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(54) **SUSPENSION SYSTEM FOR A SASH OF A FUME CUPBOARD, AND METHOD IN A SASH OF A FUME CUPBOARD**

(57) The invention relates to a suspension system for a sash (10) of a fume cupboard (2), which includes a vertically moving sash (10), which is supported by counterweights (14) two or more suspension elements (12), and in which there is an activatable arrester catch (26) . The suspension arrangement includes, in addition, a cross-connected safety arrester (18), in which, if one suspension element (12) breaks, the counterweight (14) connected to the broken suspension element (12) is arranged to activate the said arrester catch (26), in order to stop the movement of the unbroken suspension element (12). The invention also relates to a method in a sash (10) of a fume cupboard.

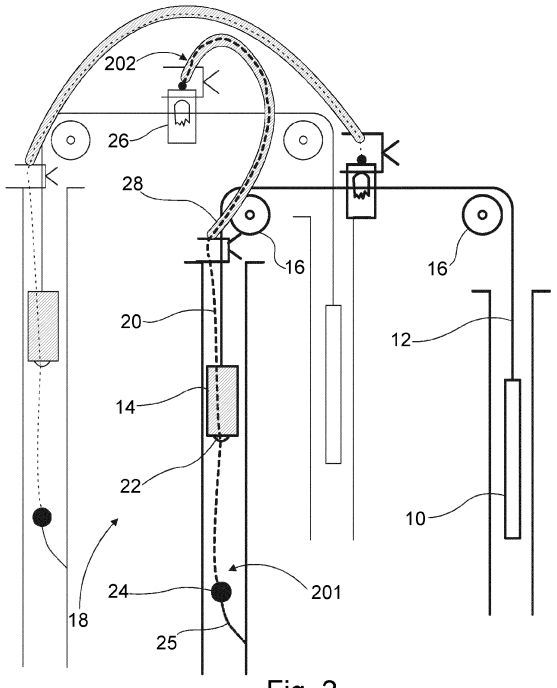

Fig. 2

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Description

[0001] The invention relates to a suspension system for a sash of a fume cupboard, which includes a vertically moving sash, which is supported by counterweights on two or more suspension elements, and in which there is an activatable arrester catch. The invention also relates to a method in a sash of a fume cupboard.

[0002] Substances that are detrimental to users and the environment are handled in fume cupboards. There is a sash, which is usually of glass, between the user and the object being studied. The sash prevents splashes flying on top of the user and at the same time reduces the working opening, so that the airflow needed for protection is smaller.

[0003] It should be possible to stop the sash in any position whatever, and due to this the suspension of the sash is typically implemented using the counterweight principle. If one of the sash's suspension elements (e.g. a wire cable) breaks, the sash supported by the counterweight will fall. However section 7.3.3 of the standard SFS-EN 14175-2 applying to fume cupboards lays down that a sash may not fall if a single suspension element breaks. Complicated safety systems are known from the prior art in case of the failure of a suspension element, but due to their complexity they result in considerable costs.

[0004] The invention is intended to create a fume-cupboard safety system, which prevents a sash falling if one suspension element breaks. The characteristic features of this invention are stated in the accompanying Claim 1. The invention is also intended to create a method in a fume-cupboard sash, by which the sash is prevented from falling, if a single suspension element fails. The characteristic features of this invention are stated in the accompanying Claim 10.

[0005] The sash-suspension arrangement of the fume cupboard according to the invention includes a vertically moving sash, which is supported by counterweights on two or more suspension elements, and in which there is an activatable arrester catch. The suspension arrangement includes, in addition, a cross-connected safety arrester, in which if one suspension element breaks, the counterweight connected to the suspension element is arranged to activate the arrester catch to stop the movement of the unbroken suspension element. If one suspension element breaks, the fall of the sash can then be stopped almost before it has begun.

[0006] Each of the sash's counterweights are preferably arranged to activate the arrester catch. The falling of the sash can then be stopped if any suspension device fails.

[0007] The safety arrester preferably comprises a stopper, on which the counterweight of the broken suspension element is arranged to concentrate the force, which is transmitted to the arrester catch by means of a wire cable or similar. In this way, if the suspension element breaks, the falling counterweight can be arranged to activate the arrester catch to stop the falling of the sash.

[0008] The force of the counterweight connected to the broken suspension element, acting on the stopper, is preferably arranged to pull the arrester catch towards the support part, thus pressing the unbroken suspension element between the arrester catch and the support part. In this way, the movement of the unbroken suspension element is stopped, thus stopping the fall of the sash.

[0009] The wire cable of the safety arrester is preferably arranged to run through a guide in the counterweight. In this way, if the suspension element breaks, the falling counterweight is arranged to strike the stopper.

[0010] The safety arrester's cable preferably runs at least partly inside a sleeve. In this way, the safety arrester can be easily cross-connected.

[0011] There is preferably an adjuster in the safety arrester for removing slack. There will then be no excessive delay in activating the arrester catch.

[0012] Each suspension element is preferably connected to its own counterweight. The operation of the safety arrester will then be ensured.

[0013] The first end of the safety arrester's cable, which comprises the stopper, is preferably attached to the fume cupboard's frame. This will prevent the safety arrester's cable from rising and becoming entangled.

[0014] In the method according to the invention in a fume cupboard's sash, in which fume cupboard the sash is moved vertically, and which sash is supported by counterweights on two or more suspension elements, and in which fume cupboard there is an activatable arrester catch, if one suspension element breaks the movement of the unbroken suspension element is stopped when the falling counterweight connected to the broken suspension element activates the arrester catch. When one suspension element breaks, the fall of the sash can then be stopped almost immediately.

[0015] The force of the counterweight connected to the broken suspension element is preferably concentrated on the stopper, through which the force is transmitted by a cable or similar to the arrester catch. Thus, when the suspension element breaks, the falling counterweight is made to activate the arrester catch, to prevent the sash from falling.

[0016] The arrester catch is preferably pulled towards the support part by the force of the counterweight connected to the broken suspension element, and the unbroken suspension element is pressed between the arrester catch and the support part. This stops the movement of the unbroken suspension element, which stops the sash falling.

[0017] The safety arrester's cable is preferably guided through a guide in the counterweight. Thus, if the suspension element breaks, the falling counterweight is aimed to strike the stopper.

[0018] In the following, the invention is described in detail with reference to the accompanying drawings showing some embodiments of the invention, in which

Figure 1 shows a front view of a fume cupboard,

Figure 2 shows a schematic diagram of the suspension arrangement and safety arrester of the sash of a fume cupboard according to the invention,

Figure 3 shows one arrester catch according to the invention.

[0019] Figure 1 shows one fume cupboard 2, to which the invention can be applied. On the front of the fume cupboard 2 is a working opening 4, which can be closed and opened using a sash 10. The sash 10 can be stopped at any point whatever between the extreme ends of its vertical movement. There are exhaust-air ducts 6 on top of the fume cupboard 10, through which noxious substances are led out of the breathing air.

[0020] Figure 2 shows one embodiment of the suspension system of the sash 10 of a fume cupboard according to the invention. The sash 10 is fitted to two counterweights 14 using two suspension elements 12. The suspension element 12 can be, for example, a wire cable, a cord, or a belt. The suspension element 12 runs around two pulleys 16, so that both counterweights 14 hang freely in the rear part of the fume cupboard 2. The total mass of the counterweights 14 equals the mass of the sash 10. Thus gravity acts equally on the counterweights 14 and the sash 10, so that the system remains in equilibrium. In other words, the sash 10 can be moved vertically, and stopped at any height between the extreme ends of the movement.

[0021] If, for some reason, one suspension element 12 breaks, the counterweight 14 attached to the relevant suspension element 12 drops freely downwards. The sash 10 is then supported only by the force of the other counterweight 14 acting upwards, which is not sufficient to hold the sash 10, because the mass of a single counterweight 14 is only half of the sash's 10 mass.

[0022] When it falls, the counterweight 14 belonging to the broken suspension element 12 is arranged to activate the safety arrester 18, which prevents the sash 10 from falling. The safety arrester 18 includes a cable 20, which is arranged to run through a guide 22 in the counterweight 14. The guide 22 can be, for example, a loop attached to the side of the counterweight 14, or the counterweight 14 can be shaped as a hollow cylinder, in which case the safety arrester's 18 cable 20 is arranged to run through the counterweight 14, so that the counterweight 14 itself can act as the guide 22.

[0023] At the first end 201 of the cable 20 is a stopper 24, which the counterweight 14 is arranged to strike when it falls. The stopper's 24 outer diameter is larger than the guide's 22 inner diameter, so that the falling counterweight 14 cannot travel freely farther than the stopper 24. When the counterweight 14 strikes the stopper 24 as it falls, it directs a downwardly directed force onto it. This activates the arrester catch 26 at the other end 202 of the cable 20, which is arranged around the unbroken suspension element 12. When the arrester catch 26 is activated, it stops the movement of the unbroken suspension element 12, so that the fall of the sash 10 stops. In other words, the safety arrester 18 is cross-connected in such a way that the counterweight 14 of the first suspension element 12 is arranged to activate the arrester catch 26 connected to the second suspension element 12.

[0024] The cable's 20 first end 201 is attached to the fume cupboard's 2 frame by a fastener 25. The fastener 25 prevents the cable 20 from rising and becoming entangled by anchoring the stopper 24 to the fume cupboard's 2 frame. However the fastener 25 permits the stopper's 24 movement necessary to activate the arrester catch 26. The fastener 25 can be, for example, a cord or a cable. An actual separate fastener 25 is not, however, necessarily required, instead the cable 20 can continue through the stopper 24 and be attached at its first end 201 to the fume cupboard's 2 frame, so that the cable 20 itself can act as the fastener 25. The stopper 24 can be, for example, a cable stop.

[0025] In addition to the embodiment shown in Figure 2, there can be more than two suspension elements 12 and counterweights 14. The safety arrester 18 is then cross-connected in such a way that the counterweight 14 connected to the broken suspension element 12 is arranged to activate the arrester catch 26 connected to one of the unbroken suspension elements 12.

[0026] Figure 3 shows in detail one embodiment of the arrester catch 26 according to the invention. The second end 202 of the safety arrester's 18 cable 20 is fitted through the first opening 261 of the arrester catch 26. Attached to the cable 20 is a cable stop 27, the diameter of which is greater than the diameter of the first opening 261, and which is thus supported on the arrester catch 26, when the cable 20 is pulled. The suspension element 12 is in turn arranged to run through the second opening 262 of the arrester catch 26.

[0027] The cable 20 is arranged to run for part of the way in a sleeve 28. The cable 20 is dimensioned in such a way that there is no excess slack in the system. In addition, the safety arrester 18 preferably includes an adjustment element 30 for removing slack.

[0028] When one suspension element 12 breaks, the falling counterweight 14 directs a force, when it strikes the stopper 24, which is transmitted through the cable 20 to the arrester catch 26. This force pulls the arrester catch 26 towards the support part 32, when the unbroken suspension element 12 running through the arrester catch's 26 second opening 262 is pressed between the arrester catch 26 and the support part 32 and stops immediately.

Claims

1. Suspension system for a sash (10) of a fume cupboard (2), which includes a vertically moving sash (10), which is supported by counterweights (14) on two or more suspension elements (12), and in which

there is an activatable arrester catch (26), **characterized in that** the suspension arrangement includes, in addition, a cross-connected safety arrester (18), in which, if one suspension element (12) breaks, the counterweight (14) connected to the broken suspension element (12) is arranged to activate the said arrester catch (26), in order to stop the movement of the unbroken suspension element (12).

2. Suspension system according to Claim 1, **characterized in that** each of the sash's (10) counterweights (14) is arranged to activate the arrester catch (26).

3. Suspension system according to Claim 1 or 2, **characterized in that** the safety arrester (18) comprises a stopper (24), on which the counterweight (14) of the broken suspension element (12) is arranged to direct a force, which by means of a cable (20) or similar, is transmitted to the arrester catch (26) .

4. Suspension system according to any of Claims 1 - 3, **characterized in that** the force directed on the stopper (24) by the counterweight (14) connected to the broken suspension element (12) is arranged to pull the arrester catch (26) towards the support part (32), thus pressing the unbroken suspension element (12) between the arrester catch (26) and the support part (32).

5. Suspension system according to any of Claims 1 - 4, **characterized in that** the safety arrester's (18) cable (20) is arranged to run through a guide (22) in the counterweight (12).

6. Suspension system according to any of Claims 1 - 5, **characterized in that** the safety arrester's (18) cable (20) runs at least partly inside a sleeve (28).

7. Suspension system according to any of Claims 1 - 6, **characterized in that** there is an adjustment element (30) in the safety arrester (18) to remove slack.

8. Suspension system according to any of Claims 1 - 7, **characterized in that** each suspension element (12) is connected to its own counterweight (14).

9. Suspension system according to any of Claims 1 - 8, **characterized in that** the first end (201) of the safety arrester's (18) cable (20), which comprises the stopper (24), is attached to the fume cupboard's (2) frame.

10. Method in the sash (10) of a fume cupboard (2), in which the sash (10) is moved vertically in the fume cupboard (2), and which sash (10) is supported by counterweights (14) on two or more suspension elements (12), and in which fume cupboard (2) is an activatable arrester catch (26), **characterized in that**, when one suspension element (12) breaks, the movement of the unbroken suspension element (12) is stopped when the falling counterweight (14) connected to the broken suspension element (12) activates the said arrester catch (26).

11. Method according to Claim 10, **characterized in that** the counterweight (14) connected to the broken suspension element (12) directs a force to a stopper (24), through which the force is transmitted by means of a cable (20) or similar to the arrester catch (26).

12. Method according to Claim 10 or 11, **characterized in that** the arrester catch (26) is pulled towards the support part (32) by the force directed to the stopper (24) by the counterweight (14) connected to the broken suspension element (12) and the unbroken suspension element (12) is pressed between the arrester catch (26) and the support part (32).

13. Method according to any of Claims 10 - 12, **characterized in that** the safety arrester's (18) cable (20) is guided through a guide (22) in the counterweight (12).

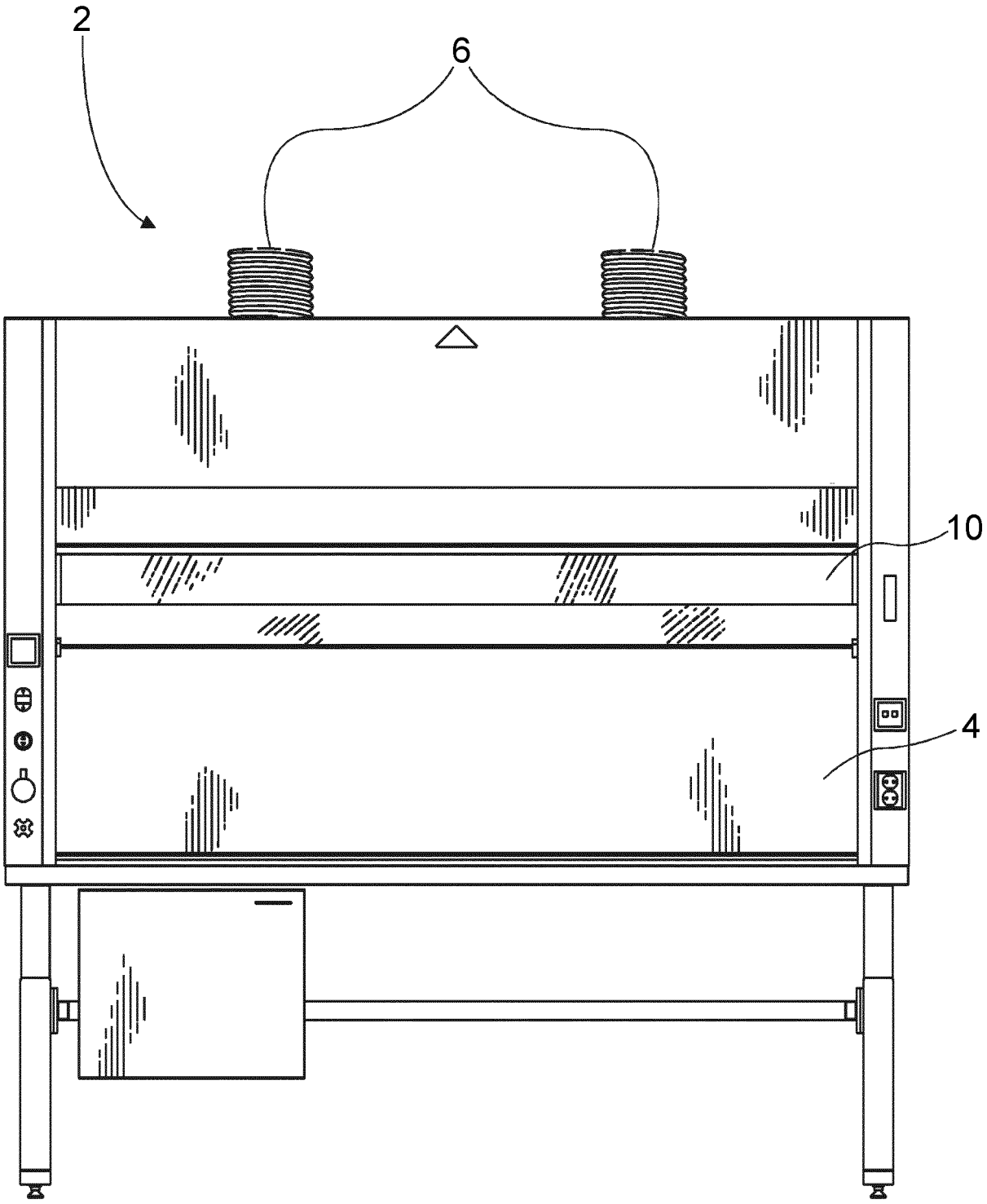

Fig. 1

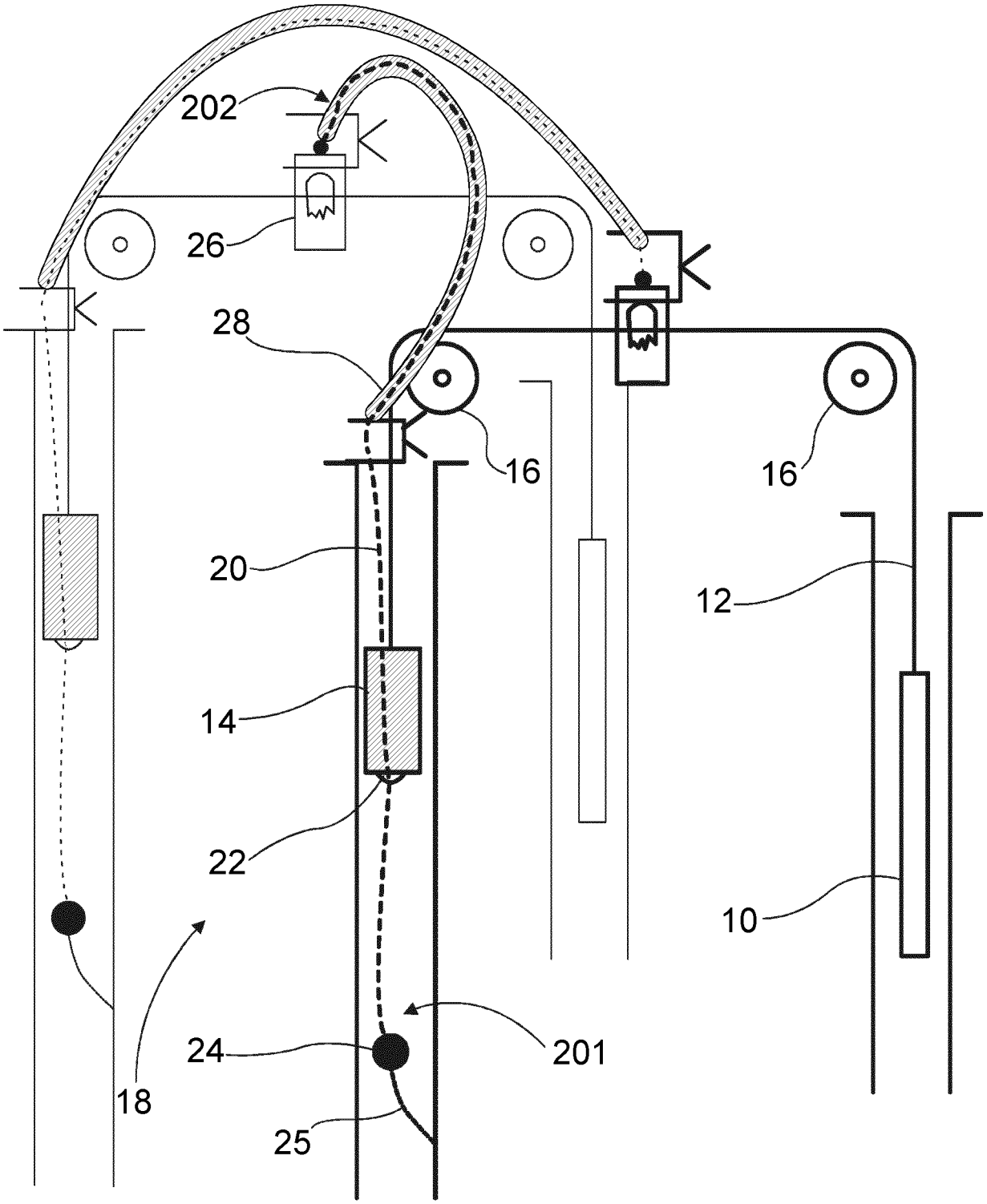

Fig. 2

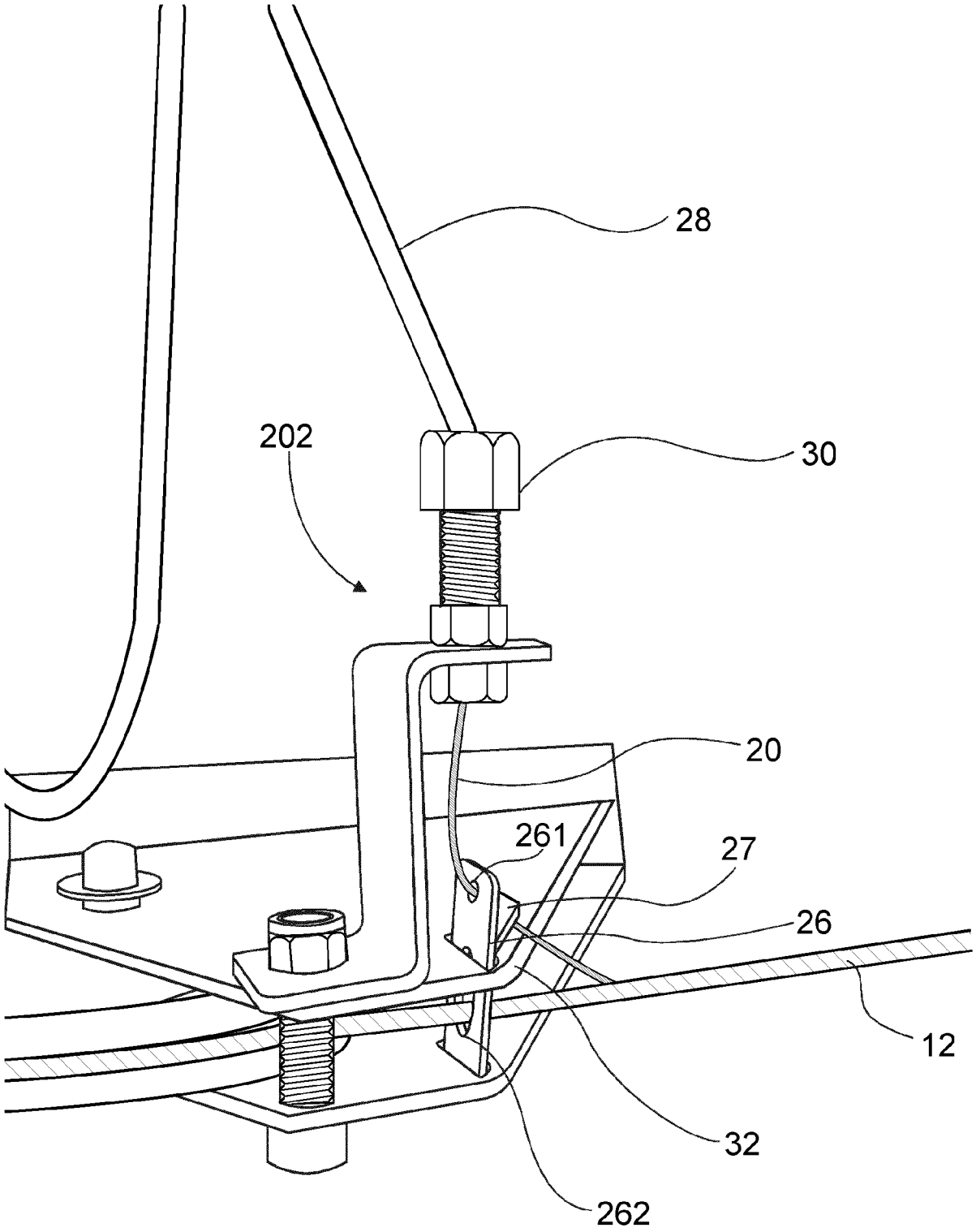

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 21 15 6800

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 July 2021	Cassiat, Clément

CATEGORY OF CITED DOCUMENTS

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