body portion of the crutch being constructed of wood and the type having a column provided with an offset upper end having a forearm engaging cuff generally of U-shaped configuration pivoted thereto and a handgrip located at the upper end of the column as well as the usual rubber tip at the lower end with this type of crutch usually being constructed of metal. U.S. Pat. Nos. 2,192,766; 2,453,632 and 2,516,852 are representative of prior patents disclosing the type of crutch having a forearm engaging cuff at the upper end thereof. Presently available walking canes usually include a column or shaft having a rubber tip at the lower end and a reversely curved handle, generally in the form of a hook, at the upper end. When a person requires a crutch, he is faced with the acceptance of a crutch that is made in a standard size which may not be the proper size for him or considerable expense and delay in obtaining a custom fitted crutch. A similar problem exists with canes and in addition, a substantial number of people employing crutches could utilize a cane except that their wrists are insufficiently strong to exert sufficient supporting force on the cane.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a crutch and cane assembly incorporating assembled structural components defining a generally vertically disposed column including an upper and lower portion having a handle or handgrip at the upper end of the lower portion and a generally U-shaped cuff at the upper end of the upper portion with the components being selected and assembled so that the assembly may be custom fitted to the customer at the locality where the purchase is made and also enable the assembly to be arranged in the form of a crutch with a forearm engaging cuff or a cane with a wrist support.

Another object of the invention is to provide a crutch and cane assembly in accordance with the preceding object in which the cuff or support is constructed to provide increased rigidity for effective support of the forearm or wrist.

A further object of the invention is to provide a crutch and cane assembly constructed of conventionally shaped structural components, such as channels, tubing or the like, enabling the introduction of a modu-

lar concept into the construction of orthopedic crutches or canes.

Still another object of the present invention is to provide a crutch and cane assembly including a vertical column constructed of a structural component such as a channel or torsion member capable of being torsionally twisted during normal use thereof thus eliminating the tendency of the lower tip end of the column rotating on the supporting surface which it engages thereby reducing the wear on the tip and also reducing the tendency of the tip to slip in relation to its supporting surface.

Still another feature of the invention is to provide a crutch and cane assembly including an adjustable foot or tip which compensates for wear and also provides for slight adjustment of the over-all length of the crutch or cane as well as daily minor adjustment to increase comfort.

Yet another object of this invention is to provide a crutch and cane assembly having a lower column portion offset forwardly or backwardly to substantial alignment with the force exerted on the handle to improve stability of the crutch or cane.

Another significant feature of the present invention is to provide a crutch and cane assembly constructed of rigid components such as lightweight aluminum, plastic or the like which may be anodized or otherwise coated for protection against corrosion and also to enhance the appearance characteristics thereof by providing a crutch or cane in desirable colors or with the components thereof in different colors.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view of a crutch assembly embodying the present invention therein.

FIG. 2 is a top plan view of the upper portion of the construction of FIG. 1.

FIG. 3 is a vertical section view of the upper portion of FIG. 1 illustrating the association of the structural components forming the column and cuff.

FIG. 4 is a fragmental elevational view of the front of the lower column illustrating a representative configuration of the cutouts formed therein.

FIG. 5 is a top plan view similar to FIG. 2 but illustrating a different arrangement of the cuff in relation to the handle.

FIG. 6 is a plan view of another type of handle constructed to distribute forces over a large surface area of the hand.

FIG. 7 is a side elevational view of the construction of FIG. 6.

FIG. 8 is a front end view of the construction of FIGS. 6 and 7.

FIG. 9 is a fragmental elevational view illustrating a crutch assembly constructed in accordance with the present invention in which the lower column is offset to be substantially in line with the force exerted on the handle.

FIG. 10 is a fragmental perspective view of the upper end of a cane assembly illustrating the arrangement of the structural components.

FIG. 11 is a side elevational view of another embodiment of the cane assembly.

FIG. 12 is a sectional view taken along section line 12—12 of FIG. 2 showing the reinforcing rib.

FIG. 13 is a sectional view of the foot assembly.

FIG. 14 is a transverse sectional view taken along section line 14—14 on FIG. 13.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring specifically to FIGS. 1—4, the crutch assembly is generally designated by the numeral 12 and includes a substantially vertical column 14 including a lower portion 16 and an upper portion 18 having a foot assembly 20 at the lower end of the lower column portion 16, a handle generally designated by the numeral 22 at the upper end of the lower column portion 16 and a cuff generally designated by the numeral 24 at the upper end of the upper column portion 18.

As illustrated, the lower column portion 16 is formed by an elongated channel-shaped member 26 which has the web thereof facing forwardly and the open edge facing rearwardly. The orientation of the channel-shaped member may vary and the channel configuration may not be continuous. The web portion of the channel 26 is provided with a plurality of elongated slots or openings 28 therein to reduce the weight, serve as decorative items with the channel construction enabling twisting of the lower column portion 16 about its longitudinal axis. The channel-shaped member 26 may be constructed of aluminum or other lightweight and relatively strong metal, plastic or the like and may be anodized or otherwise coated to a desired color for enhancing the appearance characteristics thereof and also protecting the structure from corrosion.

The upper end of the lower column portion 16 includes a connecting block 30 having a reduced lower end 32 extending into and fitting closely with respect to the interior dimensions of the end of the channel-shaped member 26. Suitable fastening devices 34 extend through the flanges of the upper end of the channel-shaped member 26 and the reduced end of the block 32 thus rigidly connecting the block 30 to the channel-shaped member 26 so that the block 30 forms a rigid continuation of the channel-shaped member 26.

Between the ends of the block 30, there is provided an internally threaded socket 36 which faces forwardly for receiving an externally threaded extension 38 on a generally cylindrical handgrip or handle 40 having a rounded outer end 42 thus forming a handle assembly which extends forwardly from the block 30 generally in the nature of a cantilever with the length, diameter and external configuration of the handle 40 being varied within the requirements of the person using the crutch.

The upper end of the block 30 is provided with a reduced extension 44 having an angulated forward edge 46 which is inclined to the rear of the crutch. The side shoulders 48 which form the reduced extension 44 are in angular relation to the inclined surface 46 for receiving the lower end edge of an open channel-shaped member 50 which forms the upper column portion 48. Suitable fasteners 52 extend through the lower end of the channel-shaped member 50 and the extension 46 for rigidly securing these components together. At the upper end of the channel-shaped member 50, there is provided a generally U-shaped or bifurcated yoke 54 having a reduced extension 56 received telescopically

within the upper end of the channel-shaped member 50 and secured rigidly thereto by suitable fasteners 58. The length of the channel-shaped member 50 may be selectively varied as may the angle of inclination thereof by varying the angles of the shoulders 48 or by selecting blocks 30 having different characteristics of angulation of the shoulders 48 so that the cuff 24 may be supported at different elevational relations to the handle 22 and disposed forwardly or rearwardly in relation to the handle 22.

The cuff 24 includes a generally U-shaped or partially cylindrical member 60 which forms a segment of a circle with the terminal ends flaring outwardly as at 62 thus providing an entrance area 64 so that the cuff may be moved onto the forearm of the person using the device. The member 60 includes a laterally extending lug 66 fixed thereto with the lug 66 extending between the bifurcated legs of the yoke 54 and being pivotally secured thereto by a suitable pivot pin, bolt or the like 68 thus pivotally supporting the cuff at the upper end of the upper column portion 18 with the lower edge of the lug 66 engaging the bottom of the slot defining the bifurcated legs on the yoke 54 as illustrated in FIG. 3.

The outer surface of the cuff is provided with a rigidifying reinforcing rib 70 thereon which tapers from a widest point where it abuts the lug 66 for added strength to a narrower point remote therefrom. The reinforcing rib 70 may be integral with the cuff, as obtained by stamping for example, thus providing a one piece construction for the cuff member 60 and the reinforcement rib 70 to facilitate the manufacture thereof and to maintain the resiliency of the cuff but at the same time reinforce and rigidify the cuff.

As illustrated in FIGS. 1—3, the cuff 24 is a side opening cuff with the lug 66 being attached thereto adjacent one of the flared ends 62. FIG. 5 illustrates another embodiment of the cuff 72 in which the pivot lug 74 is attached to the center thereof so that the cuff is a forwardly opening cuff with the opening 76 being disposed above and in alignment with the handle structure. The reinforcing rib 78 is formed on the cuff in the same manner with the widest portion of the reinforcing rib 78 being at the center of the cuff. Thus, by simply removing the pivot pin or bolt 68, either type of cuff 60 or 72 illustrated in FIGS. 2 and 5 respectively may be provided at the upper end of the crutch assembly depending upon the desires or need of a particular user.

The foot assembly or tip 20 of the crutch includes a block 80 having an extension 82 of reduced cross-sectional configuration closely received within the channel-shaped member 26 and being fixed thereto such as by removable fasteners or the like. A rubber body of generally frusto-conical configuration 84 is disposed below the body 80 and has a generally circular lower end portion 86 provided with a surface engaging lower surface 88 which may have circular ribs or other structural provision to reduce the tendency of slippage of the rubber tip 84. The upper end of the rubber tip 84 is provided with a cylindrical member 90 inserted into the rubber tip 84 and includes an externally threaded extension 92 which is threaded into an internally threaded recess 94 in the lower end of the block 80. A setscrew 96 is threaded through the block 80 into engagement with the extension 92 for securing the extension rotatably in the threaded socket 94 thereby enabling limited adjustment in length of the tip 84 to compensate for wear of the lower surface 88 thereof and to

make minor adjustments for comfort. A jamb nut 98 is positioned between the tip 84 and the lower end of the block 80 to further lock the tip 84 in adjusted position.

The interior of the tip 84, the member 90 and the block 80 includes a longitudinal bore 100 extending completely therethrough for receiving an externally threaded rod 102 having the lower end thereof pointed as at 104 to enable a person using the crutches to effectively employ them on icy surfaces by extending the threaded rod 102 so that the pointed end 104 projects beyond the surface 88. The threaded rod 102 is threadably engaged with an internally threaded portion of the bore 100 in the block 80 and is locked in adjusted position by a locknut 106 so that the threaded rod may be securely locked in either retracted position or in extended position. Any suitable means may be provided for positively locking the extendable rod 102 in either its extended or retracted position with the rod also being threaded or smooth surfaced depending upon the type of mechanical locking device to be employed for securing it in adjusted position.

FIGS. 6, 7 and 8 disclose a different type of handle structure 108 which includes a connecting block 110 that is similar to the block 30 but includes a laterally extending supporting member 112 either integral therewith or rigidly fixed thereto. Supported on the top of the supporting member 112 is a platform or plate 114 having a rounded outer edge at 116 and rearwardly diverging side edges 118 and 120. The edge 120 extends beyond the edge 118 and the plate 114 includes a generally L-shaped notch 122 which engages the front and one side edge of the block 110. The edge 120 of the plate is provided with a substantially cylindrical member 124 extending throughout the length thereof and attached thereto to provide a rounded gripping surface for engaging a portion of the inner surface of the hand which engages the handle or handgrip 108. Inasmuch as the edge 120 is provided with the member 124, greater force will be exerted on this side of the plate 112. To provide additional support for the plate, a reinforcement block or blocks 126 are provided to form gussets to substantially reinforce the plate 114 thereby providing a rigid cantilevered handle or handgrip constructed in a shape to support the inner surface of the hand over a relatively larger area as compared with a conventional handle of cylindrical configuration thereby reducing the tendency of the handle or handgrip forming callouses or otherwise causing discomfort due to concentration of forces in a particular location on the surface of the hands. The particular shape, configuration and dimensions of the platform or plate and its associated structural components may be varied in a manner to distribute the forces effectively over a relatively wide area of the hands.

FIG. 9 illustrated another embodiment of the crutch in which the lower column portion generally designated by numeral 130 is forwardly offset which orients the vertical portion of the lower column forwardly under the handle generally designated by the numeral 134 which may be the same construction as the handle 22 illustrated in FIG. 1 and also, various types of cuffs may be employed with this form of the crutch with the remainder of the crutch being the same construction as that illustrated in FIGS. 1-5. Of course, the lower column portion may or may not be of channel-shape construction but, the lower column portion is located forwardly in such a manner that the line of action of the

hand passes in a straight line to the ground thereby stabilizing the crutch.

FIG. 10 illustrates a cane assembly generally designated by the numeral 140 which includes a lower column portion 142 having a smoothly curved handle 144 connected thereto or formed thereon to form substantially a conventional cane structure. Extending upwardly from the lower column portion is an extension or upper column portion 146 which terminates in a yoke 148 pivotally receiving a lug 150 on a wrist engaging cuff or support generally designated by the numeral 152 which is substantially identical to the construction of the cuff illustrated in FIGS. 2, 4 or 5. The cuff 152 preferably opens rearwardly so that as the hand grasps the handle 144, the wrist will be moved into the cuff and thus stabilized. The handle 144 may be curved as illustrated or may be straight and the vertical dimension of the upper column portion 146 is relatively short. In addition, the upper column portion 146 may include a swivel unit to enable rotation of the cuff about the longitudinal axis of the upper column portion to a desired position and then secure it.

FIG. 11 illustrates a cane structure in which the lower column portion 154 is provided with a curved offset or straight offset upper end 156 having an upward extension forming the upper column portion 158 having a swivel unit incorporated therein and a cuff 160 opening toward the handle 156. In this arrangement, the cuff 160 opens forwardly and supports the wrist from a point either behind or on one or more sides of the wrist when the handle 156 is grasped in the nature of a walking cane.

By using the structure disclosed, the standard structural elements and machined components enable elimination of castings, bent tubes and other expensive components and the various structural elements may be furnished in various lengths thus enabling custom building of the crutches or canes and extending the useful life of the crutch or cane to the user. This construction also eliminates welding of components thereby facilitating the assembly of the components to form a crutch or cane. Also, alternative pressure reducing platforms may be provided of various configurations to more evenly distribute and reduce palm pressure while using the crutch or cane. This platform may be oriented in various positions and shaped into desired configurations. For example, the angle of the rounded member on the platform illustrated in FIGS. 6-8 may be oriented to enable the fingers to grasp the handle while inclined at a natural angle which may vary but has been found to be approximately 20° although this is variable.

The lower end of the crutch also may be provided with a rocker device which is in the form of a supporting tip which can rock in relation to the lower column to further facilitate use of the device. Also, the ice pick or pointed rod illustrated in FIG. 2 may have a spring incorporated therein.

When additional adjustment is desired, two telescoping channels may be used to provide a broader range of adjustment. Also, rectangular or square tubing may be employed in lieu of the partially open channel construction. The torsional spring action of the lower column may also be attached by the incorporation of a torsion spring in the foot assembly 24 as shown in FIGS. 13 and 14 in which tip 84 has a bore 162 therein receiving the member 90 and providing an annular space receiving a leaf torsion spring 162 which has a flange on

one end anchored to the tip 84 and a flange on the other end anchored to body 90. A spring may also be incorporated in line with the ice pick to bias it to an extended operative position. Further, the device may be constructed so that it can be folded to a compact condition by employing a suitable locking hinge or the like.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. An orthopedic walking aid comprising a vertically disposed column including a lower column portion and an upper column portion, handle means connected to the column at the juncture between the lower column portion and the upper column portion, means at the upper end of the upper column portion for engagement with the forearm or wrist, and a tip mounted at the lower end of the lower column portion for engaging a supporting surface, said lower column portion and upper column portion being detachably interconnected and the forearm or wrist engaging means being detachable from the upper column portion to enable components of selected dimensions to be used thereby enabling the device to be custom fitted to a person employing the device, said tip including a support surface engaging member, and torsion spring means interconnecting the lower column portion and said member to provide relative twisting therebetween.

2. The structure as defined in claim 1 wherein said tip is in the form of a frusto-conical rubber body screw-threadedly attached to the lower end of the lower column portion to enable compensation for wear of the tip and minor adjustment for comfort.

3. The structure as defined in claim 2 together with a pointed rod adjustably mounted in the lower end portion of the lower column portion and extending through the tip for extension and retraction for providing an ice pick so that the device may be used on icy surfaces.

4. The structure as defined in claim 1 wherein said column portions are each constructed of an open channel-shaped structural member, the web of the channel-shaped structural member forming the lower column

portion including elongated slots therein for reducing the weight.

5. The structure as defined in claim 1 wherein said upper and lower column portions are constructed of rigid material colored for protection and attractive appearance.

6. An orthopedic walking aid comprising a vertically disposed column including a lower column portion and an upper column portion, handle means at the juncture between the lower column portion and the upper column portion, a wrist engaging cuff at the upper end portion of the upper column portion and being disposed in alignment with the handle means and a tip mounted at the lower end of the lower column portion for engaging a supporting surface, said tip including a pointed extendible and retractable rod and means to manually extend and retract the pointed rod for providing an ice pick to enable the device to be used in icy surfaces, said column being longitudinally adjustable to enable variation in the effective length of the device, said device being constructed to enable the cuff member and handle means to torsionally twist in relation to the surface of the tip which engages a supporting surface to enable torsional movement of the wrist without causing rotational movement of the lower end of the tip in relation to a supporting surface.

7. The structure as defined in claim 6 wherein said means enabling torsional twist of the wrist of a person using the device including a channel-shaped lower column portion capable of torsionally twisting between the upper and lower end thereof, said cuff member including a substantially cylindrical member having an opening therein defining a segment of a circle with the free ends thereof converging towards each other and being reversely curved to form curved edges for the entrance area therebetween, and a vertically centrally disposed circumferentially extending rib reinforcing said cuff member with the rib extending radially outwardly thereof with the depth of the rib decreasing toward the curved edges of the cuff member to reinforce the cuff member but enable lateral flexibility of the curved edges thereof.

8. The structure as defined in claim 6 wherein said handle means is formed by an offset portion of the upper end of the lower column portion, said cuff member defining a wrist support and engaging the wrist of a person using the device as a cane from any angle.

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