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(54) **Elastic safety frame for access opening of a doorless person-hoisting installation**

(57) A safety device (1) apt to be installed in a hoisting installation such as a lift, a hoist, a lifting platform and the like, of the type comprising a doorless car (3) slidably movable in an lift shaft, and having a frame (2) apt to be connected externally and peripherally to an access opening (31) of the car (3) so as to substantially limit accessibility to the lift shaft by a user of the installation.

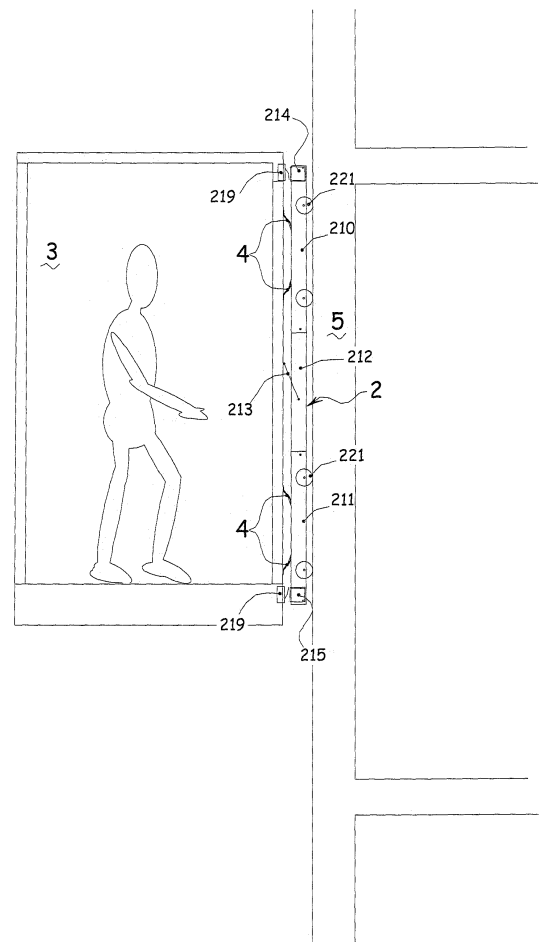


FIGURE 2

Description

[0001] The present invention refers to a safety device apt to be installed in a hoisting installation such as a lift, a hoist, a lifting platform and the like, of the type comprising a doorless car.

[0002] In the field of hoisting installations, it is known that the absence of car doors entails, from a safety standpoint, a series of hazards in the use and maintenance of said equipment, which can be traced back to the following categories:

- falling hazard;
- shearing hazard;
- crushing hazard;
- entrapment hazard.

[0003] Doorless installations equipped with a "person onboard" operating system are deemed sufficiently safe, as any residual hazards related to the use of the same would be granted control in that a user, in case of danger of any kind, can stop the system simply by interrupting the command action.

[0004] Moreover, it is deemed that the presence of a lift shaft, along which the car moves, that be smooth and void of irregularities would seem to eliminate the shearing hazard even in case of a possible contact between users' bodies and/or body parts and the wall of the lift shaft itself, leaving at most an abrasion hazard, which would anyhow be reduced by virtue of the limited relative velocity.

[0005] Actually, the presence of a zone, in correspondence of the access opening of the car, defined by the gap (generally of about 20 nominal mm) between car and wall of the lift shaft represents a source of danger even in the hypothesis of a perfectly smooth lift shaft and a "person-onboard"- controlled installation. In fact, such a gap allows a user's accessibility to the lift shaft. E.g., there could easily be inserted (voluntarily or involuntarily) items of common use and limited size, such as belts, scarves, pet leashes, etc., which could get stuck and/or remain blocked with the floor doors (a minimum bottom clearance is always present to allow for door wing motion) and/or with the relevant lock release mechanisms (necessarily present) or even with items (or a foot) present on the landing, giving rise to a series of extremely hazardous situations that may even comprise strangling.

[0006] As shown in Figure 4, a user could have a scarf stuck between floor and car while another user could be acting on the apparatus, by calling the lift and/or the platform from another floor, therefore without seeing the danger. In this case, the motion of the car would entail extremely high shearing and strangling hazards for the first user, hazards that might be prevented only if the second user were to become aware of the danger situation and stop his/her command action in time.

[0007] Moreover, said zone is very hazardous also due to the chance of insertion of users' body parts.

[0008] In fact, 20 mm are a gap anyhow sufficing for

insertion of an adult's fingers, as well as of a child's hand.

[0009] Lastly, it has to be taken into account that 20 mm are a purely nominal size and that often in actual embodiments, owing to the walls of the lift shaft being unavoidably inclined, the gap between lift shaft and car along the travel may assume different values, even greater than 20 mm.

[0010] Hence, evidently the maintained or "person onboard" control is not an intrinsically safe system on hoisting installations having a doorless car, as it is not capable of eliminating the dangers listed hereto.

[0011] The technical problem underlying the present invention is to provide a safety device allowing to overcome the drawbacks mentioned above with reference to the known art.

[0012] Such a problem is solved by a device according to claim 1.

[0013] Preferred characteristics of the present invention reside in the dependent claims thereof.

[0014] The present invention provides several relevant advantages.

[0015] The main advantage lies in equipping the hoisting installations with a safety device capable of reducing the gap between car and lift shaft so as to prevent the physical insertion of limbs and/or limb parts and/or of items as the above-mentioned ones, practically eliminating the shearing, abrasion and entrapment hazards.

[0016] A further advantage of the safety device subject-matter of the present invention lies in automatically activating an element for denying and/or stopping the motion of the car in case of danger with no manual intervention by the user. Thus, there are eliminated also the residual hazards deriving from the insertion, between lift shaft and safety device, of items of extremely reduced dimensions, like e.g. scarves, belts and leashes.

[0017] Thus, there are also eliminated those variables linked to emergency manual interventions in which the intervention anyhow depends not only on the will of an individual, but also on his/her reaction times (variable not only from one subject to the next but also, for each person, according to the physical, psychological and/or environmental situations in which he/she operates).

[0018] In fact, the operator, even when being in top psychophysical conditions, could simply fail to realize the danger, or be late in realizing it and intervening.

[0019] E.g., in the hypothesis two users were concomitantly present (an extremely likely instance, as very often this kind of installation is intended for disabled persons requiring an attendant) just one of the two would act on the person-onboard control, whereas the other one would have no protection whatsoever in case of him/her coming into contact with a zone void of walls, short of a timely intervention by the other user serving as "driver".

[0020] Other advantages, characteristics and manner of using the present invention will be made apparent from the following detailed description of some embodiments thereof, given by way of example and not for limitative purposes. Reference will be made to the figures of the

annexed drawings, wherein:

Figure 1 shows in axonometry a preferred embodiment of a safety device according to the present invention connected to a car of a hoisting installation; Figure 2 shows a side sectional view of the safety device of Figure 1 connected to the car and placed in correspondence of a wall for access to the latter; Figure 3 shows a detail of the safety device depicted in Figure 2;

Figure 4 schematically shows the operation of the safety device of Figure 1 during a danger situation.

[0021] Referring initially to Figure 1, a safety device apt to be installed in a hoisting installation of the type comprising a doorless car slidably movable in a lift shaft is generally denoted by 1.

[0022] The safety device 1 comprises a frame 2 apt to be connected in a cantilevered manner externally and peripherally to an access opening 31 of a car 3.

[0023] As shown in Figure 2, the safety device 1 comprises first elastic contrast means 4, preferably interposed between said frame 2 and said car 3 so as to keep said frame 2 substantially adhering to a wall 5 of the lift shaft. Preferably, said elastic contrast means is springs 4.

[0024] In the present embodiment, the frame 2 comprises a first jamb 21 and a second jamb 22 connected to the car 3. Said first jamb 21 and second jamb 22 of the frame 2 have sliding means 221 apt to slide onto the wall 5 of the lift shaft. In particular, the jambs 21 and 22 are articulated and comprise each at least one first 210 and one second member 211.

[0025] In the present embodiment, said first member 210 and second member 211 are connected therebetween by a cross member 212 articulated thereto. As shown in Figures 1 and 2, the sliding means 221 is connected to said first member 210 and second member 211 so as to form "sliding block".

[0026] It will be understood that the jambs 21 and 22 described hereto may comprise a plurality of members articulated thereamong, apt to perform, as in the described case, relative motions thereamong so as to allow the frame 2 to "comply" with any irregularity of the wall 5 of the lift shaft.

[0027] In a preferred embodiment, the sliding means 221 is wheels 221 partially projecting from said first member 210 and said second member 211 in which they are inserted, so as to define a predetermined gap between the members 210 and 211 and the wall 5 of the lift shaft. Said predetermined gap preferably ranges from about 4 to 6 mm, so as to actually eliminate all hazards, such as shearing, crushing and strangling. Of course, as mentioned in the foregoing, said sliding means 221, in the specific case wheels 221, are kept adhering to the wall 5 by the elastic contrast means 4 acting on said first member 210 and said second member 211.

[0028] As shown in Figure 2, the first jamb 21 and the second jamb 22 are preferably connected to the car 3 by

means of an articulated connecting rod 213 connected to the cross member 212.

[0029] Moreover, the frame 2 comprises at least one top beam 214 and/or a bottom beam 215 connected to a top end and a bottom end of said first 21 and second 22 jamb, respectively. In particular, said top beam 214 and said bottom beam 215 are respectively hinged to a top and bottom end of said first 21 and second 22 jamb.

[0030] In the present embodiment the top beam 214 and the bottom beam 215 are hinged to said first jamb 21 and to said second jamb 22 so as to be apt to pivot about a longitudinal axis A thereof in the presence of items interposed between the beam 214 and/or 215 and the wall 5 of the lift shaft.

[0031] Top 214 and bottom 215 beams are kept in a resting position by second elastic contrast means 216 connected and integral to said first 21 and said second 22 jambs, preferably by a tongue 217, as shown in detail in Figure 3. In this case as well, said second elastic contrast means 216 is preferably springs 216.

[0032] In the present embodiment the top beam 214 and the bottom beam 215 comprise an angular L-like member having a horizontal side 218 apt to carry out a platband function for top and bottom closure respectively of said top beam 214 and said bottom beam 215.

[0033] As shown in Figure 2 and in detail in Figure 3, the safety device 1, in a preferred embodiment, comprises a member 219 for denying and/or stopping the motion of the car, apt to be automatically actuated by said frame 2 in the presence of items interposed between the frame itself and the wall of the lift shaft.

[0034] Thus, the safety device 1 is an automatic safety device requiring, in case of danger, no intervention by the user or a person outside, yet automatically intervening to stop the motion of the installation.

[0035] In particular, in the present embodiment the member 219 for denying or stopping motion is constrained to the car 3 near the connection of said top 214 and/or bottom 215 beam and said first 21 and second 22 jamb, so as to be directly actuated by said top beam and/or by said bottom beam. In particular, it can be actuated by the pivoting, and/or the translation in the direction of the denying and/or stopping member 219, of the top and/or bottom beam. In a preferred embodiment said denying and/or stopping member 219 is a cutout 219.

[0036] The operation of the abovedescribed safety device 1 and the relevant operation will be made evident in the description of the use process thereof.

[0037] The safety device 1, once mounted externally and peripherally to the access opening 31 of a car 3, is adjusted and calibrated so that the sliding means 221 be substantially adhering to the wall 5 and the first 4 and second 216 elastic contrast means allow operation of the denying and/or stopping members 219 after the frame 2 has been subjected to stresses of predetermined intensity. Such a step is just carried out by acting in particular on the first 4 and second 216 elastic contrast means.

[0038] When the hoisting installation is in operation,

the frame 2, connected to the car 3 and into contact with the wall 5, follows the pattern of the lift shaft by modifying its shape thanks to the articulated jambs 21 and 22 and to the first elastic contrast means 4.

[0039] If, during the travel, the relative motion of the various members 210, 211 and 212 assumes values higher than those previously calibrated, owing to an anomalous and therefore potentially dangerous stress (e.g. due to involuntary or forced insertion of items of extremely reduced dimensions, such as scarves, inside of the limited available gaps (about 4-6 mm) the system intervenes immediately by causing the intervention of one or more denying and/or stopping members 219, thereby locking the hoisting installation.

[0040] In particular, as shown in Figure 4, if a foreign body 6, rope, string or scarf wedges between said bottom beam 215 and the wall 5 of the lift shaft, said foreign body causes the pivoting of the beam 215 itself.

[0041] Said pivoting, once having exceeded a certain angle of free pivoting suitably calibrated at assembly, allows the horizontal side 218 of the beam structure to trip a cutout 219 (denying and/or stopping means), which therefore interrupts the electric circuit causing the stopping of the installation.

[0042] Since said bottom beam 215 is hinged to a corresponding second member 211, even a possible moving of the first member 211 away from the wall 5 of the lift shaft will cause a translation of the bottom beam toward the cutout 219 and the relevant operation of the latter, and therefore the stopping of the installation.

[0043] In a preferred embodiment, the stopping of the installation at a position differing from the alignment with floor doors will activate a suitable alarm signalling system, such as a siren, or a phone dial capable of contacting the persons in charge of surveillance and/or safety.

[0044] Resuming the motion will be possible again only after having eliminated the anomaly, bringing the various members of the safety device 1 back to the position of normal use and only after the user will have given a new voluntary ascent or descent command by acting on the relevant pushbutton.

[0045] It will be appreciated that said safety device 1 may be connected to vertical jambs of the car entrance returns or, in the absence of the latter, along the side walls, but also onto the wall at the top and/or bottom of the access opening 31.

[0046] Moreover, in the presence of cars having plural access openings each of said openings could be equipped with the safety device 1 subject-matter of the present invention.

[0047] It will be understood that the present invention is susceptible of several embodiments alternative to the one described hereto; e.g., the frame 2 could be an elastic frame, made such by the use of materials having suitable elasticity for its manufacturing.

[0048] The present invention has been hereto described with reference to preferred embodiments thereof. It is understood that other embodiments might exist, all

referable to the same inventive kernel, and all comprised within the protective scope of the claims hereinafter.

5 Claims

1. A safety device (1) apt to be installed in a hoisting installation such as a lift, a hoist, a lifting platform and the like, of the type comprising a doorless car (3) slidably movable in an lift shaft, said device being **characterised in that** it comprises a frame (2) apt to be connected in a cantilevered manner externally and peripherally to an access opening (31) of the car (3) so as to substantially limit accessibility to the lift shaft by a user of the installation.
2. The safety device (1) according to the preceding claim, wherein said frame (2) is substantially elastic.
3. The safety device (1) according to any one of the preceding claims, wherein said safety device comprises first elastic contrast means (4) apt to keep said frame (2) substantially adhering to the wall (5) of the lift shaft.
4. The safety device (1) according to the preceding claim, wherein said first elastic contrast means (4) is interposed between said frame (2) and the car (3).
5. The safety device (1) according to claim 3 or 4, wherein said elastic contrast means (4) is springs.
6. The safety device (1) according to any one of the preceding claims, wherein said frame (2) comprises at least one first jamb (21) and one second jamb (22).
7. The safety device (1) according to the preceding claim, wherein said first jamb (21) and said second jamb (22) of said frame (2) comprise sliding means (221) apt to slide onto the wall (5) of the lift shaft.
8. The safety device (1) according to any one of the claims 6 and 7, wherein said first jamb (21) and said second jamb (22) are articulated and comprise each at least one first (210) and one second (211) member.
9. The safety device (1) according to the preceding claim, wherein said first member (210) and second member (211) are connected therebetween by a cross member (212) articulated thereto.
10. The safety device (1) according to the preceding claim, wherein said cross member is connected to the car (3) by an articulated connecting rod (213).
11. The safety device (1) according to claim 7 and to any one of the claims 8 to 10, wherein said sliding means

- (221) is connected at least to said first member (210) and second member (211) of said first (21) and second (22) jamb so as to form sliding block.
12. The safety device (1) according to any one of the claims 7 to 11, wherein said sliding means (221) is wheels (221).
 13. The safety device (1) according to the preceding claim, wherein said wheels are projecting with respect to said first (21) and second (22) jamb so as to define a predetermined gap between said jambs and the wall (5) of the lift shaft.
 14. The safety device (1) according to the preceding claim, wherein said predetermined gap ranges from about 4 to 6 mm.
 15. The safety device (1) according to any one of the preceding claims, wherein said frame (2) comprises at least one top beam (214).
 16. The safety device (1) according to the preceding claim, wherein said top beam (214) is connected to one end of said first jamb (21) and said second jamb (22).
 17. The safety device (1) according to the preceding claim, wherein said top beam (214) is hinged to said first jamb (21) and said second jamb (22) and is apt to pivot about a longitudinal axis (A) thereof in the presence of items interposed between the beam itself and the wall (5) of the lift shaft.
 18. The safety device (1) according to any one of the claims 15 to 17, wherein said top beam (214) is kept in position by second elastic contrast means (216).
 19. The safety device (1) according to the preceding claim, wherein said second elastic contrast means (216) is connected and integral to said first (21) and said second jamb (22).
 20. The safety device (1) according to any one of the preceding claims, wherein said frame (2) comprises at least one bottom beam (215).
 21. The safety device (1) according to the preceding claim, wherein said bottom beam (215) is connected to said first jamb (21) and said second jamb (22).
 22. The safety device (1) according to the preceding claim, wherein said bottom beam (215) is hinged to said first jamb (21) and to said second jamb (22) and is apt pivot about a longitudinal axis (A) thereof in the presence of items interposed between the beam itself and the wall (5) of the lift shaft.
 23. The safety device (1) according to the preceding claim, wherein said bottom beam (215) is kept in position by second elastic contrast means (216).
 24. The safety device (1) according to the preceding claim, wherein said second elastic contrast means (216) is connected and integral to said first (21) and said second (22) jamb.
 25. The safety device (1) according to any one of the claims 18, 19, 23 and 24, wherein said second elastic contrast means (216) is springs (216).
 26. The safety device (1) according to any one of the claims 15 to 18 or 20 to 23, wherein said top beam (214) and said bottom beam (215) comprise an angular member (L).
 27. The safety device (1) according to the preceding claim, wherein said angular member (L) has a horizontal side (218) apt to carry out a platband function for top and bottom closure respectively of said top beam (214) and said bottom beam (215).
 28. The safety device (1) according to any one of the preceding claims, wherein said safety device (1) is an automatic safety device.
 29. The safety device (1) according to any one of the preceding claims, wherein said safety device (1) comprises at least one member (219) for denying and/or stopping the motion of the car (3), apt to be automatically actuated by said frame (2) in the presence of items interposed between the frame (2) itself and the wall (5) of the lift shaft.
 30. The safety device (1) according to the preceding claim, wherein said member (219) for denying and/or stopping the motion is constrained to the car (3).
 31. The safety device (1) according to the preceding claim, wherein said member (219) for denying and/or stopping the motion is constrained to the car (3) near the connection of said top (214) and/or bottom (215) beam and said first (21) and second (22) jamb.
 32. The safety device (1) according to any one of the claims 29 to 31, wherein said member (219) for denying and/or stopping the motion is apt to be actuated by said top beam (214) and/or by said bottom beam (215).
 33. The safety device (1) according to the preceding claim, wherein said member (219) for denying and/or stopping the motion is apt to be actuated by a pivoting of said top (214) and/or bottom (215) beam.
 34. The safety device (1) according to claim 32, wherein

said member (219) for denying and/or stopping the motion is apt to be actuated by a translation of said beam structure (214, 215) in the direction of the member (219) for denying and/or stopping the motion itself.

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- 35.** The safety device (1) according to any one of the claims 29 to 34, wherein said member (219) for denying and/or stopping the motion itself is a cutout (219) apt to interrupt the electric circuit causing the stopping of the installation.

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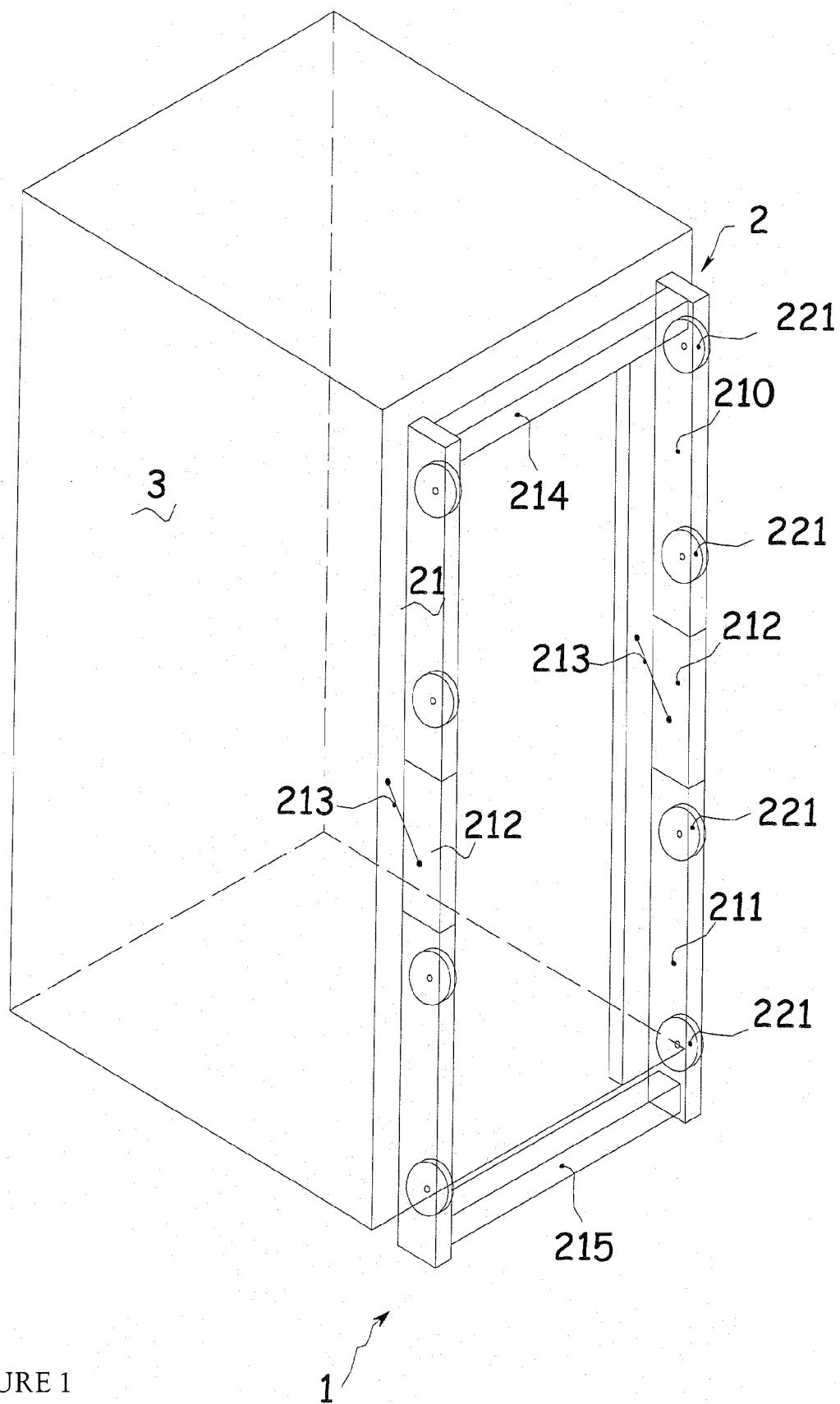
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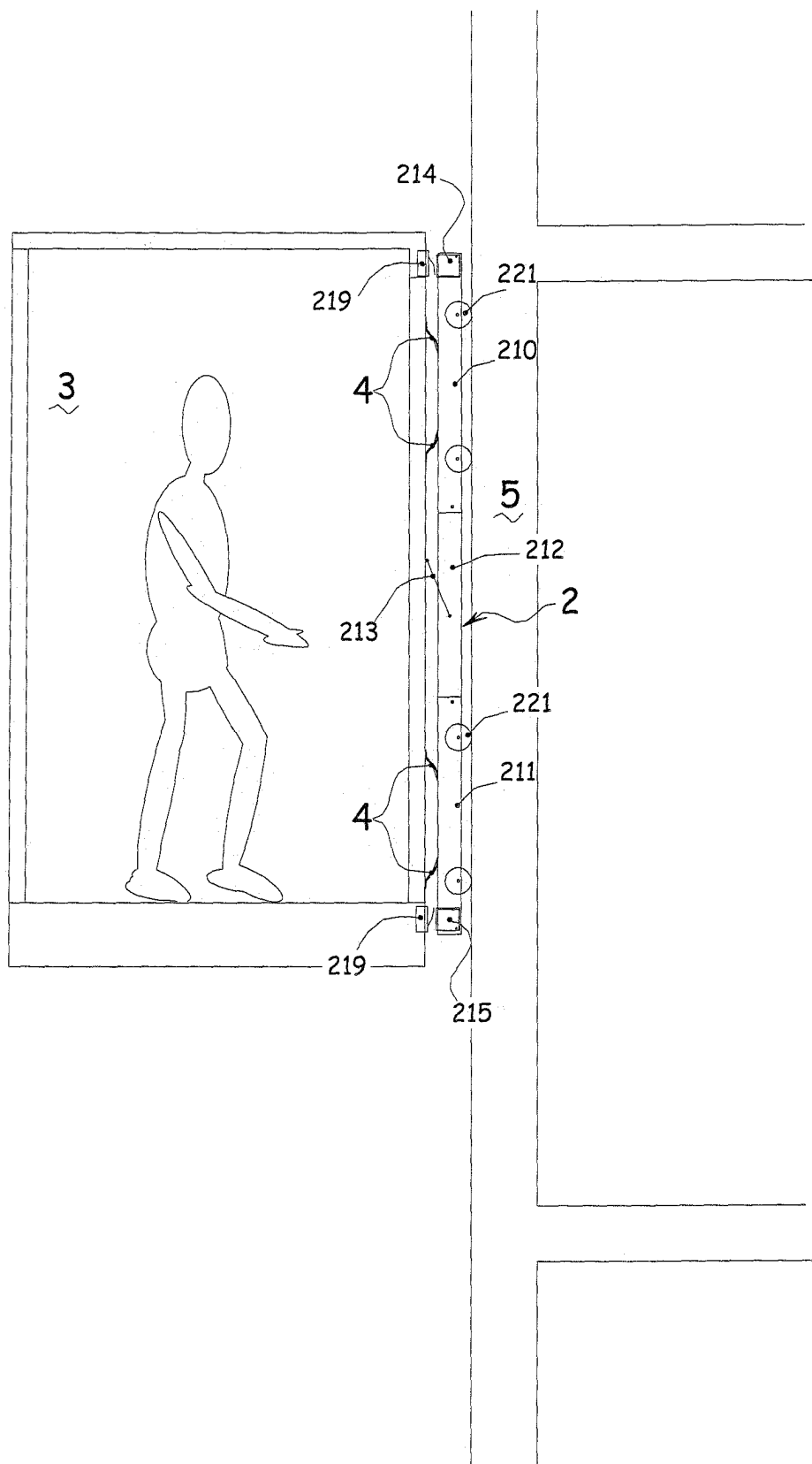


FIGURE 2

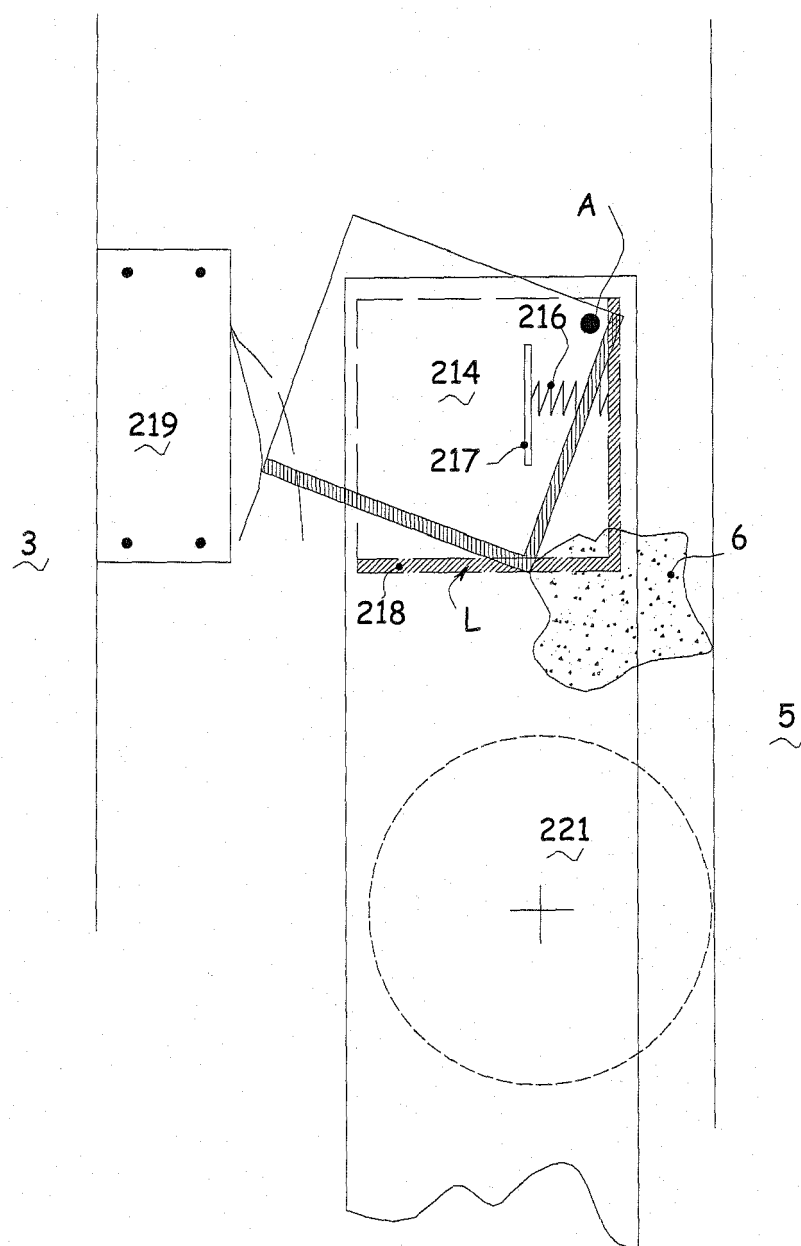


FIGURE 3

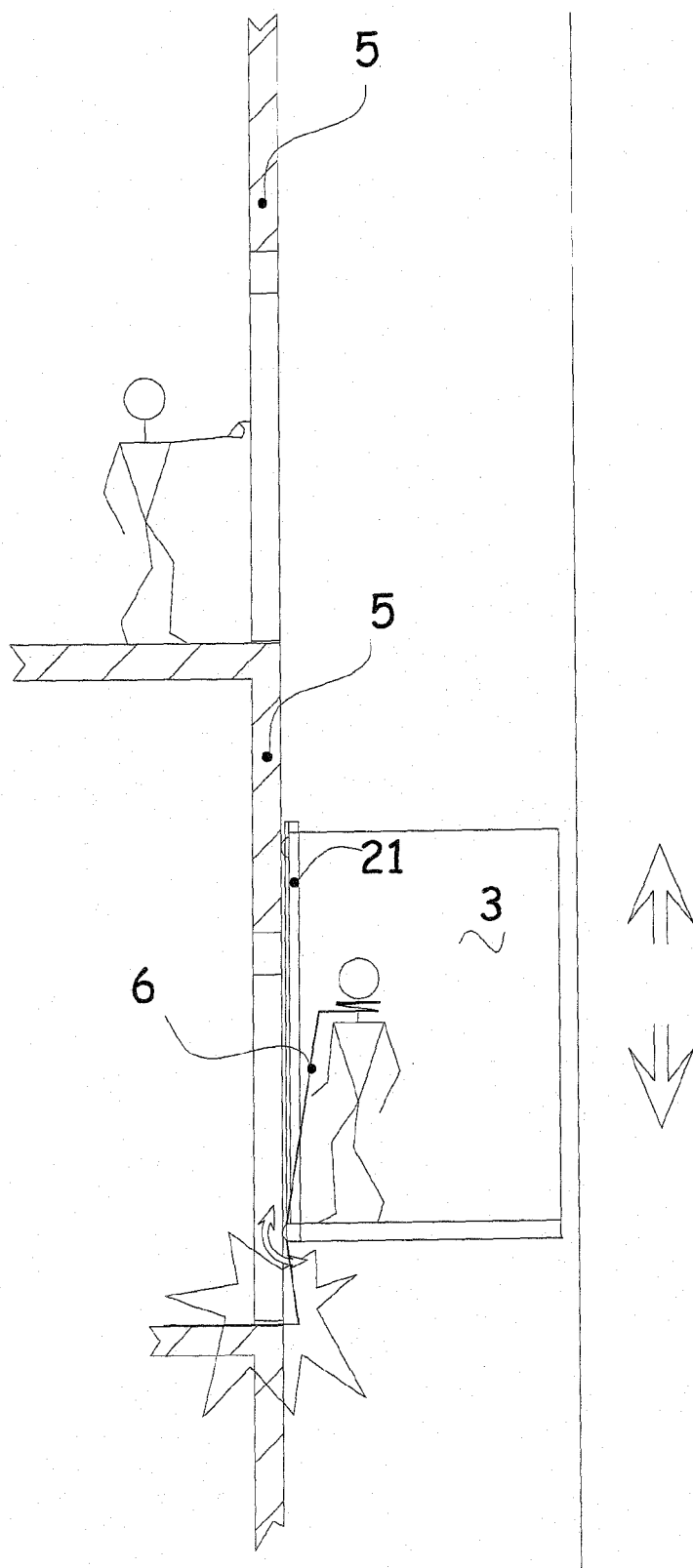


FIGURE 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 10 8951

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 September 2007	Examiner ECKENSCHWILLER, A
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 07 10 8951

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17-09-2007

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