

### [54] INVALID WALKER

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[58] Field of Search ..... **135/40, 45 A, 49, 50; 297/5, 6; 248/188.3**

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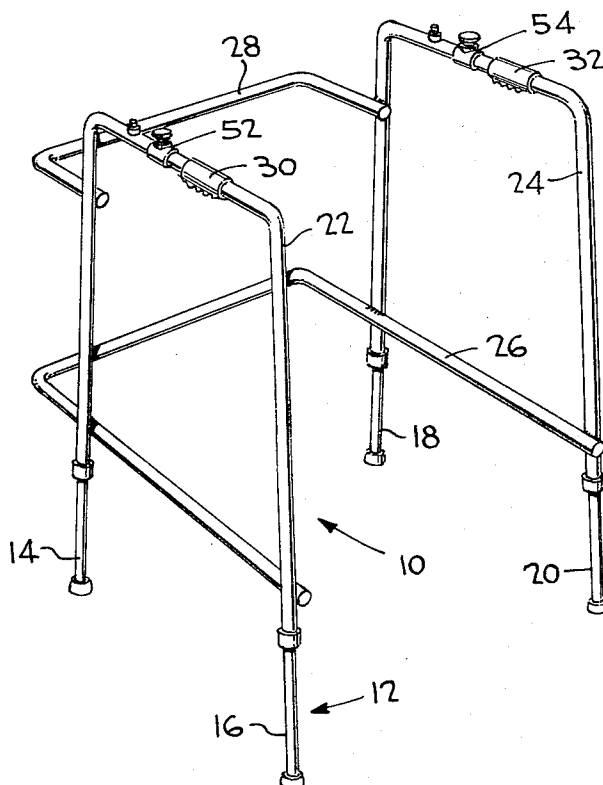
Attorney, Agent, or Firm—Cantor & Kraft

### [57]

### ABSTRACT

A novel invalid walker is disclosed for use by injured or crippled persons to steady such persons and support them during walking or standing in a substantially erect position. The walker is particularly designed to assist the user thereof in ascending or descending staircases and the like. In the preferred inventive embodiment, the invalid walker comprises a hollow tubular frame member by which the user of the apparatus can be supported and steadied. A plurality of legs downwardly depend from the frame member and will be seen to constitute, in the preferred embodiment, two pairs of front and rear legs disposed to either side and telescopically mounted within the tubular frame in the fashion of a piston. The tubular frame itself defines two closed hydraulic fluid lines interconnecting associated front and rear leg pairs such that movement of a front leg into the tubular frame to effect relative shortening of the front leg automatically and simultaneously brings about a movement of the associated rear leg in a direction outwardly from the tubular frame so as to effect relative lengthening of the rear leg. Locking means are provided so as to lock each front and rear leg pair in any respective position, thus enabling an infinite relative adjustment between the respective lengths of a front and rear leg of a given pair. In this fashion, staircases can readily be ascended or descended by the user of the apparatus.

1 Claim, 4 Drawing Figures



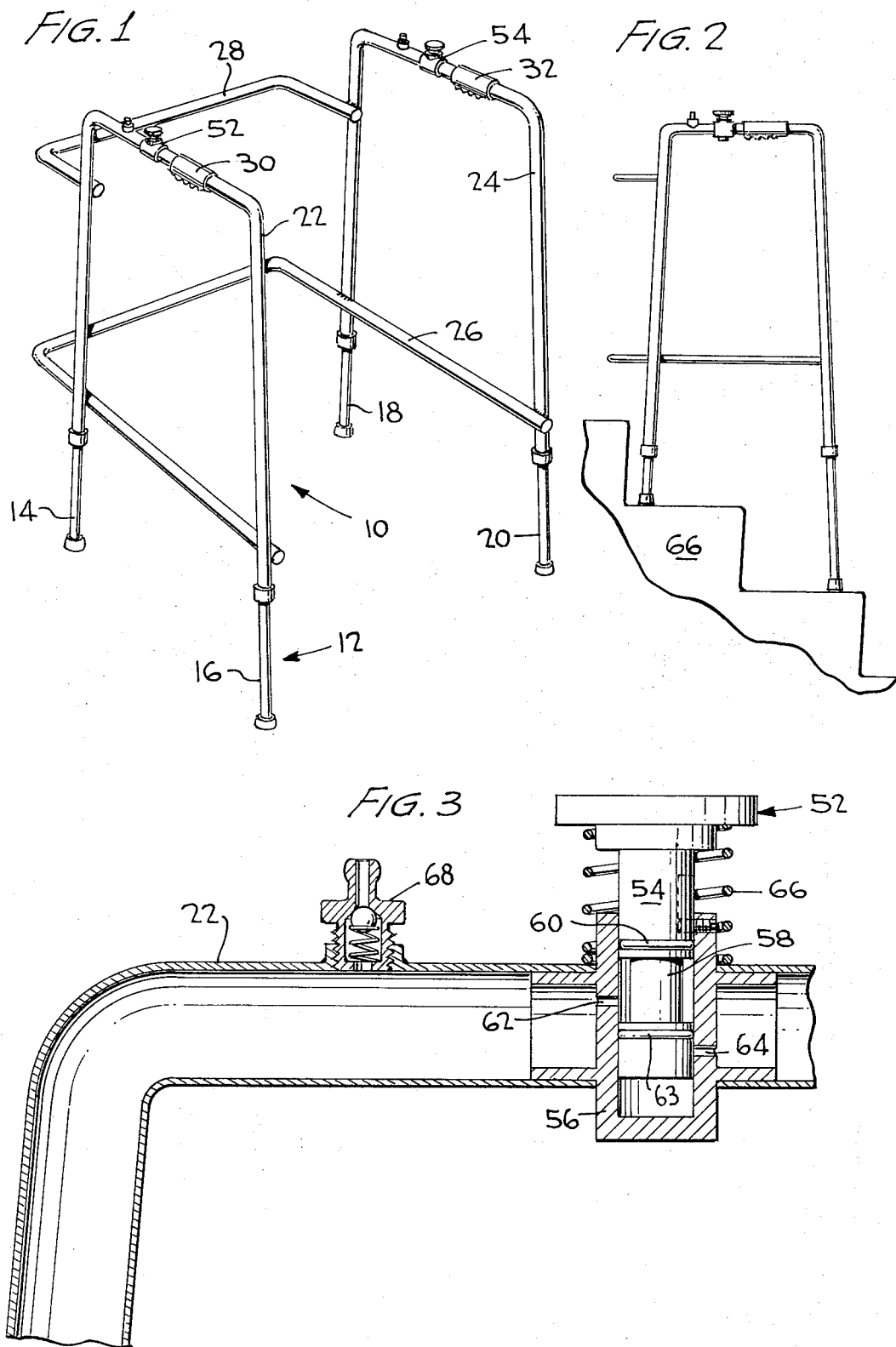
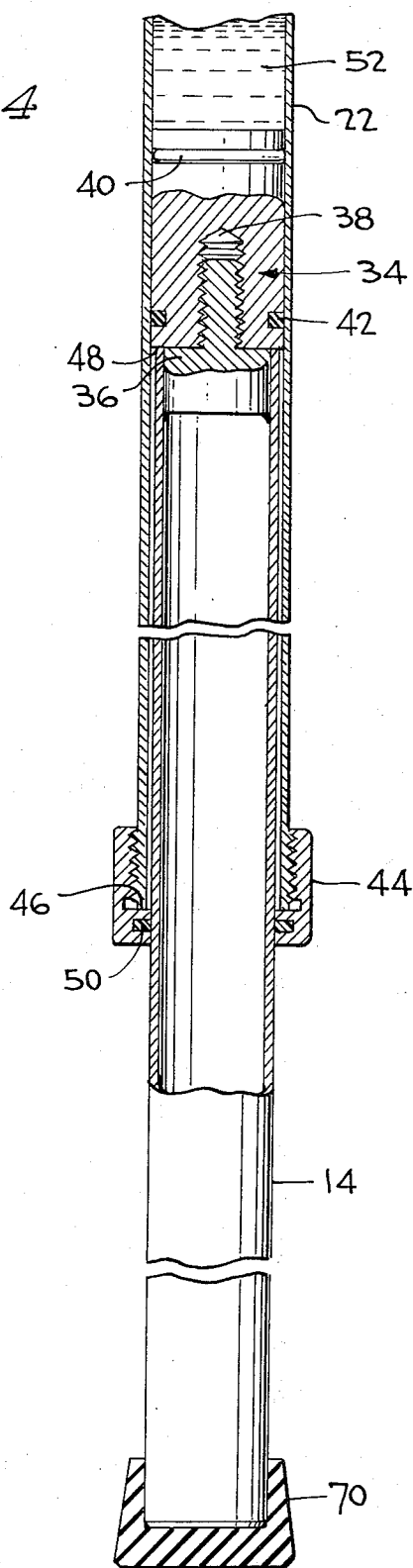


FIG. 4



## INVALID WALKER

## BACKGROUND OF THE INVENTION

This invention generally relates to invalid walkers for steadying and supporting injured and crippled persons during walking or standing in a substantially upright or erect position, the invention being particularly directed to an invalid walker specifically designed for utilization in ascending or descending staircases and the like.

Invalid walkers of the general type to which this invention relates have long been utilized by ambulatory crippled or injured persons as an alternative to crutches or the like, such walkers enabling the user thereof to move about in a substantially upright or erect position in a more facile manner than can be achieved with other devices.

The typical prior art walker incorporates a frame member supported by three or more legs above the ground at a position enabling the user or patient to comfortably grasp same and achieve a measure of steadying and support. The legs provided on such frame members normally are adjustable in length so that the height of the frame member can be adjusted and conformed to the requirements of a particular user. To adjust the relative height of the various legs, adjustment and locking mechanisms usually are associated with each leg, generally at a position whereat an individual leg meets the frame. To effect adjustment of the leg lengths, therefore, the user of such prior art apparatus had to remove himself from the relative safety and support of the frame, which oftentimes placed unnecessary and impossible physical strain upon the user.

This disadvantage of the typical prior art invalid walker construction is even more magnified when attempting to utilize such walkers to assist in ascending or descending staircases or the like. In this respect, the user of the apparatus would have to adjust the relative lengths of the legs so that when the walker was placed upon a staircase, the frame thereof would be level. After ascension or descension of the staircase, a readjustment of the legs had to take place so as to again level the support frame.

In an effort to overcome at least some of the disadvantages associated with the typical invalid walker above-discussed, improved walkers have been developed whereby adjustment of the relative lengths of the legs of the supporting frame could be achieved by the user without the necessity of leaving the support and safety of the frame itself. One such improved walker is that depicted in U.S. Pat. No. 3,455,313, wherein a walker is depicted of the type comprising a supporting frame with three or more legs for supporting the frame at an appropriate distance above the ground, with adjustment means for adjusting the length of at least one of the legs, with locking means for locking the legs at a desired length, and with a release means operably connected to the locking means so as to permit the locking means to be deactuated effecting adjustment of the length of the legs. Importantly, such release means is located in such a position as to be operable by a person while the person is being steadied or supported by the frame.

In the specific embodiment depicted in the above-mentioned patent, the various legs are telescopically disposed about a tubular frame member and are biased in an outward or lengthening direction by means of

springs. The legs each incorporate a series of apertures therein adapted to receive a spring-loaded pin there-through to effect locking of an individual leg in a given position relative to the frame. A cable release mechanism is disposed between the frame in a position easily reached by the user, and the spring-biased pin, the cable release mechanism, when actuated, serving to disengage the pin from a hole in the leg allowing the leg to once again be biased outwardly by the spring-loading means to effect a re-adjustment of the length thereof.

While the above-discussed improved device constitutes a marked advantage over the older and more typical prior art invalid walkers in that ascension and descension of staircases is facilitated thereby, even this improved device suffers from marked disadvantages. For one, the mechanical locking action of the legs is complex and prone to failure. Additionally, adjustment of the relative leg lengths cannot be effected through an infinite ratio, but is constrained to only those ratios of lengths at which an aperture is provided. Furthermore, each leg of the improved device incorporates a separate adjustment mechanism whereby the length of each leg must be individually adjusted in a time-consuming manner.

## SUMMARY OF THE INVENTION

It is thus apparent that a need still exists in the art for an invalid walker of still further improved construction which will enable the user to ascend and descend staircases and the like without presenting the disadvantages associated with prior art devices as discussed. It is the primary objective of the instant invention to provide such an invalid walker.

It is a further objective of the instant invention to provide an invalid walker wherein the depending legs thereof are coupled in pairs such that adjustment of the length of one leg of a pair simultaneously and automatically effects a corresponding and complementary adjustment in the length of the other leg of the pair.

Yet another objective of the instant invention concerns the provision of an invalid walker of improved design whereby such adjustment of the leg lengths can readily and easily be effected by the user thereof without the necessity of leaving the relative safety and support of the apparatus.

A further objective of the instant invention concerns the provision of an invalid walker of improved design whereby the ratio of relative lengths to which the various legs can be adjusted is near infinite, enabling a precise adjustment of the walker to assist in ascension or descension of staircases and the like of virtually any dimension and design.

It is still another objective of the instant invention to provide an invalid walker designed so that adjustment of the relative lengths of the legs can be effected by the user of the apparatus merely through shifting his weight upon the supporting frame itself.

Yet another objective of the instant invention concerns the provision of an invalid walker of the type wherein adjustment of the legs can be quickly effected in a smooth fashion which avoids all discomfort to the user of the apparatus.

These objectives, as well as others which will become apparent as the description proceeds, are implemented by the novel invalid walker of the instant invention which will be seen to comprise a frame means designed

for supporting and steadying the user thereof, the frame means incorporating a plurality of downwardly depending legs including at least one pair of legs constituted by a front and a rear leg each of adjustable length in typical fashion. Means are provided for coupling together the front and rear leg of the pair in a fashion such that relative shortening of one leg simultaneously effects relative lengthening of the other leg. A locking means is provided disposed in position on the frame to enable an actuation thereof by the user to lock the front and rear leg pair at any desired relative length, release of the locking means enabling adjustment of the relative lengths of a front and rear leg pair simply through a shifting of the user's weight on the support frame.

In the preferred inventive embodiment, the frame means will be seen to constitute a pair of hollow tubular U-shaped members into which two pairs of front and rear legs are telescopically inserted. Each leg of the pair includes a piston means attached thereto, the piston means being insertable into the cylinder defined by the tubular frame members. The tubular frame members define a closed hydraulic fluid line interconnecting a front and rear leg of each pair such that movement of one leg and its attached piston into the tubular frame member so as to effect a relative shortening of the one leg automatically and simultaneously effects a flow of hydraulic fluid in the hollow tubular member towards the other leg and attached piston to forcibly drive same outwardly effecting a relative lengthening thereof. The locking means of the instant invention will be seen to preferably comprise a valve means disposed in the hollow tubular frame members to selectively prevent and allow hydraulic fluid flow therein, actuation of the valve means and subsequent shifting of the user's weight upon the tubular frame effecting adjustment of the leg lengths, release of the valve means serving to lock or fix the legs at their then relative position with respect to one another, due to the principle of incompressibility of hydraulic fluid.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention itself will be better understood and further features and advantages thereof will become apparent by the following detailed description of a preferred inventive embodiment, such description making reference to the appended sheets of drawings wherein:

FIG. 1 is a perspective illustration of the novel invalid walker of the instant invention;

FIG. 2 is a side elevational view of the walker of the instant invention depicting its utilization in ascending a staircase;

FIG. 3 is an exploded sectional view of one portion of the invalid walker depicted in FIG. 1, showing the placement and operation of the valve means which define the mechanism by which the various legs of the walker can be locked in any desired position, or released for adjustment; and

FIG. 4 is an elevational view, in section, of a single leg of the invalid walker telescopically disposed within the frame member, this view depicting in detail preferred constructional configurations.

#### DETAILED DESCRIPTION OF THE PREFERRED INVENTIVE EMBODIMENT

Referring now to the drawings, and particularly to

FIG. 1 thereof, the novel invalid walker of the instant invention will be seen to comprise a frame means generally designated by reference numeral 10 which incorporates a plurality of downwardly depending legs generally designated by reference numeral 12, such legs including at least one pair of legs constituted by a front and a rear leg, each of adjustable length. Specifically, and in the preferred inventive embodiment, a first pair of legs comprising front leg 14 and rear leg 16 is provided, as is a second pair of legs constituting front leg 18, and rear leg 20. From the standpoint of providing a stable support surface, however, it should be recognized by those skilled in the art that three or more legs are required.

The frame means 10, in the preferred inventive embodiment, constitutes first and second U-shaped hollow tubular frame members 22 and 24 into which the various legs generally designated by reference numeral 12 are telescopically disposed. For strengthening the structure, transverse crosspieces 26 and 28 are provided suitably attached to the frame means 10 such as by welding or the like. In use, a patient or other person would enter the invalid walker from the open rear thereof and grasp the frame means 10 about grips 30 and 32 provided on each of the hollow tubular members 22 and 24, respectively, the patient thus obtaining steadying and support whereby ambulation of the patient while standing in an upright manner can be achieved.

At this juncture, reference is made to FIG. 4 of the appended drawings wherein the manner in which the individual legs 14, 16, 18, and 20 are telescopically mounted within the frame means 10 is made clear. The leg depicted in FIG. 4 will, for purposes of illustration, be presumed to comprise front leg 14 which is telescopically disposed within the U-shaped tubular frame member 22. Leg 14 incorporates a piston means 34 attached to one end thereof, as do each of the other legs of the frame means 10. Specifically, it should be noted that piston 34 is attached to the upper end of leg 14 about a stud 36 extending upwardly from the upper end of leg 14. Piston 34 contains a threaded internal bore 36 so that the stud 36 can be threadedly secured thereto, the spacing between the piston 34 and the upper end of leg 14 thereby being adjustable. Piston 34 is, as aforementioned, disposed within the cylinder defined by the hollow tubular frame member 22 and is hermetically sealed from the interior of tubular member 22 by a plurality of O-rings, designated by reference numerals 40 and 42, for example.

With such a construction, the leg 14 can be inserted in a telescopic manner throughout its entire length into the hollow tubular member 22. A threaded cap assembly 44 disposed about the tubular member 22 forms a stop delimiting outward travel of the leg 14 from the open end of tubular member 22. Specifically, it will be seen that the cap 44 incorporates an inwardly extending shoulder 46 thereon which makes contact with the undersurface 48 of piston 34 to stop travel of leg 14 in an outward direction. Cap 44 also includes an O-ring seal 50 which functions to further hermetically seal the interior of the hollow tubular member 22 and further functions as a wear-ring. It should, of course, be appreciated that variations in the specific construction of the piston means 34 and associated parts can be made by those skilled in the art, the criteria herein being that each leg, such as leg 14, should be mounted in a tele-

scopic manner with respect to the tubular frame members such that motion of an individual leg in an upward or downward direction effects travel of an internal piston effectively decreasing and increasing the interior volume of the tubular frame members. The importance of this operation will become apparent from the following description.

Each of the U-shaped hollow tubular members is contemplated to be filled with a hydraulic fluid 52 such that the respective hollow tubular frame members 22 and 24 form or define closed hydraulic fluid lines interconnecting a front and rear leg of a pair, such as legs 14 and 16 on the one hand, and legs 18 and 20 on the other hand.

Since the construction defines a closed hydraulic system, it will be appreciated that shortening of leg 14 effected by inserting leg 14 further into the tubular frame member 22 causes a flow of hydraulic fluid through the tubular member 22 which impacts upon the piston associated with leg 16 tending to forcibly drive leg 16 outwardly from the frame member 22 to effect a relative lengthening thereof. Since the hydraulic system is a closed system, the relative shortening of one leg of a pair, and the simultaneously effected relative lengthening of the other leg of a pair, takes place in equal amounts, though in opposite directions.

Locking means, such as valve means 52 and 54, are disposed on the respective tubular members 22 and 24 of the frame 10 in a position enabling easy actuation by a user thereof. When each valve means 52 and 54 is actuated, the locking mechanism, to be discussed hereinbelow, is released enabling adjustment of the relative lengths of the legs in the fashion above-discussed. The valve means 52 and 54 otherwise effect a locking of their associated front and rear leg pair 14 and 16, and 18 and 20, respectively, in any given desired relative position with respect to one another.

Referring now to FIG. 3 of the appended drawings, the detailed preferred construction of a valve means, such as valve means 52, can be seen, valve means 52 being disposed on the tubular frame member 22 in this example. Valve means 52 comprises a cylindrical shaft 54 which extends in a direction transverse and through the tubular frame member 22, the cylindrical shaft 54 being slidably journaled within an interior valve housing 56 disposed within the tubular member 22 as shown. The cylindrical shaft 54 has an area thereof of reduced cross-section, such as at 58 leaving a space between the shaft 54 and the inside wall of the internal housing 56. This area of reduced cross-section is hermetically sealed from the remainder of cylindrical shaft 54 and the surrounding environment by means of O-rings 60 and 62. Further, it should be noted that orifices are provided through the valve housing 56 such as at locations 62 and 64 to communicate with the interior of the tubular frame member 22, which interior is, as afore-mentioned, contemplated to be filled with a hydraulic fluid.

Valve means 52 is biased by means of a spring 66 into the illustrated position whereat hydraulic fluid in the tubular frame member 22 towards the left-hand side of valve means 52 when viewing the drawings can enter the region of reduced cross-section 58 through orifice 62 but cannot continue to flow to the other or right-hand side of the tubular frame member 22 since orifice 64 is blocked at this location. However, when the valve means 52 is depressed, the area of reduced cross-

section 58 is aligned with orifice 64, thus allowing a path for fluid flow from one side of the tubular member 22 through orifice 62 and out orifice 64 into the other side of the tubular member 22. Also, as should be appreciated, due to the contemplated construction of valve means 52, fluid flow can take place in both directions, i.e. left to right, as well as right to left.

Again, it should be appreciated by those skilled in the art, that the specific construction of valve means 52, as well as valve means 54 which is identical thereto, forms no part of the instant invention and may be modified as desired. The important criterion herein is that the valve means, when actuated, must allow flow of hydraulic fluid through the tubular frame members and, the valve means in a non-actuated position thereof, must block and stop such flow.

Referring now to FIG. 2 of the drawings, the manner of use of the invalid walker will be described. Initially, let it be assumed that all legs 14, 16, 18 and 20 of the walker are of substantially equal length, thus providing a level support surface of the frame means 10. The user of the apparatus, which user would be positioned within the apparatus as above-discussed, would then manually depress each of the two valve means 52 and 54 allowing free fluid flow within the respective hollow tubular members 22 and 24. The user would then lean towards the front of the apparatus, thereby placing a greater amount of weight over the front legs 14 and 18. Legs 14 and 18 would thereby tend to collapse or, in other words, telescopically move inward within the respective tubular frame members 22 and 24. This action would effect a flow of hydraulic fluid within the hollow tubular frame members 22 and 24 in a direction tending to force outward the rear legs 16 and 20. Thus, shortening of front legs 14 and 18 simultaneously and automatically effects a respective lengthening of rear legs 16 and 20. When a new desired position of the legs have been reached, the user of the apparatus would release valve means 52 and 54 by which all fluid flow within the tubular frame members 22 and 24 ceases, thereby locking the legs 14, 16, 18 and 20 in the new desired position. This position is, for example, the position of the legs illustrated in FIG. 2, whereby the invalid walker can now be placed upon a staircase 66 in the manner shown with the top of the frame means 10 level so as to assist in ascension of the staircase 66.

When the user of the apparatus reached the top of a staircase 66, he would effect a levelling of the frame means 10 by again depressing the individual valve means 52 and 54 and placing the greater amount of his weight over the rear legs 16 and 20. Rear legs 16 and 20 would therefore tend to "collapse" simultaneously and automatically effecting a relative lengthening of the front legs 14 and 18 to thereby once again level the frame 10, at which point the valve means 52 and 54 would be released, locking the legs in their new relative position with respect to one another.

As should be appreciated, descension of a staircase can be effected in virtually the identical, though reversed, manner to that immediately discussed above. Further, it should be appreciated that the relative lengths of the legs 14, 16, 18 and 20 can be adjusted through virtually an infinite ratio due to the hydraulic action of the device.

To fill each of the hollow tubular frame members 22 and 24 with fluid, a one-way valve mechanism such as that designated by reference numeral 68 is provided

and attention is herein directed to FIG. 3. Further, each of the legs 14, 16, 18 and 20 could have rubber tips, such as tips 70, associated therewith, and attention herein is directed to FIG. 4.

It should be apparent from the foregoing detailed description that the objects set forth hereinabove have been successfully achieved. Moreover, while there has been shown and described a present preferred embodiment of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope of the following claims. Accordingly,

What is claimed is:

1. An invalid walker having adjustable legs to enable the user thereof to ascend and descend staircases, said walker comprising, in combination: two inverted hollow tubular U-shaped members defining a frame means for supporting and steadying a user thereof, each tubular member having a handle portion adapted to be gripped by the user, and a forward and rearward open end; two pairs of downwardly-depending front and rear legs, each leg having a piston means attached thereto, each front and rear leg pair being telescopically mounted in the respective forward and rearward open

end of each U-shaped member to close the ends of said member; each hollow tubular U-shaped member being filled with hydraulic fluid to define a closed hydraulic system interconnecting a respective front and rear leg pair such that downward pressure applied by the user over one leg of each pair effects a relative shortening movement of said one leg and attached piston into the respective tubular member and a flow of fluid in each said tubular member towards the other leg and attached piston of each pair in a direction to forcibly drive same outwardly, thereby simultaneously bringing about an automatic relative lengthening movement of said other leg of each said pair; and a separate valve means actuatable by the user disposed in each U-shaped tubular member at the region of said handle portion thereof to selectively prevent and allow hydraulic fluid flow in each respective tubular member, each valve means, when actuated, enabling continuous adjustment of the relative lengths of the front and rear leg pair of a respective tubular member, each valve means, when released, locking the front and rear leg pair of the respective tubular member at any desired relative length.

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