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B7B BTW BTX2 B367
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(56) Documents Cited
GB 2127287 A GB 1506584 A GB 1367233 A
GB 1342397 A US 5944291 A US 5046748 A

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(54) Abstract Title
Overload warning and/or movement prevention of a load carrying device

(57) Movement of an overloaded manually operable load carrying device such as a wheelbarrow or trolley is prevented by contact of a brake 38 on a wheel 32 resulting from compression of a spring 37 by the load. If the wheel of the device is subjected to a sudden upward motion such as hitting an obstruction, braking is prevented by a pin (39, fig 3) moving backwardly and upwardly into a recess 35. A load indicator may be provided with a sprung visual indicator (fig 4); an electric load transducer measuring strain in a tubular frame portion with a visual or acoustic warning such as a lamp or buzzer (fig 5); or in a handle unit 80 with sprung contacts 92, 94.

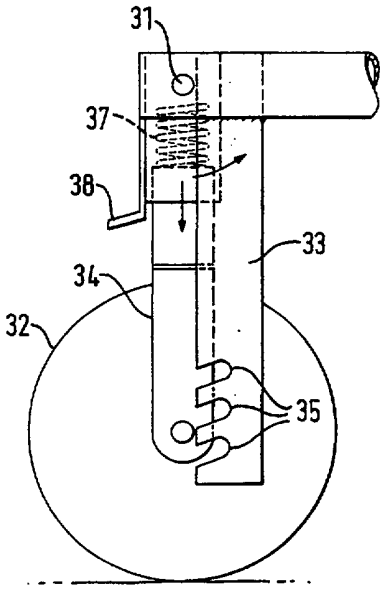

FIG. 3

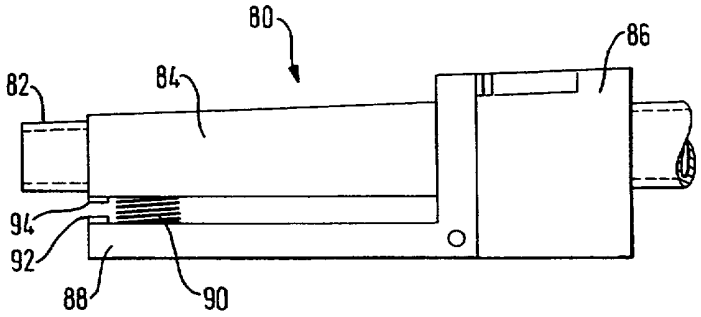

FIG. 6

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

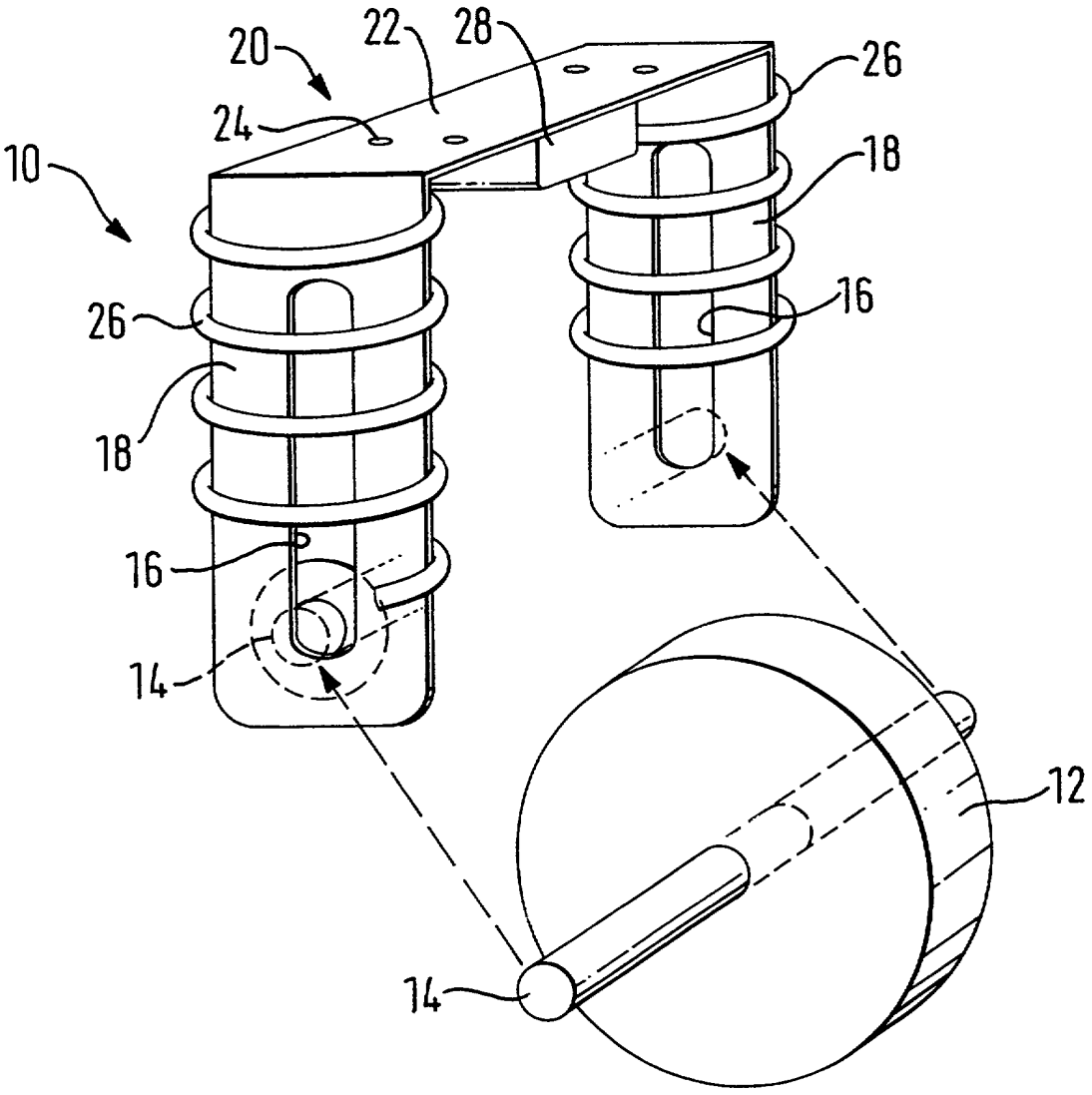

FIG. 1

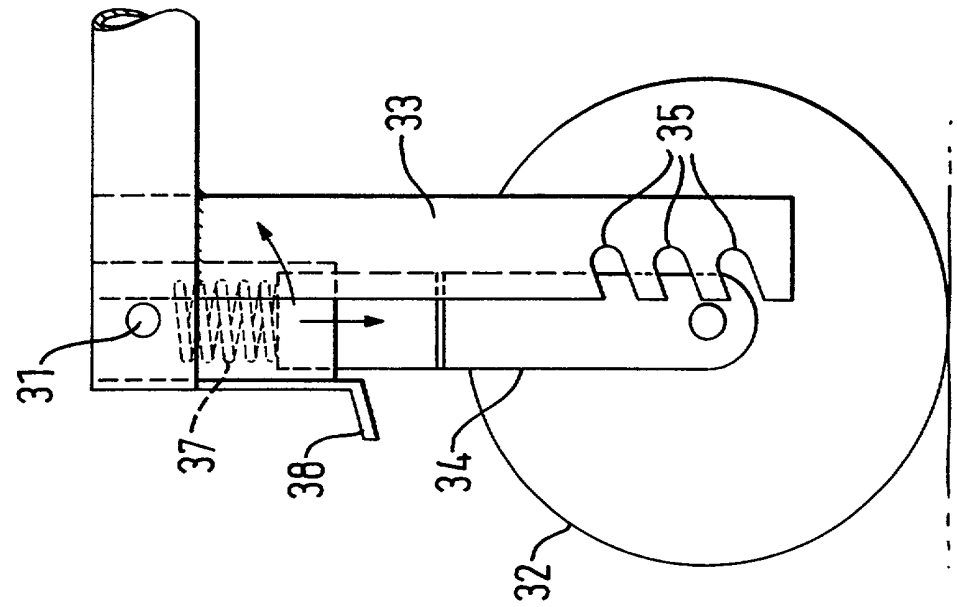

FIG. 3

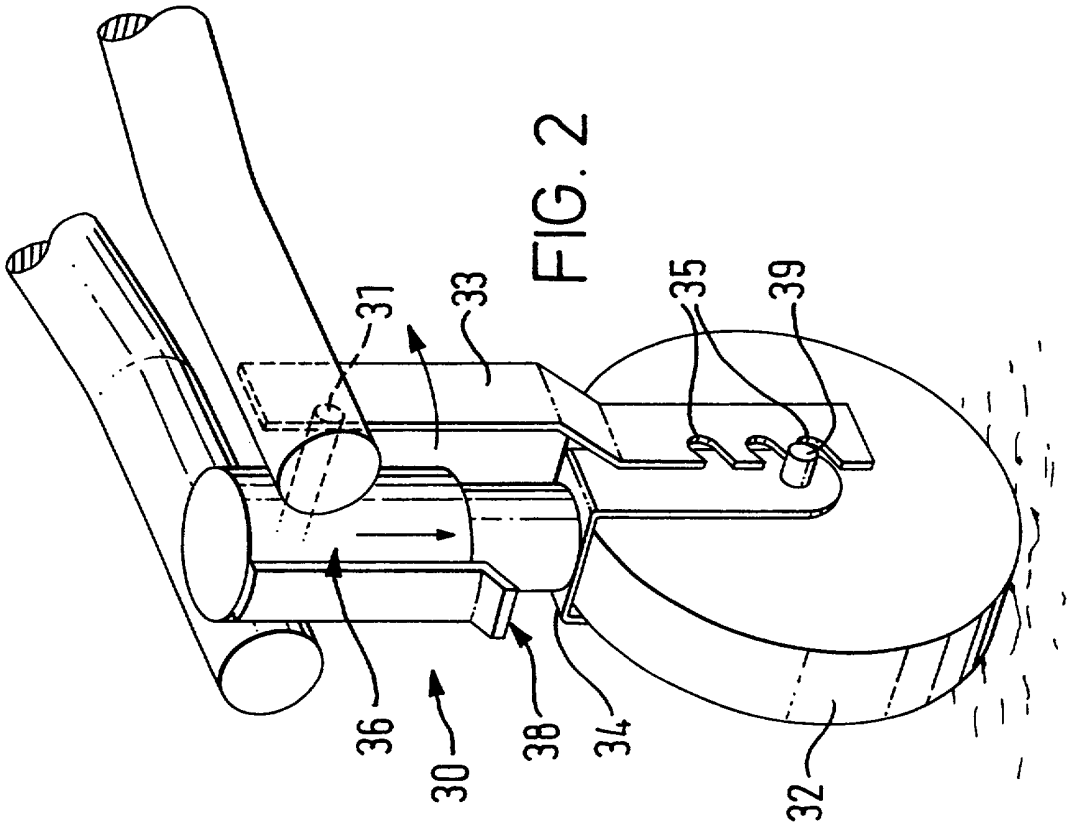

FIG. 2

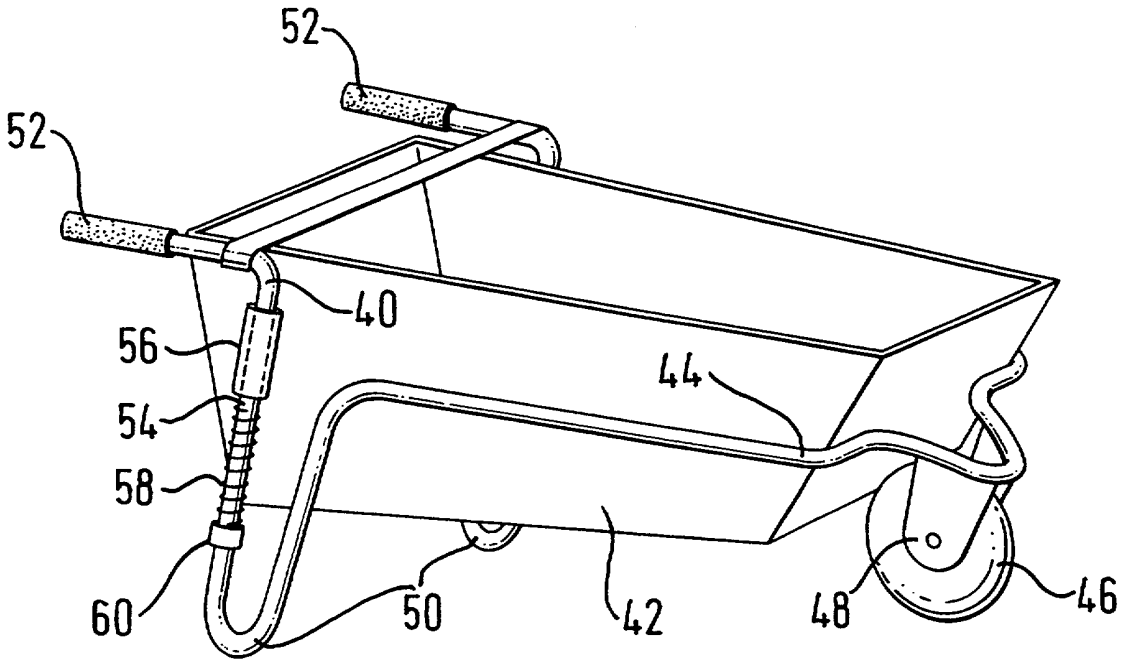

FIG. 4

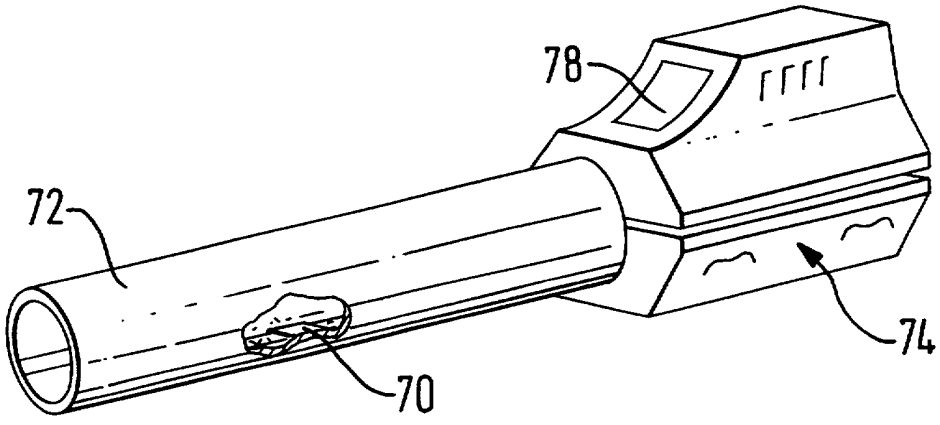

FIG. 5

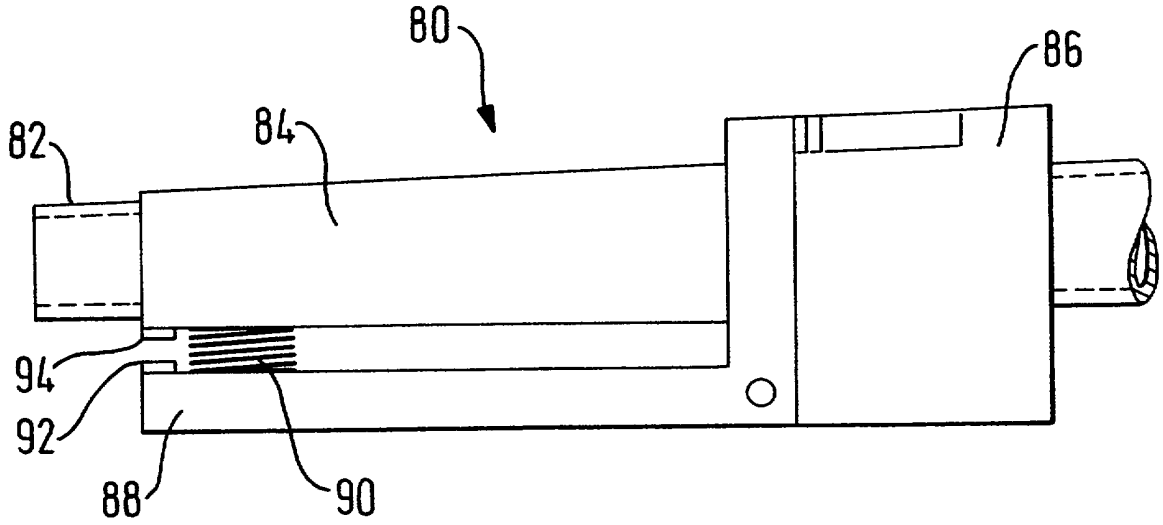

FIG. 6

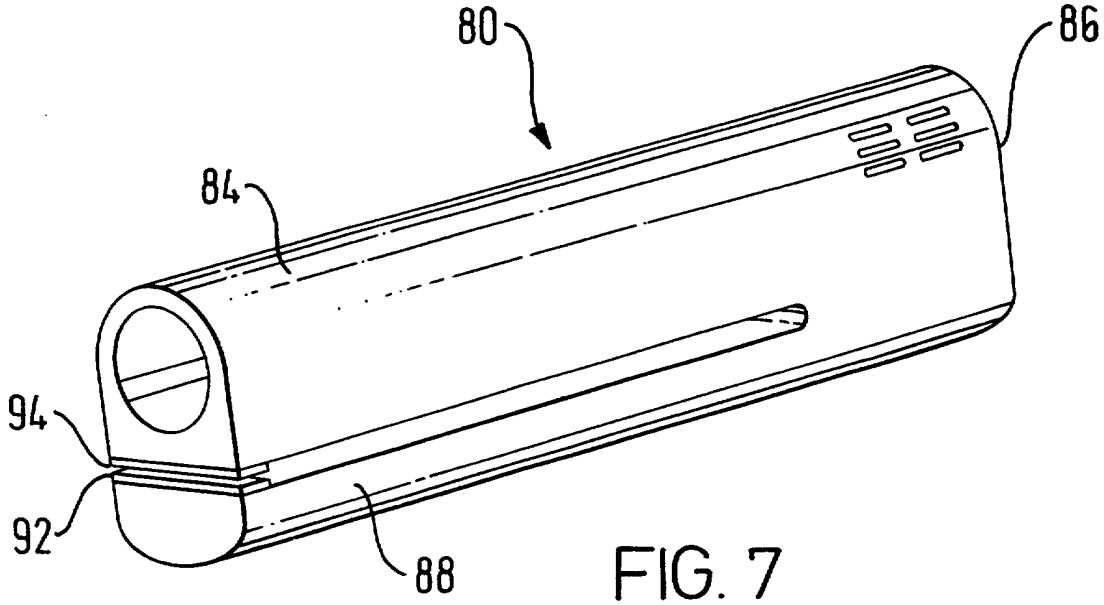

FIG. 7

OVERLOAD DEVICE

The present invention relates to a device for preventing and/or warning of overloading of trolleys, wheelbarrows and other load carrying devices.

It is well known for operatives to try to overload load-carrying devices to speed up their work. It is also well known, however, that such practices can lead to potential damage to the equipment and potential injury to the operatives. Reducing the load carrying volume or surfaces does not provide a reliable solution to these problems.

The present invention seeks to provide a system for preventing and/or warning of overloading of load carrying devices.

According to an aspect of the present invention, there is provided a manually operable load-carrying device including means for preventing movement of the device when a predetermined load is exceeded.

In the preferred embodiment, the device is provided with one or more wheels and the movement preventing means operates to brake the or at least one of the wheels. In practice, this may be accomplished by providing a brake on the device and a deformable spacer between the brake and a wheel, the spacer being deformable progressively with increasing load. Engagement of the brake with the wheel occurs at a predetermined load, chosen to be, for example, a maximum safe carrying load for a person or for the device itself. The spacer is preferably a spring, such as a coil spring or leaf spring.

The device can be, for example, a wheelbarrow, trolley, stretcher, cage or any other load-carrying device. In practice, the user of the device is prevented from using the device, which typically involves at least a degree of carrying or pushing or pulling effort, when the device is overloaded.

In the preferred embodiment, the movement preventing means is provided with position locking means operable to lock the wheel in a non-braked position when the wheel is

subjected to a sudden upward motion during travel, such as on hitting a stone or other ground surface protuberance.

Advantageously, the device includes a load indicator as specified below.

According to another aspect of the present invention, there is provided a manually operable load-carrying device including means for indicating the load placed on the device.

The device is preferably a wheelbarrow or trolley or other load-carrying device.

The load indicating means may be provided with a suspension element of the device. Alternatively or additionally, the load indicating means is provided at a handle of the device used for lifting or moving the device. In the preferred embodiment, the load indicating means is incorporated into or integral with the handle.

There may be provided means to prevent movement of the device when a predetermined load is exceeded and/or an overload warning device.

Various embodiments of the present invention are described below, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is an exploded view of an embodiment of wheel portion of a wheelbarrow incorporating a movement prevention device;

Figures 2 and 3 are views of a portion of a wheelbarrow incorporating another embodiment of movement prevention device;

Figure 4 is a perspective view of a wheelbarrow incorporating an embodiment of load indicating device;

Figure 5 is a view of another embodiment of load indicating device; and

Figures 6 and 7 are views of yet another embodiment of load indicating device.

Referring to Figure 1, there is shown a simple embodiment of movement prevention device. This embodiment is designed for use in a single wheeled wheelbarrow but could be used in any wheeled device.

The device 10 incorporates a wheel 12, which can be of conventional form, fixed to an axle 14 which extends either side of the wheel 12. The ends of the axle 14 are fitted within elongate slots 16 in depending flanges 18 of a carrier 20. The carrier 20 includes a top wall 22 which is secured to the bottom of a wheelbarrow bucket by any suitable means, for example by rivets, screws or bolts passing through apertures 24 in the top wall 22.

Located around each depending flange 18 of the carrier 20 there is provided a coil spring 26, while depending from the top wall 22 there is a brake block 28.

The coil springs 26 and brake block 28 are chosen such that the rim of the wheel 12 contacts the brake block 28 so as to be braked thereby when a load on the wheel barrow exceeds a chosen maximum load. The selection of spring rates and size of the brake block 28 can be made readily by the skilled person.

In use, the coil springs 26 will urge the ends of the spindle 14 towards the lower extremities of the slots 16 to keep the rim of the wheel 12 spaced from the brake block 28. Upon loading of the wheelbarrow, the coil springs will compress progressively, bringing the rim of the wheel 12 closer to the brake block 28. As long as there is a space between the brake block 28 and rim of the wheel 12, the wheelbarrow can be used. However, on exceeding the chosen threshold load, the rim of the wheel 12 will contact and be braked by the brake block 28. Thus, the wheelbarrow cannot be moved if

overloaded and, as long as the predetermined maximum load is chosen correctly, injury to the user can be prevented.

Referring now to Figures 2 and 3, there is shown another embodiment of overload prevention device 30 fitted to the front forks of a wheelbarrow (not shown). The device 30 includes a wheel 32 carried on a fork 34 which is attached to a piston and cylinder assembly 36 within which cylinder there is located a coil spring 37. The coil spring 37 acts to bias the fork and hence the wheel 32 in a downwards direction but is compressed progressively upon placement of an increasing load in the wheelbarrow. Attached to the outside of the cylinder 36 is a brake 38. As the load in the wheelbarrow increases, the coil spring 37 is progressively compressed thus moving the brake 38 closer to the wheel 32, until the brake abuts and brakes the wheel, in a manner similar to the embodiment of Figure 1.

Also included in this embodiment is a mechanism to prevent unwanted application of the brake during use when the wheelbarrow is not overloaded, for example when the wheel 32 hits an obstruction such as a stone or step in the ground surface. As can be seen in Figures 2 and 3, the cylinder 36 is linked to the front forks of the wheelbarrow by a pivot 31. Depending from one of the front forks is a fixed bar 33 which is provided with, in this example, three upwardly extending recesses 35. The spindle 39 linking the wheel 32 to the forks 34 extends beyond the associated fork 34 and bar 35, as is clearly seen in Figure 2.

During normal operation, the wheel 32 does not contact the bar 33 and is free to move upwardly and downwardly with the piston. In practice, the piston and cylinder arrangement 36 is biased in a non-engaging position with the bar 33, for example by a spring or the like (not shown). However, when the wheel 32 hits an obstruction, such as a stone or step, it will naturally be pushed backwardly and upwardly. Instead of the wheel 32 hitting the brake 38, the pin 39 is pushed by the movement of the wheel 32 to the bar 33 and eventually into one of the recesses 35, where further upward movement of the wheel 32 is prevented. This allows continued movement of the wheelbarrow and

prevents a sudden and potentially dangerous braking of the wheel 32. Once the obstruction has passed, the wheel moves out of the recess 35 due to the downward bias of the coil spring 37 back to its normal operating position.

It will be apparent that the embodiment of Figure 1 could be modified to provide an equivalent feature. In this case, the recesses 35 could usefully be located in the side members 18.

Referring now to Figure 4, there is shown an embodiment of wheelbarrow which includes a load indicator 40. The wheelbarrow in this Figure does not include a movement prevention device when the wheelbarrow is overloaded, such as the devices shown in Figures 1 or 2 and 3, but this can be incorporated if desired.

The wheelbarrow in Figure 4 includes a bucket member 42 and a frame member 44. The frame member 44 includes, at a front end thereof, a wheel 46 carried by a wheel support 48. At a rear end of the frame 44 there are provided two supports or feet portions 50 and two handles 52. As will be apparent, the frame 44 can be formed from a bent piece of rod or tubing.

The handles 52 are coupled to the feet members 50 by upright portions 54 (of which only one is visible in Figure 4) which are reciprocably located within respective tubular coupling members 56 fixed to the wheelbarrow bucket 42. Two compression springs 58 (of which only one is visible in Figure 4) are held at their lower ends by a stop 60 and their upper ends contact the tubular member 56.

The upright portions 54 are provided with gradient markings indicating load. These may be specific markings indicating the actual load or simple markings to indicate safe and unsafe loads, such as green for safe and red for unsafe. A red marking would be located on the upright 54 lower than a safe marking, as will be evident to the skilled reader.

On loading of the bucket 42, the springs 58 are progressively compressed by the tubular members 56. Once compressed by a load in excess of the threshold, the red or other overload marking becomes evident above the tubular member 56.

Referring now to Figure 5, there is shown another embodiment of load indicating system. In this embodiment, the system is fitted to the handles of a load-carrying device, which may be a wheelbarrow, a trolley or the like. It will be apparent that the system could be located anywhere on the device which can measure the load imposed on the device. It is preferred that the device be used with an overload prevention device of the type of Figures 1 or 2 and 3.

In the embodiment of Figure 5, a transducer 70 is located within the tubular portion of the handle 72 and is coupled to an electronic circuit (not shown) within the indicator housing 74. The indicator housing 74 is formed in two parts which are clamped around the handle 72 and includes a power unit, such as a battery, and a warning device, which may be an acoustical device, a visual device or a combination of the two. The circuitry compares the signal from the transducer 70 with data indicative of load and activates the warning unit 76 as soon as it has detected that the measured load exceeds a predetermined load. The device could be adjustable so as to adjust the threshold at which the warning is given and may also include, for example, a reset switch 78.

In use, when it is desired to move the load-carrying device, the user will grasp the handles 72 to lift a holding portion of the load-carrying device. This lifting action will cause strain on the handles 72. The greater the load on the load carrying device, the greater will be the strain on the handles 72 and thereby greater will be the load sensed by the transducer 70.

The embodiment of Figure 5 could be provided in a single handle of the load carrying device or in both handles to measure relative loads on either side of the device. Moreover, for load carrying devices which do not need any lifting, for example a wheeled trolley, the indicating device could be located and set to measure rolling

resistance, that is the strain caused on a handle which is pulled or pushed rather than lifted. Of course, such a strain may involve a different threshold load from that for a lifting-type device.

Figures 6 and 7 show another embodiment of indicator similar to the embodiment of Figure 5. In the embodiment of Figures 6 and 7, there is provided a handle unit 80 which is fitted around a tubular member 82 of a load carrying device, which may be a wheelbarrow a trolley or other similar device. The unit 80 includes a sleeve 84 which is secured to the tubular member 82 of the load-carrying device. The unit 80 also includes a housing 86 and cantilever 88 extending from the housing 86 in the same direction as the sleeve 84. Figures 6 and 7 show two versions of cantilever 88, one version which is pivoted to the housing 86, the second version which is flexible and can be flexed to the sleeve 84.

In the pivotable version, there is provided a coil spring 90 between the sleeve 84 and the cantilever 88, which spring 90 is calibrated to compress by controlled amounts upon application of a load. At the free end of the cantilever 88 there is provided an electrical contact 92, opposite an electrical contact 94 provided on the sleeve 84.

In the case of the flexible cantilever 88, no calibrated spring 90 is provided but the cantilever 88 is designed so as to flex in an analogous manner to the compression of the spring 90.

Each electrical contact 92, 94 is provided with an electrical wire (not shown) coupling the contact 92, 94 to circuitry within the housing 86. The circuitry includes a warning unit, such as a buzzer or lamp, which is activated upon contact of the two contacts 92, 94.

In use, the handle unit 80 is used to lift a part of a load carrying device for movement thereof and such lifting action will cause compression of the spring 90 or flexion of the flexible cantilever 88 in dependence upon the load on the load carrying device. If the

load exceeds the predetermined threshold, the contacts 92 and 94 are caused to abut one another to create the electrical contact which activates the waning unit, that is a buzzer and/or lamp.

An alternative version for use with a load-carrying device which is pushed or pulled rather than lifted will be immediately apparent to the skilled person from the teachings herein.

The load carrying devices described can be used with a movement prevention device of the type described with reference to Figures 1 or 2 and 3.

Although the above-mentioned embodiments have been described in relation to wheelbarrows and trolleys, it can be used with other load moving/carrying devices, such as cages used in warehouses, harnesses or stretchers used in medical applications and the like.

It will be apparent that the warning unit could take any suitable form, such as an audible warning a visual warning, a vibratory warning or even a mechanical warning such as the deployment of a flag or the like.

CLAIMS

1. A manually operable load-carrying device including means for preventing movement of the device when a predetermined load on the device is exceeded.

2. A device according to claim 1, wherein the device is provided with one or more wheels and the movement preventing means operates to brake the or at least one of the wheels.

3. A device according to claim 2, wherein there is provided a brake on the device and a deformable spacer between the brake and a wheel, the spacer being deformable progressively with increasing load.

4. A device according to claim 3, wherein the spacer is a spring.

5. A device according to any preceding claim, wherein the movement preventing means is provided with position locking means operable to lock the wheel in a non-braked position when the wheel is subjected to a sudden upward motion during travel.

6. A device according to any preceding claim, including a load indicator.

7. A manually operable load-carrying device including means for indicating the load placed on the device.

8. A device according to claim 7, wherein the load indicating means is provided with a suspension element of the device.

9. A device according to claim 7 or 8, wherein the load indicating means is provided at a handle of the device used for lifting or moving the device.

10. A device according to claim 9, wherein In the load indicating means is incorporated into or integral with the handle.

11. A device according to any one of claims 7 to 10, including means to prevent movement of the device when a predetermined load is exceeded and/or an overload warning device.

12. An overload movement prevention device substantially as hereinbefore described with reference to and as illustrated in Figure 1 or Figures 2 and 3 of the accompanying drawings.

13. An load indicating device substantially as hereinbefore described with reference to and as illustrated in any one of Figures 4 to 7 of the accompanying drawings.

14. A manually operable load-carrying device substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

Application No: GB 0109442.4 **Examiner:** Terence Newhouse
Claims searched: 1-6 **Date of search:** 31 July 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): F2E(ES)

Int Cl (Ed.7): B62B 5/04

Other: ONLINE: EPODOC, JAPIO, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2127287 A	(NANSHIN RUBBER), see particularly page 2 lines 51-66	1 at least
X	GB 1506584 A	(BRITISH CASTORS), see particularly page 2 lines 4-19	1 at least
X	GB 1367233 A	(TYSZKIEWICZ), see particularly page 2 lines 105-116	1 at least
X	GB 1342397 A	(DROVE), see particularly page 2 lines 32-43 and lines 75-82	1 at least
X	US 5944291	(KOKUYO), see, for example, embodiment of figs 2 and 3	1 at least
X	US 5046748	(OAT-JUDGE), see column 3 lines 26-38	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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