June 30, 1970

A. A. SMITH

3,517,677

INVALID WALKER

Filed Jan. 21, 1969

Fig. 1

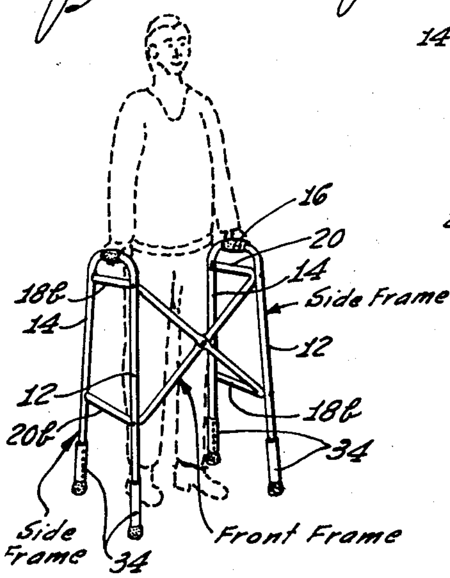


Fig. 3

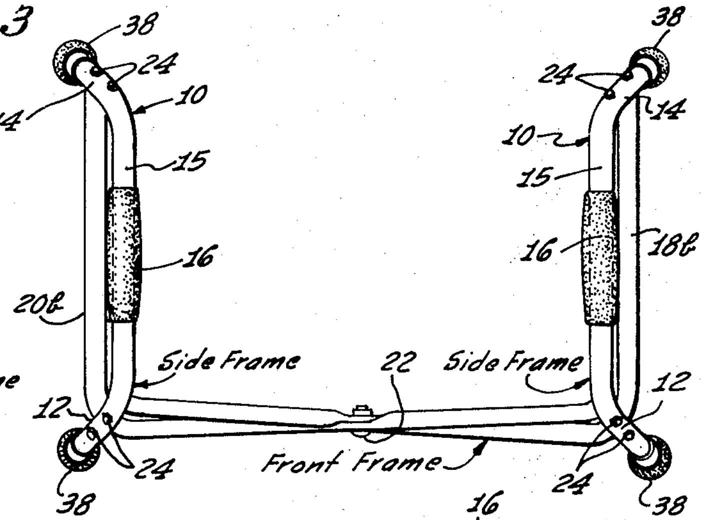


Fig. 4

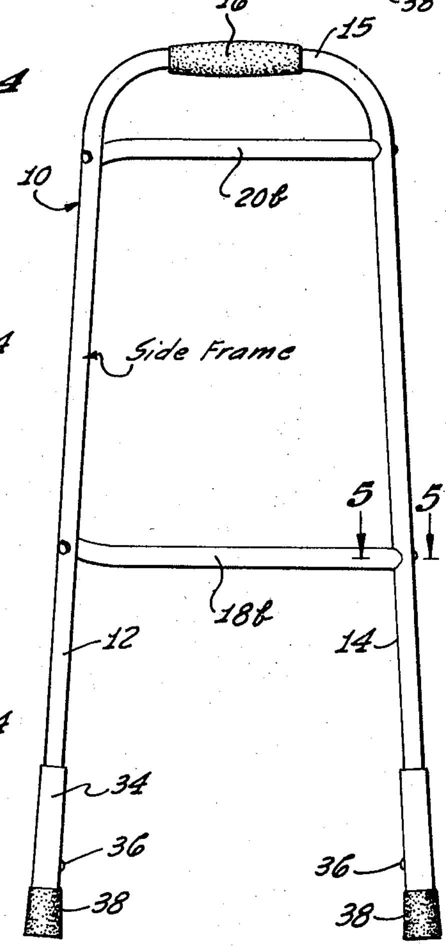
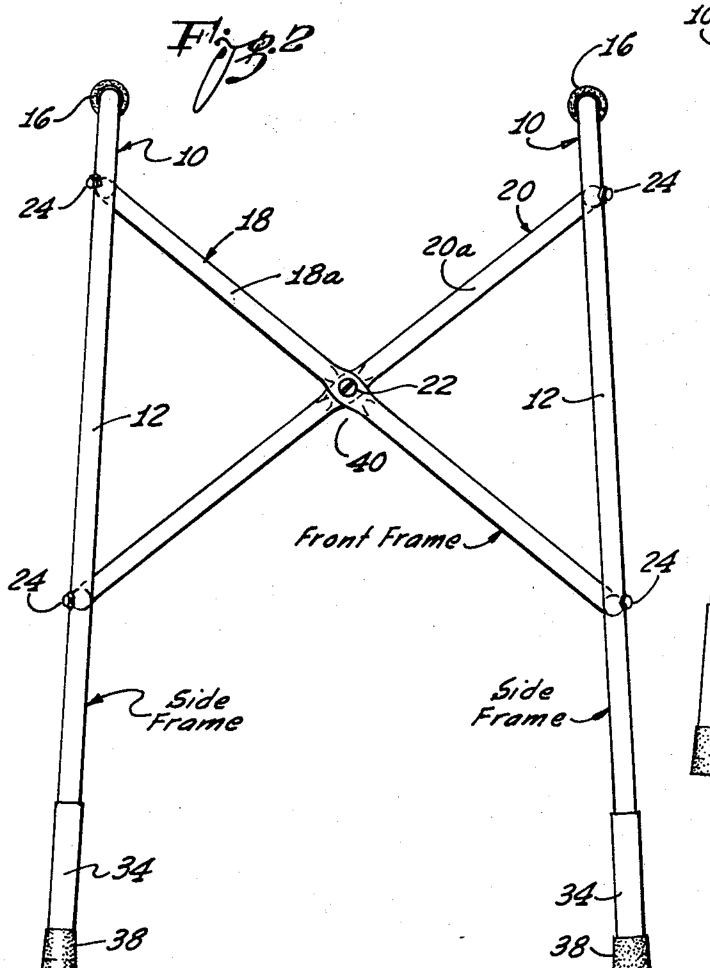


Fig. 2



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INVALID WALKER

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Fig. 5

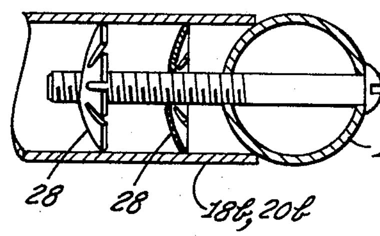


Fig. 6

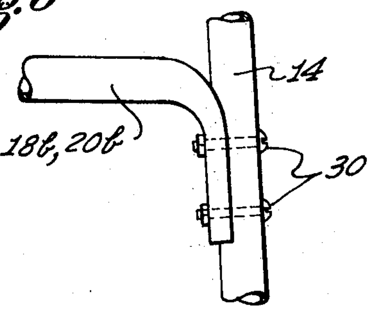


Fig. 7

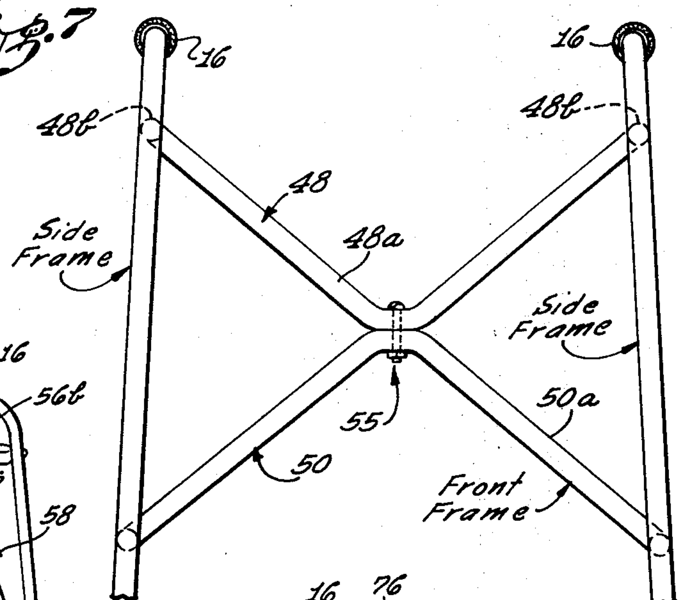
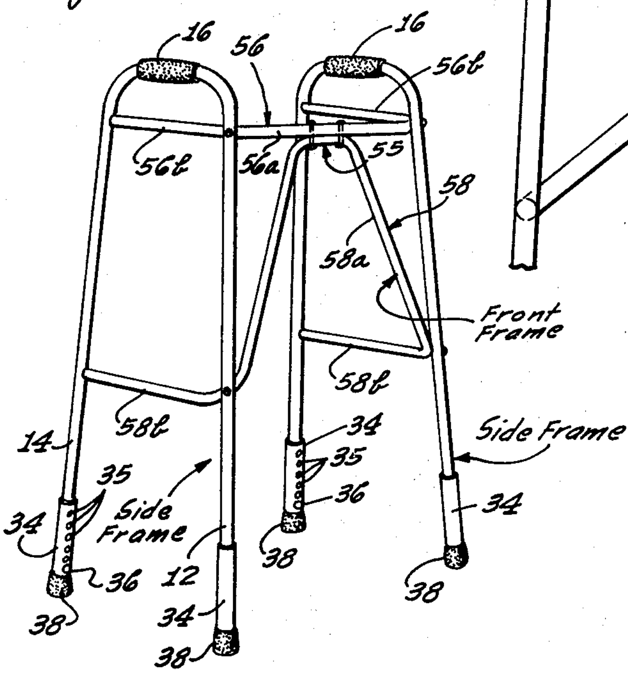


Fig. 8



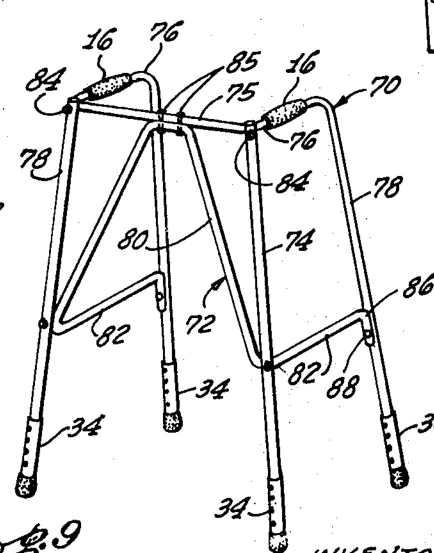


Fig. 9

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INVALID WALKER

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Int. Cl. A61h 3/06
U.S. Cl. 135—45 7 Claims

ABSTRACT OF THE DISCLOSURE

An invalid walker comprises two side frames interconnected by a front frame, each of the two side frames forming the two side legs of the walker, each side frame including two lateral members that interconnect the two side legs at different levels, said two lateral members being integral extensions of the front frame. The front frame narrows centrally in crosss ection to form a torque portion that permits slight relative rotation of the two side frames in their planes for self-leveling of the walker.

BACKGROUND OF THE INVENTION

An invalid walker of the general type to which the invention refers may be broadly described as comprising a pair of side frames forming the four legs of the walker and a front frame that interconnects the two side frames in a substantially rigid manner. The invalid walkers of this character are disclosed in the following patents:

Blewitt et al., 1,448,783; Thieman, 2,627,904; Ries, 2,759,525; Frank, 2,798,553; Diehl et al., 2,866,495; Ries, 2,996,070; Ries, 3,165,112; Ingalls et al., 3,195,550; and Kempel, 3,279,567.

The present invention meets certain deficiencies and needs for improvement in the prior art invalid walkers.

One need for improvement is to achieve a suitable balance between the requirement for substantial rigidity of the two side frames relative to each other and the conflicting requirement of yieldability of the two sides relative to each other for self-leveling action of the invalid walker in response to the imposed weight of the user. To make the invalid walker stable and to give the user confidence in the invalid walker the four legs of the invalid walker should rest simultaneously on a flat floor surface or flat ground surface and must accommodate themselves as well to irregularties in a floor surface or ground surface.

Although the invalid walker must have a certain degree of yieldability to accommodate itself to different support surfaces, nevertheless the accommodation must not be accomplished by relative movement at the joints of the walker structure because the user readily senses any play at the joints and too often has a feeling that the relative motion is not sufficiently limited. A further need for improvement in this respect is to provide an invalid walker construction in which the joint connections are not solely depended upon for the rigidity of the structure.

While the self-leveling capability of the invalid walker requires freedom for at least a slight degree of rotation of the two side frames relative to each other in their planes, nevertheless the user's confidence in the invalid walker requires that the front frame effectively side sway on the part of the two side frames.

A further need for improvement is to align the two side frames of the invalid walker with the downwardly extending arms of the user.

A further pressing need for improvement is to provide an invalid walker structure that meets the above requirements and yet is simple of construction and inexpensive to produce.

The present invention meets all of the above mentioned needs for improvement.

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SUMMARY OF THE INVENTION

The preferred embodiment of the invalid walker construction taught by the present invention comprises essentially four elongated members of U-shaped configuration. Each of two of the U-shaped members is of inverted U-shape, each forming an upper hand grip on one side of the walker and two downwardly extending legs on one side of the walker. The two downwardly extending legs on each side of the walker are interconnected at different levels by two lateral side members, the two lateral side members cooperating with the two legs to form the corresponding side frame of the walker.

The front of the walker is integral with the lateral side members of the two side frames of the walker and thus interconnects the two side frames in such manner as to effectively maintain a given orientation of the two side frames relative to each other. The front frame is in effect wrapped around the front and sides of the walker.

The front frame of the walker comprises two elongated members that are U-shaped in plan, forward intermediate portions of the two members forming the front frame proper and rearwardly extending legs of the two members forming the above mentioned lateral side members of the two side frames.

It is contemplated that while the front frame effectively maintains the orientation of the two side frames relative to each other, nevertheless the front frame yields in torque as may be required to permit the self-leveling adjustment of the walker as required by different support surfaces. For this purpose the front frame narrows centrally to a mid region where the two members of the front frame are contiguous to each other and are interconnected to form what may be termed a torque portion of the front frame that yields in torque for the desired self leveling action.

In one embodiment of the invention the two members of the front frame cross each other at their centers and are interconnected at their intersection to form the desired torque portion of reduced cross section. In a second embodiment of the invention the front frame comprises an upper transverse member and a lower transverse member both of which are offset centrally to converge towards each other and the two offset portions are centrally interconnected to form the torque portion of the front frame. In a third embodiment of the invention, the front frame comprises a substantially straight upper member and a lower member that is centrally offset upwards towards the upper member and is centrally connected to the upper member to provide the desired torque portion of the front frame.

The features and advantages of the inevntion may be understood from the following detailed description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, which are to be regarded as merely illustrative:

FIG. 1 is a perspective view of the first embodiment of the invalid walker with a user indicated in phantom;

FIG. 2 is a front elevation of the invalid walker;

FIG. 3 is a top plan view of the invalid walker;

FIG. 4 is a side elevational view of the invalid walker;

FIG. 5 is a fragmentary sectional view taken along the line 5—5 of FIG. 4 showing how the end of a side member may be connected to a rear leg of the invalid walker;

FIG. 6 is a fragmentary side elevational view of an alternate joint structure for the juncture of a side member with a rear leg of the invalid walker;

FIG. 7 is a fragmentary front elevational view of a second embodiment of the invalid walker;

FIG. 8 is a perspective view of a third emodiment of the invalid walker; and

FIG. 9 is a perspective view of a fourth embodiment of the invention.

DESCRIPTION OF THE SELECTED EMBODIMENTS OF THE INVENTION

The first embodiment of the invalid walker shown in FIGS. 1–5 comprises two side frames each of which forms a forward leg and a rearward leg, the two side frames being interconnetced by a front frame that maintains the orientation of the two side frames relative to each other with substantial rigidity but nevertheless permits the side frames to rotate slightly in their planes for self-leveling of the walker, i.e. to permit simultaneously supporting contact of the four legs of the walker with a floor surface or ground surface even though the surface may be somewhat uneven or irregular. The whole structure comprising the two side frames and the interconnecting front frame is made of four U-shaped rod-like members which may be, for example, extruded aluminum tubing.

Two of the tubing members, each generally designated **10**, are of inverted U-shape and form the two opposite side frames, respectively, of the walker. Each of the tubing members **10** forms a forward leg **12** and a rearward leg **14**, the two legs being connected by an upper intermediate portions **15** which is provided with a yieldable sleeve **16** that serves as a hand grip for the user.

The other two of the four tubing members, which are generally designated **18** and **20** respectively, are U-shaped in plan with rearwardly extending arms. The forward intermediate portions **18*a*** and **20*a*** of the two U-shaped members **18** and **20** respectively, form the front frame of the walker and the rearwardly extending arms **18*b*** and **20*b*** of the two U-shaped members respectively are the previously mentioned lateral members that connect the two legs **12** and **14** of each of the two side frames at different levels and thus complete the two side frames.

In the first embodiment of the invention the forward intermediate portions **18*a*** and **20*a*** of the two U-shaped members **18** and **20**, respectively, centrally cross each other and are interconnected at their intersection by a suitable fastening means **22** which may be in the form of a rivet. As indicated in FIG. 2, the two tubular members **18** and **20** may be at least slightly flattened for intimate contact at their intersection.

The two tubular U-shaped members **18*b*** and **20*b*** may be connected to the two legs of each side frame in any suitable manner. In the construction shown, fastening members **24** positioned diagonally of the invalid walker extend through the 90° bends of the tubular members **18** and **20** into and through the front legs **12**.

The rear ends of the two arms **18*b*** and **20*b*** of the two tubular members **18** and **20**, respectively, may be connected to the rear legs **14** in any suitable manner. In the construction shown in FIGS. 4 and 5, for example, each of the rear ends of the arms **18*b*** and **20*b*** is cut away or recessed to conform to the cross-sectional configuration of the corresponding rear leg **14** and is connected to the rear leg by a screw **26** and a pair of radially slotted dished disks **28** which are centrally apertured and internally threaded for engagement by the screw. The two disks **28** are dimensioned for forced fit and therefore expand radially into positive grip with the surrounding tubing when the screw **26** is tightened. Thus the end of each arm **18*b*** or **20*b*** in effect straddles the corresponding rear leg **14** to resist torsional forces that tend to rotate the arm relative to the rear leg.

FIG. 6 shows an alternate joint structure for connecting the rear end of a tubing arm **18*a*** or **20*b*** to a rear leg **14**. The end of the arm **18*b*** or **20*b*** is bent downward at a right angle and the bent down portion is flattened and rounded in cross section to straddle the rear leg. Two screws **30** provided with nuts **32** rigidly connect the straddling portions to the rear legs.

Each of the four legs **12** and **14** may be constructed in a well known manner for adjustment in length to suit the user. For this purpose, the lower ends of the legs **12** and **14** telescope into short tubes **34**. Each short tube **34** has a longitudinal series of radial apertures **35** as best shown in FIG. 8 and a spring-pressed detent member **36** with a rounded nose is retractably mounted in the lower end of each leg to engage the radial apertures selectively. Thus to change the effective length of a leg it is merely necessary to depress the rounded nose of a detent member **36** and then shift the tubes **34** to cause the detent member to snap into a different radial aperture. In a well known manner, the lower end of each of the short tubes **34** is provided with an elastomeric tip **38** for nonslipping engagement with the floor or ground.

It can be seen that by virtue of the intersection of the forward intermediate portions **18*a*** and **20*a*** of the two tubular members **18** and **20**, the front frame centrally narrows to a minimum cross section at the intersection. This central portion **49** of minimum cross section may be termed a torque portion of the frame since the narrowed portion tends to yield in torque for the desired self-leveling action. In addition the four tube portions of the front that radiate from the torque portion may yield somewhat in flexure in the self-leveling action.

The high structural efficiency of the front frame may be appreciated when it is considered that the front frame comprises two triangular trusses that are integrally connected with each other at their apexes. It is well known that a triangle forms a perfect truss.

The effectiveness of the front frame in rigidly maintaining the two side frames at a constant orientation relative to each other derives from the fact that the front frame is integral with the tubular lateral members **18*b*** and **20*b*** that interconnect the legs of the two side frames. It is to be noted that the 90° bends in the two tubular members **18** and **20** are formed with liberal radius for stiffness of the bends. The fact that the lateral members **18*b*** and **20*b*** that interconnect forward and rearward legs of the walker are integral with the front frame accounts in large part for the fact that slight loosening of an interconnection at any of the joints of the side frames does not result in any significant play of the two side frames relative to the front frame. Any diagonal downward force on either of the two side frames does not unduly distort the side frame because the two lateral members **18*b*** and **20*b*** of each side frame are integral with the front frame and thereby are effectively maintained in substantially horizontal positions.

The second embodiment of the invention, the construction of which is indicated by FIG. 7, is similar to the first embodiment in that it comprises four U-shaped tubular members. Two of the U-shaped members are the previously described U-shaped tubular members **10** which form the front legs **12** and rear legs **14** of the walker, the other two-U-shaped tubular members which are designated **48** and **50** correspond to the tubular members **18**, **20** of the first embodiment. The U-shaped tubular member **48** is an upper member having a forward intermediate portion **48*a*** and two rearwardly extending arms **48*b*** that interconnect the side legs of the walker at a relatively high level. In like manner, the tubular member **50** is a lower tubular member having a forward intermediate portion **50*a*** and two lower rearwardly extending arms **50*b*** which interconnect the forward and rearward legs of the walker at a lower level. The forward intermediate portions **48*a*** and **50*a*** of the tubular members **48** and **50** that form the front frame of the invalid walker are V-shaped in front elevation as may be seen in FIG. 7, the two members **48*a*** and **50*a*** centrally converging together and being centrally interconnected by a pair of fastening members **52** to form a central torque portion **55** of the front frame.

It is apparent that the second embodiment of the invention is functionally equivalent to the first embodiment.

The third embodiment of the invention shown in FIG. 8 comprises four U-shaped members of the general character heretofore described. Thus each of the side frames that forms forward and rearward legs **12** and **14** comprises a previously described tubular member **10** of inverted U-shape configuration. The second pair of U-shaped members that form the front frame of the invalid walker comprise an upper U-shaped member **56** and a lower U-shaped member **58**. The forward intermediate portion **56***a* of the upper member **58** is substantially horizontal but the forward intermediate portion **58***a* of the lower U-shaped member **58** is offset to the configuration of an inverted V, the two front portions thus converging together and being centrally rigidly connected by a pair of fastening members **60** to form a central torque portion **62** of the front frame. The two rearwardly extending arms **56***b* of the upper tubular member **56** interconnect the front and rear legs of the two side frames at a relatively high level and the rearwardly extending arms **58***b* of the lower tubular member **58** interconnect the legs of the side frames at a lower level.

The two side frames are provided with the usual resilient hand grip sleeves **16** and the four legs are provided with the usual tubular extensions **34** and resilient tips **38**.

It is apparent that the third embodiment of the invention is the functional equivalent of the first two embodiments. One advantage of the third embodiment over the first two embodiments is that with the torque portion **55** of the front frame at a relatively high level, there is ample room for the user's legs to extend forward through the plane of the front frame.

FIG. 9 shows the fourth embodiment of the invention which is the functional equivalent of the other embodiments. This fourth embodiment comprises a first tubular member, generally designated **70**, that is U-shaped in plan, a second tubular member, generally designated **72**, that is also U-shaped in plan and two front straight leg members **74**. The first tubular member **70** has a forward intermediate portion **75** and two rearwardly extending arms **76** that terminate in rearwardly downwardly extending legs **78** respectively. The forward intermediate portion **75** is the upper lateral member of the front frame and the two rearwardly extending arms **76** are provided with the usual sleeves **16** to serve as hand grips. The second tubular member **72** has a forward intermediate portion **80** and two rearwardly extending arms **82** which serve as lower lateral members of the two side frames and thus connect the forward leg member **74** with a rearward leg **78**. The upper end of each of the leg members **74** is connected to the first tubular member **70** by suitable fasteners **84**. It is to be noted that the forward intermediate portion **80** of the second tubular member **72** serves as the lower lateral member of the front frame and this transverse member is centrally offset upwardly and is connected to the upper lateral member **75** by suitable fasteners **85** to form the usual central torque portion of the invalid walker.

It can be seen that, in accord with the teaching of the invention, each of the two tubular members **70** and **72** that form the front frame of the walker is integral with two lateral members of the two side frames respectively to make the walker structure relatively rigid. It is also to be noted that the two lower rearwardly extending arms **82** have downwardly bent terminal portions **86** which are rigidly connected to the corresponding rear legs **78** by suitable fasteners **88**. The lower ends of the four legs of the walker are provided with the usual adjustable short tubes **34** and the usual elastomeric tips.

The utility of the various embodiments of the invention may be appreciated by considering the fact that a basic problem in the construction of an invalid walker is to provide adequate resistance to diagonal distortion or side sway, i.e. resistance to any force that tends to cause the walker to yield by leaning laterally in either direction. This problem is complicated by the fact that the rear of the walker must be fully open to admit the user and therefore the two rear legs cannot be directly interconnected across the back nor is any room available for bracing to extend diagonally from each front leg to the rear leg on the opposite side of the walker.

The invention solves this problem by two provisions which supplement each other. The first provision in all embodiments of the invention is to rigidly interconnect the two opposite front legs of the walker by a front frame that is structurally efficient because it consists of two triangular trusses. A triangle is the only polyon whose shape cannot be altered in its plane without changing the length of its sides. The second provision is, in effect, to wrap the front frame around the two sides of the walker by making the front frame integral with the side members of the two side frames at two different levels of the side frames. Thus leaning of the two front legs away from their normal positions is prevented by the exceptionally high resistance of the front frame to distortion in its plane and this resistance to leaning is effectively transmitted to the two rear legs by the rearwardly extending side members that are integral with the front frame.

It is important to note that while each of the two triangular trusses of the front frame effectively prevents distortion in its plane, nevertheless, since the two triangular trusses are interconnected at their apexes the front frame can be distorted out of its plane to a limited but useful degree by yielding in torque at the interconnected apexes.

The fact that the resistance to side sway of the two front legs is effectively transmitted to the two rear legs may be appreciated by considering the resistance to torsion of the rearwardly extending members of the two side frames. In the first three embodiments of the invention, each upper hand grip portion is integral with both the corresponding front leg and the corresponding rear leg and therefore offers high torsional resistance to lateral sway of the rear leg relative to the front leg. In all four embodiments of the invention the rearwardly extending arms at the opposite sides of the walker effectively resist torsion because they are integral with the rigid front frame of the walker and it is to be noted that each side arm is terminally rigidly connected to the corresponding rear leg of the walker.

Each of the four embodiments of the invalid walker is of relatively simple construction in that it comprises only four tubular members. In the first three embodiments the four tubular members are U-shaped either in plan or in side elevation. In the fourth embodiment two of the tubular members are U-shaped in plan and the other two tubular members are simple straight legs.

My description in specific detail of the selected embodiments of the invention will suggest various changes, substitutions and other departures from my disclosure.

I claim:

1. In an invalid walker, the combination of:

two side frames, each providing two side legs of the walker, the two side legs of each side frame being interconnected by two side members at different levels; and

a front frame integral with the two side members of the two side frames, respectively, thereby interconnecting the two side frames and maintaining the two side frames at given orientations relative to each other,

said front frame comprising two frame members that converge together centrally of the front frame, the convergent portions of the two frame members being interconnected to form a central torque portion of the frame that is sufficiently yieldable in torque to permit sufficient rotation of the two side frames relative to each other in their planes to permit the four legs of the walker to rest on a support surface and to conform to irregularities in the support surface in response to the weight imposed on the walker by the user.

2. A combination as set forth in claim **1** in which the front frame comprises two triangular trusses interconnected at their apexes, the interconnected apexes forming the central torque portion.

3. A combination as set forth in claim **2** in which the forward intermediate portions of the two rod-like members cross each other centrally and are interconnected at their intersection to form the torque portion of the front frame.

4. A combination as set forth in claim **1** which comprises:

a first pair of frame members of inverted U-shaped configuration in side elevation, each forming two side legs of the walker, the two side legs being interconnected by a hand grip portion of the frame member;

and a second pair of frame members U-shaped in plan having intermediate portions forming the front frame of the walker and having end portions interconnecting the legs on each side respectively of the walker.

5. A combination as set forth in claim **1** in which the ends of the two frame members are bent approximately 90° and extending longitudinally of the corresponding rear legs, said bent ends being flattened and rounded in cross section to conform to the rear legs, each of said bent ends being rigidly attached to the corresponding rear leg at points spaced longitudinally of the rear leg.

6. In an invalid walker, the combination of:

two side frames, each providing two side legs of the walker, the two side legs of each side frame being interconnected by two side members at different levels; and

a front frame integral with the two side members of the two side frames, respectively, thereby interconnecting the two side frames and maintaining the two side frames at given orientations relative to each other,

said front frame comprising an upper rod-like transverse member and a lower rod-like transverse member, each U-shaped in plan with a forward intermediate portion and two rearwardly extending arms, the intermediate portions of the two rod-like members constituting the front frame of the walker and the rearward extending arms of the two rod-like members constituting the side members of the two side frames respectively,

said forward intermediate portions of the two rod-like members converging together and being interconnected centrally to form a torque portion of the front frame,

said upper transverse rod-like member being substantially straight and the lower transverse rod-like member being centrally offset to the central region of the upper rod-like member and being connected to the central region of the upper rod-like member to form a torque portion of the front frame.

7. In an invalid walker, the combination of:

two side frames, each providing two side legs of the walker, the two side legs of each side frame being interconnected by two side members at different levels; and

a front frame integral with the two side members of the two side frames, respectively, thereby interconnecting the two side frames and maintaining the two side frames at given orientations relative to each other,

said front frame comprising an upper rod-like transverse member and a lower rod-like transverse member, each U-shaped in plan with a forward intermediate portion and two rearwardly extending arms, the intermediate portions of the two rod-like members constituting the front frame of the walker and the rearward extending arms of the two rod-like members constituting the side members of the two side frames respectively,

said forward intermediate portions of the two rod-like members converging together and being interconnected centrally to form a torque portion of the front frame,

said upper transverse rod-like member being substantially straight and the lower transverse rod-like member being centrally offset to the central region of the upper rod-like member and being connected to the central region of the upper rod-like member to form a torque portion of the front frame,

the upper transverse rod-like member being centrally offset downward towards the lower transverse rod-like member, the lower transverse rod-like member being centrally offset upward towards the upper transverse member,

the two offset portions of the two transverse rod-like members being interconnected to form said torque portion of the front frame.

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J. KARL BELL, Primary Examiner

U.S. Cl. X.R.

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