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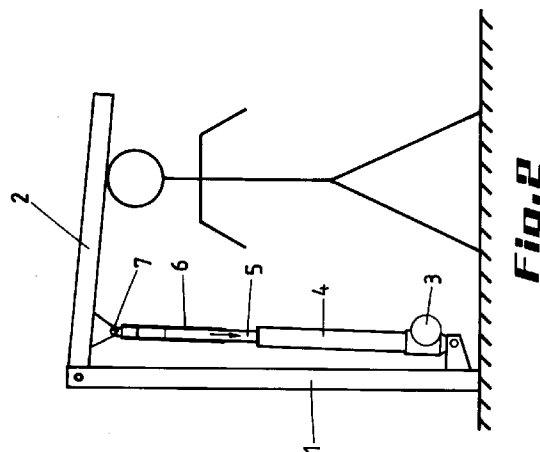
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(54) **Safety device for an apparatus provided for lifting and lowering loads.**

(57) The invention relates to a safety device for an apparatus provided for lifting and lowering loads and comprising at least one column (1,10), an arm (2,11) attached to this column and means for moving said arm up and downwards, characterized in that said means act upon a rod (5) which slides telescopically in a hollow tube (6) or upon a hollow rod (8) which slides around a loose rod (9) in order to lift said arm (2, 11) and to lower it so that when said arm (2, 11) is held back, the rod (5) and the hollow tube (6), and the hollow rod (8) and the loose rod (9), can slide with respect to one another.



The present invention relates to a safety device for an apparatus provided for lifting and lowering loads and comprising at least one column, an arm attached to this column and pneumatic, hydraulic or motor means for moving said arm up and downwards.

Such devices are known. A field wherein they are regularly used is the field of lifting and lowering patients. The invention is however not limited to this field. For example, lifting and putting down loads of whatever kind and in general exerting a push or pull force on a mechanical component fall also within the scope of this patent application.

In apparatus or devices of the most common type for lifting and lowering patients, the arm is hingedly connected to the hereabove mentioned column. Lifting and moving the arm downwards is realized, in many cases, by a motor although hydraulic or pneumatic drives may also be used.

The arm is moved upwards and downwards by a rod which is itself partially shaped as a spindle rod. When use is made of an electromotor with reducer, it is not excluded that the motor does not react correctly to one command or another. In particular, there is especially an important risk that when the arm is moving downwards and when the motor which actuates this arm is not stopped in time (as a consequence of a human mistake or of a technical malfunction), the arm will continue to move downwards which may cause serious injuries to the patient.

It is clear that when this problem is posed in the device for hoisting and/or putting down goods, these goods can be heavily damaged when the arm is not stopped in time during its downward motion or cannot be stopped at all.

An object of the present invention is now to provide a safety device which solves this problem and which offers a large safety in those cases wherein a drive motor or any other drive means of such an arm does not react in time to a received command or when the command is simply not given so that the arm continues to move downwards with a large force.

The intention is therefore to provide a device of the hereabove described type which can be stopped when the arm of the apparatus meets an obstacle during its downward movement.

In order to enable this according to the invention, said means act upon a rod which slides telescopically in a hollow tube or upon a hollow rod which slides around a loose rod in order to lift said arm and to lower it in such a manner that when said arm is held back either directly or indirectly by an obstacle, the rod and the hollow tube, on the one hand, and the hollow rod and the loose rod, on the other hand, can slide with respect to one another so as to prevent a further downward movement of the arm when said arm is held back for example by an operator.

Other details and advantages of the invention will become apparent from the following description of a

safety device for an apparatus provided for lifting and lowering loads according to the invention. This description is only given by way of example and does not limit the invention. The reference numerals relate to the annexed figures.

Figure 1 is a side elevational view which is kept schematically, of an apparatus for lifting and lowering loads according to the invention.

Figure 2 is a view analogous to figure 1 wherein the arm of the apparatus meets an obstacle.

Figure 3 shows, on a larger scale, the relative position of a tube with respect to a rod which can be moved up and downwards (position without obstacle).

Figure 4 shows, on a larger scale, the relative position of a tube with respect to a rod which can be moved up and downwards (position with an obstacle).

Figure 5 shows, on a larger scale, the relative position of a rod with respect to a hollow tube which can be moved up and downwards (position without an obstacle).

Figure 6 shows, on a larger scale, the relative position of a rod with respect to a hollow tube which can be moved up and downwards (position with an obstacle).

Figure 7 is, on another scale, a front elevational view which is kept schematically of a variant embodiment of the apparatus according to the invention.

The safety device shown in these different figures belongs to an apparatus for lifting and putting down loads.

As in the example set forth in the preamble, there will be discussed here especially the case of an apparatus destined for lifting and putting down patients. Such an apparatus consists amongst others of a column 1 with a hinged arm 2. This arm is lifted according to the principle of a lever of the third order. Lifting the arm 2 is realized by making use of an electric motor 3 which drives in the cylinder 4 a jack rod or spindle which exerts the necessary pressure onto the rod 5 to lift the arm 2.

According to the invention, this can now be embodied in one of the two following ways.

a) First embodiment

According to the first embodiment (figures 1, 2, 3, 4 and 7) the rod 5 is pushed out of the cylinder 4 and slides into a hollow tube 6 which cooperates telescopically with this rod. At the top, the tube 6 is hingedly connected in 7 to the arm 2.

Upon lifting the arm 2, the uppermost extremity of the rod 5 pushes therefore against the bottom 6' of the hollow tube 6. During the downward movement of the arm 2, it pushes due to its own weight onto the hollow tube 6 which, in its turn, rests with its bottom 6' upon the rod 5. In case the arm 6 meets now an obstacle and in case the electric motor 3 cannot be stop-

ped, the operator can still hold back the arm which however does not prevent the rod 5 from being displaced further downwards and from continuing to move separately from the hollow tube 6, as shown anyway in figure 4, when the electric motor 3 continues to rotate

When mention is made of an obstacle, reference is made either to the patient himself or to the bed or the chair of this patient, but this may also be a furniture component and in the case wherein the motor cannot be stopped, the operator may simply stretch out his arm and hold back the hinged arm 2 of the apparatus. A forced further downward movement of the arm 2 has in no way to be feared. In figure 2 the obstacle is formed by the patient himself but this is of course a very schematic and simplified representation of the facts. In many cases the patient lies into a carrier frame and this carrier frame is then intended to be put onto his bed so that a further downward movement of the arm 2 may cause very serious injuries.

b) Second embodiment

The principle according to which the second embodiment has been invented is very related to the first one. According to the second embodiment, the rod 5 is replaced by a hollow rod 8 (figures 5 and 6), while the hollow tube 6 from the embodiment according to figures 1 to 4 is replaced by a loose rod 9 having a cylindrically shaped abutment 9', the uppermost portion of the hollow rod 8 can push against during the upward movement of the arm 2.

In case the arm 2 meets now an obstacle as it has just been explained, the hollow rod will simply continue to move downwards with respect to the loose rod 9. In this case also, the operator of the device which observes a malfunction in the control of the electric motor, can simply hold back the arm 2. A forced drive and therefore a continued downward displacement of the loose rod 9 is therefore not to be feared.

In figure 7 there is shown a variant wherein two columns 10 are present along which an arm 11 can be displaced up and downwards. The components which enable to up and downward movement of the arm 11 are here of the type according to figures 5 and 6 wherein a loose rod 9 can be displaced in a hollow rod 8. Also in this case an intervention is possible to prevent the arm 11 from moving further downwards against the will of the operator since upon a further continued rotation of the electric motor 3, the hollow rod 8 will be pulled further downwards and will further displace along the loose rod 9 so that when the arm 11 is held back manually, this can be realized by the intervention of one or two operators.

Although the invention is described in view of the problems involved with lifting and putting down a patient, it is clear that the patent application covers also

the field wherein similar problems can be observed, not only upon lifting and putting down loads but also upon exerting a pulling force on condition however that the arm 2 or the arm 11 are moved downwards by their own weights, i.e. by gravity.

It is clear that the invention is not limited to the hereabove described embodiments and that many modifications could be applied to these embodiments without leaving the scope of the present patent application.

Claims

1. A safety device for an apparatus provided for lifting and lowering loads and comprising at least one column (1,10), an arm (2,11) attached to this column and pneumatic, hydraulic or motor means for moving said arm up and downwards, characterized in that said means act upon a rod (5) which slides telescopically in a hollow tube (6) or upon a hollow rod (8) which slides around a loose rod (9) in order to lift said arm (2,11) and to lower it in such a manner that, when said arm (2,11) is held back either directly or indirectly by an obstacle, the rod (5) and the hollow tube (6), on the one hand, and the hollow rod (8) and the loose rod (9), on the other hand, can slide with respect to one another so as to prevent a further downward movement of the arm when said arm (2,11) is held back for example by an operator.
2. A safety device according to claim 1, characterized in that said arm (2) is hingedly mounted onto said column (1).
3. A safety device according to either one of the claims 1 and 2, characterized in that said rod (5) which slides telescopically into a hollow tube (6) and said hollow rod (8) which slides over a loose rod (9) compose in each case two by two a lever of the third order having a fulcrum, a component which forms at the bottom a part of said column and a power point on said arm near the place where said arm is hingedly connected to said column.
4. A safety device according to any one of the claims 1 to 3, characterized in that during an upward movement of the rod (5), it pushes onto the bottom (6') of the hollow tube (6).
5. A safety device according to any one of the claims 1 to 3, characterized in that during an upward movement of the hollow rod (8), the upwards directed extremity of the hollow rod (8) pushes against a cylindrical abutment (9') of the loose rod (9).

6. A safety device according to claim 1, characterized in that when two columns (10) are present and the function of said arm is taken over by an arm (11) which is up and downwards movable between these columns (10) and which is moved up and downwards by pneumatic, hydraulic or motor means, said rod (5), which slides telescopically into a hollow tube (6), and said hollow rod (8), which slides over the loose rod (9), form in each case two by two a pressure rod which acts on an arbitrary place, but preferably on an equal distance from both of said columns (10), upon said arm (11).

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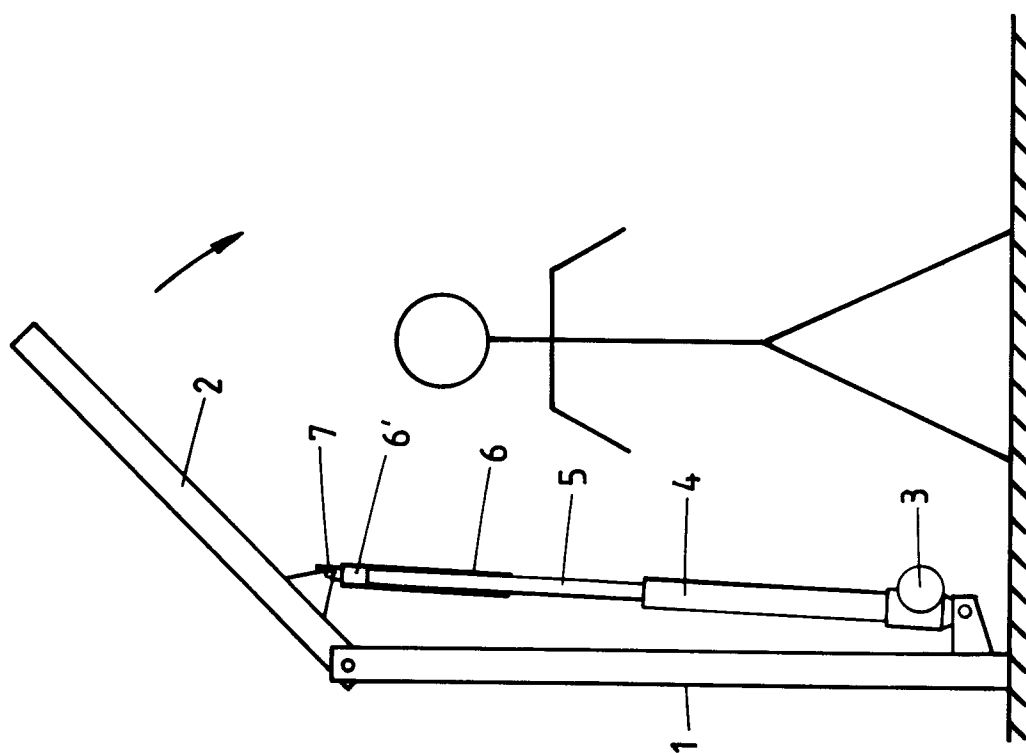


Fig. 1

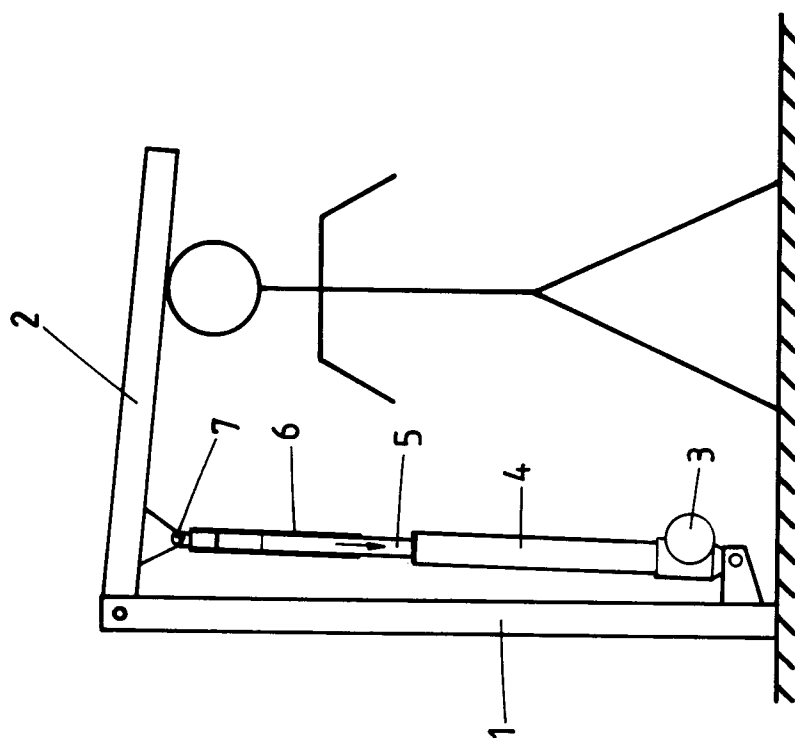
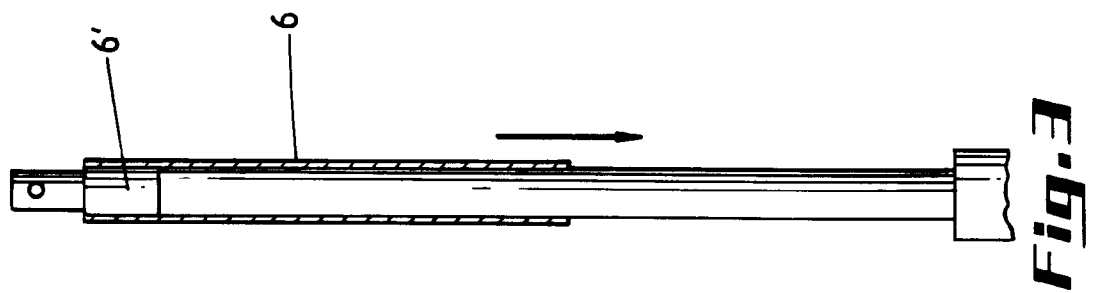
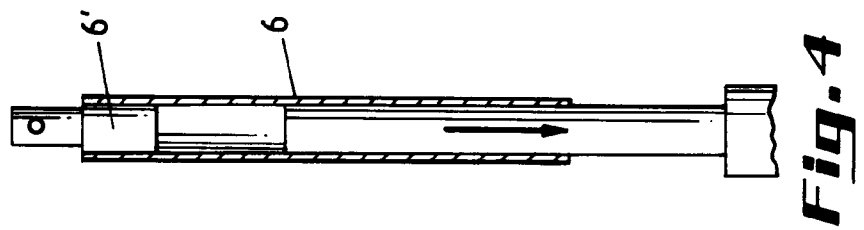
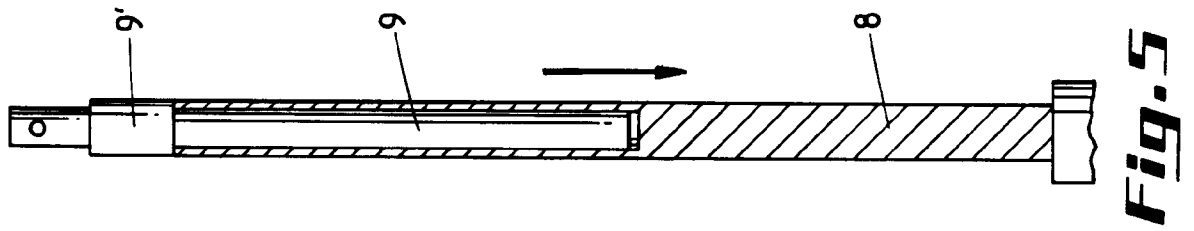
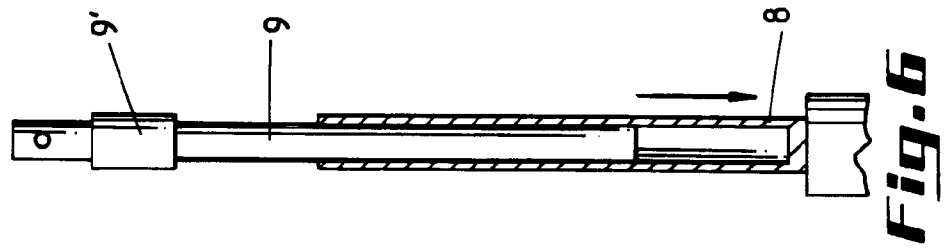


Fig. 2



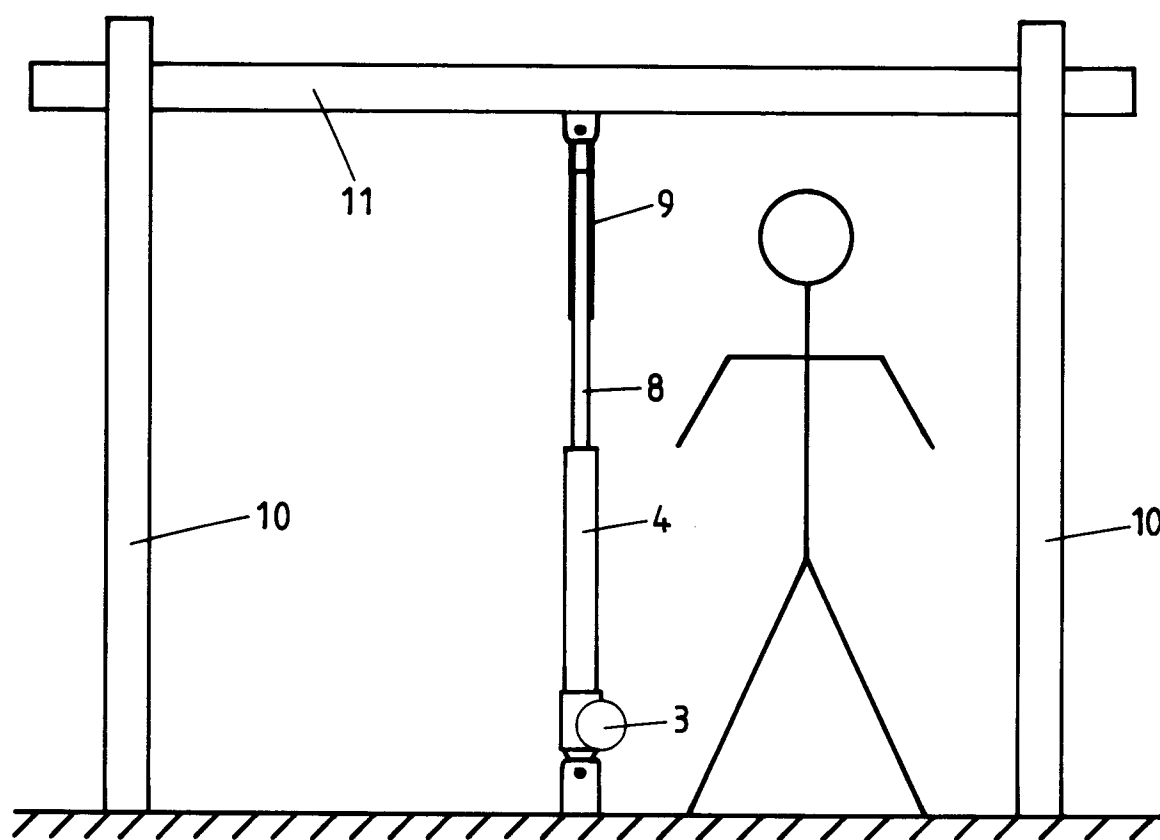


Fig.7



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 93 87 0018

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	WO-A-9 001 916 (PEDERSEN) * claim 1; figures * ---	1	A61G7/10 B66F17/00
A	US-A-4 092 748 (EWERS) * column 3, line 56 - column 60 * * figures 1,2,5 * ---	1	
A	US-A-3 677 424 (ANDERSON) * column 4, line 39 - line 44; figure 4 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A61G B66F B66C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29 MARCH 1993	Examiner GODOT T.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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