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Talati et al.

[11] **3,923,045**

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[54] **AMBULATION DEVICE**

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[52] **U.S. Cl.** ..... **128/25 R;** 128/80 F

[51] **Int. Cl.²** **A61H 1/02**

[58] **Field of Search** ..... 128/25 R, 25 B, 44, 49, 128/80 F

[56] **References Cited**

UNITED STATES PATENTS

2,010,482	8/1935	Cobb	128/25 X
2,107,095	2/1938	Wagner	128/80 F
3,502,071	3/1970	Holly	128/25 R

Primary Examiner—Lawrence W. Trapp

[57] **ABSTRACT**

An ambulation device for hemiplegics and the like which includes a torso-encircling band and a torsion shaft being mounted to the band for horizontal positioning across the small of the hemiplegic's back and for torsional rotation about the longitudinal axis of the shaft. An upper end of a leg-engaging arm is attached to one end of the torsion shaft and the lower end of the arm depends substantially parallel to and engages one leg of the hemiplegic. A swing lever is attached to the other end of the torsion shaft and extends forwardly and downwardly when the paralyzed leg of the hemiplegic is in a vertical position. The swing lever is freely extendible and is provided with a band at the distal end for attachment to the wrist of the person using the device. The device is intended to be used in conjunction with a cane, walker or the like.

7 Claims, 4 Drawing Figures

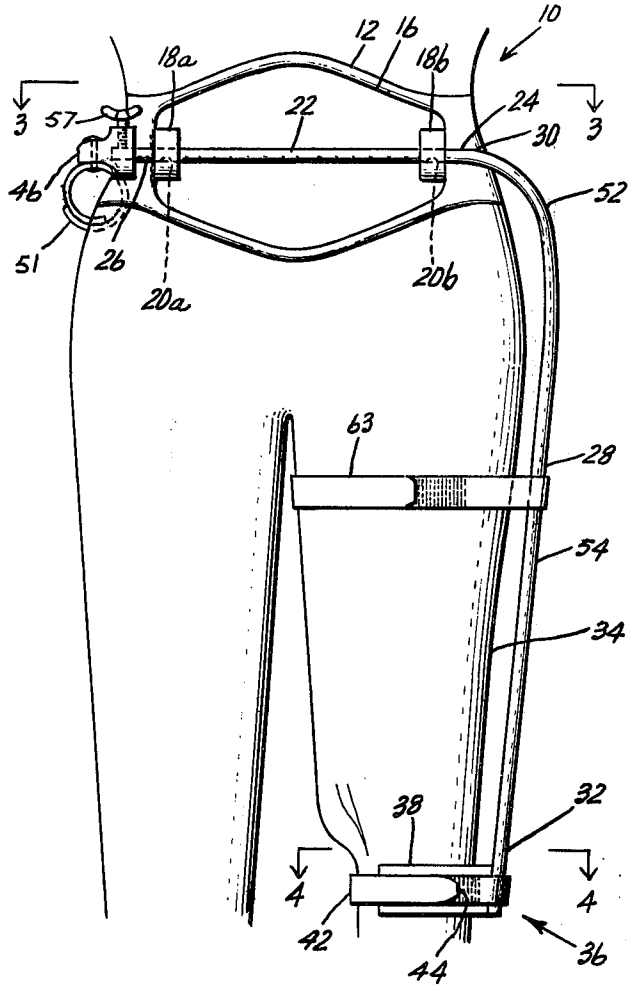


FIG. 1

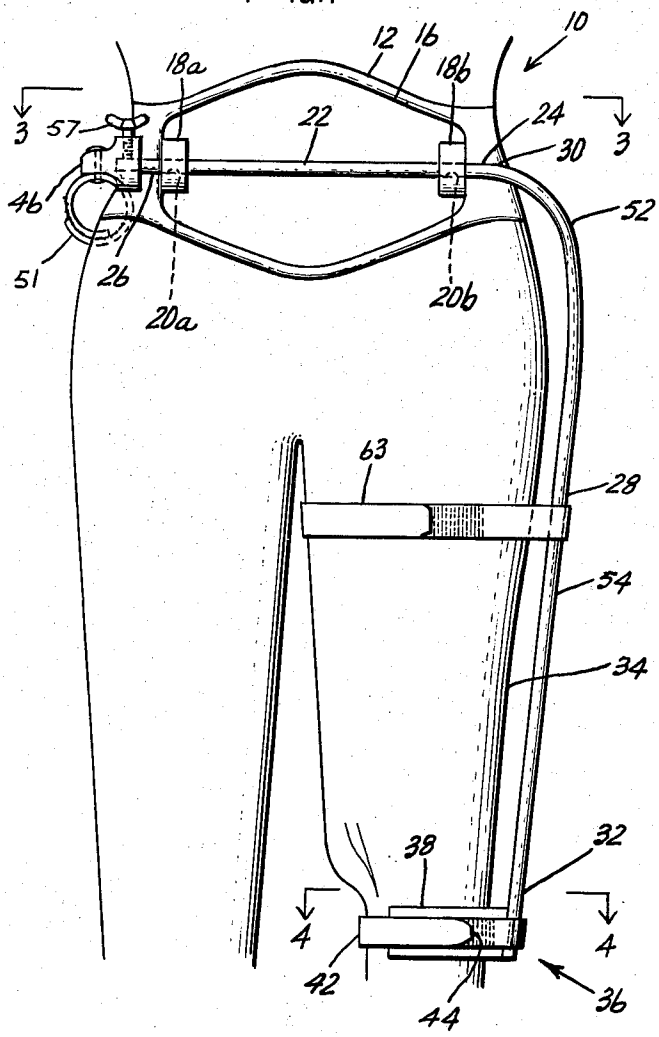


FIG. 2

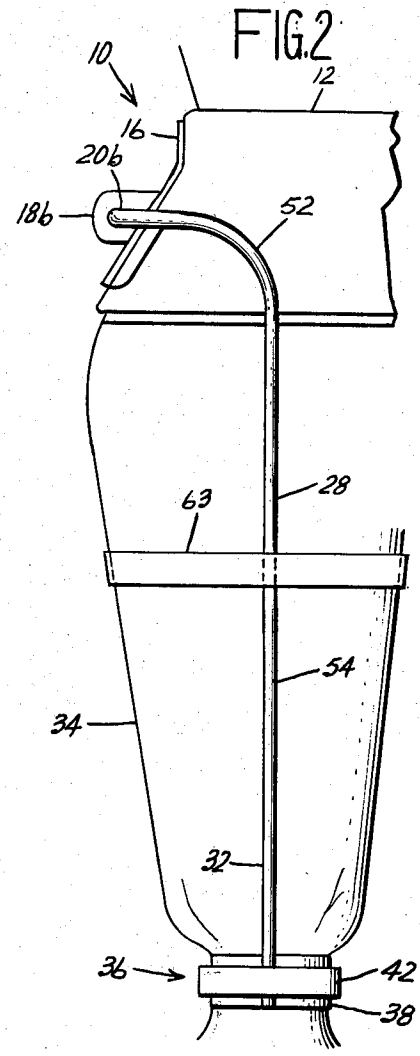


FIG. 3

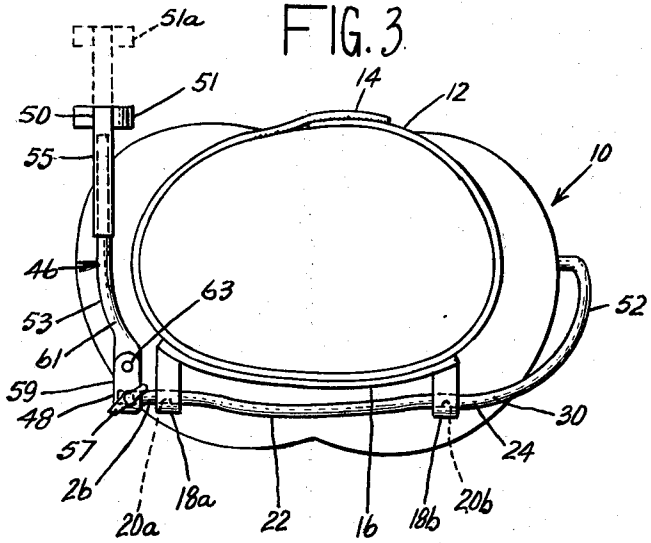
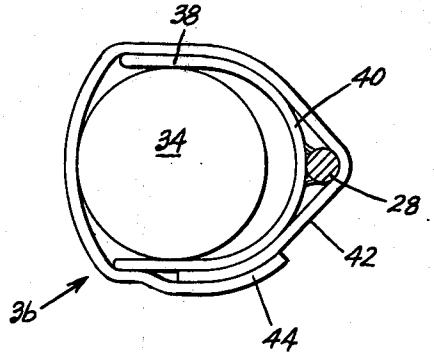


FIG. 4



AMBULATION DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to an ambulation or walking device for paralyzed persons, and more particularly to an ambulation device for hemiplegics and paraplegics.

2. Description of the Prior Art

Various devices have been provided to assist in ambulation of paralyzed persons. One such device is the walking motion device of Cobb, U.S. Pat. No. **2,010,482** which provides walking motion for a completely paralyzed person and which is, of necessity, quite complex in construction. Another such device is the hand-controlled leg brace of Holly, U.S. Pat. No. **3,502,071** which may be used by persons having use of the arm proximal to a paralyzed leg. In contrast to the prior art, the present invention provides an ambulation device for hemiplegics and paraplegics such that the distal and unparalyzed arm or arms, as the case may be, of a hemiplegic or paraplegic may be used to provide ambulatory motion to the paralyzed leg or legs.

SUMMARY OF THE INVENTION

In accordance with the broader aspects of this invention, there is provided an ambulation device for hemiplegics and paraplegics. This ambulation device includes a torso-encircling band having opening and adjusting means, a plate being attached to the band for positioning in the small of the person's back, a pair of bearings being mounted in horizontally spaced relationship to the plate, a torsion shaft being rotatably journalled through the bearings, an arm with the upper end thereof being attached to one end of the torsion shaft and having the lower end thereof in operative engagement with the paralyzed leg of the person, and a swing lever having a first end being attached to the other end of the torsion shaft and having a second end extending forwardly in a suitable, adjusted position when the paralyzed leg of the hemiplegic is in a vertical position.

It is an object of this invention to provide an ambulation device which may be used by hemiplegics and paraplegics.

It is still another object of this invention to provide a leg-engaging and leg-swinging arm which is actuated by an arm operated swing lever on the side of the person distal from the paralyzed leg.

It is still another object of this invention to provide a torso-encircling band having torsion shaft means mounted thereon for positioning behind the small of the back of the hemiplegic or paraplegic and for transferring ambulatory motion from an unparalyzed arm to a paralyzed leg on the opposite side of the person.

The above-mentioned and other features and objects of this invention and the manner of obtaining them will become more apparent and the invention itself will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** is a back elevation of the ambulation device;

FIG. **2** is a side elevation of the ambulation device of FIG. **1**;

FIG. **3** is a top elevation of the ambulation device taken substantially as shown by view line **3—3** of FIG. **1**; and

FIG. **4** is a cross-section taken substantially along section line **4—4** of FIG. **1**, showing the means for attaching the lower end of the arm to the leg of, for example, a hemiplegic.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. **1–4** of the drawings, the apparatus of the invention, generally indicated by the numeral **10**, comprises a torso-encircling band or belt **12**, such as a velcro, having opening and adjusting means **14**, a metal plate **16** being attached to the belt **12** and preferably being contoured to conform to the small of the back of a person, such as a hemiplegic or paraplegic as best seen in FIG. **2**, a pair of bearings **18***a* and **18***b* each having bearing openings **20***a* and **20***b* therethrough and being mounted to the metal plate **16** in horizontal spaced-apart position with the bearing openings **20***a* and **20***b* in axial alignment, a torsion shaft **22** having one end **24** thereof proximal to the paralyzed leg of the person and another end **26**, a leg-engaging arm **28** having an upper end **30** thereof fixedly attached to the end **24** of the torsion shaft **22** and having a lower end **32** depending substantially parallel to a paralyzed, proximal leg **34** of the hemiplegic, and attaching means **36** which comprises a U-shaped leg-engaging member **38** with a base portion **40** thereof being attached to the lower end **32** of the leg-engaging arm **28** and a leg-engaging strap **42** such as a velcro, which includes an opening and adjusting means **44**, a swing lever **46** which includes a first end **48** attached to the shaft end **26** and a second forwardly projecting end **50** which carries a wrist-attaching strap **51** having a conventional buckle or velcro.

It can be seen by inspection of FIGS. **1** and **2** that the shaft **22** and the arm **28**, in the disclosed configuration, are made from a single piece of metallic bar stock integrally joined at the respective ends **24** and **30**. In addition, it can be seen that the arm **28** includes a contoured portion **52** which is formed to position a lower portion **54** of the arm **28** forward of the torsion shaft **22** in substantially parallel relationship to the leg **34**.

The swing lever **28** is composed essentially of two freely movable, telescoped rod elements **53** and **55**, with the rod element **53** being adjustably secured to the end of shaft **22** by means of a thumb screw **57**. The rod element **53** is provided with a socket that receives the end **26**, the thumb screw **57** being received in a threaded bore in element **53** that opens into such socket to engage end **26**. By tightening the screw **57**, the elements **53** is locked to the shaft **22** such that swinging of the lever **46** imparts corresponding rotation to shaft **22**. Loosening screw **57** permits adjusting the vertical angle of the handle to a desired position, which in the usual situation will be downwardly from horizontal when arm **28** is vertical, tightening the screw **57** securing lever **46** in this position.

Lever **46** is articulated adjacent to shaft end **26** to swing horizontally. This articulation includes forming the rod element **53** in two parts, a clevis **59** and rod **61**, the proximal end of rod **61** being formed flat to be re-

ceived by clevis **59.** An upright pin **63** pivotably connects clevis **59** to the flattened rod end.

In operation, the torso-encircling band **12** is positioned around the waist of the hemiplegic with the torsion shaft **22** in the small of the hemiplegic's back and the opening and adjusting means **14,** which may be a velcrotype fastener, is adjusted to securely position the ambulation device **10** as shown in FIGS. **1–3.** The lower end **32** of the leg-engaging arm **28** is attached to the paralyzed leg **34,** preferably near the ankle, by means of the U-shaped leg-engaging member **38** and the leg-engaging strap **42** which cooperates with and which preferably encircles both the leg **34** and the member **38.** Another strap **63** provided with a buckle or velcro fastener securely wraps around the thigh and arm **28.**

The strap **51** on lever **46** is wrapped around the wrist of the hemiplegic's healthy arm, the lever freely telescoping to proper length.

In using the ambulation device **10,** it is assumed that the hemiplegic uses a cane to assist in ambulation, the cane being grasped in the usual manner by the hand of his useful arm. In taking a step, he normally extends the cane forwardly, his arm and wrist moving forwardly in doing so, and then leans on the cane thereby removing his weight from the leg **34.** As the wrist moves forwardly, the lever **46** extends and swings upwardly, thereby swinging the arm **28** forwardly, carrying the leg **34** with it. In this position, with weight on both the can and paralyzed leg **34,** he takes a step forwardly with his healthy leg to which he then shifts his weight. The cane is then moved forwardly again, thereby repeating the walking action using the paralyzed leg in the process.

By reason of the telescoping and articulated construction of the lever **46,** the hemiplegic can employ the usual movement of his healthy arm as he walks with a cane, this movement thereby being uninhibited and natural yet effective to swing his paralyzed leg forwardly in a walking motion. The adjustment provided by the screw **57** conforms lever **46** to the natural position of this healthy arm.

Two of the ambulation devices may be employed by a paraplegic in assisting him to move his two paralyzed legs in a walking motion. In this case, both arms must, of course, be healthy, as each arm is needed to move the opposite leg. Canes may be manipulated with the two hands in essentially the same manner as described above for the hemiplegic. Thus, wherever the invention is explained hereinabove in connection with hemiplegics, paraplegics are also intended.

For paraplegics, the two ambulation devices preferably will use a common plate **16** and torso-encircling band **12,** the plate **16** supporting the respective bearings **20***a* and **20***b* and the two shafts **22.**

As clearly shown by the preceding explanation, the present device provides an extremely simple and effective means of ambulation for a hemiplegic or paraplegic in which the unparalyzed arm on one side is used to actuate the good leg on the paralyzed side.

While there have been described above the principles of this invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of the invention.

What is claimed is:

1. An ambulation device for hemiplegics and the like which comprises:

a torso-encircling band;

torsion shaft means being mounted on said band for horizontally positioning a torsion shaft across the small of a hemiplegic's back and for torsional rotation of said shaft about the longitudinal axis thereof;

a vertically extending leg-engaging arm extending alongside the paralyzed leg and having the upper end thereof attached to one end of said torsion shaft and the lower end disposed therebelow;

means for attaching said lower end of said arm to the paralyzed leg of said hemiplegic near the ankle; and

a swing lever having a first end thereof secured to the other end of said torsion shaft and a second end extending forwardly therefrom.

2. The ambulation device of claim **1** in which said torsion shaft mounting comprises a plate attached to said band, and a pair of spaced apart bearings carried by said plate and receiving said shaft for rotation.

3. The ambulation device of claim **1** in which said attaching means comprises a U-shaped leg-engaging member having the base portion thereof attached proximal to said lower end of said arm, being horizontally disposed, and opening toward said other end of said torsion shaft.

4. The ambulation device of claim **1** in which said swing lever is freely adjustable in length.

5. The ambulation device of claim **4** in which said swing lever includes two freely telescoping rod elements, one of said rod elements being joined to said torsion shaft by pivot means that permits horizontal swinging movement of said swing lever.

6. The ambulation device of claim **5** in which said pivot means includes a clevis connection disposed adjacent to said shaft, and including strap means on the distal end of said swing lever for attaching said swing lever to the arm of a hemiplegic.

7. The ambulation device of claim **5** including means for adjustably securing said swing lever to said shaft in different angular positions radially of said shaft.

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