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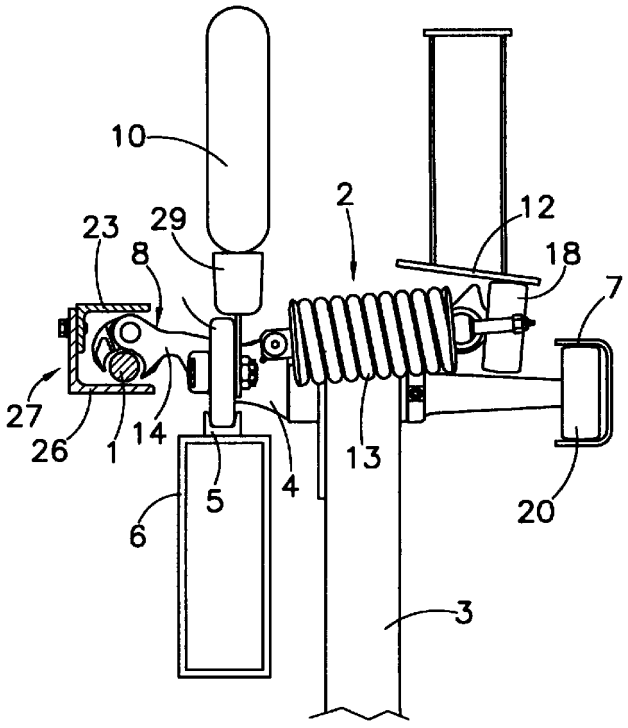
(54) Safety device for the forced execution and the control of the gripping at the exit from a station for a continuous motion single cable cableway with temporary disconnection of the cars

(57) A safety device is described for the forced execution and the control of the gripping of a car onto a cable before its exit from a station for single cable cableway. The safety device comprises a plurality of mechanical guides (22, 23, 24, 26) inserted along the path that is run by a gripping vice (8) of the car inside the station in order to force the same vice (8) to close itself again on the cable (1) before the exit of the car from the station.

FIG.7



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Description

[0001] The present invention concerns a safety device for the forced execution and the control of the gripping at the exit from a station for a continuous motion single cable cableway with temporary disconnection of the cars.

[0002] In modern continuous motion single cable cableways, in order to allow passengers to easily get off the cars who transport them, it is customary to temporarily disconnect the same cars, at the entrance of the station, from the cable that carries and transports them and to then reconnect them before their exit from the station itself. This is obtained by opening and then closing a gripping vice with elastically biased jaws that the support of the vehicle is provided with.

[0003] The double operation of detachment and reattachment involves evident safety problems, in that the re-gripping of the car could be done in a defective way and thus determine the fall of the same car at the exit from the station.

[0004] In order to avoid that a possible non-clamping or defective re-clamping of the car to the cable can have disastrous consequences for passengers, rails for the guiding of the car are usually located at the exit from stations which in the case of detachment of the car from the carrying cable receive and guide the car during its fall, thus preventing major damages.

[0005] In addition, the fall of the car that is already at maximum speed on the guide rails also represents a not negligible accident for passengers, who can undergo physical and psychological traumas of various nature and seriousness, especially with open type cars. Furthermore, as a consequence of the fall, the vice can get stuck on the rails with a consequent jamming and dangerous oscillations of the car. In any case, a complicated rescue of the people becomes necessary, as well as a difficult dismantling of the car with the consequent putting out of service of the facility for a relatively long period. In addition damages to both rails and car could occur.

[0006] In addition, with the current servicing velocities, guide rails have become so long that they often create insurmountable compatibility problems, in particular in view of the not negligible lowering of the cable under the load and of the inevitable transverse displacements of car and cable, especially in the presence of wind or in the instance of reversal of the course.

[0007] What derives from it is a strong tendency toward the substitution of guide rails with other devices that are at least equivalent from a safety point of view but that are free of the aforementioned inconveniences.

[0008] In view of this state of the art object of the present invention has been to provide a safety device that is capable to operate already in the gripping stage by forcing the clamping of the car onto the carrying cable and ensuring that the gripping is done in a correct way before the same leaves the station, that is a device operating in a preventive way instead of as a remedy for an already occurred accident.

[0009] According to the invention, such object is attained by means of a device characterised in that it comprises a plurality of mechanical guides inserted in the path that is run by the gripping vice of the car inside the station in order to force the same vice to close again on the transport cable before the exit of the car from the station.

[0010] In addition, electric controls are provided, that are purposed to verify the correct clamping condition of the vice to the cable before the car exits the station and, if this is the case, to signal the anomaly and to obtain the stop of the facility.

[0011] The characteristics of the present invention will be made evident from the following detailed description of an embodiment thereof that is illustrated as a non-limiting example in the enclosed drawings, in which:

Figure 1 shows schematically an elevation of the zone of exit of a car from a station;

Figure 2 shows schematically the same exit zone in a top plan;

Figures 3-8 show cross sections illustrating the state of the advancement of the car in various positions of the aforesaid exit zone, taken along lines III-III to VIII-VIII of Figure 1.

[0012] Figures 1 and 2 show the exit zone from a station for single cable cableway that provides for the temporary detachment of the car from the transport cable 1 at the entrance of the station and its subsequent reattachment before the exit from the station.

[0013] For detachment and reattachment it is meant, respectively, the clamping and the release of the cable on behalf of a vice with jaws that is comprised in the support device 2 to which a suspension arm 3 of a cableway car is attached.

[0014] Such support device, or better one of its possible embodiments, is represented in Figures 3-8, where this can be seen as being composed of a main body 4 which centrally bears a idle wheel 19 slidingly laying on a rail 5 supported by a fix longitudinal member 6 and that has an additional idle wheel 20 at its back end that is engaged into a C-shape guide 7. The fore end of the main body 4 has instead a vice 8 with two turning jaws 9 that are capable to open up and close on the cable 1. When in condition detached from the cable, the support device is pulled along the station by a sequence of motorised rubber wheels 10 at a progressively increasing velocity toward the exit from the station (see also Figures 1 and 2). A fix guide 12 with variable height is capable to engage itself with a idle wheel 18 located on top of a pair of springs 13 reacting between the body 4 of the support device and one end of an arm 14 fixedly mounted to one of the two jaws 9 of the vice 8 and to the fulcrum 15 in the articulation point between the two jaws. The support device 2 is of the type known per se

and therefore it will not be described in greater details.

[0015] The cable 1 is in turn guided by grooved motorised guiding drums 16 and by a fix guide 17 in order to follow, in the exit zone from the station, a path that is initially inclined from the bottom to the top and then horizontal up to the end of the station (Figure 1).

[0016] In order to allow the sure gripping of the vice 8 onto the cable 1 before the car exits the station a safety device according to the present invention is provided, that comprises a sequence of guides and electric sensors serving the purpose to co-operate with the vice 8 so as to verify its correct vertical and horizontal position and therefore the effective clamping on the cable.

[0017] Along the advancement path of the car, indicated by an arrow in Figure 1, first of all a pair of contoured electric sensors 21 is provided (Figure 3) that detect if the vice 8 is at the beginning of the exit zone in a horizontally and vertically corrected position.

[0018] Following is a first guide 22 with horizontal course and L-shape section, that has its vertical arm inserted in the jaws of the vice 8 (Figure 4) so as to ensure the maintening of the vice itself in a geometrically correct position. A second horizontal extension guide 23 with L-shape section rotated by 90° ensures that the vice 8 does not lift nor slowly moves sideways toward the outside as regards to the correct vertical and horizontal position.

[0019] Right after the beginning of the variable height guide 12, which provides to force the opening of the vice 8 against the opposite force of the springs 13, the guide 22 is substituted by a third horizontal guide 24 with a larger section vertical arm (Figure 5), that ensures that the vice 8 has reached a degree of opening such as to allow the entrance of the cable between the two jaws 9.

[0020] At the end of the guide 24, an electric sensor 25 detects the presence of the cable 1 in a suitable position for its entrance in the vice 8 (Figure 6) and therefore the cable 1 effectively enters between the two jaws 9 and it is kept between the same two by a fourth horizontal guide 26 with L-shape section, which at the end of the guide 24 completes and is attached to the guide 23 so as to form a single C-shape guide 27 capable to maintain the vice 8 in the correct horizontal and vertical position and the cable 1 inside the vice itself (Figure 7).

[0021] Finally, the variable height guide 12 allows the springs 13 to force the closing of the vice 8 for the tight clamping of the same cable 1 and a pair of contoured electric sensors 28 envelops the vice 8 right after and the cable 1 enclosed in the same (Figure 8) in order to detect and definitely communicate to a suitable control apparatus that the car is correctly attached to the cable 1 and can leave the station without danger of detachment and fall.

Claims

1. Safety device for the forced execution and the control of the gripping of a car onto a cable at the exit from a station for continuous motion single cable cableway, characterised in that it comprises a plurality of mechanical guides (22, 23, 24, 26) inserted along the path that is run by a gripping vice (8) of the car inside the station in order to force the same vice (8) to close itself again on the cable (1) before the exit of the car from the station.

2. Safety device according to claim 1, characterised in that said plurality of mechanical guides (22, 23, 24, 26) comprises a first horizontal guide (22) with L-shape section, with vertical arm destined to be inserted in the partially open mouth of the vice (8) in order to ensure its maintaining of the aforesaid condition.

3. Safety device according to claim 2, characterised in that said plurality of mechanical guides (22, 23, 24, 26) also comprises a second horizontal guide (23) with L-shape section turned by 90° that ensures that the vice (8) does not lift nor moves sideways toward the outside as regards the correct vertical and horizontal position.

4. Safety device according to claim 3, characterised in that said plurality of mechanical guides (22, 23, 24, 26) also comprises a third horizontal guide (24) with larger section vertical arm, that continues and substitutes said first guide (22) after said vice (8) has engaged a variable height guide (12) capable to cause the complete opening of the vice itself for the housing of the cable inside it.

5. Safety device according to claim 4, characterised in that said plurality of mechanical guides (22, 23, 24, 26) also comprises a fourth horizontal guide (26) that at the end of said third guide (24) completes and it is coupled in order to form a single C-shape guide (27) capable to maintain the vice (8) in the correct horizontal and vertical position and the cable (1) inside the same vice.

6. Safety device according to claim 2, characterised in that said first guide (22) is preceded by a pair of contoured electric sensors (21) suitable to detect if the vice (8) is in a position horizontally and vertically corrected at the beginning of the exit zone of the station.

7. Safety device according to claim 4, characterised in that at the end of said third guide (24) and before the beginning of the fourth guide (26) there is provided an electric sensor (25) suitable to detect if the cable (1) is in a suitable position for its entrance inside the vice (8).

8. Safety device according to claim 4, characterised in that at the end of said plurality of mechanical guides

(22, 23, 24, 26) and of said variable height guide (12) there is provided an additional pair of contoured electric sensors (28) suitable to envelop the vice (8) and the cable (1) enclosed in the same (Figure 8) in order to detect the correct gripping of the vice (8) to the cable (1).

FIG.1

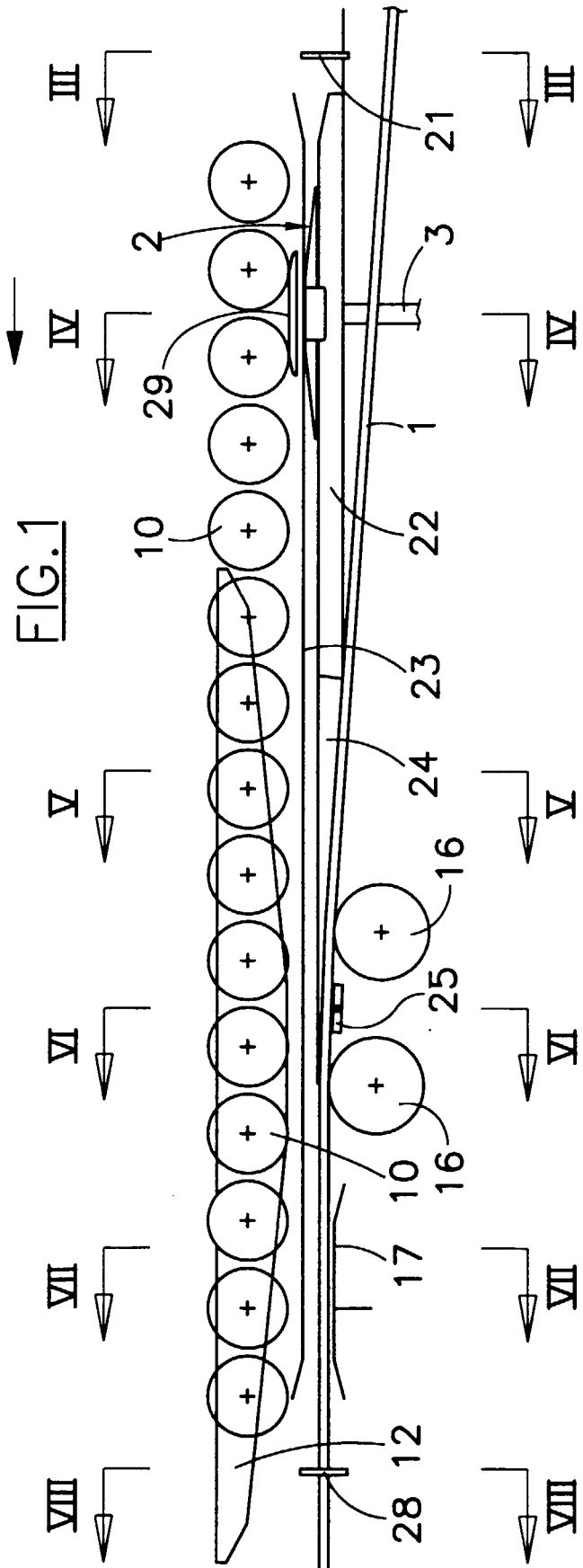
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FIG.2

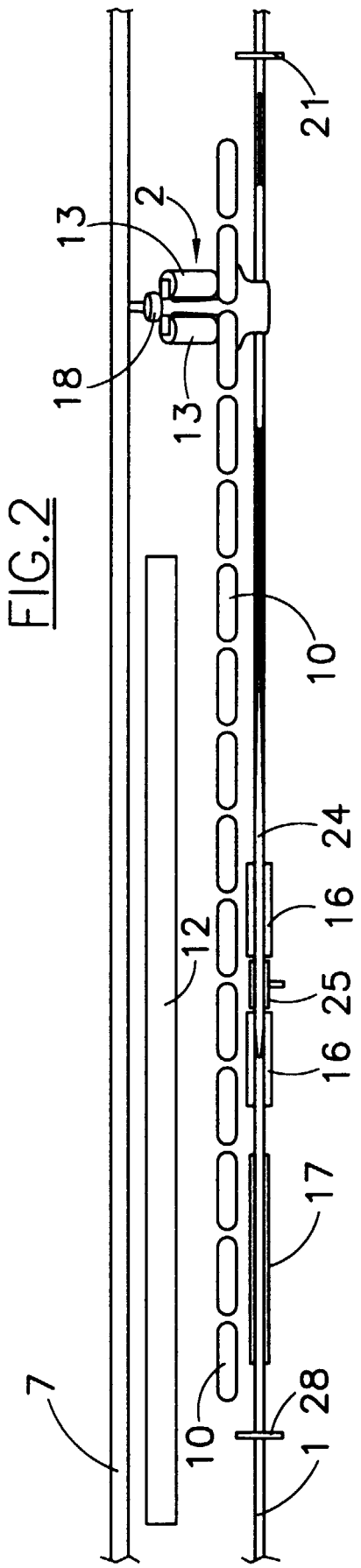
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FIG.3

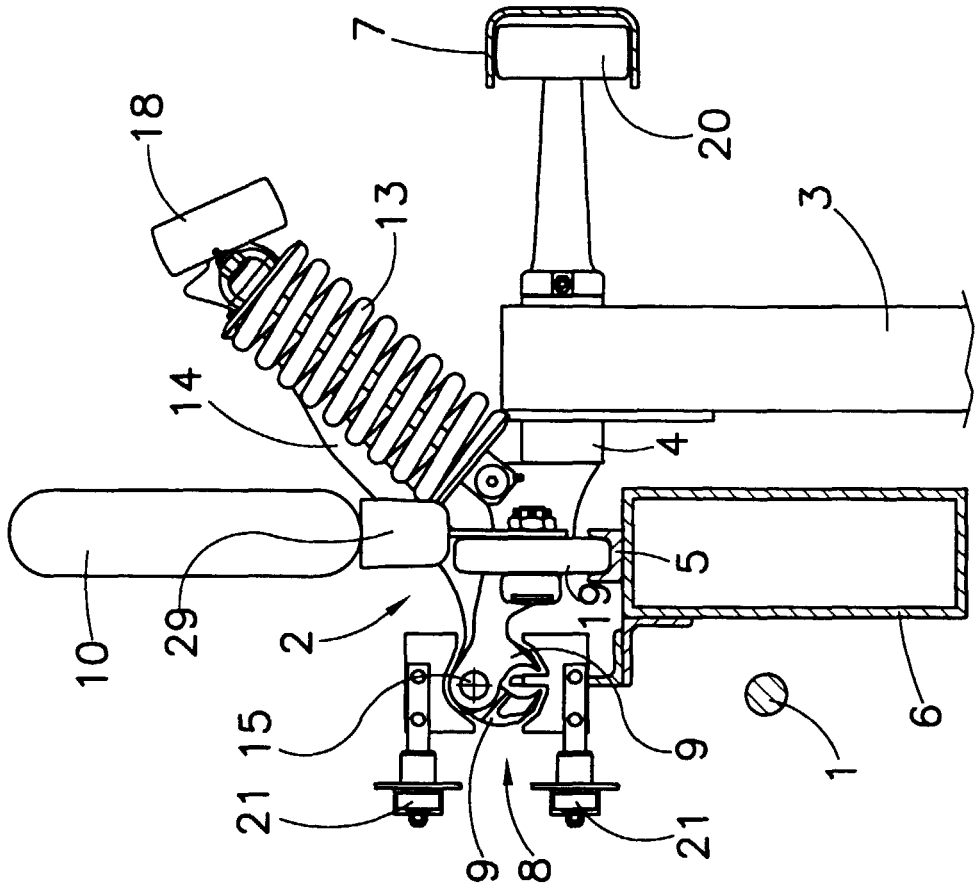
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FIG.4

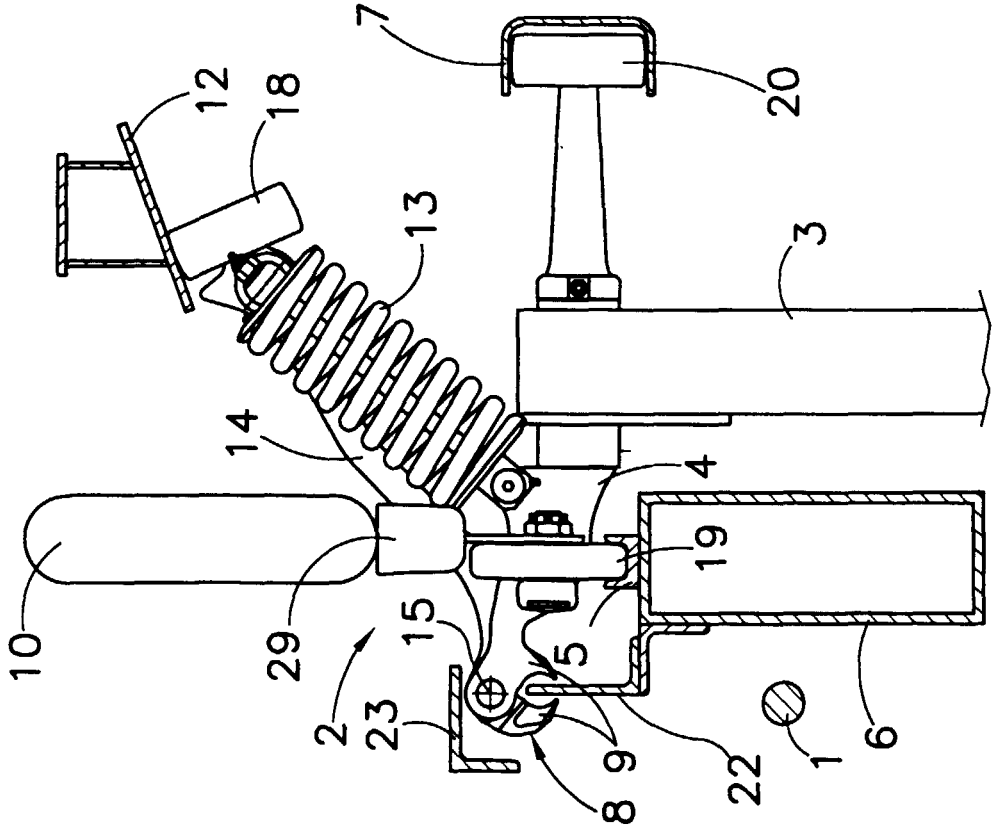
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FIG.5

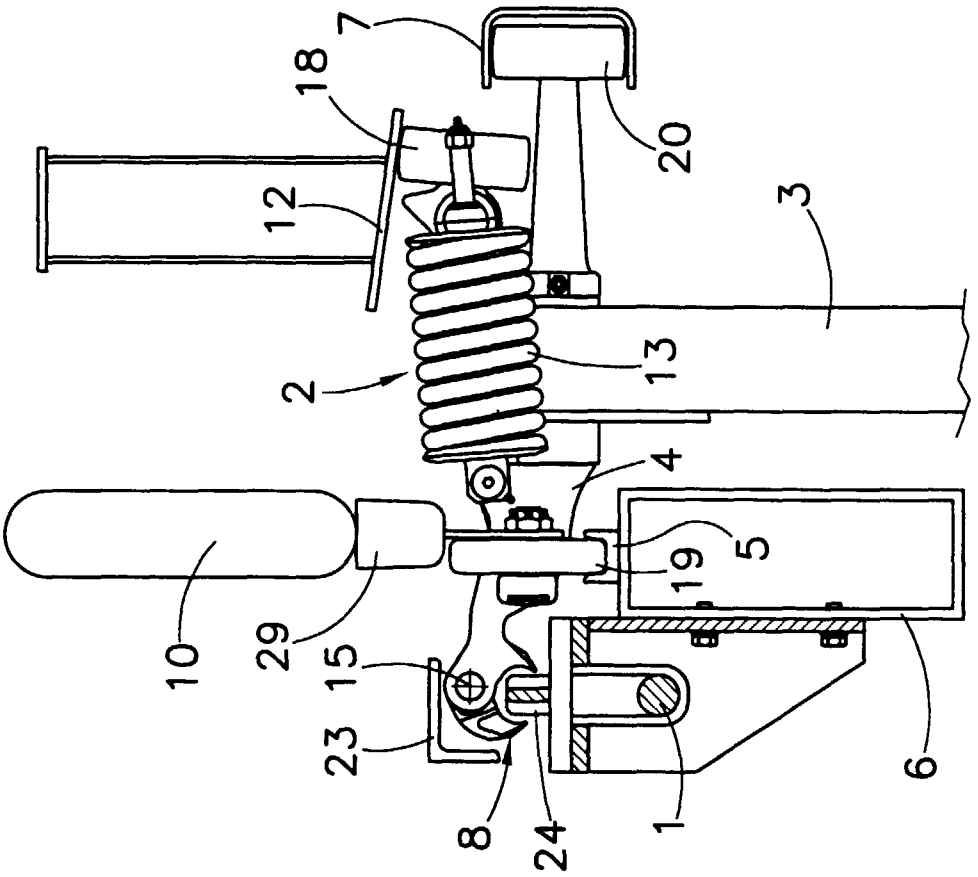
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FIG.6

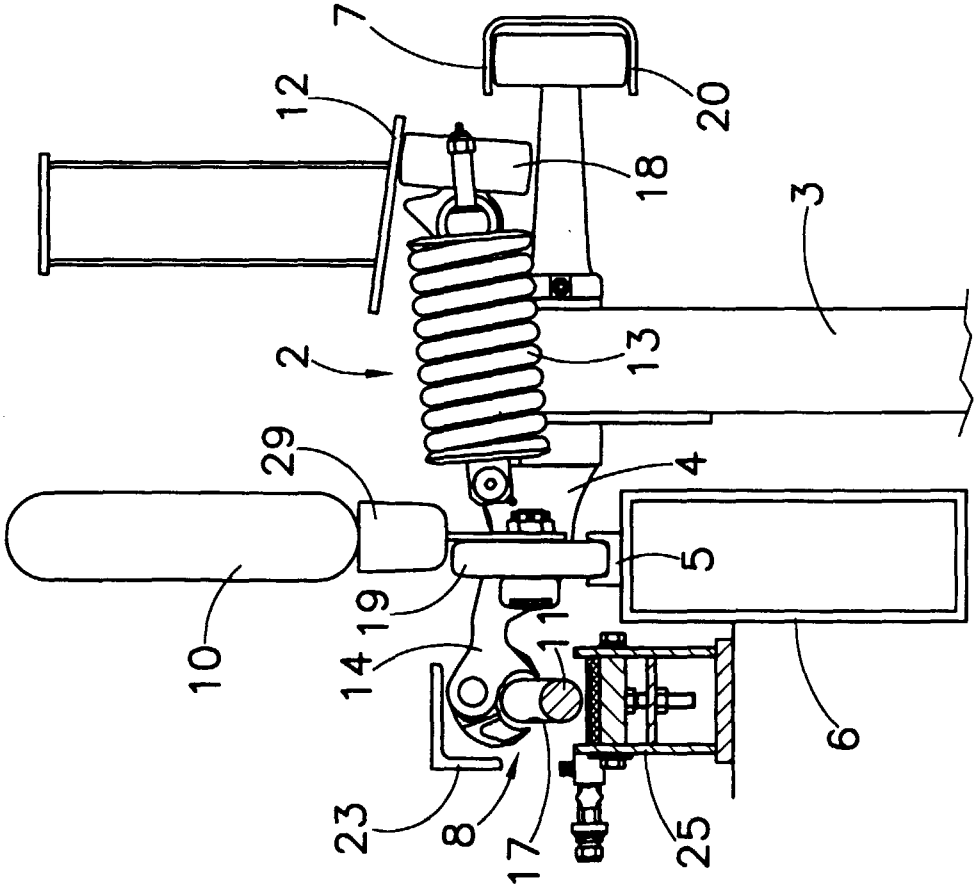
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FIG.7

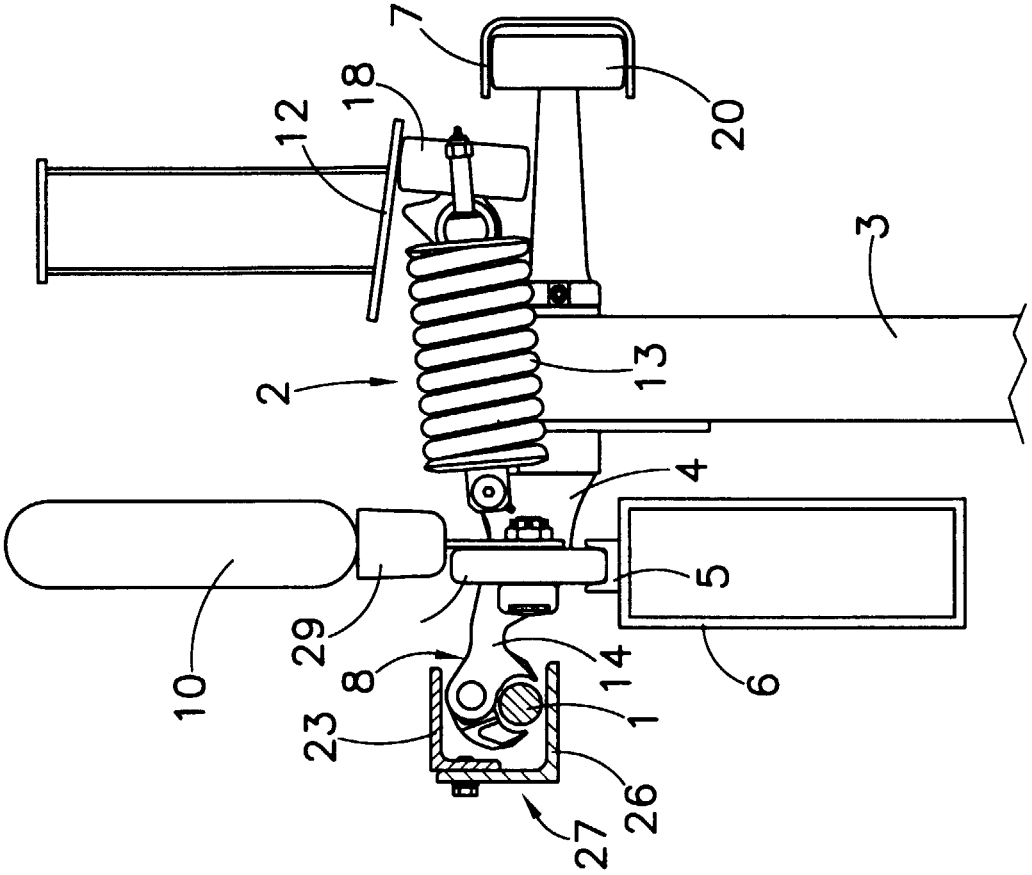
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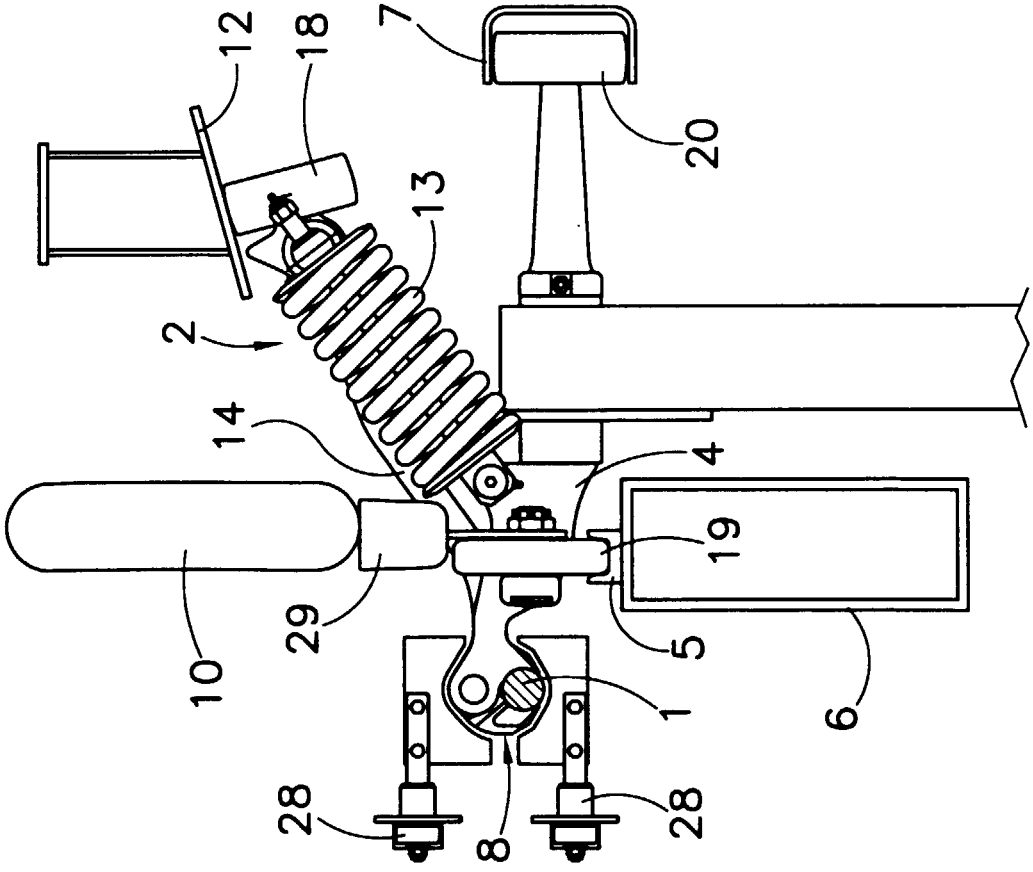
FIG.8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EUROPEAN SEARCH REPORT

Application Number
EP 99 20 1290

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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B61B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 November 1999	Chlosta, P

CATEGORY OF CITED DOCUMENTS

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