March 2, 1971 S. T. POWERS 3,567,236

WHEELCHAIR ATTACHMENT

Filed Nov. 25, 1968 2 Sheets-Sheet 1

Fig. 1.

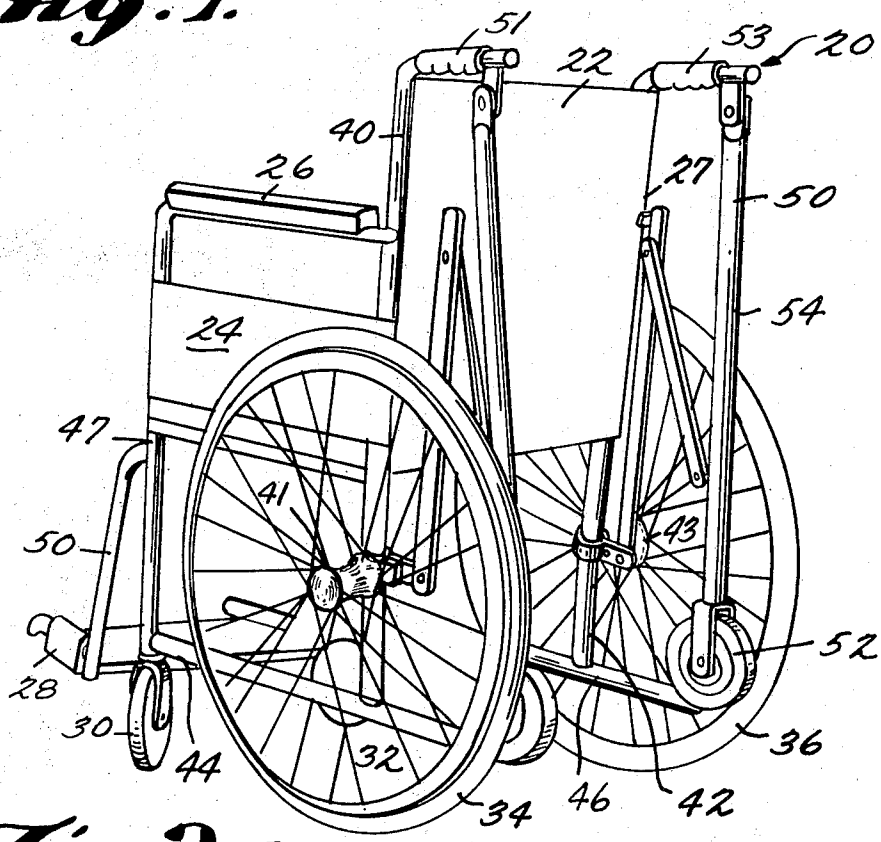
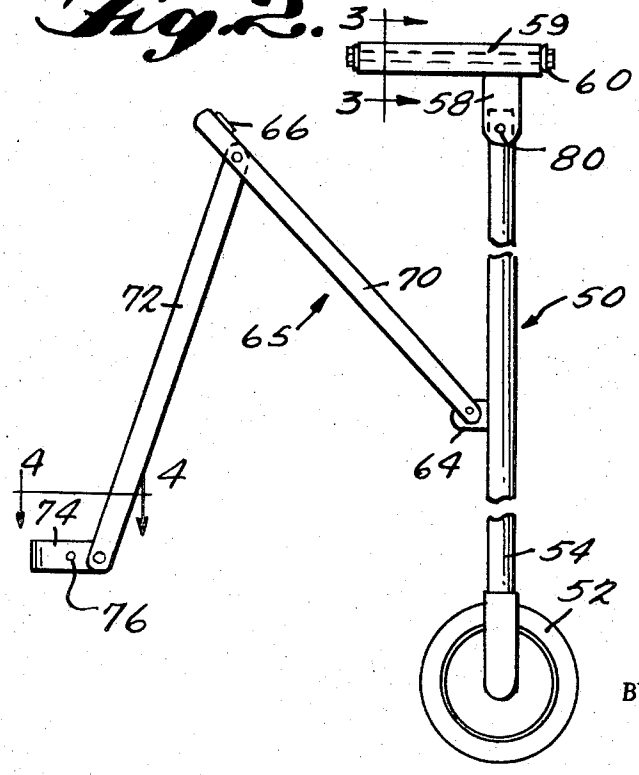


Fig. 2.



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Fig. 3.

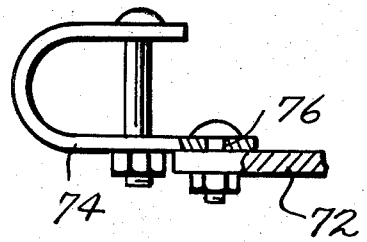


Fig. 4.

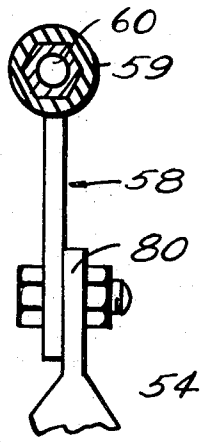
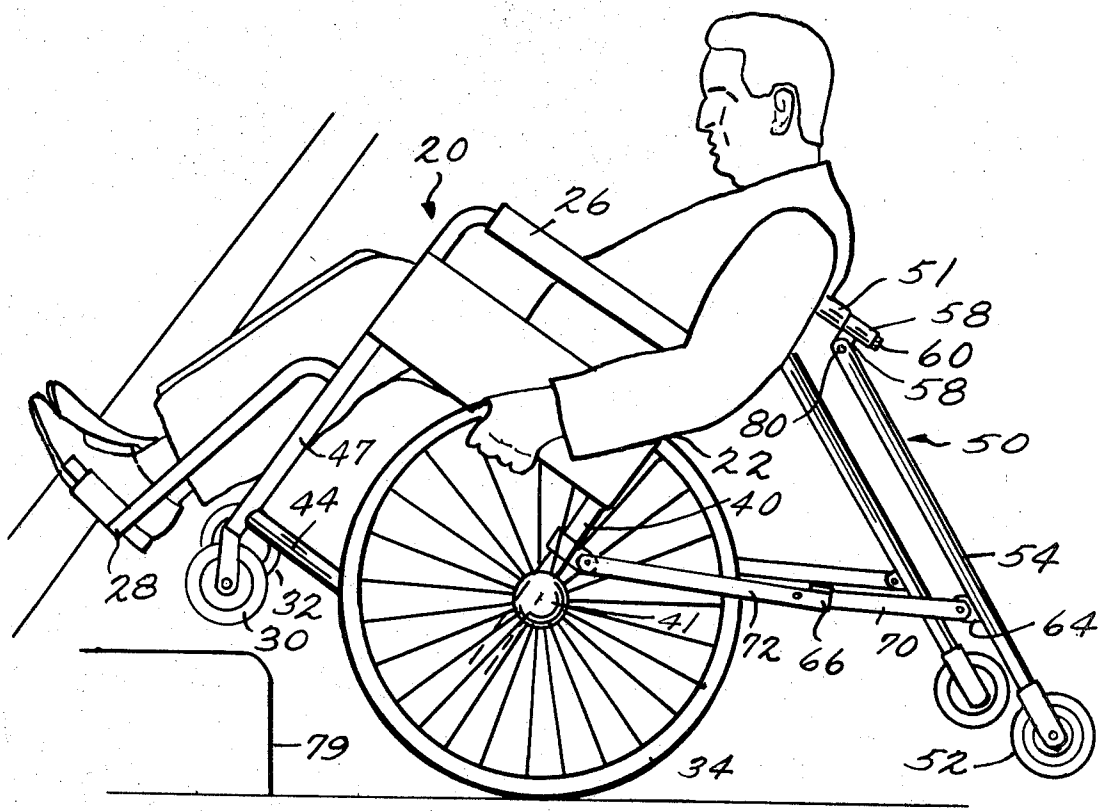


Fig. 5.



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WHEELCHAIR ATTACHMENT

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U.S. Cl. 280—5.32 7 Claims

ABSTRACT OF THE DISCLOSURE

Wheelchair attachments ordinarily installed in pairs for enabling patients confined to wheelchairs to easily negotiate obstacles, such as curbs, in a conventional wheelchair having two small front wheels and two large rear wheels which the patient manually rotates to propel and maneuver the wheelchair. Each attachment includes an extendible wheels, or dolly, which is connectable to the wheelchair through supporting member and which can be manually extended backward by the patient to a locked position. When both dollies of a pair of attachments are in this extended and locked position, the wheelchair can be tilted backwards manually to rest in a stable, tilted position on the two large wheels and the extended dollies or wheels with the two small front wheels, or casters, elevated. Curbs and other obstacles can then be simply negotiated in this tilted position by manually rotating the two large wheels so as to climb the obstacle.

BRIEF DESCRIPTION OF THE PRIOR ART AND SUMMARY OF THE INVENTION

The invention relates to simple attachments to a wheelchair for enabling patients confined to wheelchairs to mount curbs and overcome other obstacles.

For the disabled individual, who has temporarily or permanently lost the use of his legs and must depend upon mechanical, usually manually operated, substitutes, such as wheelchairs, to move himself about, many of the minor obstacles and obstructions, which those fortunate individuals who can walk manage without difficulty and usually without notice, become extremely difficult to negotiate and, too often, insurmountable. Despite increased public awareness of the need to provide special facilities, such as ramps, which those individuals who are confined to wheelchairs can use, a short walk through any populated area quickly reveals many obstacles such as curbs, stairs, broken sidewalks and the like which, to an individual in a wheelchair, can make even a short trip a hazardous adventure. The present invention relates to a simple attachments which can be quickly and easily affixed to conventional existing wheelchairs and which enable a wheelchair confined individual to easily overcome minor obstacles without great effort or skill.

Many attempts have been made in the prior art to produce either a wheelchair which can climb over or otherwise overcome obstacles or attachments to wheelchairs to enable such obstacles to be overcome. For example, the patents to Zamotin, 3,259,396, and Bennett et al., 2,701,005, show two types of wheelchairs of the prior art which purportedly can climb curbs and obstacles. However such devices have not found ready acceptance, perhaps because of their complexity or expense or some other problems. This invention relates to simple, inexpensive, reliable attachments which can easily and quickly be affixed to wheelchairs and which not only perform satisfactorily but which can be attached to conventional wheelchairs.

The wheelchair attachments of this invention are ordinarily used in pairs, each of the attachments being attached to one side of the wheelchair, roughly aligned with and behind one of the two conventional, manually operated, large diameter wheels.

Each of these attachments is comprised of an elongated member, a dolly or wheel, a supporting connection made up of two rods, and means for connecting the elongated member and one of the rods to the wheelchair. The elongated member of each of a pair of attachments is preferably attached to the wheelchair, in the embodiment set forth below, and particularly to one of the conventionally provided hand grips at the top of the wheelchair back. The length of the member is chosen to be less than the distance from the hand grip to the ground. Attached to the other end of each member is the small wheel or dolly, which has been called a drop-back dolly, and which is similar to the small permanently attached front wheel of the wheelchair itself. Also attached to a point between the ends of this member is one of the rods of the supporting connection which is made up of the two rods serially connected together and forming a pivot point at their point of connection. The other of the rods of this supporting connection is then attached to the wheelchair and preferably to the main rod which runs beneath and supports the wheelchair seat and back and which is attached to the axle of each large wheel. In the storage position, each dolly or wheel is positioned roughly below the hand grip to which it is connected.

To employ a pair of attachments to mount an obstacle such as a curb, the dollies of each attachment are extended backwards by manually pushing downward on the pivot point between the two rods making up the supporting connection until the two rods lock by means of a scissor mechanism or the like. After the dollies or extendible wheels are so extended to the operative position, the wheelchair can be easily tilted backwards so that the front two wheels are elevated, and the wheelchair rests at an angle of about 45 degrees in a stable position on the two large wheels and the two extended dollies.

The curb can then be approached by moving the large wheels in the usual manner until the large wheels are directly applied to the base of the curb. The large wheels can then be rotated to climb the curb with the two backwardly extending dollies or wheels remaining on the lower surface. After the large wheels are atop of the obstacle, the wheelchair can be tilted forward again by shifting the body weight so that the wheelchair returns to its normal position resting atop the curb upon the two large wheels and the two small front wheels. Each of the extended dollies or wheels which are once again elevated can now be manually rotated back to their storage position by manually releasing each of the locking arrangements and pulling upward on each of the pivot points at which the two rods making up each supporting connection are linked.

Many other objects and purposes of this invention will be clear after reading the following detailed description of the drawings.

A BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a conventional wheelchair with attachments of this invention shown in the storage position.

FIG. 2 shows a view of the attachment.

FIG. 3 shows a view of the connection of the attachment to the main post of the wheelchair along the lines 3—3.

FIG. 4 shows a view of the connection of the attachment to the hand grip or handle along lines 4—4.

FIG. 5 shows a view of a wheelchair with the attachments in the operative position climbing a curb.

DETAILED DESCRIPTION OF THE DRAWINGS

Reference is now made to FIG. 1 which shows a conventional wheelchair 20 with a pair of the attachments

50 of this invention added thereto to enable certain wheelchair confined patients to negotiate curbs, inclines, rough terrain, sand and rocks, and other obstacles with a minimum of difficulty or danger. The wheelchair 20 is conventional with a cloth back 22, a seat 24, arm rests 26 and 27, a foot rest 28, small front wheels 30 and 32, and manually operated large rear wheels 34 and 36. The person within the wheelchair 20 is supported by a frame which includes a pair of vertically disposed posts 40 and 42, which have a cloth sheet or similar structure stretched between them to make up the back 22 and which extend downward and are permanently attached to the axles 41 and 43, respectively, of the large wheels 34 and 36, respectively, and also to horizontally supporting members 44 and 46, respectively. The posts 40 and 42 terminate in hand grips 51 and 53 which are provided so that the wheelchair 20 can be easily pushed by another as well as manually propelled by the operator. The horizontal members 44 and 46 in turn support front posts 47 and 48 which connect to the arm rests 26 and 27, and which also support the struts which form the seat 24. The wheelchair 20 shown in FIG. 1, is a simple conventional wheelchair which is locomoted by the patient manually rotating the large wheels 34 and 36 so that the wheelchair and patient are propelled in the direction which the patient chooses. In addition, the wheelchair 20 shown in FIG. 1 may be simply collapsed for storage or made ready for use from storage in a few seconds.

Moreover, FIG. 1 also shows the tow attachments 50 which make up the subject of this invention attached to the conventional wheelchair 20. Each of these attachments 50 is identical and each can be left in position while the wheelchair 20 is collapsed for storage. Reference is now made to FIG. 2 which shows in detail one of the attachments 50. As can be seen in FIG. 2, the dolly or wheel 52, which is used to catch the wheel chair 20 when it is tilted backward, is supported directly by an elongated member 54 which allows it to rotate freely in a conventional manner. The member 54 is in turn pivotally attached to an upper member 58 which is preferably attached to the wheelchair handle 51 or 53, as shown in FIGS. 1 and 4, by cutting or removing the end of the rubber or plastic grip which conventionally covers the wheelchair handle 51 or 53 and inserting the conventional expansion lug 59 of the upper member 58 into the hollow hand grip or handle 51 or 53. By tightening the nut 60 which fits within the expandable lug 58, the lug 58 can be expanded within the handle 51 or 53 and the attachment 50 firmly fixed to handle 51 or 53.

A bracket 64 is shown attached to the member 54 in a position more than midway between the expansion lug 59 and the wheel or dolly 52. Pivotably attached to this bracket 64 is a supporting connection 65 by which the wheel or dolly can be extended, made up of two separate rods 70 and 72. As can be seen in FIG. 1, the point of pivotal connection between rods 70 and 72 is within each reach of the person in the wheelchair, so that when the scissor-like mechanism 66 located at the connection between rods 70 and 72 is manually pushed downward to cause the rods 70 and 72 to assume roughly a horizontal position, as shown in FIG. 5, the member 54 and wheel 55 are pivoted about the point 80 at which they attach to the upper member 58 and the dolly or wheel 52 moves backward to the operative position. In this embodiment, the rods 70 and 72 as connected to the scissor mechanism 66 trace an arc from about 25 degrees to over 180 degrees and lock in place at about 185 degrees. When locked, the attachment 50 will not collapse to its original storage position until the operator manually pulls upward on the scissor mechanism 66. Thus, there is virtually no possibility that the attachment 50 will collapse when the wheelchair is tilted backwards at approximately 45 degrees.

The rod 72 and thus the connection 65 is attached to a short bracket 74, as shown in FIGS. 1 and 3, which is in turn attached to wheelchair 20, for example, by removing the axle nuts that serve the wheel 34 and positioning the bracket 74 so that the hole 76 is aligned with the bolt holes through which the wheel 34 is attached to its axle 41. The bolt and nut supporting the large back wheel 34 can then be reapplied tightly so that the bracket 74 is firmly and securely attached to that axle 41 in the manner shown in FIGS. 1 and 3.

Reference is now made to FIG. 5 which shows the pair of wheelchair attachments 50 locked in the stable extended position with the wheelchair 20 supported by the large wheels 32 and 34 and two dollies or wheels 52. As is apparent from FIGS. 1 and 5, each of the wheels 52, in both the storage and extended operative position is elevated a considerable distance above the ground when the wheelchair 20 rests on the two front wheels 30 and 32 and the two large rear wheels 34 and 36. Thus, when the wheelchair 20 is manually tilted backwards to rest on the two wheels 52 and the large wheels 34 and 36, the front wheels 30 and 32 are likewise elevated and as shown in FIG. 5, the front wheels 30 and 32 can then be placed atop an obstacle such as the curb 79 shown in FIG. 5, by rolling the wheelchair 20 forward in the tilted position until the large wheels 34 and 36 are at the base of the curb 79. The angle between the tilted wheelchair 20 and the ground can, of course, be simply controlled by changing the length of member 54 and rods 70 and 72 to change the distance from the wheels 52 to the wheelchair 20 and the distance from the wheels 52 to the ground. A tilting angle of about 45 degrees is shown in FIG. 5, and this angle has been found quite satisfactory. At this angle, most patients with practice have been able to climb a four inch curb, to dismount a fifteen inch curb, and to overcome most common obstacles in streets, highways and sidewalks.

To assume the tilted position, the individual in the wheelchair first pushes both of the wheels 52 to the extended position by pushing downward on each of the scissor mechanisms 66 until each of the attachments 50 is firmly locked in place. Then the wheelchair 20 is tilted backwards by the operator until the wheelchair 20 rests on the rear wheels 34 and 36 and both of the wheels 52. This tilting can be accomplished in any manner, for example, by producing slight backward momentum, then quickly and smoothly jerking the large wheels 34 and 36 forward and at the same time throwing the body weight backwards. With practice, this maneuver can be accomplished without substantial effort and without strain to the dollies or wheels 52 or the front wheels 30 and 32.

Next, the patient approaches the obstacle, such as the curb 79, shown in FIG. 5, with the wheelchair 20 in the tilted position by manually rotating the large wheels 34 and 36. As shown, the small wheels 30 and 32 will be automatically placed atop the curb 79 as the large wheels 34 and 36 contact the base of the curb 79. The wheelchair operator now merely rotates the large wheels 34 and 36 manually to cause the wheels 34 and 36 to climb the curb 79 and, at the same time, pull the wheels 52 slightly forward. When the wheels 34 and 36 are atop the curb 79, the wheelchair operator can now tilt the wheelchair 20 forward, for example by repeating in reverse the maneuver used to assume the backward tilted position, to cause the now elevated front wheels 30 and 32 to resume contact with the ground and the wheels 52 to again become elevated. The wheelchair is now safely atop the curb 79 and in the normal upright position resting on wheels 30, 32, 34 and 36 with the wheels 52 elevated. The wheels 52 can now be returned to their storage position by the operator manually pulling upward on each of the scissors mechanisms 66 to rotate each of the wheels 52 back to the position shown in FIG. 1.

Experienced and skilled wheelchair operators, of course, have heretofore been able to accomplish a similar climbing maneuver without assisting devices, such as the attachments **50**, simply by balancing on the two large wheels **34** and **36**. However, such balancing takes time and skill to perfect while any individual can learn to use the attachments **50** in a very short length of time. Further, even when done by the most skilled and experienced individuals, such balancing requires much effort and is inherently dangerous with a broken head or wheelchair the price of carelessness or miscalculations. In contrast, the attachments **50** enable this climbing operation to be done with complete safety and ease. Even should one of the attachments **50** fail during climbing, tests have indicated that either of the attachments **50** alone is sufficient to support the wheelchair **20**. The only real source of danger is the possible human error of forgetting to extend either of the wheels **52** before the wheelchair **20** is tilted.

Of course, the patient can not only mount curbs but can overcome virtually any type of minor obstacle with the attachments **50**. Even movement over sand and rough terrain, which is ordinarily very difficult because of the tendency of the small front wheels **30** and **32** to plough and pitch the operator forward, is made relatively easy. By assuming the tilted position when moving over sand and rough ground, the large rear wheels **34** and **36** are converted into the lead wheels and progress is thus substantially easier. Even if the wheelchair **20** veers off its intended course due to the fact that one of the wheels **52** is deeper in sand or hits a rock or hole, the patient can simply continue by lifting the wheels **52** a few inches off the ground and at the same time manually turning his wheelchair **20** a few degrees with his large wheels **34** and **36** until he can resume his intended course. With this maneuver, which can be quickly and simply learned, a wheelchair confined patient can make even a 90 degree turn or reverse his direction by 180 degrees with ease.

Although not especially designed for this purpose, it is believed that use of the attachments **50** will reduce the prevalence of pressure ulcers over the ischia in wheelchair confined individuals. By resuming the tilted position for a few minutes each hour, it has been demonstrated that pressures on critical regions of wheelchair contained individuals are reduced by about 35% so that even those patients who must spend 10 to 15 hours a day in their wheelchairs can avoid or at least reduce the chances of incurring this common difficulty. Further, the attachments **50** permit a conventional wheelchair to be converted into a comfortable lounge chair simply by resuming the tilted position.

Adding to their advantages is the ease with which the attachments **50** can be attached and removed to and from a conventional wheelchair. It has been found that both attachments **50** can be removed from one wheelchair and transferred to another wheelchair in about ten minutes. Of course, it may be desirable to permanently fix the attachments **50** to the wheelchair **20** or to construct a wheelchair with the attachments **50** as a permanent part thereof. However, until all wheelchairs are so equipped, the adaptability of the attachments **50** to any conventional wheelchair makes them especially useful.

Further, the inherent simplicity of the attachments **50** in comparison to the functions which they perform makes them both inexpensive and economical. Since no major alteration of the wheelchair to which they are attached is necessary or even desirable, the total cost of the attachments to the wheelchair confined individual is nominal especially compared to the mobile capability which they give him. Their simplicity also virtually guarantees trouble free operation and precludes expensive maintenance. In short, the attachments are simple, inexpensive, reliable devices, easily and quickly attachable to

conventional wheelchairs and capable of enabling a wheelchair confined individual to overcome common obstacles and move freely about his environment.

As mentioned above, the attachments can also be permanently connected to the wheelchair or can be removable as in the embodiment set forth above. Further, many changes and modifications in the examples set forth above will be apparent to any one of ordinary skill in the art and the invention is intended to be limited only by the following claims.

What is claimed is:

1. A wheelchair attachment for overcoming obstacles in a wheelchair having at least one front wheel and a pair of large rear wheels which can be manually rotated to propel said wheelchair comprising wheelchair supporting means mountable behind said wheelchair so that said wheelchair can be tilted backwards to a stable tilted position in which at least a portion of the weight of said wheelchair and the weight supported by said wheelchair is supported by said supporting means, said supporting means including at least first and second supporting wheels, means for attaching said supporting wheels to said wheelchair and means for moving said supporting wheels from a storage position with said supporting wheels above the ground and adjacent said larger rear wheels to an operative position with said supporting wheels above the ground and rearwardly from said rear wheels when said front wheel is on the ground.

2. An attachment as in claim **1** including means to lock each of said single wheels in said operative position.

3. An attachment as in claim **2** wherein said supporting means includes a first member connected at one end to one of said single wheels so as to allow said one single wheel to rotate freely and at the other end pivotably connected to said wheelchair, said first member having a length less than the distance from the point said first member is attached to said wheelchair to the ground when said wheelchair is in the upright position, a second member pivotably connected at one end to said first member between said ends, and a third member pivotably attached at one end to the other end of said second member and pivotably connected to said wheelchair at a point lower than the point of connection to said first member at the other end of said third member so that said first member can be pivoted about its point of connection to said wheelchair to extend said one single wheel backwards by manually pushing downward on the point of connection between said second and third members.

4. A wheelchair comprising:

a pair of small front wheels,

a pair of manually rotatable rear wheels,

frame means connected to said front and rear wheels and forming a seat, and

wheelchair supporting means mounted on said frame means so that said wheelchair can be tilted backwards to a tilted position in which at least a portion of the weight of said wheelchair and the weight supported by said wheelchair is supported by said supporting means and said front wheels are elevated above the ground, said supporting means including at least first and second supporting wheels, means for attaching said supporting wheels to said wheelchair and means for moving said supporting wheels from a storage position with said supporting wheels above the ground and adjacent the manually rotatable rear wheels to an operative position with said supporting wheels above the ground when said front wheels are on the ground and rearwardly spaced from said rear wheels.

5. A method of operating a wheelchair with at least a single large wheel for manually propelling said wheelchair and at least a single front wheel to overcome obstacles comprising the steps of:

manually shifting supporting means from a storage position in which said supporting means are elevated

above the ground and adjacent the large wheel to an operative position in which said supporting means is elevated above the ground and spaced rearwardly from said large wheel when said front wheel is on the ground,

tilting the wheelchair backwards until the wheelchair is in a stable tilted position in which the weight of the wheelchair and the weight supported by the wheelchair is at least partially supported by supporting means mounted behind said wheelchair, and

manipulating said wheelchair in said stable tilted position to overcome said obstacle.

6. A method as in claim **5** including the step of manually shifting said supporting means from said operative to said storage position after said obstacle has been overcome.

7. A method of overcoming obstacles in a wheelchair having a pair of small front wheels, a pair of large manually rotatable rear wheels and a pair of extendible wheels manually movable from a storage position in which said extendible wheels are adjacent said large rotatable rear wheels to a stable, operative position in which said extendable wheels are spaced behind said rear wheels and are elevated above the ground when said wheelchair rests on said front and rear wheels comprising the steps of:

manually moving said extendible wheels from said storage to said operative position,

manually tilting said wheelchair backwards, to a stable tilted position in which said wheelchair rests on said extendible wheels and said rear wheels,

manually rotating said rear wheels to overcome said obstacle, and

manually returning said extendible wheels to said storage position after said obstacle has been overcome.

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