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(54) **A safety stop device for fire barrier doors**

(57) A safety stop device (1), for fire barrier doors, comprising suction cup means (8) associated with a fire barrier door (9) and cooperating with a wall (7) associated with a fixed body, said suction cup means forming a negative pressure chamber (10) with said wall which comprises an outlet hole coupled to a valve (11) controlled by a valve electromagnet (3) thereby, as electric power

is switched on, said electromagnet restrains said valve thereby closing a communication between the negative pressure chamber and outside environment, whereas, as electric power is switched off, said electromagnet releases said valve thereby communicating said negative pressure chamber with the outside environment, while disengaging the suction cup means from the fixed body.

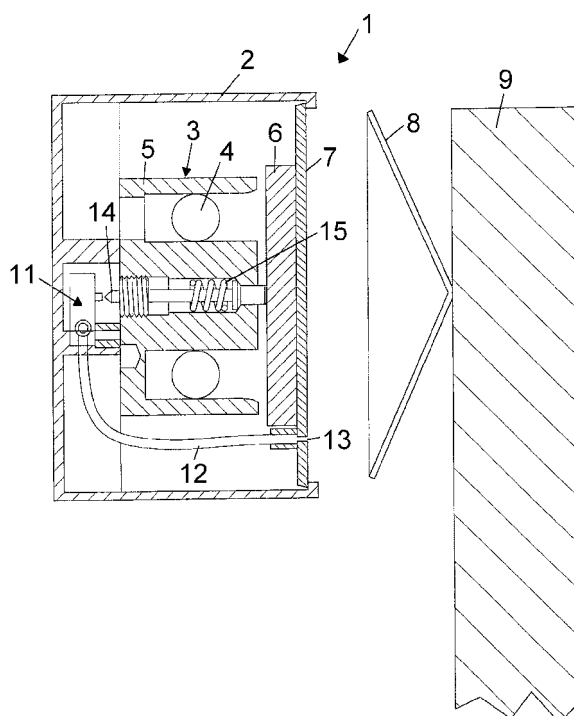


FIG. 1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a safety stop device particularly designed for fire barrier doors.

[0002] As is known, fire barrier doors usually comprise stop devices allowing to hold the door in a normally opened condition, in order not to hinder a people passage, but which may operate automatically for releasing the door in a fire event.

[0003] More specifically, are conventionally herein used electromagnetic stop devices holding the door in an open position by means of an electromagnetic force.

[0004] Those same safety stop devices, in an alarm event or as the electric power is interrupted, will release the door, which will be closed by a spring system associated therewith.

[0005] The above mentioned electromagnetic safety stop devices have the problem that they drain the energy necessary for holding under voltage the electromagnetic coil assembly.

SUMMARY OF THE INVENTION

[0006] Accordingly, the aim of the present invention is to provide a novel safety stop device which has a power drain much more smaller than that of prior systems.

[0007] Within the scope of the above mentioned aim, a main object of the invention is to provide such a safety stop device allowing the door to be quickly and reliably released in an emergency event.

[0008] Yet another object of the present invention is to provide such a safety stop device which may be applied to any types of door.

[0009] Yet another object of the present invention is to provide such a safety stop device which may be made by using easily available elements and materials and which, moreover, is very competitive from a mere economic standpoint.

[0010] Yet another object of the present invention is to provide such a safety stop device which, owing to its specifically designed constructional features is very reliable and safe in operation.

[0011] According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a safety stop device, for fire barrier doors, **characterized in that** said device comprises suction cup means associated to a fire barrier door and cooperating with a wall associated to a fixed body.

[0012] Said suction cup means form a negative pressure chamber with said wall, which comprises an outlet hole coupled to a valve controlled by a valve electromagnet.

[0013] Thus, as electric power is switched on, said electromagnet will restrain said valve thereby closing the communication between the negative pressure chamber

and the outside environment.

[0014] On the other hand, as electric power is switched off, said electromagnet will release said valve thereby communicating said negative pressure chamber with the outside environment, while disengaging the suction cup means from the fixed body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Further characteristics and advantages of the present invention will become more apparent hereinafter from the following disclosure of a preferred, though not exclusive, embodiment of the invention, which is illustrated, by way of an indicative, but not limitative example, in the accompanying drawings, where:

Figure 1 is a longitudinal cross-sectioned side elevation view of the safety stop device, shown in a closed door condition;

Figure 2 is a view similar to the preceding Figure but showing a latching operation whereby the door is latched or locked by the subject safety stop device; Figure 3 shows the safety stop device in a normally use condition, with the door being opened and latched by the device;

and

Figure 4 shows an operating step for latching the door.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] With reference to the number references of the above mentioned figures, the safety stop device according to the present invention, which has been generally indicated by the reference number 1, comprises an envelope or casing 2, including therein an electromagnet 3, consisting of an electromagnet coil 4 and an electromagnet core 5.

[0017] The electromagnet 3 cooperates with a metal plate 6 associated to a wall 7 and movable within the casing 2.

[0018] The wall 7, which may be made of any materials, for example a metal or plastics material, cooperate with a suction cup 8 associated to a door 9.

[0019] In the closed door condition, the suction cup 8 is spaced away from the wall 7, as is shown in Figure 1, whereas, in an opened door condition, the suction cup 8 strictly contacts the wall 7 thereby forming an air chamber 10, wherein is present a pressure less than the environment pressure, and holding the door in a contact relationship with the casing 2, as shown in Figure 3.

[0020] The air chamber 10 communicates with a valve 11, through a communicating duct 12 ending with an outlet hole 13 formed through the wall 7.

[0021] The valve 11 is arranged at a valve actuator 14, consisting of an actuator piston having a releasing or unlatching spring 15 and associated to said electromag-

net 3.

[0022] In the closed door condition, shown in Figure 1, the suction cup 8 associated with said door is spaced away from the body of the device 1.

[0023] In Figure 1, the device is shown in an operating condition thereof in which the electromagnet 3 is not power supplied and is accordingly spaced away from the wall 7 plate 6.

[0024] As the door is opened, the suction cup will latch or lock the wall 7, as shown in Figure 2, thereby providing an air chamber 10 in which is present a pressure less than the environment pressure, thereby causing air to exit the outer rim or edge of the suction cup.

[0025] In a normal use condition, the door being opened and latched, the device will be in the condition shown in Figure 3, in which the electromagnet 3 is power supplied and contacts the plate 6 and valve 11 closing the air passage through the duct 12.

[0026] Thus, the chamber 10 will not communicate with the outside environment.

[0027] The necessary force for holding the door in its opened position is all provided by the suction cup 8 through the depressurized or negative pressure air chamber 10.

[0028] In this operating step, the electromagnet 3 is merely used for holding the valve 11 in a closed position, thereby preventing any communication between the chamber 10 and outside environment

[0029] Thus, the electric power consume or drain is very small, since the force necessary for holding the valve 11 is a very small one, much less than the force which would be necessary for holding the overall door, as in a conventional safety stop device.

[0030] In an emergency operating case, the electric power will be switched off thereby the electromagnet will disengage the valve 11, being aided by the unlatched spring 15, so as to communicate the chamber 10 with the outside environment through the outlet hole 13 and duct 12, as schematically shown in Figure 4.

[0031] It has been found that the invention fully achieves the intended aim and objects.

[0032] In fact, the invention has provided a safety stop device consuming a very small electric power amount for holding a small pneumatic valve, whereas the force necessary for restraining the door is completely exerted by a suction cup, with a zero power consume.

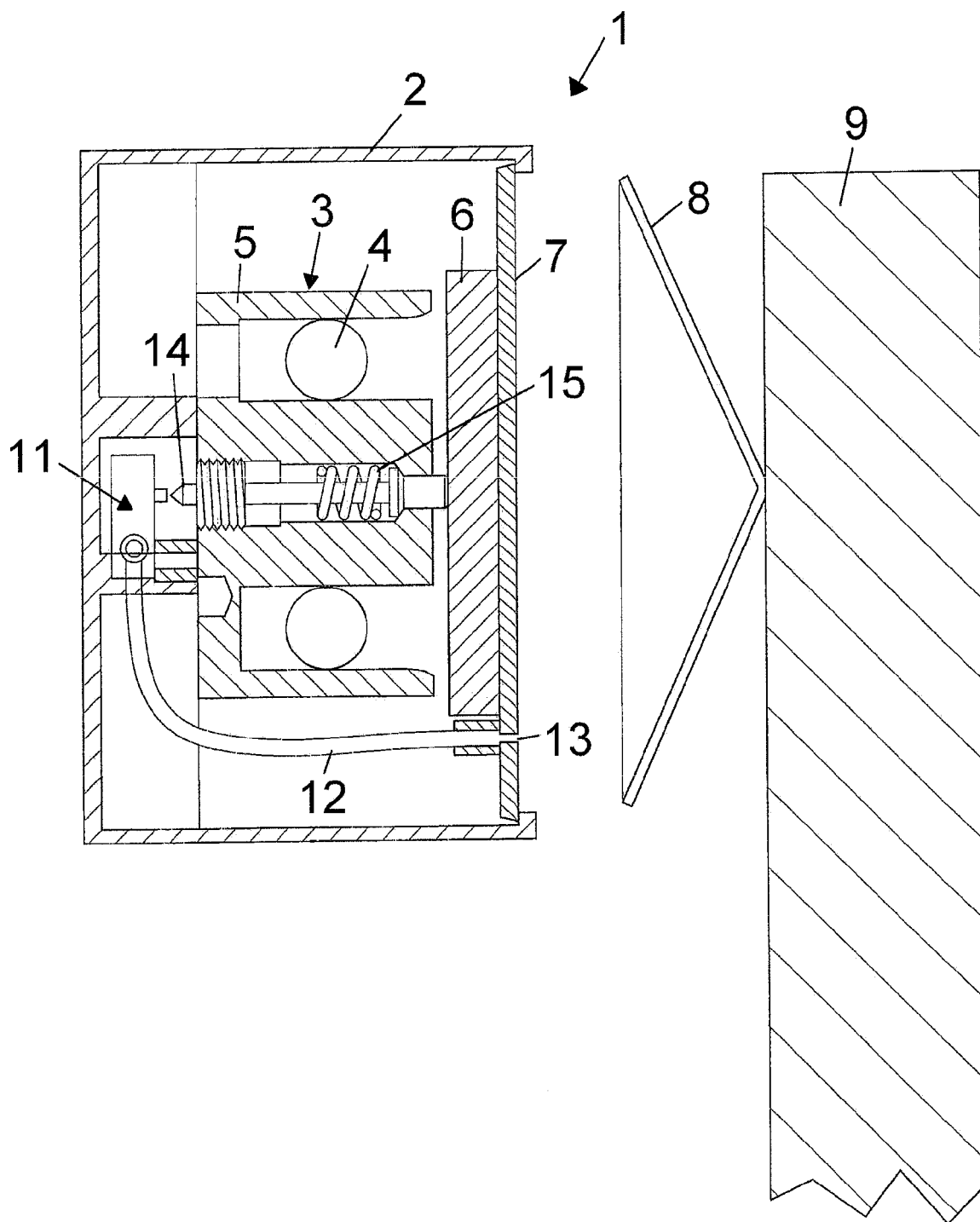
[0033] In practicing the invention, the used materials, as well as the contingent size and shapes can be any, depending on requirements.

chamber with said wall which comprises an outlet hole coupled to a valve controlled by a valve electromagnet thereby, as electric power is switched on, said electromagnet restrains said valve thereby closing a communication between the negative pressure chamber and outside environment, whereas, as electric power is switched off, said electromagnet releases said valve thereby communicating said negative pressure chamber with the outside environment, while disengaging the suction cup means from the fixed body.

2. A safety stop device, according to claim 1, **characterized in that** said device comprises a casing including said electromagnet including an electromagnet coil and core.
3. A safety stop device, according to claim 2, **characterized in that** said electromagnet cooperates with a metal plate associated with said wall and movable within said casing.
4. A safety stop device, according to claim 3, **characterized in that** said negative pressure chamber communicates with said valve through a communicating duct ending at said wall outlet hole.
5. A safety stop device, according to claim 4, **characterized in that** said valve is arranged at a valve actuator including an actuator piston having a releasing spring and being associated with said electromagnet.

Claims

1. A safety stop device, for fire barrier doors, **characterized in that** said device comprises suction cup means associated with a fire barrier door and cooperating with a wall associated with a fixed body, said suction cup means forming a negative pressure



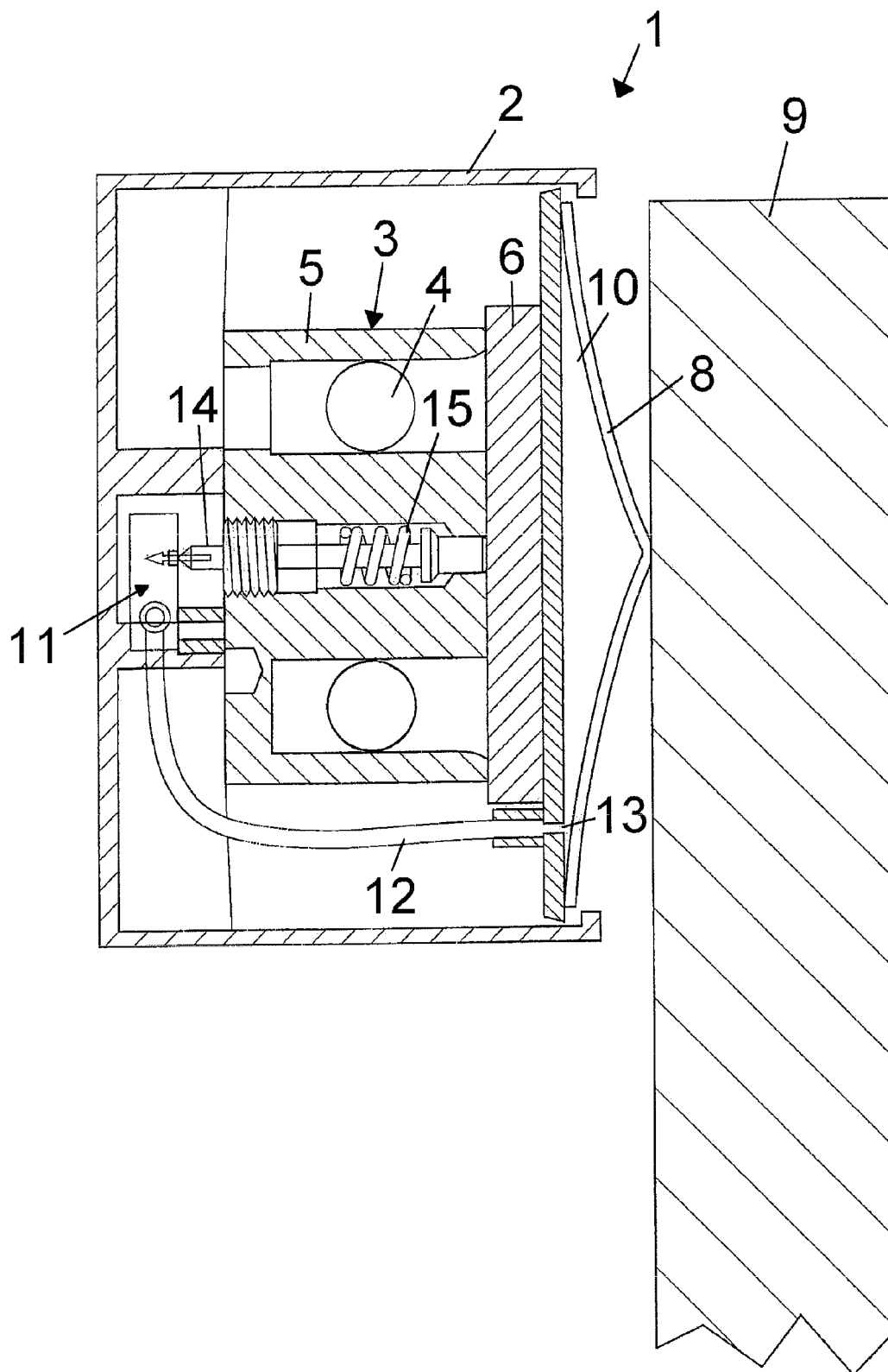


FIG. 2

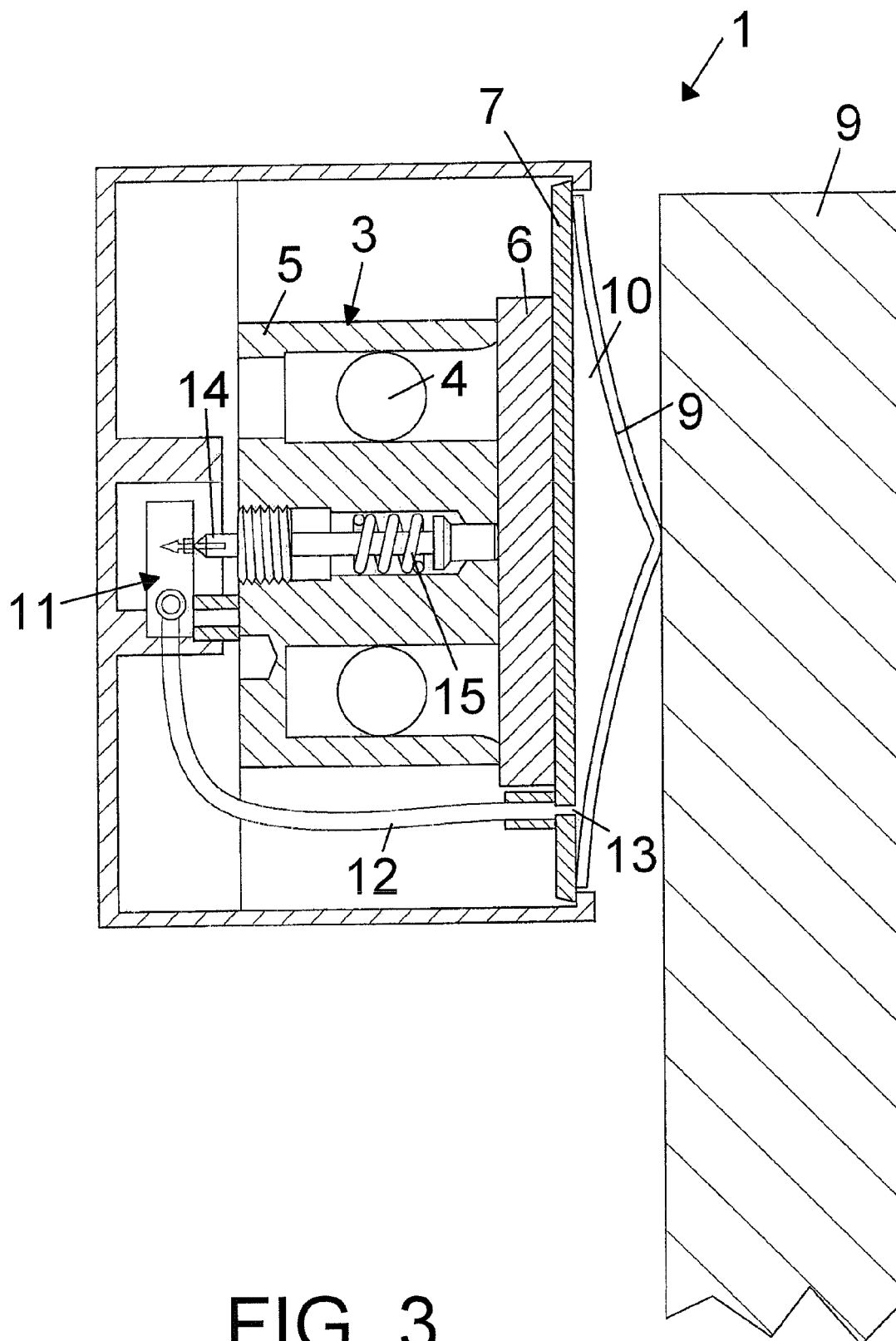
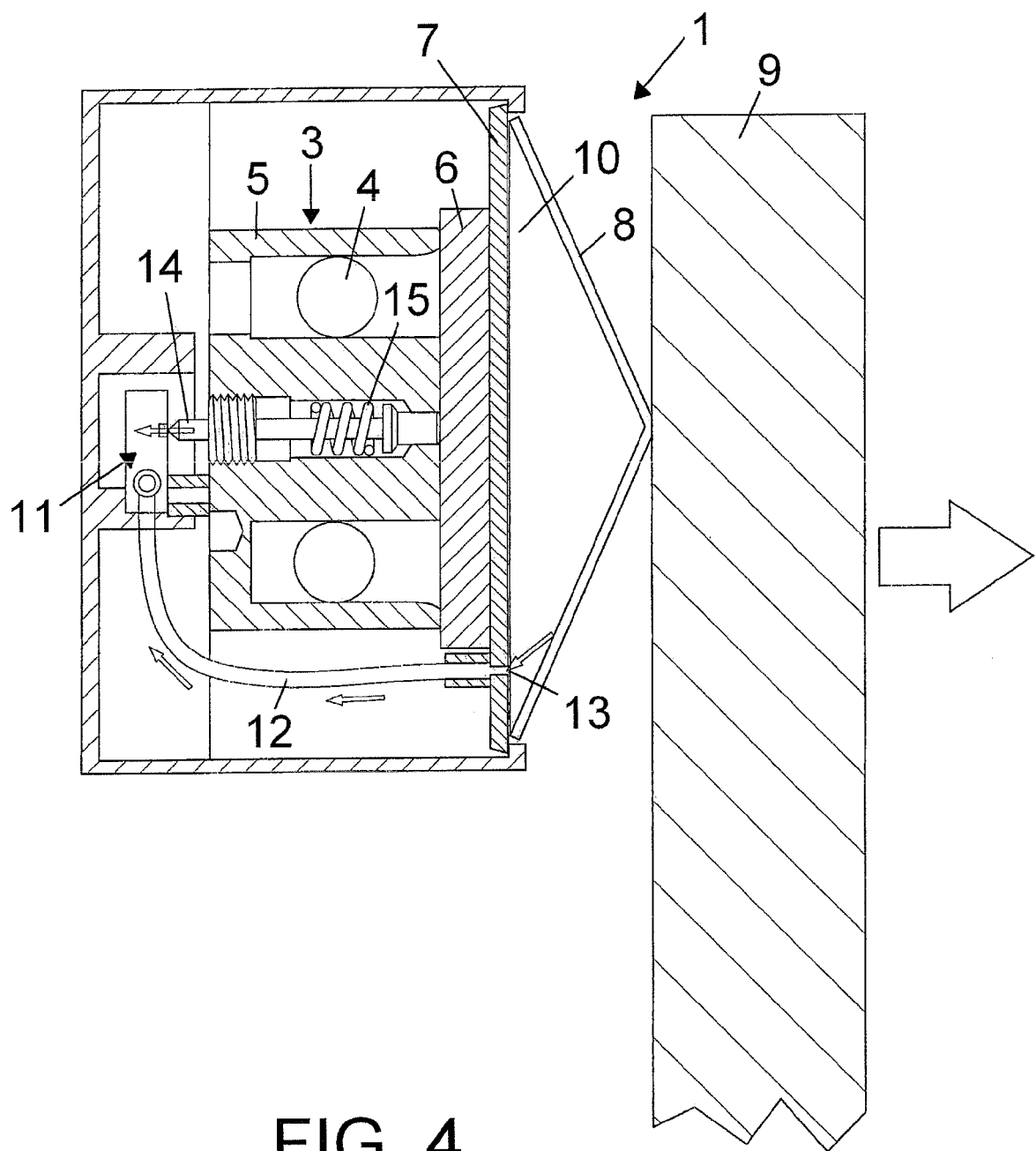


FIG. 3





EUROPEAN SEARCH REPORT

Application Number
EP 12 16 6758

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 463 944 A (RED DOT TECHNOLOGIES LTD [GB]) 7 April 2010 (2010-04-07)	1,2	INV. A62C2/06
A	* abstract * * figure 1 * * page 2, line 30 - page 2, line 24 *	3-5	A62C2/12 A62C2/24
T	"Solenoid Valve; Wikipedia", Wikipedia.org, 29 December 2011 (2011-12-29), XP055016037, Wikipedia.org Retrieved from the Internet: URL:http://en.wikipedia.org/wiki/Solenoid_valve [retrieved on 2012-01-10] * the whole document *	1,2,4,5	ADD. E05C19/00
			TECHNICAL FIELDS SEARCHED (IPC)
			A62C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 1 October 2012	Examiner Nehrdich, Martin
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 16 6758

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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01-10-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2463944	A	07-04-2010	NONE

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82