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(54) **CONTROLLABLY OPERATING DRAUGHT EXCLUDER DEVICE**

(57) A controllably movable draught-excluder device is designed to be attached to the bottom edge (B) of a door (P) or window, which is hinged to a fixed frame (T), and comprises a strip (3) made of a flexible material, which defines a longitudinal axis (L) and is adapted to interact with a sill (S) to provide an air sealing effect, drive means (6) acting upon the strip (3) through at least one connecting link (11) to move the strip of a profile (3) from a raised rest position to a lowered active position in contact with the sill (S) and vice versa. The drive means (6) comprise an actuator (7) which is adapted to move between an extended position, in which it is spaced from the frame (T), when the door (P) is open, and a retracted position in which it contacts the frame (T) when the door (P) is closed, delay means (8) acting upon the drive means (6) to delay the movement of said strip (3). The drive means (6) comprise at least one slide (10), which is connected to the strip through the connecting link (11) and has an appendix (25) with an end edge (26) adapted to interact by contact with the delay means (8) to delay the movement of the strip (3) from its raised position to its lowered position as the door (P) is closed. The end edge (26) may be moved away from the delay means (8) to ensure quasi-instantaneous automatic movement of the strip (3) from its lowered position to its raised position as the door (P) is opened.

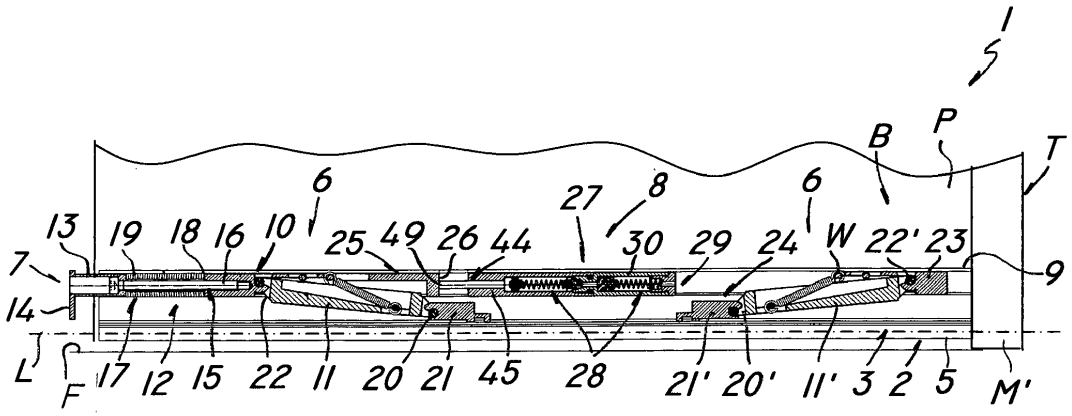

FIG. 1

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Description

Field of the Invention

[0001] The present invention generally finds application in the field of heat and sound insulating devices for doors and windows, and particularly relates to a controllably movable draught-excluder device.

Background art

[0002] Draught-excluder devices have been long known to be used in door or window leaves for at least partially closing off any gap that may occur either between the leaf and the sill or between the door and the floor.

[0003] These known devices are generally known to be attached to the bottom edge of the door and comprise a seal, e.g. a strip made of a flexible material, which is designed to interact with the floor to restrict air passage.

[0004] A first drawback of these known arrangements is that the flexible strip constantly contacts the floor and tends to rub against its surface as the door is opened and closed, thereby generating friction and making it difficult the movement by the user.

[0005] A further drawback is that the flexible strip tends to undergo permanent deformation upon repeated rubbing against the floor, which will considerably reduce its air sealing effect.

[0006] In an attempt to at least partially obviate these drawbacks, draught-excluder devices have been developed, which are able to move between a raised position, in which they are held within a seat formed in the bottom edge of the door, and a lowered position in contact with the floor.

[0007] Namely, in these devices the flexible strip can only move from the raised position to the lowered position when the door is closed, and is thus prevented from rubbing as the door moves.

[0008] Draught-excluder devices generally comprise an actuator which projects out of the door and is conformed to interact with the fixed frame and control appropriate drive means, which are designed to promote automatic translation of the flexible strip from the raised position to the lowered position and vice versa.

[0009] In certain draught-excluder devices, delay means are interposed between the actuator and the drive means to cause the flexible strip to descend some time after the door has been closed.

[0010] GB616076 discloses a draught-excluder device in which the delay means comprise a hollow oil hydraulic cylinder which slidably supports an annular shaft acted upon by a spring driven by the actuator.

[0011] The movement of the actuator compresses the spring and allows the fluid to circulate within a conduit which is located fluidically downstream from the cylinder, for controlled descent of a pair of pistons associated with the flexible strip.

[0012] A first drawback of this arrangement is that the device requires a very complex manufacturing process, because the cylinder, the conduit and the shaft must be appropriately sized to maintain the fluid at a pressure above a predetermined minimum value sufficient to counteract the natural upward movement of the strip.

[0013] CH666719 discloses a draught-excluder device in which the actuator is connected to the drive means through a rigid arm extending through a oil hydraulic cylinder which defines a pair of chambers in fluid communication with each other through a hole.

[0014] The movement of the actuator displaces the rigid arm and consequently actuates the drive means with a damping effect caused by the flow of oil into the two chambers through the oil. This will cause delayed and progressive descent of the flexible strip to contact with the floor.

[0015] Nevertheless, these arrangements have the drawback that the flexible strip is raised some time after the door has been opened.

[0016] This is because the upward movement of the flexible strip is also controlled by the drive means, whose movement is delayed, by the fluid that flows in an opposite direction, with respect to the time at which the door has been closed.

[0017] Therefore, as the door is opened, the flexible strip rubs against the floor for a non-negligible time before being raised.

[0018] Furthermore, these prior art devices require appropriate adjustments to cause the descent of the flexible strip to occur with an acceptable, non excessive delay with respect to the time at which the door is closed.

[0019] Also, another important drawback of the above described arrangements is that these solutions have a limited durability and their manufacturing and installation complexity considerably increases maintenance and/or replacement times.

Disclosure of the invention

[0020] The object of the present invention is to obviate the above drawbacks, by providing a controllably movable draught-excluder device that is highly efficient and relatively cost-effective.

[0021] A particular object of the present invention is to provide a controllably movable draught-excluder device that allows the door to be easily opened and closed and promotes a high sealing effect irrespective of the conformation of the floor or sill.

[0022] A particular object of the present invention is to provide a controllably movable draught-excluder device that ensures instantaneous response as the door is opened.

[0023] Another object of the present invention is to provide a controllably movable draught-excluder device that has a simple manufacturing process.

[0024] Another object of the present invention is to provide a controllably movable draught-excluder device that

has simple maintenance.

[0025] Yet another object of the present invention is to provide a controllably movable draught-excluder device that affords very simple adjustment of the delay with which the flexible strip is lowered, such delay being constant with time.

[0026] These and other objects, as better explained hereafter, are fulfilled by a controllably movable draught-excluder device for carts as defined in claim 1.

[0027] Advantageous embodiments of the invention are obtained in accordance with the dependent claims.

Brief Description of the Drawings

[0028] Further features and advantages of the invention will be more apparent from the detailed description of a preferred, non-exclusive embodiment of a controllably movable draught-excluder device according to the invention, which is described as a non-limiting example with the help of the annexed drawings, in which:

FIG. 1 is a broken-away side view of the draught-excluder device of the invention;
FIG. 2 is a front view of the device of Fig. 1, with the latter contacting a raised sill of a door or window leaf.
FIG. 3 is a perspective view of a first detail of Fig. 1 in a first configuration;
FIGS. 4 and 5 are broken-away side views of the first detail of Fig. 4 in two different operating positions;
FIGS. 6A, 6B, 7A, 7B, 11A, 11B, 12A and 12B are broken-away side and front views of the device 1 respectively, in different operating positions;
FIGS. 8, 10, 13 and 14 are broken-away side views of the first detail of Fig. 3, which is enlarged as compared with Figs. 6A, 7A, 11A and 12A respectively;
FIG. 9 is an enlarged broken-away side view of a second detail of Fig. 7A;
FIG. 15 is a broken-away side view of the first detail of Fig. 1 according to a second embodiment;
FIG. 16 is an enlarged view of a portion of the first detail of Fig. 15.

Detailed description of preferred embodiments

[0029] The above figures show a controllably movable draught-excluder device, generally designated by numeral 1, which is designed to be attached to the bottom edge B of a door P or a door or window leaf, the latter being hinged to a fixed frame T secured to an opening formed in a wall.

[0030] As is known per se, the frame T comprises a pair of vertical posts M, M', joined by a horizontal cross member. The door P may be hinged to one of these posts M' to pivot about a substantially vertical axis.

[0031] In the embodiment of FIG. 1, the draught-excluder device 1 comprises a box-like enclosure 9 which is designed to be fitted into a longitudinal groove W formed in the bottom edge B of the door P and a seal 2 extending along a longitudinal axis L.

[0032] The seal 2 essentially consists of a strip 3 of a profile that is adapted to interact with the floor F to provide an at least partial air sealing effect.

[0033] Alternatively, as best shown in FIG. 2, the strip 3 may interact with a sill S, which is attached to the floor F and has a convex outer surface to prevent the passage of dirt or impurities.

[0034] The seal 2 is preferably made of a flexible material selected from the group comprising elastomers or polymeric materials and may have an upper portion 4 with at least one lower appendix 5 extending therefrom to interact with the sill S.

[0035] The device 1 further comprises drive means 6 which act upon the strip 3 to move it between a raised rest position, relative to the sill S or the floor F and a lowered operating position, in contact with the sill S or the floor F.

[0036] Proximate to one of the ends of the box-like enclosure 9, the device 1 comprises an actuator 7, which is operably associated with the drive means 6 to control actuation thereof.

[0037] Namely, the actuator 7 is adapted to move between an extended position, in which it does not interact with the frame T and a retracted position in which it contacts the frame T.

[0038] The box-like enclosure is designed to be located in the longitudinal groove W of the bottom edge B of the door P for the actuator 7 to be able to interact with a post M of the frame T. Namely, the actuator 7 will be in an extended position when the door P is open and in a retracted position when the door P is closed.

[0039] Delay means 8 are further provided, which act upon the drive means 6 to delay the movement of the strip 3.

[0040] The delay means 8 are adapted to interact with the drive means 6 to transfer motion from the actuator 7 to the strip 3 and to delay the movement of the strip 3 from the raised position to the lowered position as the door P is closed.

[0041] Thus, the lower appendix 5 of the strip 3 will gradually fit the particular shape of the sill S or floor F, thereby increasing its draught or air sealing effect.

[0042] Furthermore, the strip 3 will only move to its lowered position when the door P is closed, which will prevent it from rubbing against the sill S or floor F.

[0043] A peculiar feature of the invention is that the drive means 6 comprise at least one slide 10, which is connected to the strip 3 by means of one or more links 11.

[0044] First elastic means 12 may be further provided between the actuator 7 and the slide 10.

[0045] Conveniently, the actuator 7 may comprise a tubular element 13 having a flat end portion 14 projecting out of the enclosure 9 and adapted for interaction with the post M of the frame T.

[0046] The tubular element 14 may be slidably mounted to a longitudinal pin 15 located in the enclosure 9 and

having one end 16 rigidly joined to the slide 10.

[0047] The first elastic means 12 may comprise a bias spring 17 fitted on the longitudinal pin 15 whose ends 18, 19 interact with the actuator 7 and the slide 10 respectively. The slide 10 may interact with the actuator 7 to move in a longitudinal direction to a predetermined extent.

[0048] In the retracted position, the actuator 7 may promote compression of the bias spring 17. The latter may have a spring modulus K_1 selected to transfer a longitudinal force F_1 of not less than 230 N to the slide 10.

[0049] In the embodiment of the figures, the device 1 may comprise a pair of connecting rods 11, 11' with one end 20, 20' hinged to corresponding anchor elements 21, 21', which are designed to be removably secured to the upper portion 4 of the strip 3.

[0050] The other end 22 of one of the connecting links 11 is hinged to a slide 10, whereas the end 22' of the other connecting link 11' is hinged to a fixed support 23.

[0051] This connecting arrangement will provide a four-bar linkage 24 whose sides are formed by the slide 10, the connecting link 11, the strip 3 and the other connecting link 11' respectively.

[0052] The force F_1 applied by the bias spring 17 to the four-bar linkage 24 through the slide 10 will cause the strip 3 to move downwards, while remaining substantially parallel to the longitudinal axis L.

[0053] A further peculiar feature of the invention is that the slide 10 has an appendix 25 with end edge 26, preferably but without limitation having a flat shape, adapted to interact by contact with the delay means 8 when the actuator 7 contacts the post M, to thereby delay the movement of the strip 3 from the raised position to the lowered position as the door P is closed.

[0054] The end edge 26 is further adapted to be moved away from the delay means 8 to ensure quasi-instantaneous automatic movement of the strip 3 from its lowered position to its raised position as the door P is opened.

[0055] Conveniently, as best shown in FIGS. 3 to 5, 8 10, 12 and 14, the delay means 8 may comprise a substantially longitudinal oil hydraulic shock-absorber 27 comprising second elastic means 28.

[0056] Preferably, the shock absorber 27 comprises an elongate body 29 having a substantially cylindrical longitudinal cavity 30 which defines at least one first chamber filled with incompressible oil O.

[0057] Particularly, a partition element 31 may be placed in the cavity 30 to define a first chamber 32 and a second chamber 33, with an axial passage 34 for fluid communication therebetween.

[0058] The elongate body 29 may in turn comprise a front portion 35 and a rear portion 36, which are joined together at one end 37, 28 and define the first chamber 32 and the second chamber 33 respectively.

[0059] Furthermore, the end 38 of the rear portion 36 may be fitted into an opening 39 formed in the end 37 of the front portion 35 to define the partition element 31.

[0060] The partition element 31 may have a pair of substantially flat faces 40, 41 facing the first chamber 32 and the second chamber 33 respectively.

[0061] Preferably, the fluid O that fills the cavity 30 may be an oil selected from the group comprising both natural and synthetic hydraulic oils.

[0062] Conveniently, the second elastic means 28 may comprise at least one first spring 42 held within the first chamber 32, and the second elastic means 28 may comprise a second spring 43 held within the second chamber 33.

[0063] Conveniently, the shock-absorber 27 may comprise a piston 44 having a rod 45 slidably fitted in an axial end hole 46 of the elongate body 29 and an enlarged head 47, slidably held within the first chamber 32 and interacts with one end 48 of the first spring 42.

[0064] Thus, the first spring 42 may act upon the enlarged head 47 with a longitudinal force F_2 directed opposite to the force F_1 exerted by the bias spring 17 on the slide 10, as best shown in FIGS. 7, 9 and 10.

[0065] Preferably, the axial end hole 46 will be formed in the front portion 35 of the elongate body 29 and the free end of the shaft 49 may project outwardly thereof when the first chamber 32 is at least partially filled with fluid O.

[0066] Furthermore, the shock-absorber 27 may comprise an annular element 50, which is slidably and sealably inserted in the second chamber 33.

[0067] The second spring 43 may interact with the annular element 50 to exert thereupon a longitudinal force F_3 in the same direction as the force F_2 exerted by the first spring 42 on the enlarged head 47, to promote compression of the fluid O in the second chamber 33.

[0068] The partition element 31 may have a seat 51 on the face 40 facing the first chamber 32, said seat communicating with the axial passage 34 and being adapted to accommodate a valve body 52 which is slidably movable against the biasing action of the first spring 42.

[0069] The valve body 52 may have a calibrated axial orifice 53 which is designed to restrict the flow of fluid O from the first chamber 32 to the second chamber 33, thereby damping the displacement t of the shaft 45.

[0070] Namely, the axial orifice 53 may face toward and be located at an end opening 54 of the axial passage 34, once the valve body 52 has been fully accommodated in the seat 51 due to the compression of the fluid O generated by the inward displacement of the rod 45.

[0071] Thus, the fluid O will be able to gradually flow from the first chamber 32 to the second chamber 33, thereby promoting a slower and substantially constant inward movement t of the rod 45.

[0072] In the embodiment as shown in FIG. 5, the seat 51 and the lateral surface 55 of the valve body 52 have substantially frustoconical complementary shapes, to create a substantially annular meatus therebetween, through which the fluid O is designed to flow from the second chamber 33 to the first chamber 32.

[0073] Namely, the clearance 56 will be formed as the valve body 52 moves away from the seat 51 due to the

force F_4 generated by the fluid O as it flows through the axial passage 34.

[0074] Also, the second spring 43 may interact with the annular element 50 to compress the fluid O in the second chamber 33 and promote backflow thereof into the first chamber 32 through the axial passage 34 and the clearer and 56.

[0075] As the fluid O flows from the second chamber 33 to the first chamber 32, it will cause the rod 45 to slide outwards, with its free end 49 projecting out of the end hole 46.

[0076] Advantageously, the edge 26 of the appendix 25 may compress the free end 49 of the rod 45 when the actuator 7 is in the retracted position.

[0077] Thus, the edge 26 of the appendix 25 will transfer the force F_1 generated by the bias spring 17 to the free end 49 of the rod 45 when the actuator 7 is in the retracted position and the door P is closed.

[0078] Therefore, in this state, the rod 45 will be pressed inwards and the drive means 6 will promote the delayed movement of the slide 10 and the flexible strip 3 from the raised position to the lowered position, in contact with the sill S.

[0079] On the other hand, the edge 26 of the appendix 25 may be moved away from the free end 49 of the rod 45 when the actuator 7 is in the extended position, thereby ensuring quasi-instantaneous movement of the slide 10 and the connecting link 11, and instantaneous upward movement of the strip 3 from the lowered position to the raised position, while maintaining an orientation substantially parallel to the longitudinal axis L.

[0080] In the alternative embodiment of the shock-absorber 27 as shown in FIG. 15, the cavity 13 has a single chamber 32, which houses the head 47 of the piston 44, acted upon by the end 48 of a single spring 42.

[0081] As shown in fig 16, a plurality of substantially axial calibrated through holes 57 are formed at the enlarged head 47 of the piston 44, allowing the fluid O in the first chamber 32 to flow through the head 47 as the piston 44 moves forward.

[0082] The spring 32 is designed to act upon the head 47 of the piston 44 to cause the free end 49 of the rod 45 to move back to the maximum distance from the end hole 46.

[0083] Furthermore, a cylindrical element 58 may be inserted in the chamber 32 upstream from the enlarged head 47, and have a corresponding central passage 59, for the rod 45 to slide therein and compensate for fluid O volume changes as the piston 44 moves.

[0084] FIGS. 6 to 14 sequentially show the steps of the operation of the draught-excluder device 1 as the door P is being closed/opened.

[0085] Namely, when the door P is open, the actuator 7 is in the extended position, and the strip 3 is in the raised position, at a distance from the sill S, as shown in FIG. 6.

[0086] In this operating step, the free end 49 of the rod 45 projects out of the end hole 46 of the cylindrical body 29 and contacts the edge 26 of the appendix 25, as shown in FIG. 8.

[0087] As the door P is closed, as shown in FIG. 7, the end surface 14 of the actuator 7 will contact the post M, thereby promoting the longitudinal translation t' of the actuator 7 to its maximum predetermined extent w, i.e. to its retracted position, and compressing the spring 17 to transfer the force F_1 to the slide 10 and the appendix 25.

[0088] In this particular state, the rod 45 of the shock-absorber 27 is initially still, as the force F_1 is initially counteracted and balanced by a force resulting from the sum of the compression of the fluid O in the first chamber 32, the force F_2 of the first spring 42 and the force F_3 of the second spring 43.

[0089] As the force F_1 is applied to the rod 45 of the shock-absorber 27 the valve body 52 will be displaced into the seat 51 formed in the partition element 31.

[0090] In the embodiment of figures 11 and 12, in which the shock-absorber has two inner chambers, pressure upon the rod 45 promotes circulation of the fluid O from the first chamber 32 to the second chamber 33 through the calibrated orifice 53, and causes the enlarged head 47 of the piston 44 to move back into the first chamber 32.

[0091] As the fluid letter O flows into the second chamber 33, the annular element 50 will slide in the longitudinal direction and the second spring 43 will be compressed.

[0092] In this state, the slide 10 will move longitudinally in the same direction as the force F_1, thereby causing the connecting link 11 to rotate and the strip 3 to be progressively lowered to contact with the sill S.

[0093] Appropriate selection of the spring modulus of the springs 17, 42, 43 and of the sizes of the chambers 32, 33 and the axial orifice 53 will allow adjustment of the delay with which the strip 3 will reach the lowered contact position. For example, the complete descent of the strip 3 may occur with a delay of the order of 5 s.

[0094] Then, as the door P is opened, the compression of the bias spring 17 will be relieved on the actuator 7, thereby causing it to move back into its extended position, as shown in FIG. 13.

[0095] The actuator 7 will move the pin 15 outwards and the latter will cause instantaneous displacement of the slide 10 and the edge 26 of the appendix 25, as well as an instantaneous upward motion of the strip 3 from the contact position to the raised position.

[0096] Then, as shown in FIG. 14, the fluid O may circulate from the second chamber 33 to the first chamber 32 due to the compression exerted thereon by the second spring 43 through the annular element 50, which will cause the valve body 52 to move away from the seat 51 with a meatus 56 being formed thereby.

[0097] As the first chamber 32 is progressively filled with the fluid O, the enlarged head 47 of the piston 44 will slide outwards and the free end 49 of the rod 45 will come out of the end hole 46.

[0098] The piston 41 will stop sliding when the free end 49 of the shaft 45 will contact the edge 26 of the appendix

25, and the state of FIG. 6 will be restored.

[0099] Typically, the contact of the rod 45 with the appendix 25 may occur in about 2 s, whereupon the device 1 is ready for a new operating cycle.

[0100] The above disclosure shows that the draught-excluder device of the invention fulfills the intended objects, in that it allows the flexible strip to contact the floor with a predetermined delay after the door has been closed, and to be raised almost instantaneously as soon as the door is opened.

[0101] While the device has been described with particular reference to the accompanying figures, the numerals referred to in the disclosure and claims are only used for the sake of a better intelligibility of the invention and shall not be intended to limit the claimed scope in any manner.

Claims

1. A controllably movable draught-excluder device, for attachment to the bottom edge (B) of a door (P) or window hingedly connected to a fixed frame (T), which device comprises:

- a strip of a profile (3) made of a flexible material defining a longitudinal axis (L) and adapted to interact with a sill (S) to provide an air sealing effect;
- drive means (6) acting upon said strip (3) through at least one connecting rod (11) to move said strip (3) between a raised rest position and an active lowered position, in contact with the sill (S);
- an actuator (7) associated with said drive means (6) to control actuation thereof, said actuator (7) being adapted to move between an extended position, in which it is spaced from the frame (T) when the door (P) is open, and a retracted position in which it contacts the frame (T) when the door (P) is closed;
- delay means (8) acting upon said drive means (6) to delay the movement of said strip (3);

characterized in that said drive means (6) comprise at least one slide (10) connected to said strip (3) through said at least one connecting link (11), said slide (10) having an appendix (25) with an end edge (26) adapted to contact engage said delay means (8) to delay the movement of said strip (3) from said raised position to said lowered position upon closure of the door (P), said end edge (26) being adapted to be spaced apart from said delay means (8) to ensure quasi-instantaneous automatic movement of said strip (3) from said lowered position to said raised position upon opening of the door (P).

2. Device as claimed in claim 1, **characterized by** comprising first elastic means (12) having a bias spring (17) interposed between said actuator (7) and said slide (10).

3. Device as claimed in claim 1, **characterized in that** said delay means (8) comprise an oil hydraulic shock-absorber (27) having an elongate body (29) with a substantially cylindrical longitudinal cavity (30) filled with an incompressible fluid (O) and defining at least one first chamber (32), said shock-absorber (27) further comprising second elastic means (28).

4. Device as claimed in claim 3, **characterized in that** said oil hydraulic shock-absorber (27) comprises a piston (44) with a rod (45) slidably fitted in an end hole (46) of said body (29) and an enlarged head (47) slidably housed within said at least one first chamber (32), wherein the free end (49) of said rod (45) projects out wardly of said end hole (46) when said at least one first chamber (32) is partially filled with fluid (O).

5. Device as claimed in claim 4, **characterized in that** said second elastic means (28) comprise at least one first spring (42) housed in said at least one first chamber (32) and having an end (48) that interacts with said enlarged head (47).

6. Device as claimed in claim 5, **characterized in that** said cavity (30) defines a single first chamber (32) and said second elastic means (28) comprise a single first spring (42), said enlarged head (47) having one or more calibrated through holes (57) for the passage of the fluid (O) as said piston (44) moves forward in said first chamber (32).

7. Device as claimed in claim 3, **characterized in that** said longitudinal cavity (30) has internally thereof a partition element (31) therein, which is adapted to define a first chamber (32) and a second chamber (33), said partition element (31) having an axial passage (34) for providing fluid communication between said first chamber (32) and said second chamber (33).

8. Device as claimed in claim 7, **characterized in that** said second elastic means (28) comprise a first spring (42) and a second spring (43), each being housed in one respective chamber (32, 33) of said longitudinal cavity.

9. Device as claimed in claim 8, **characterized in that** said partition element (31) has a seat (51) on the face (40) oriented forward said first chamber (32), said seat communicating with said axial passage (34) and being adapted to slidably accommodate a valve body (52) against the biasing action of said first spring (42).

10. Device as claimed in claim 9, **characterized in that** said valve body (52) has a calibrated axial orifice (53) for delaying the circulation of the fluid (O) from said first chamber (32) to said second chamber (33), thereby damping the displacement of said rod (45), said axial orifice (53) facing an open end (54) of said passage (34).

11. Device as claimed in claim 9, **characterized in that** said valve body (52) has a frustoconical lateral surface (55) substantially complementarily shaped with respect to that of said seat (51) to define therewith a substantially annular meatus (56) when said valve body (52) is speed apart from said seat (51) to allow the fluid (O) to flow from said second chamber (33) to said first chamber (32).

12. Device as claimed in claim 9, **characterized in that** said oil hydraulic shock-absorber (27) comprises an annular element (50) which is slidably and sealably inserted in said second chamber (33), said second spring (43) being adapted to interact with said annular element (50) to compress the fluid (O) in said second chamber (33) and promote backflow thereof into said first chamber (32) through said axial passage (34) and said annular meatus (56).

13. Device as claimed in claim 1, **characterized in that** said drive means (6) and said delay means (8) are housed in a box-like enclosure (9) which is designed to be fitted into a longitudinal groove (W) of the bottom edge (B) of a door (P) or window.

14. Device as claimed in claim 2, **characterized in that** said actuator (7) comprises a tubular element (13) with an end portion (14) projecting out of said enclosure (9) and adapted to interact with an upright (M) of the fixed frame (T) said tubular element (13) being slidably mounted to a pin (15) having one end (16) rigidly joined to said slide (10) with said bias spring (17) interposed therebetween.

15. Device as claimed in claim 4, **characterized in that** said end edge (26) is designed to press the free end (49) of said shaft (45) to delay the movement of said slide (10) and said at least one connecting link (11), when said actuator (7) is in its retracted position, and to be moved away from said free end (49) when said actuator (7) is in the extended position, thereby allowing quasi-instantaneous movement of said slide (10) and said connecting link (11).

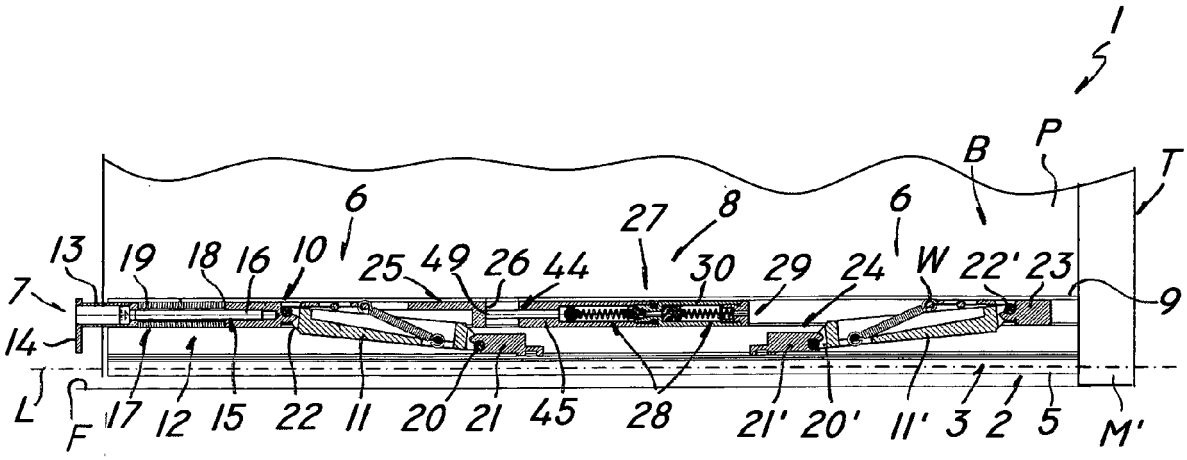
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FIG. 1

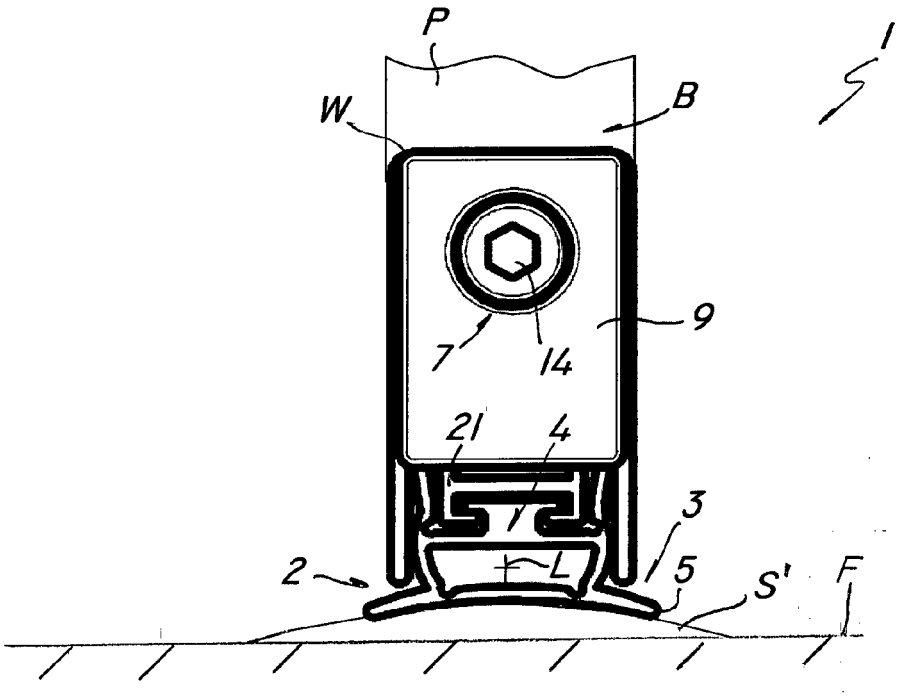
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FIG. 2

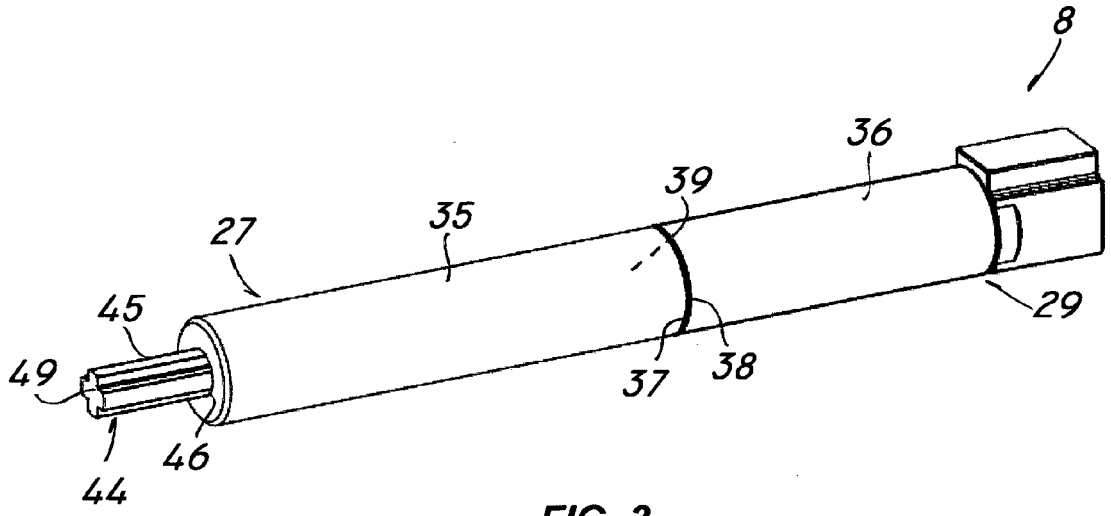

FIG. 3

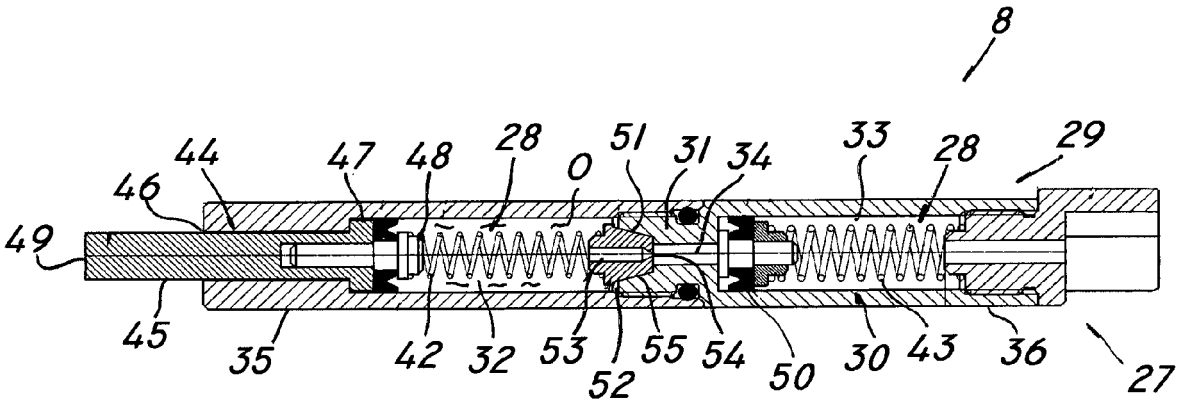

FIG. 4

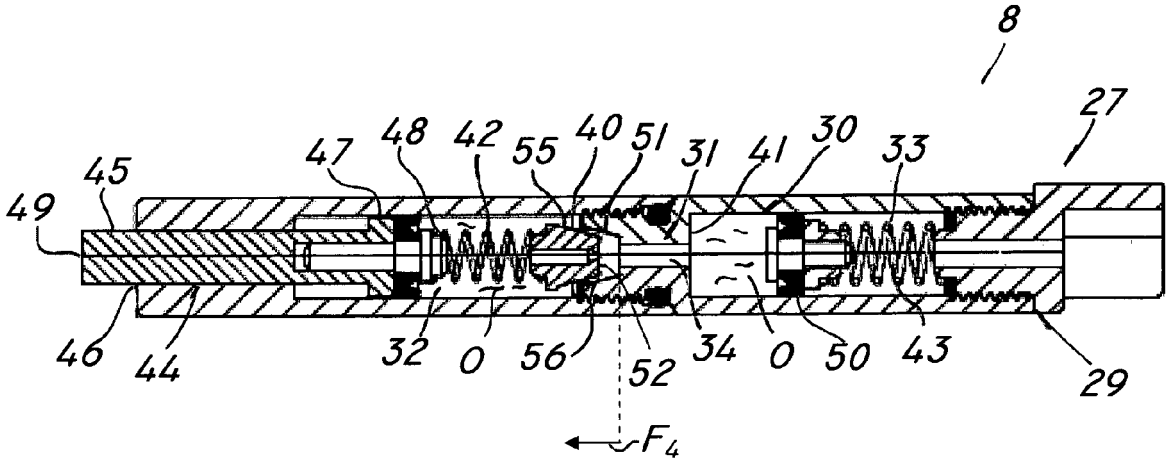

FIG. 5

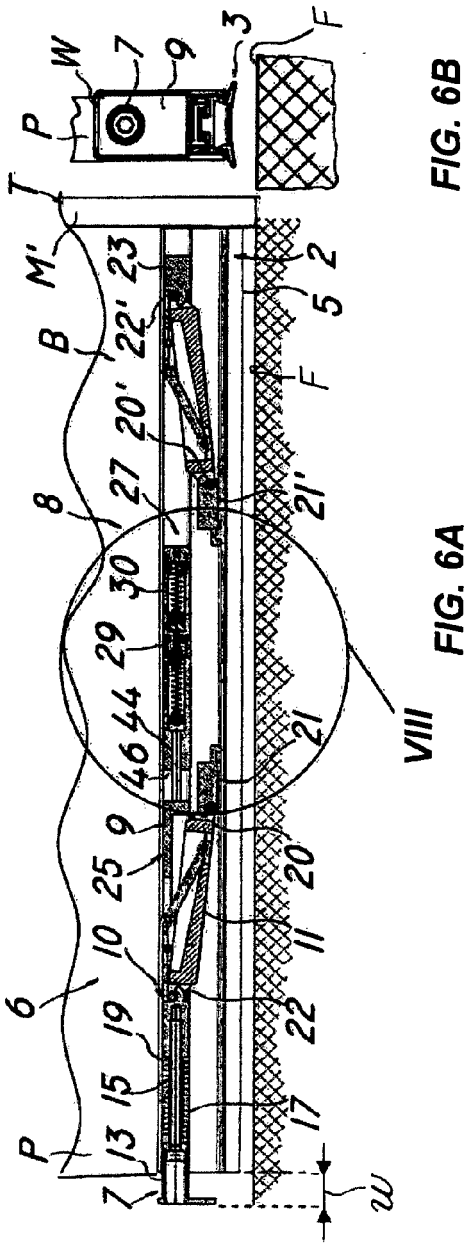

FIG. 6B

FIG. 6A

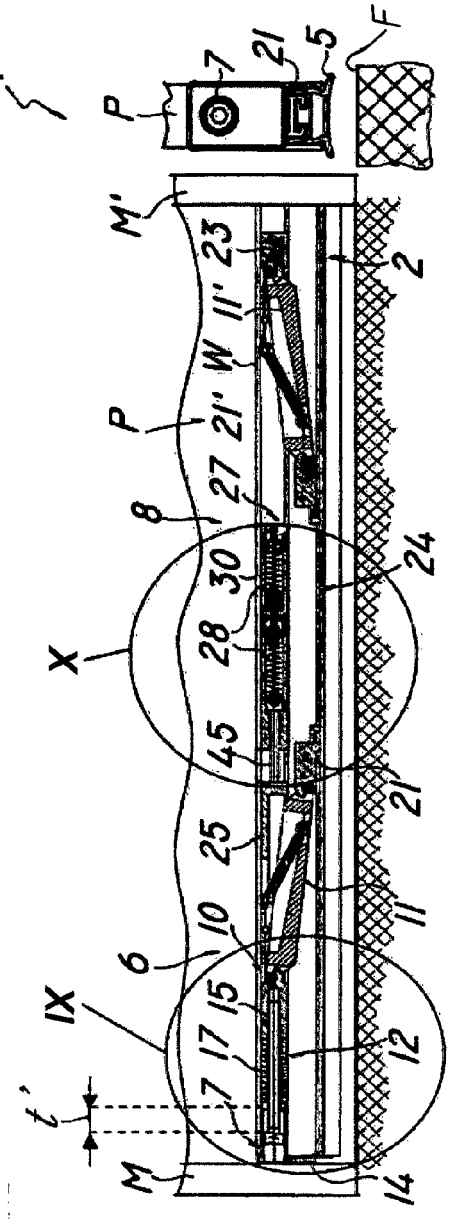

FIG. 7B

FIG. 7A

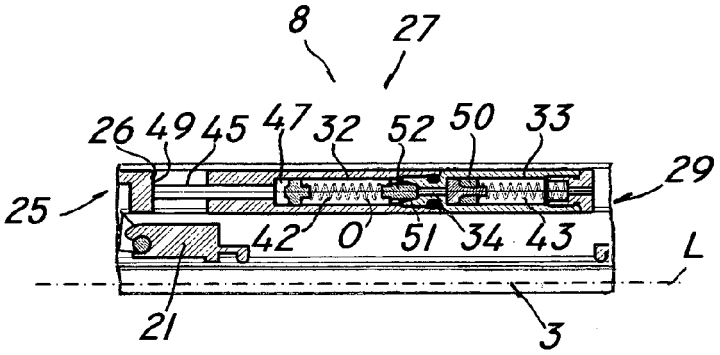

FIG. 8

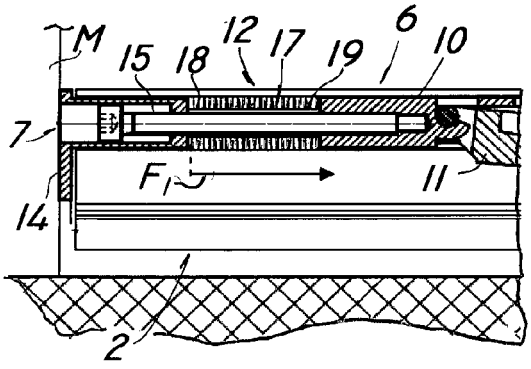

FIG. 9

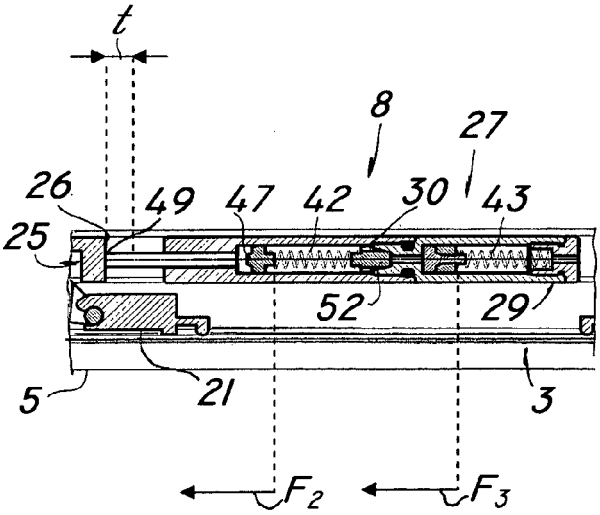

FIG. 10

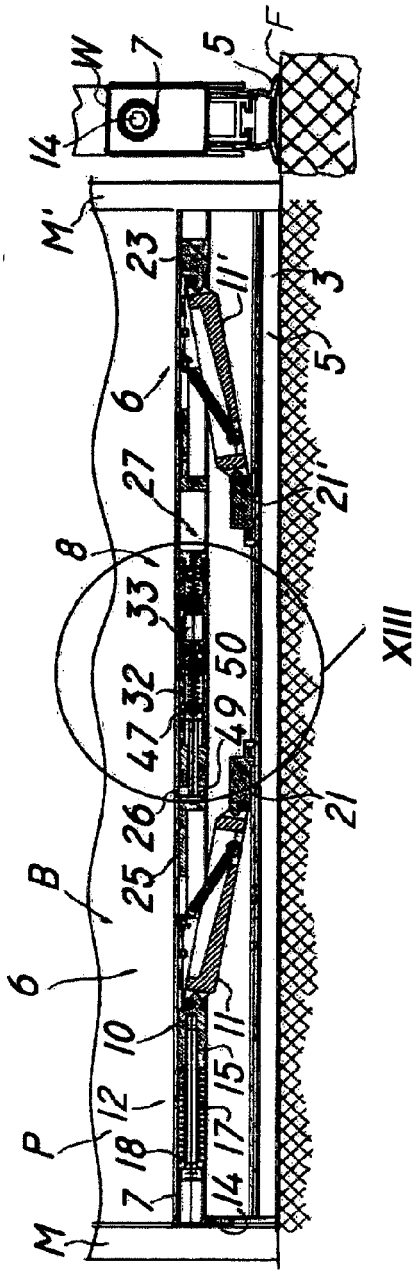

FIG. 11B

FIG. 11A

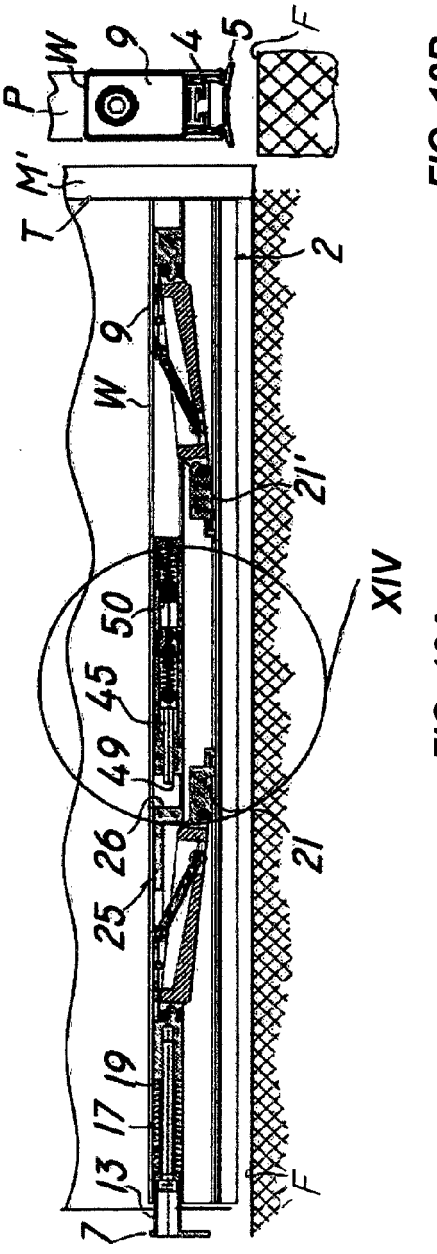

FIG. 12B

FIG. 12A

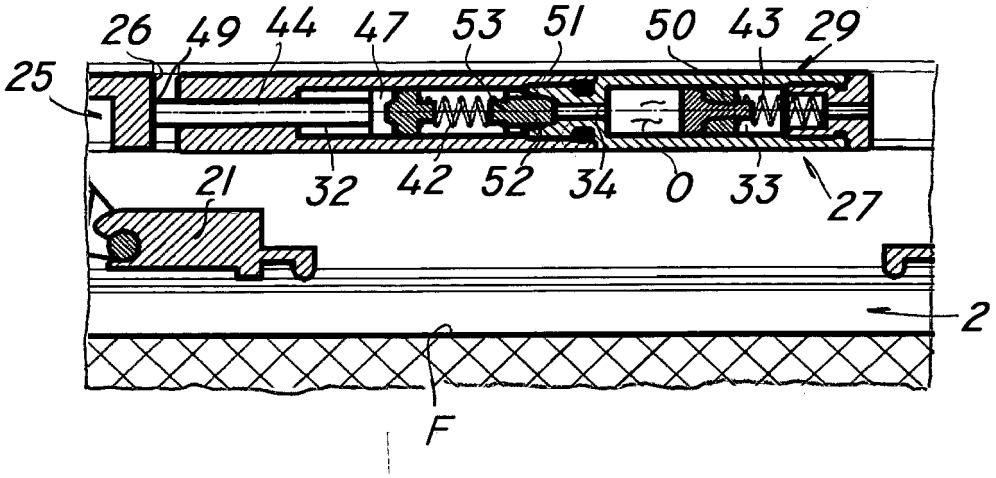
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FIG. 13

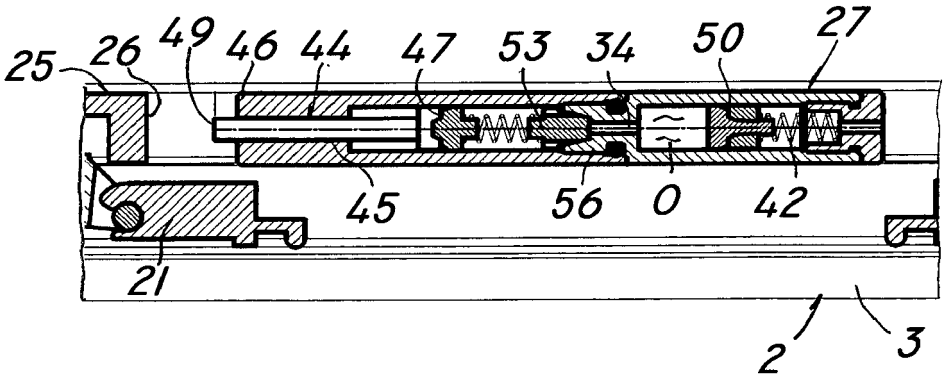
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FIG. 14

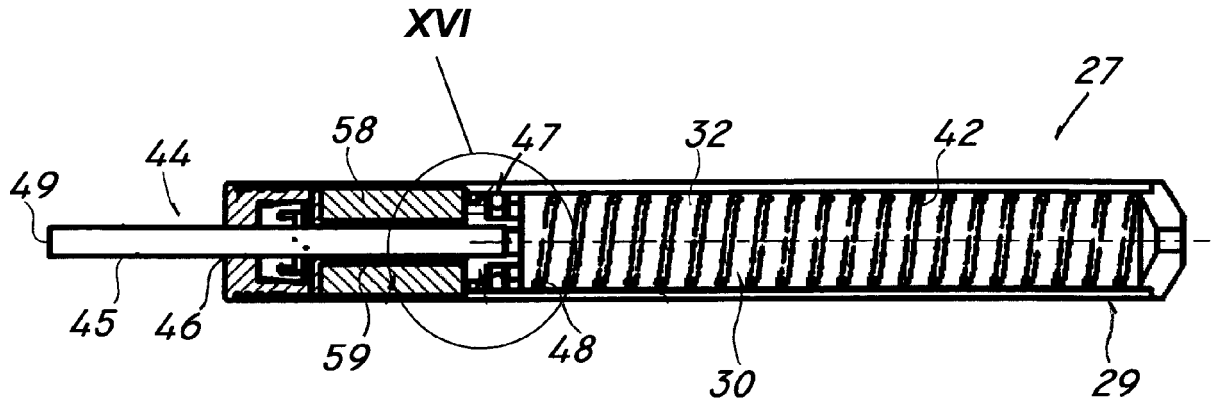

FIG. 15

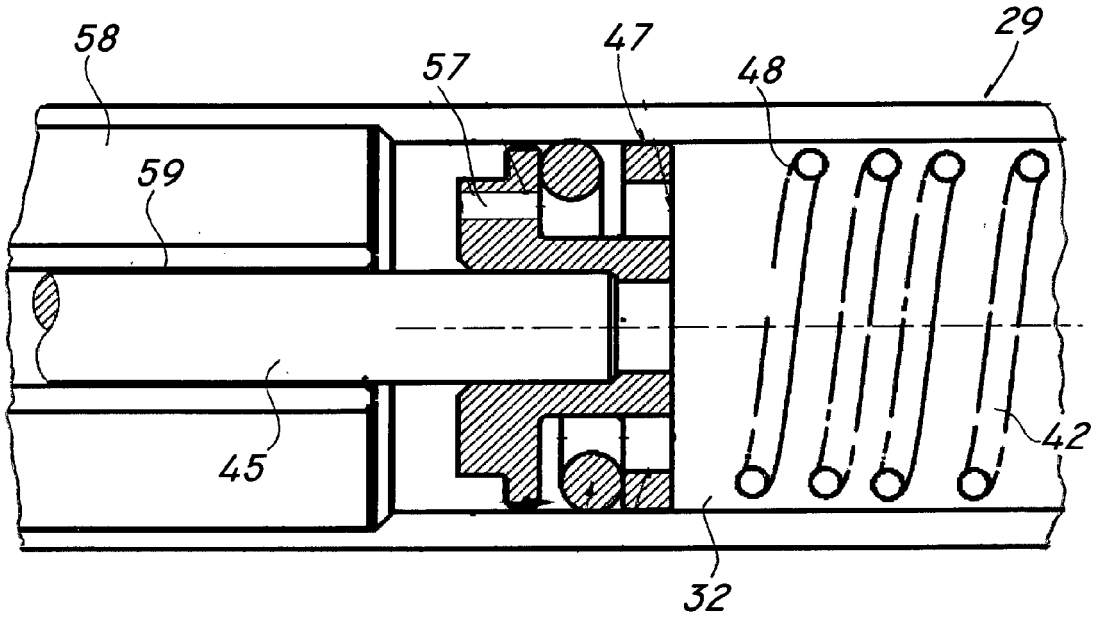

FIG. 16

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EUROPEAN SEARCH REPORT

Application Number
EP 15 00 0903

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CH 666 719 A5 (PLANET MATTHIAS JAGGI) 15 August 1988 (1988-08-15) * page 2, right-hand column, line 6 - line 59; claims 1,2; figures 1-4 *	1	INV. E06B7/215
A	FR 812 519 A (SIMONEAU LEON GUILLAUME) 12 May 1937 (1937-05-12) * page 4, line 20 - line 97 *	1,11	

TECHNICAL FIELDS SEARCHED (IPC)
E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 June 2015	Knerr, Gerhard

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EPO FORM 1503 03.82 (P04C01)

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24-06-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CH 666719 A5	15-08-1988	NONE	
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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- GB 616076 A **[0010]**
- CH 666719 **[0013]**