

[54] **STRETCHERS**

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[30] **Foreign Application Priority Data**

Mar. 2, 1970 Great Britain..... 9,815/70

- [52] U.S. Cl. .... 5/81 R, 5/86
- [51] Int. Cl. .... B66f 11/00, A61g 7/10
- [58] Field of Search..... 5/60, 81 R, 82, 86

[56] **References Cited**

**UNITED STATES PATENTS**

3,418,670	12/1968	Morgan .....	5/81 B
3,493,979	2/1970	Koll et al.....	5/81 B
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3,593,351	7/1971	Dove .....	5/81 R
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**FOREIGN PATENTS OR APPLICATIONS**

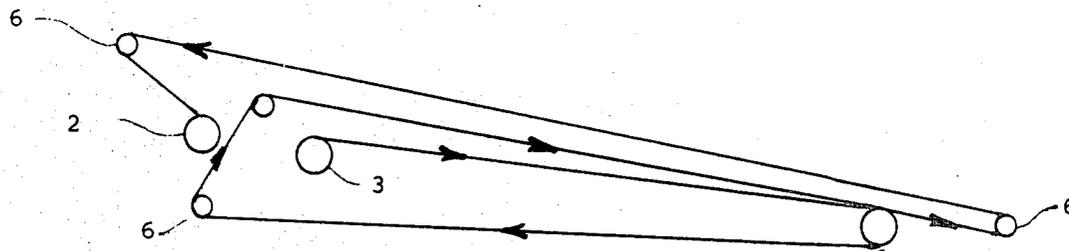
1,102,119 2/1968 Great Britain ..... 5/81 R

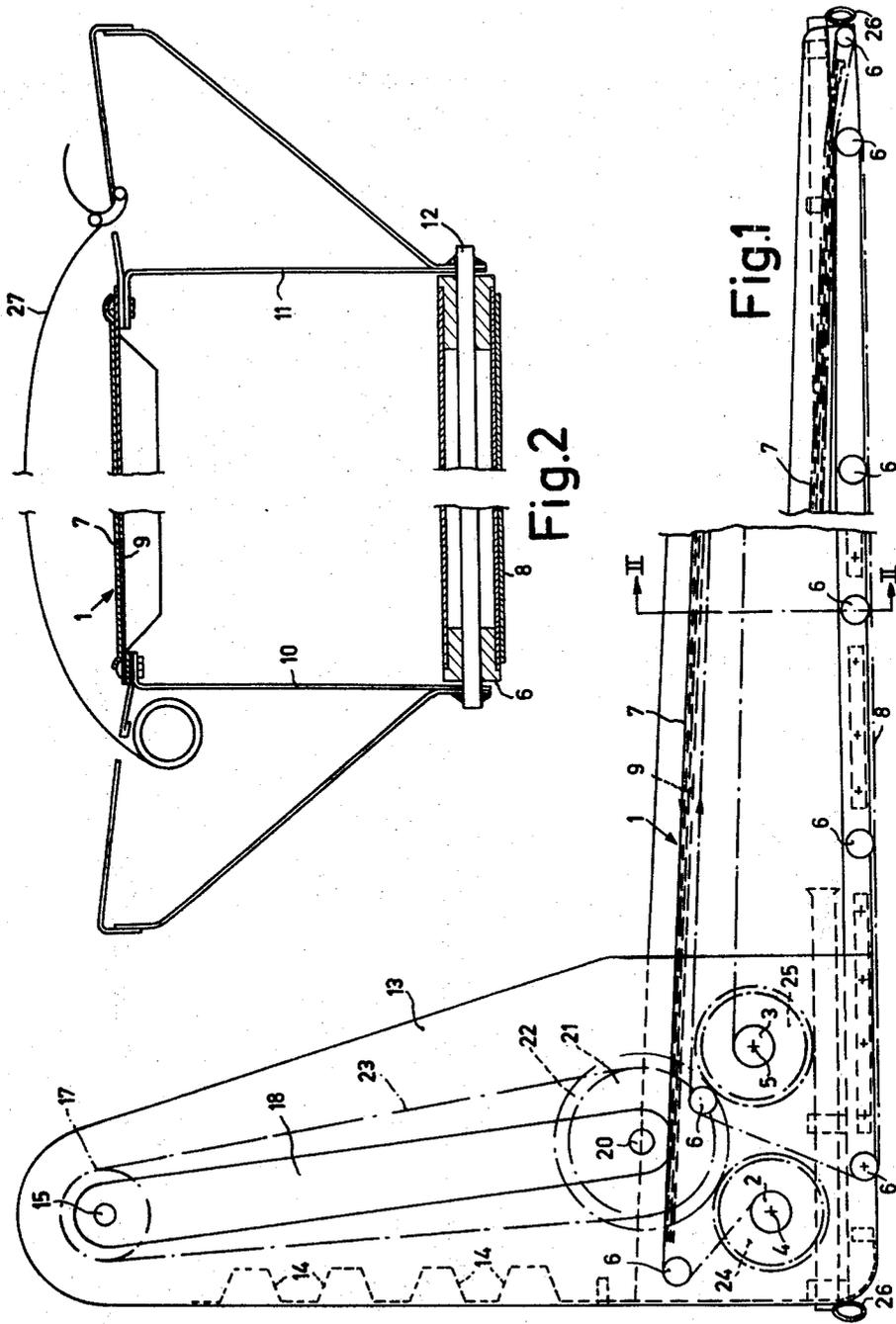
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[57] **ABSTRACT**

A stretcher for supporting injured persons having a movable belt carried between two drums rotatably mounted between a pair of side frames. Guide means are arranged along the upper portion of the frame to guide the movable belt thereover and support a person. Another portion of the belt is guided along the bottom of the frame so that it is in contact with the ground. Manual means are provided for causing rotation of at least one of the drums so as to wind the belt thereabout. When the drum is rotated the belt will travel from one drum to the other being guided over the upper portion and lower portion of the frame in the same direction so that the frame will travel along the ground in the opposite direction.

**7 Claims, 6 Drawing Figures**





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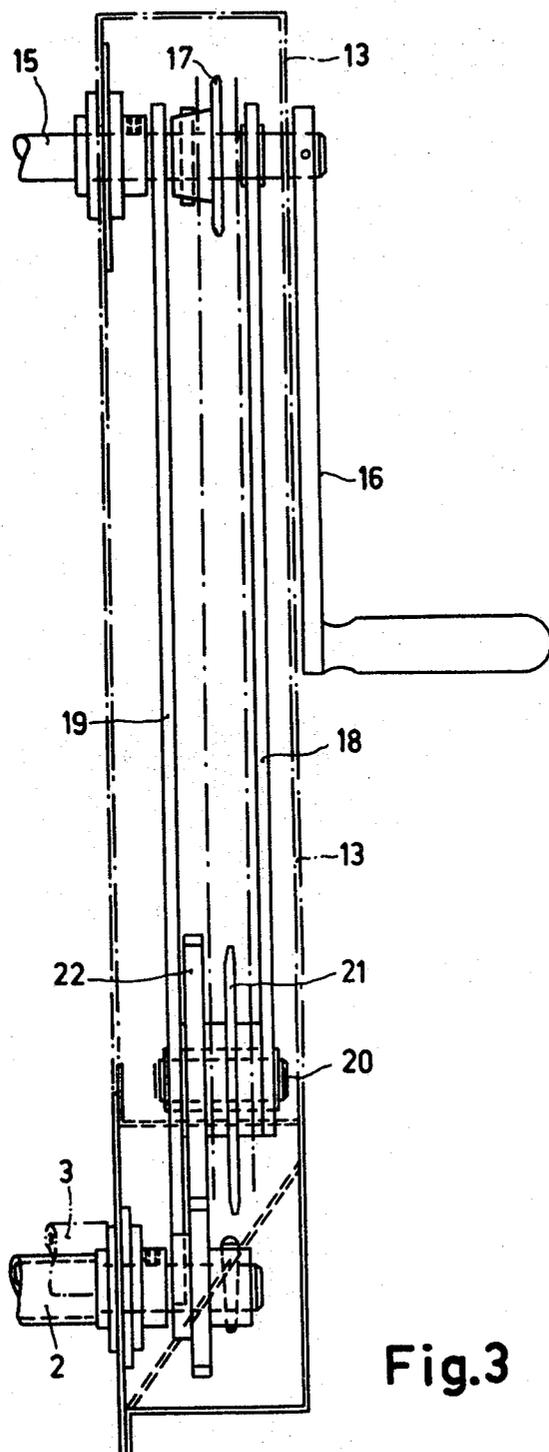


Fig.3

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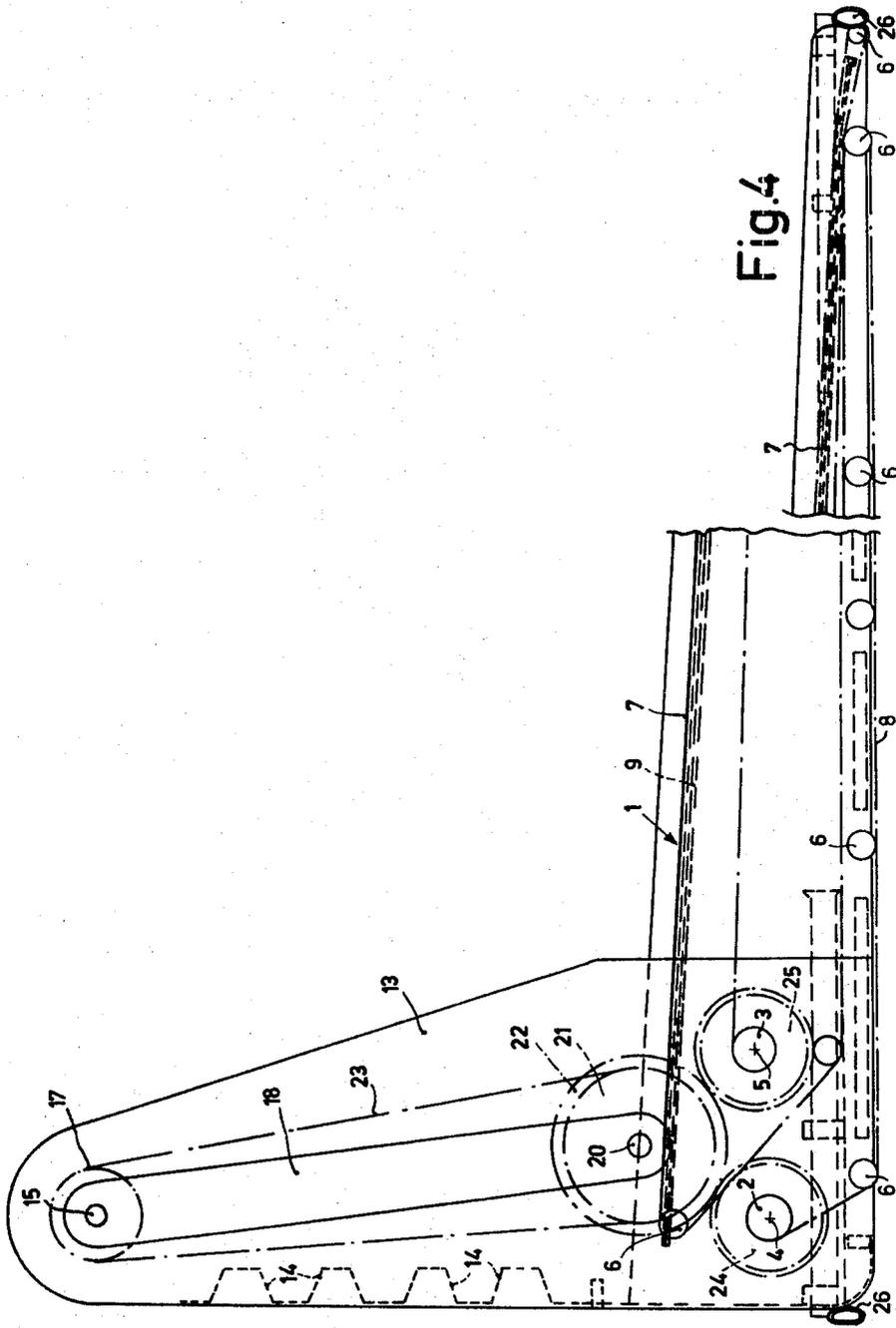


Fig. 4

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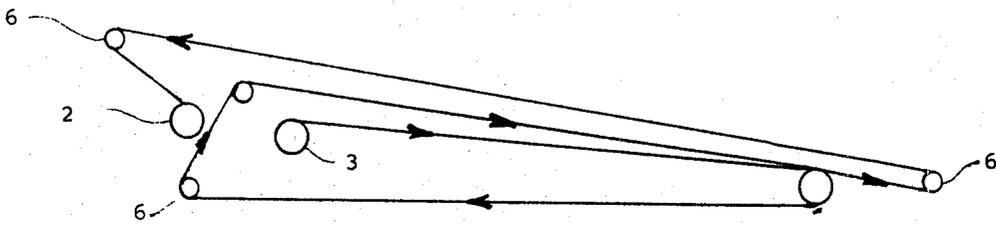


FIG. 5

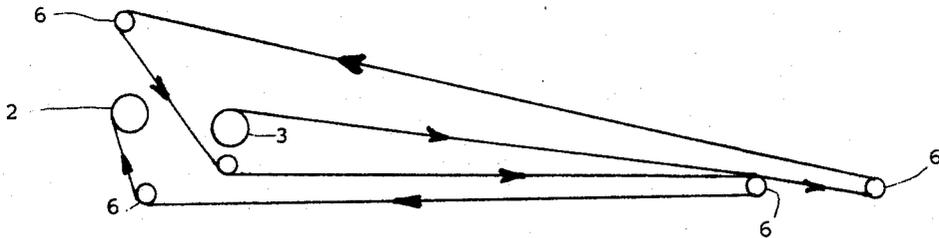


FIG. 6

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**STRETCHERS**

The invention relates to a stretcher comprising a frame having at least two upper guides situated in parallel on the front and rear sides thereof, respectively, for a belt portion movable over said guides for supporting a human body. The frame also has at least two parallel lower guides situated on the front and rear sides, respectively, for a belt portion which is movable over said guides and is capable of contacting the ground. The two belt portions when in operation are movable in the same direction relative to the frame.

A stretcher of the above-described type is known from the U.S. Pat. No. specification 3,418,670. In this stretcher each of the said belt portions forms part of an endless belt which is wound around the upper and lower guides, respectively, and in which the two belts are locally in frictional contact with each other. In addition a driving mechanism is provided for rotating one of the lower or upper guides.

In addition to the rather complicated structure which makes replacement of the endless belts difficult and time-consuming, a drawback of this known structure is the fact that one of the belts is functionally driven by the other belt. This type of drive there is always the possibility of slip occurring which makes it uncertain whether the belts move at the same speed.

It is the object of the invention to provide a stretcher in which the above-mentioned drawbacks are avoided and in which it is ensured that the belt portion supporting the human body has an equal and opposite speed as the frame so that an injured person can be picked up without relative movement between said person and the belt portion supporting him. As a result of this the posture of the injured person need not be changed so that the risk of additional injuries, such as complicating spinal injuries or fractures of other parts of the human body, is minimized.

In order to realize these objectives, the stretcher according to the invention is characterized in that the two belt portions are part of one finite belt which is coupled at one end to a first belt drum and at its other end is coupled to a second belt drum. The belt is guided from the first belt drum over the two upper guides and then over the two lower guides, in such manner that the belt portions located between the two upper and the two lower guides move in the same direction relative to the frame. A driving mechanism is provided for rotating at least one of the belt drums on which the belt is wound.

Since a finite belt is used in the stretcher according to the invention, it can much more easily be mounted and replaced than is the case with endless belts. Since the belt portion which supports the human body and the belt portion which is in contact with the ground now form part of the same belt, the two belt portions upon movement of the belt, will move at exactly the same speed and since the belt extends over the upper and lower guides in the same direction, the said belt portions move in the same direction and hence opposite to the direction in which the frame is moving.

In this manner a stretcher is obtained with which an injured person can be lifted without substantially changing his posture.

In order that the invention may be readily carried into effect, one embodiment thereof will now be described in greater detail, by way of example, with reference to the accompanying drawings, in which:

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FIGS. 1, 2 and 3 are three diagrammatic cross-sectional views of an embodiment of a stretcher according to the invention;

FIG. 4 is a view similar to FIG. 1 showing another embodiment of the invention; and

FIGS. 5 and 6 are schematic representations of the embodiments shown in FIGS. 1 and 4 respectively showing the path of travel of the finite belt.

The stretcher comprises a belt 1 which is coupled at its end to belt drums 2 and 3 comprising shafts 4 and 5. Between the belt drums 2 and 3, the belt 1 is guided over guide rollers 6 in such a manner that a belt portion 7 supporting a human body and a belt portion 8 for contacting the ground is formed. Upon movement of the belt said two belt portions will move in the same direction relative to the frame 11. The belt portion 7 slopes downwardly to the front end, that is to say in the direction of the right-hand end of the stretcher shown in FIG. 1. A backing plate 9 is disposed below the belt portion 7, said plate being secured at its edges to the sheet steel side frames 10 and 11 in which the shafts 12 of the guide rollers 6 are also incorporated. The backing plate 9 prevents sagging of the belt upon being loaded. On the rear side of the stretcher two plates 13 secured to the side frames 10 and 11 constitute a support for the driving mechanism.

A shaft 15 is incorporated in the upper part of the plates 13. The shaft 15 has a handle 16 (FIG. 3). A chain wheel 17 is secured to the shaft 15 while on the said shaft a pair of parallel extending arms 18 and 19 are also rotatably secured. On their lower side, the arms 18 and 19 support a shaft 20 on which a chain wheel 21 and a toothed wheel 22 are fixed. A chain 23 (FIG. 1) connects the chain wheels 17 and 21. The toothed wheel 22 in its mid-position is just in mesh with the two wheels 24 and 25 which are secured to the shafts 4 and 5 of the belt drums 2 and 3.

When the handle 16 is rotated in a direction in which the chain wheel 22 in FIG. 1 rotates counter-clockwise, the toothed wheel 22 fully meshes with toothed wheel 24, the toothed wheel 22 being free from toothed wheel 25 so that the belt drum 3 can rotate freely. As a result of this counter-clockwise rotation of toothed wheel 22, the belt 1 is wound onto belt drum 2 and unwound from belt drum 3. The part 8 of the belt which contacts the ground will move from the right to the left as a result of which the frame of the stretcher will move from the left to the right. The part 7 of the belt which supports the human body moves from the left to the right, as well as the part 8. This means that the part 7 of the belt 1 performs no horizontal movement relative to the ground. So an injured person can automatically be picked up without movement of the belt portion relative to said person occurring and hence without moving the body relative to the ground.

When the handle 16 is operated so that the toothed wheel 22 rotates clockwise, said toothed wheel fully meshes with toothed wheel 25, toothed wheel 24 being free to rotate.

The belt 1 is then wound on belt drum 3 and unwound from drum 2. If desirable, this can be done to move a person off the stretcher. As a result of the movement of the belt portion 8, the stretcher, viewed from the situation shown in FIG. 1, will then move to the left while the belt portion supporting the human body will move to the right. In order to prevent the non-driven drum from starting to rotate in an un-

checked manner, both drums are provided with a braking device.

In this manner a stretcher can be moved under the body of the injured person or be removed from below his body.

The stretcher furthermore comprises lifting handles 26 and transverse traps 27 (FIG. 2) are provided at intervals along the stretcher.

In the stretcher shown in FIG. 1, the driving mechanism with chain and chain wheels is shown by way of example. It will be obvious that other driving mechanisms for the belt drums are possible in which either only that belt drum is driven on which the belt is wound, or in which both drums are driven in opposite directions. In the last-mentioned case it should be ensured that a compensation be present for the variation of the belt drum diameter upon winding and unwinding the belt. As a driving mechanism may be used, for example, a worm which cooperates with worm wheels on the shafts or the belt drums.

In the stretcher shown in FIG. 1, the belt runs from belt drum 2 first over the upper guides from the left to the right and then over the lower guide also from the left to the right.

FIG. 4 diagrammatically shows how the belt 1 can also run from belt drum 2 first to the front guide and then from the right to the left over the upper guide as a belt portion supporting a human body to the rear side of the stretcher. The belt then runs between the belt drums 2 and 3 again to the front of the stretcher to run again as belt portion 8 from the right to the left over the guides 6 to belt drum 3. In this construction the driving etc. is not shown but this may be constructed in various manners. What matters, however, is that upon moving the belt — and this applies both to the construction shown in FIG. 1 and to the construction shown in FIG. 4 — the belt portions 7 and 8 move in the same direction and opposite to the movement of the frame.

I claim:

1. A stretcher comprising a frame having at least two parallel upper guides located on the front and rear sides thereof, respectively, a first belt portion movably carried over said guides for supporting thereon a human body, at least two parallel lower guides carried by said frame and located on the front and rear sides, respectively, a second belt portion movably carried over said lower guides and arranged for contacting the ground, said first and second belt portions moving in the same direction relative to the frame when in operation, said first and second belt portions forming part of the finite belt coupled at one end thereof to a first belt drum and at its other end to a second belt drum, said finite belt being guided from the first belt drum over the two upper guides and then over the two lower guides so that said first and second belt portions between the two upper and the two lower guides move in the same direction relative to the frame, and a driving mechanism carried on said frame for rotating at least that belt drum onto which the belt is wound.

2. The stretcher as claimed in claim 1, further comprising supporting the belt portion between said two upper guides.

3. A stretcher for supporting thereon injured persons comprised a pair of side frames, first and second belt drums rotatably mounted between said frames, a finite belt extending between and carried by said drums, upper guide means mounted between said side frames

for guiding a portion of said belt movably along the upper part of said frame so as to expose said portion of said belt for support of a human body, lower guide means mounted between said side frames for guiding a portion of said belt along the lower part of said frame so as to expose said portion thereof for contact with the ground, intermediate guide means mounted between said side frames for guiding said belt between said upper and lower guide means, and means for causing rotation of at least one of said belt drums for winding said belt thereabout, whereby said belt is guided from said first belt drum over said upper guide means and then via said intermediate guide means over said lower guide means and onto said second belt drum so that when said belt drum is caused to rotate said belt portion guided over said upper guide means for support of a human body and said belt portion guided over said lower guide means for contact with the ground will be moved in the same direction relative to the frame, said frame thereby being caused to move along the ground in the opposite direction.

4. The stretcher according to claim 3 wherein said upper guide means comprises at least two guide rollers arranged in parallel relationship to each other, one of said rollers being located at the forward end of said frame and the other being located at the rear end of said frame, and wherein said lower guide means comprises at least a pair of rollers being parallel to each other and located at the forward and rear ends respectively of said frame.

5. The stretcher according to claim 4 further comprising a backing plate secured between said side frames below the portion of said belt being guided over said upper guide means for supporting a human body carried by said belt portion.

6. The stretcher according to claim 5 wherein the guide roller of said upper guide means located at the forward end of said frame being in a lower position relative to the ground than the upper guide roller at the rear end so that the belt portion travelling over said upper guide means slopes downward in the direction of forward travel of the stretcher for automatically lifting patients off the ground as the stretcher travels forward.

7. A stretcher for automatically lifting patients comprising a frame, a pair of rotatably mounted drums carried by said frame, a belt of finite length having each of its ends attached to one of said drums so as to be carried therebetween, a pair of upper guide rollers located in parallel relationship on the forward and rear ends of said frame for guiding a portion of said belt over said rollers so as to make said portion available for supporting a person, said upper guide roller at the front end of said frame being in a lower position relative to the ground than the upper guide roller at the rear end of said frame so that said belt portion travelling over said upper guide rollers extends in a forward sloping downward direction, a plurality of lower guide rollers located along the lower portion of said frame for guiding thereabout a portion of said belt which is movable over said rollers and arranged for contact with the ground so that as said belt moves over said lower rollers said frame will be propelled along the ground in an opposite direction to the direction in which said belt is travelling over said rollers, guide means for guiding said belt between said upper and lower guide rollers so that when said belt is caused to move over the rollers, said belt portion which is guided over said upper rollers for sup-

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porting a person and said belt portion which is guided over said lower rollers for contact with the ground will be moving in the same direction relative to the frame, a first sprocket wheel rotatably mounted in said frame, a second sprocket wheel in fixed cooperation with one of said belt drums, a third sprocket wheel in fixed cooperation with the other of said belt drums, means for causing said first sprocket wheel to be in operative engagement with either said second or third sprocket wheels, and means for causing rotation of said first sprocket wheel so that said sprocket wheel is rotated, the sprocket wheel in engagement therewith will also

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cause rotation of the belt drum with which it is in cooperative fixed engagement thereby causing said belt to be wound about said belt drum and moved over said guide rollers in such a manner that the portion of the belt for supporting the person and the portion of the belt in contact with the ground will be moved in the same direction and said frame will be moved in the opposite direction so that when said stretcher is in such movement and comes in contact with a person on the ground, it will automatically lift the person onto the portion of the belt carried by said upper guide rollers.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3760435 Dated September 25, 1973

Inventor(s) Robert William Jardine

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 25, "This type of drive" should read  
--In this type of drive--

Column 3, line 61, "comprising supporting" should be  
--comprising a backing plate which  
extends between the two upper  
guides for supporting--

Signed and sealed this 23rd day of April 1974.

(SEAL)  
Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

C. MARSHALL DANN  
Commissioner of Patents