

[54] WHEELCHAIR ANTI-TIP APPARATUS

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[51] Int. Cl. B62b 5/02

[58] Field of Search 280/5.2, 5.32, 242 R, 242 WC, 280/211, 282, 293; 297/DIG. 10

[56] References Cited

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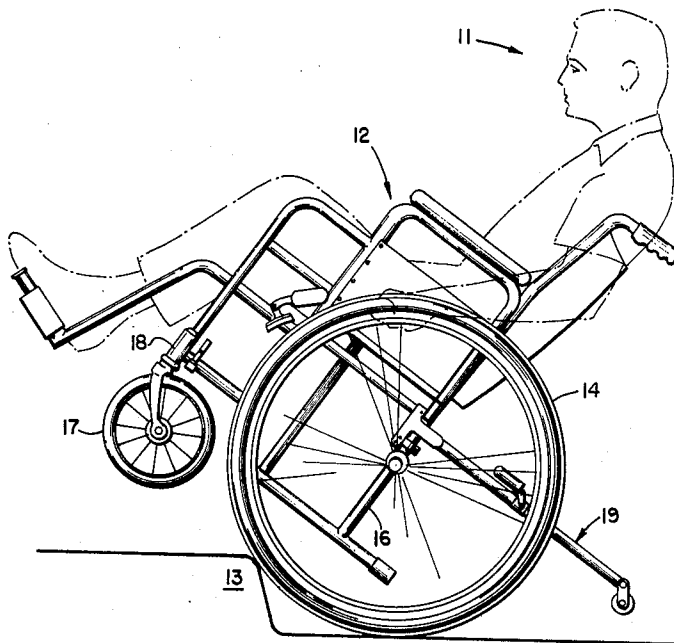
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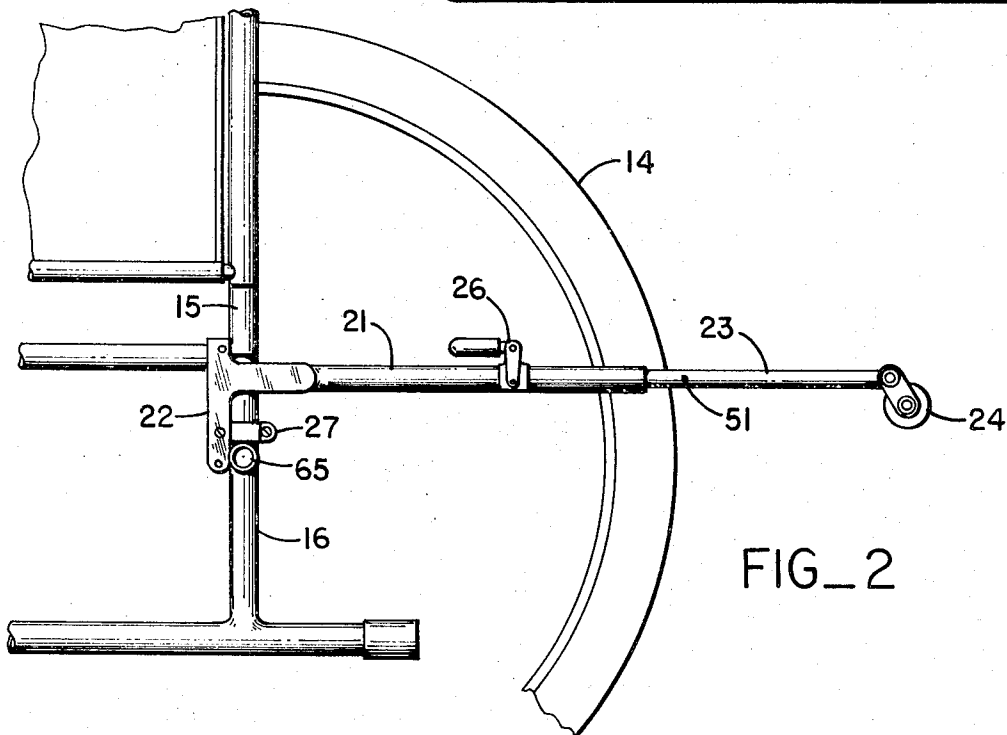
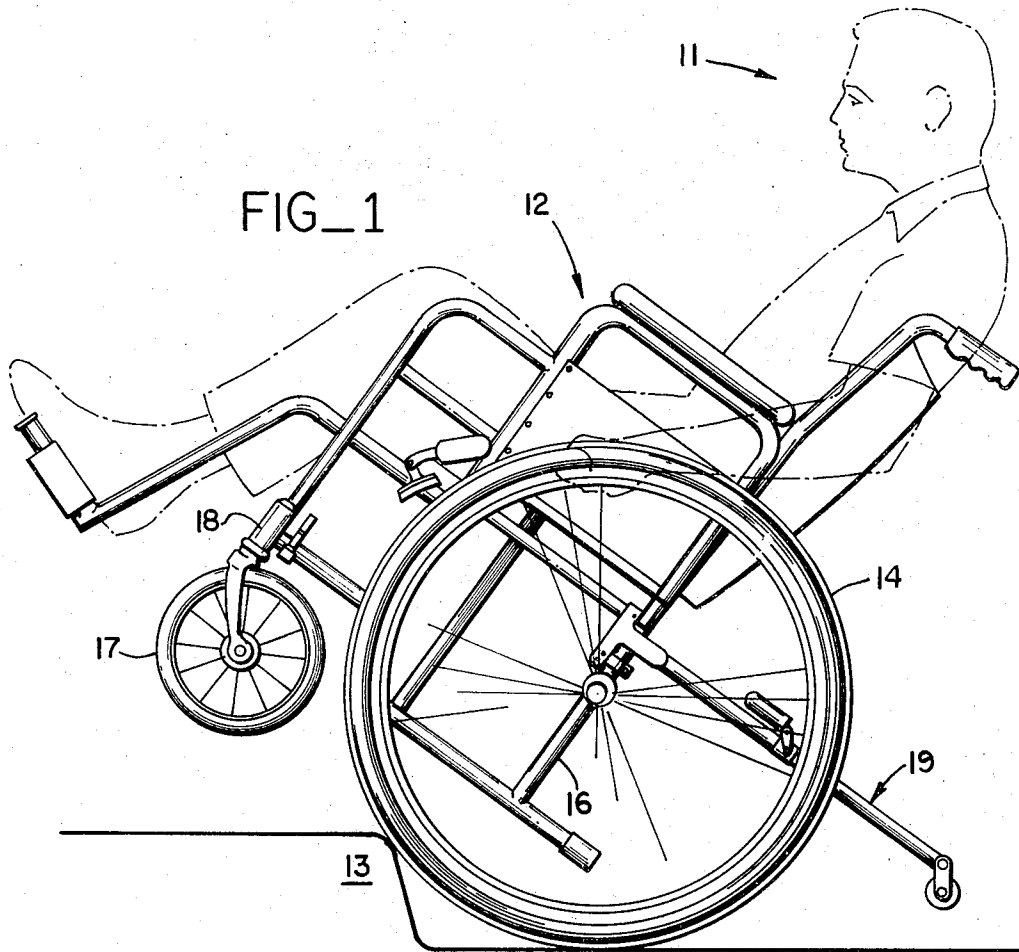
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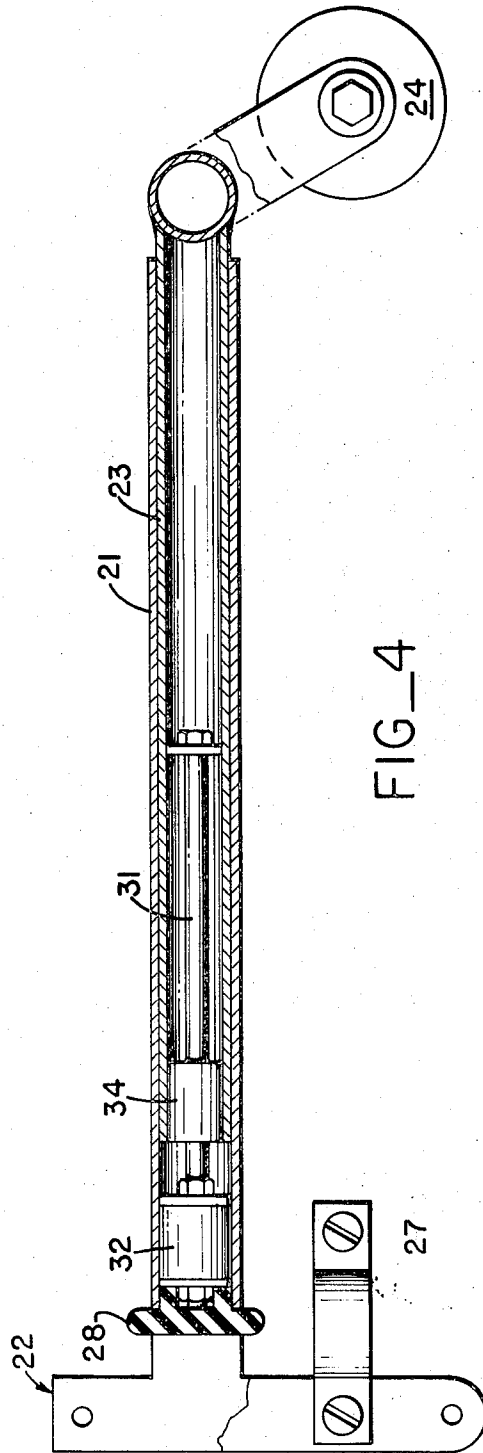
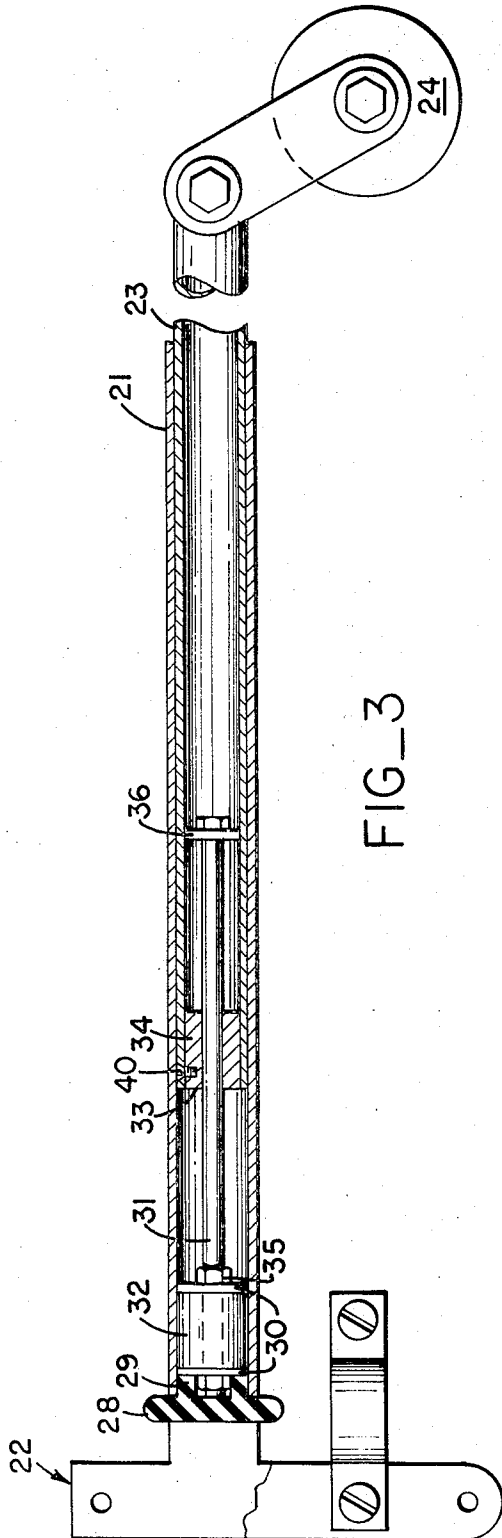
[57] ABSTRACT

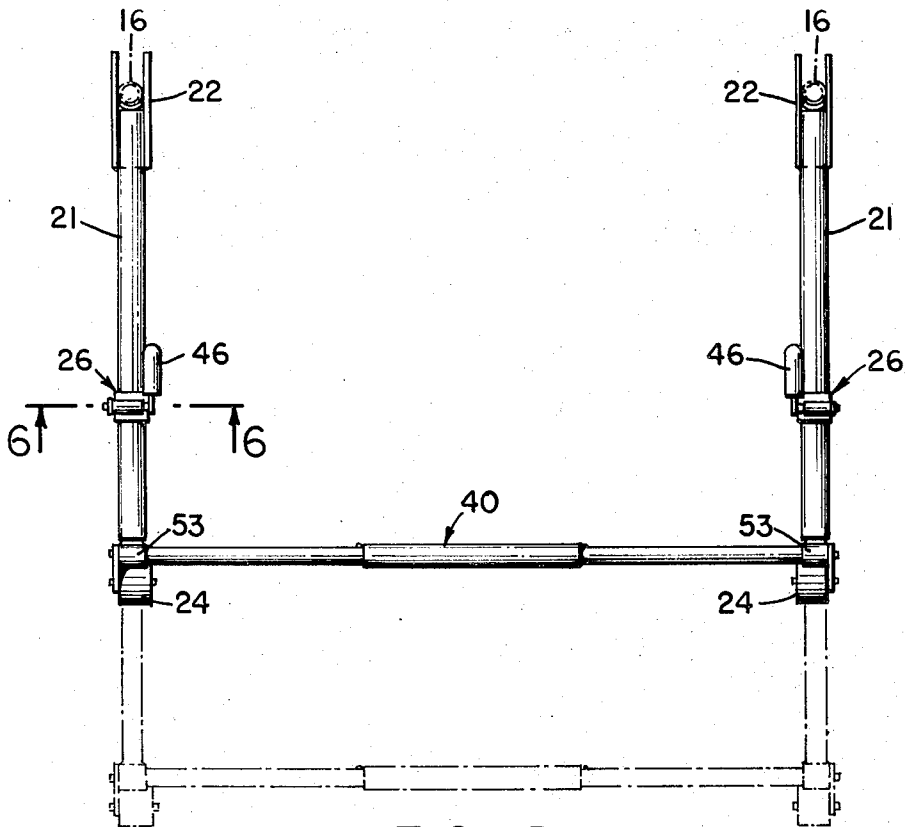
An anti-tip apparatus for a wheelchair includes a main tube extending laterally and rearwardly from the rear frame upright of a wheelchair, and an extension tube slidably received in each main tube and spring-biased to a retracted position. The extended ends of the extension tubes are joined by a transverse support tube to provide rigidity and strength to the apparatus. A wheel or coaster at the end of each extension tube allows the chair to roll rather than capsize over the tube ends, and reduces the shock to the chair. A manually releasable spring detent latch on each main tube holds the apparatus in the extended position, allowing the wheelchair occupant safely to tip the chair back onto the extended wheels to negotiate steps and curbs, and to retract the apparatus when maneuvering in close quarters. The transverse support tube is manually collapsible, permitting the wheelchair to be folded for storage or transportation.

15 Claims, 10 Drawing Figures

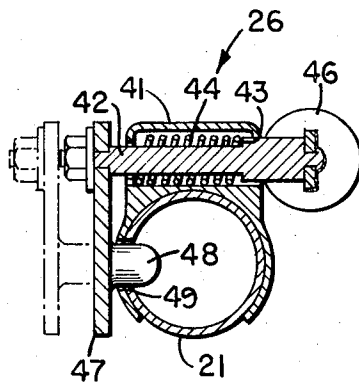






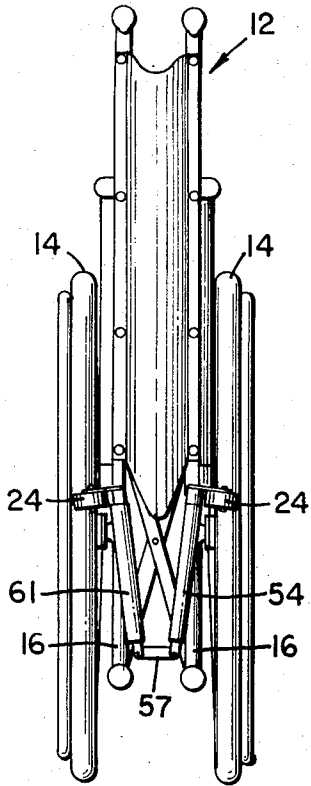


FIG_5

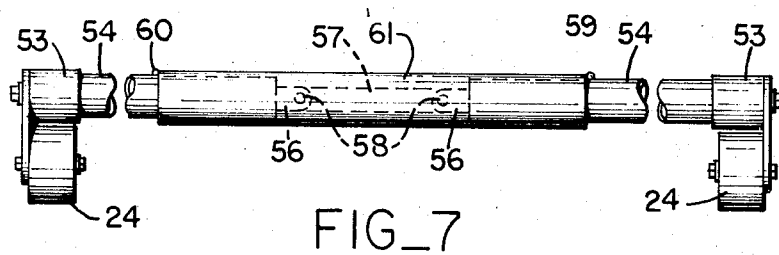
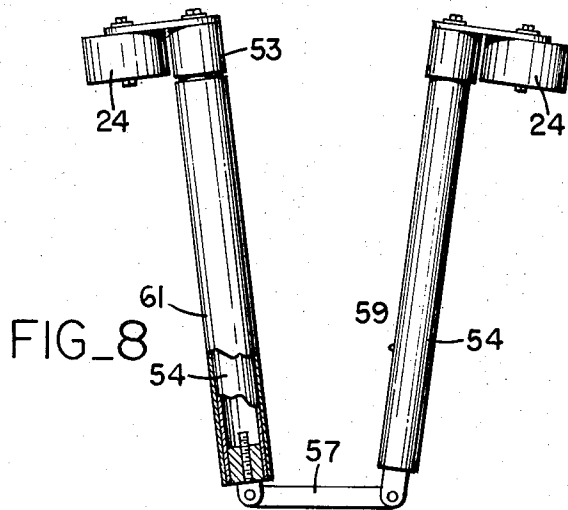
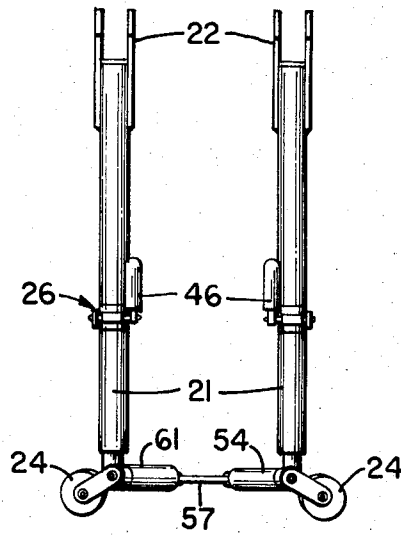


FIG_6

FIG_10



FIG_9



FIG_7

WHEELCHAIR ANTI-TIP APPARATUS

BACKGROUND OF THE INVENTION

A conventional wheelchair known in the prior art typically includes two rear wheels of large diameter and two forward wheels of small diameter secured to a frame, with the seat and back rest disposed on the frame so that the greater part of the weight of the occupant is resting on the rear wheels. This standard wheelchair configuration provides both lateral and forward stability, but does not allow the wheelchair to be tilted rearwardly without the risk of tipping over completely. Unfortunately, this rearward tilting motion must be frequently employed by the occupant if he/she is to negotiate curbs, steps, hills, etc., without the aid of an attendant. In the prior art many devices have been disclosed to stabilize a wheelchair in the rearward direction, including rearwardly extending structures supporting wheels which prevent more than a minimum of rearward tilting. These structures, however, have tended to make the wheelchair far too unwieldy in close quarters maneuvering such as in elevators, hallways, crowds, etc. Furthermore, these structures, due to their rigidity, have not been adaptable to modern, folding wheelchairs now in common use.

SUMMARY OF THE INVENTION

The present invention is directed toward an extendable anti-tip apparatus for a wheelchair which allows the wheelchair to be tilted rearward by the occupant without the danger of tipping over, and is retractable, when not in use, for maneuvering in close quarters. Furthermore, the anti-tip apparatus may be folded in concert with a folding wheelchair, permitting the chair to be easily stored and transported. The apparatus consists of a main tube secured to each of the rear frame uprights of the wheelchair by close tolerance clamping brackets, and extending horizontally and rearwardly of the wheelchair. An extension tube received within the main tube is slidably mounted on an axially disposed rod. Joining the extended ends of the extension tubes is a horizontal, transverse slide tube assembly, which comprises two transverse tubes hinged to a medial member, and a slide tube slidably disposed upon the medial member and portions of the transverse tubes. The slide tube immobilizes the hinges, and permits the assembly to add rigidity and strength to the extension tubes. Sliding the slide tube entirely onto one of the transverse tubes allows the hinges to operate, so that the assembly may fold in concert with a folding wheelchair. A wheel or caster is secured to each extension tube at the junction of the slide tube assembly, permitting the wheelchair, when resting on the wheels, to roll forwardly or backward, and preventing rearward tipping of the chair.

THE DRAWINGS

FIG. 1 is a side view of the present invention in use;

FIG. 2 is a side view of a portion of the present invention;

FIG. 3 is a side cutaway view of a portion of the present invention in the extended position;

FIG. 4 is a side cutaway view of the portion of the present invention depicted in FIG. 3, shown in the retracted position;

FIG. 5 is a plan view of the present invention;

FIG. 6 is a detailed sectional view taken along line 6-6 of FIG. 5;

FIG. 7 is a rear view of the slide tube assembly of the present invention;

FIG. 8 is a rear view of the slide tube assembly in the collapsed state;

FIG. 9 is a top view of the slide tube assembly in the collapsed state; and

FIG. 10 is a rear view of the present invention secured to a folded wheelchair.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. 1, the occupant 11 of a wheelchair 12 must resort to tilting the wheelchair rearwardly to negotiate unassisted a step or curb 13 or any similar obstacle. In doing so, the occupant risks tipping over, inviting serious injury, or, at the least, an arduous struggle to right the wheelchair and regain its seat. The common wheelchair with the main wheels 14 secured to the rear upright 16 of the frame to support most of the weight of the occupant, and the swivelling front wheels 17 secured in sockets 18 to provide forward stability to the chair, has no means for providing rearward stability in the situation depicted. However, the anti-tip apparatus 19 of the present invention, secured to the rear frame upright 16 and extending rearwardly of the frame, does provide such stability.

Each side of the anti-tip apparatus includes a main tube 21 which is welded at one end to a clevis-type bracket 22 which secures the main tube to the upright 16 by virtue of the close fit of the main tube in the clevis, and engagement of the outward tine with a section of tube 15 welded to the upright 16, and with the axle carrier 65. An extension tube 23 received in the main tube terminates in a wheel or caster 24 of hard black rubber or the like which bears on the ground when the wheelchair is tilted rearwardly. A spring-detent latch 26 secured to the main tube locks the extension tube in the fully extended position, (as shown in FIG. 2), or the retracted position. A clamp 27 secured about the rear upright 16 and bolted to the bracket 22 prevents removal of the anti-tip apparatus from the wheelchair.

Between the tines of the clevis bracket 22 a compressed resilient plug 28 received in the end of tube 21 is disposed to cushion any shock transmitted from the anti-tip apparatus to the wheelchair frame, to tension the clevis bracket against the rear upright 16 and to prevent injury from the end of the tube in case of accident. The interior portion of the pad is formed into an annular recess 29 which receives one threaded end of a rod 31. The rod extends through an annular opening in a resilient block 32, and slidably receives the extension tube 23 through the opening 33 in the end thereof. The rod passes through an annular opening in block 34 and is secured thereto by screw 40, and terminates in a rubber washer 36. Adjacent the ends of block 32 is a metal washer 30 and a nut 35, the outer diameters of the block and the washers equalling the inner diameter of the tube 21. Tightening the nuts 35 causes the washers 30 to compress the block, increasing the block diameter to compress the block against the tube interior and maintain bolt 31 and extension tube 23 securely in place. The block 34 and the washer 36 are equal in diameter to the inside diameter of tube 23.

The present invention comprises a left main tube and a right main tube, each secured to a rear frame upright 16. A transverse slide tube assembly 40 of variable length extends between the respective extension tubes to strengthen and add rigidity to the structure in the extended or retracted position, as shown in FIG. 5.

Welded to each main tube is the spring detent latch 26, which locks the extension tube in the fully retracted or fully extended position. As shown in FIG. 6, the latch comprises a housing 41 which slidably receives shaft 42 through suitable openings. The shaft 42 includes a shoulder portion 43 which retains one end of a compression spring 44, the other end of the spring bearing on the inside end of the housing. To the shouldered end of the shaft is secured a generally cylindrical rubber handle 46 which is parallel to the main tube 21. An arm 47 extends from the other end of the shaft 42 and is transverse thereto and to the handle 46. A detent 48 extends from the arm and protrudes into an aperture 49 in the main tube, engaging one of the two apertures 51 in the extension tube which registers with the detent when the extension is disposed in either the fully extended or fully retracted position. Compression spring 44 urges the shaft and the arm 47 into engagement with an aperture 51 by continually applying force to the shoulder 43. Manual force on the handle 46 to counter the spring force removes the detent from aperture 51, as shown in phantom in FIG. 6, permitting the extension tube to translate between the fully extended and retracted positions.

The slide tube assembly 40 includes sockets 53 welded to the left and right extension tubes and transverse thereto, each socket fixedly receiving one end of a support tube 54. The other end of each support tube terminates in a hinge member 56, as shown in FIG. 7, which is treadedly received in tube 54. Each hinge member is secured to medial member 57 by hinge pins 58 which are parallel to the main tubes 21. A slide tube 61 disposed about the medial member and portions of the support tube 54 is maintained in such a disposition by protrusions 59 and 60 on the support tubes. In such a disposition the hinge members 56 are nearly immobilized, so that the slide tube assembly is maintained rigid and provides support for the extension tubes and rigidity for the anti-tip apparatus. The length of the slide tube assembly may be adjusted to fit any width chair by screwing the members 56 into or out of the tubes 54.

The slide tube assembly is designed to be collapsed to accommodate the folding of the wheelchair. Protrusion 60 is a spring-loaded button which is manually depressable, allowing the tube 61 to be translated axially to a position over the support tube to free the hinge members 56 for rotation. Folding of the wheelchair frame causes the main tubes 21 to move towards each other, with the support arms 54 rotating upward on the hinge pins 58, and the extension tubes rotating within the main tubes correspondingly. The slide tube assembly acquires the collapsed configuration depicted in FIG. 8 and FIG. 9, the slide tube being maintained in its non-engaged position by the socket 53, and the angular relationship of the medial member 57 with the hinge member 56. The present invention in use on a folded wheelchair is depicted in FIG. 10. It should be noted that the entire anti-tip apparatus may be chrome-plated or otherwise finished to match the finish of the wheelchair.

Thus it may be seen that the present invention may be employed with a folding wheelchair without impairing the collapsibility of the chair. Furthermore, the anti-tip apparatus, although collapsible, is an extremely lightweight, rigid structure which can support a large portion of the weight of the wheelchair and its occupant. And, due to the novel extension tube construction, the anti-tip apparatus may be extended for use and retracted for convenience, providing a long-sought combination of safety and comfort for the disabled.

I claim:

1. In combination with a wheelchair having main rear wheels, an anti-tip apparatus comprising:
 - horizontal member means secured to the frame of said wheelchair adjacent the axes of rotation of said wheels and extending laterally and rearwardly of said wheels of said wheelchair in normally parallel relation to a ground surface; and
 - extension member means slidably secured to said horizontal member means and extensible to a position rearwardly of said wheels for preventing excessive rearward tipping of said wheelchair.
2. The anti-tip apparatus of claim 1, wherein said horizontal member means includes a main tube secured to a rear frame member of said wheelchair.
3. The anti-tip apparatus of claim 2, wherein said extension member means includes an extension tube slidably received within said main tube.
4. The anti-tip apparatus of claim 3, further including a rod secured to said main tube and disposed axially therein, said rod being slidably received in an opening in one end of said extension tube.
5. The anti-tip apparatus of claim 3, further including latch means for locking said extension tube in one or more positions within the main tube.
6. The anti-tip apparatus of claim 5, said latch means including a detent extending into an opening in the wall of said main tube and registering with and engaging one of a plurality of apertures in the wall of said extension tube.
7. The anti-tip apparatus of claim 6, further including resilient means for biasing said detent into engagement with one of said plurality of apertures, and manual means for disengaging said detent from said one of said plurality of apertures.
8. The anti-tip apparatus of claim 1, further including bracket means for securing said horizontal member means to a frame member of said wheelchair adjacent and above the axes of said wheels.
9. The anti-tip apparatus of claim 1, said bracket means comprising a clevis bracket secured to said horizontal member means, said clevis bracket including two parallel and spaced apart tines for receiving said frame member securely therebetween.
10. The anti-tip apparatus of claim 3, said wheelchair including a left rear frame member and a right rear frame member, and parallel left and right main tubes secured respectively to each of said rear frame members, each main tube receiving an extension tube therein.
11. The anti-tip apparatus of claim 10, further including a collapsible support assembly transverse to and joining said extension tubes.
12. The anti-tip apparatus of claim 11, wherein said support assembly includes left and right support members and a medial member, each support member hinged at one end to said medial member, the other

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ends of said support members secured to the respective left and right extension tubes.

13. The anti-tip apparatus of claim 12, further including a slide tube slidably received about said support assembly, said slide tube immobilizing said hinges of said medial member when disposed about said medial member.

14. The anti-tip apparatus of claim 13, further includ-

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ing retaining means for retaining said slide tube in a non-interfering disposition with said hinges of said medial member.

15. The anti-tip apparatus of claim 11, wherein said collapsible support tube assembly is manually adjustable in length to accommodate wheelchairs of differing widths.

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