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(54) Stop device for gates, doors, automatic doors and the like

(57) The invention relates to a stop device for automatic gates and/or doors and the like, wherein stop means (25, 3, 16) are provided, which are mounted on the gate and normally forced to the exterior of their seating (22, 2), the said stop means being designed to fit into a seating (30, 4) installed in the ground in correspondence with the maximum opening or closing position of the gate, so that they engage with the said seating and cause the gate movement to stop. Preferably said stop means consist of a mobile body (25) hinged eccentrically to a supporting structure integral with the gate so that it tends to rotate downwards and is fitted with a wheel (27, 7) that rests on the ground and can perform a movement so as to move from a raised position in which the said wheel (27, 7) slides along the ground to an operating position in which it projects from the said gate and is inserted into a seating (30, 4) in the ground.

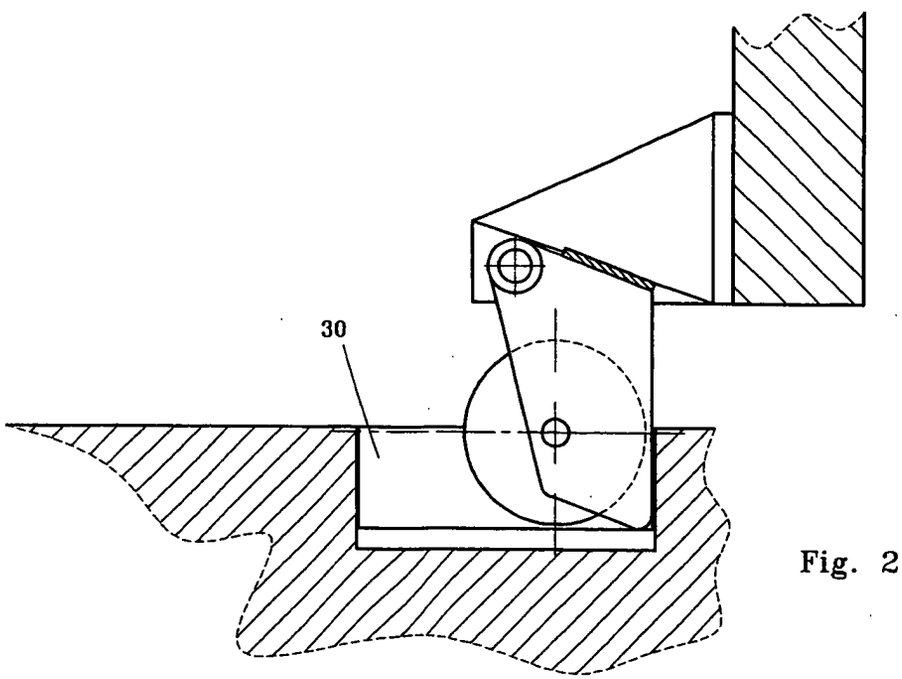

Fig. 2

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Description

[0001] This invention relates to a stop device for gates, doors, automatic doors and the like, characterised in that it is retractable and therefore does not present the drawbacks due to the presence of the traditional stop device that projects from the floor.

[0002] This is a device of new design, specifically designed and manufactured to meet criteria of safety and compactness, thus producing an end product of high quality and ergonomic characteristics.

[0003] In the case of side-hinged gates and doors, especially automatic gates, a stop device must be installed to determine the closing or maximum opening position of the gate.

[0004] Stop devices are used to stop the gate movement and shut down the motor when the gate reaches the "fully open" or "fully closed" position.

[0005] Especially if the opening position does not coincide with the proximity of the gate to a wall, the "fully open" position is determined by stop means positioned on the floor, consisting of bases, teeth, tubular parts or feet which are secured to the floor in various ways to constitute a fixed rebate for the gate.

[0006] Equally, a stop device that projects from the floor is often installed in correspondence with the central area of the gate in the closing position.

[0007] The problem encountered with the use of these stop means relates to the fact that their position, projecting from the ground, can represent an obstacle and a serious danger for pedestrians, who may trip over it, and for vehicles in transit which, especially in the case of sloping or raised ground, may strike it with the lower part of the chassis and damage the vehicle or its mechanical parts.

[0008] The invention solves these drawbacks by using a mechanical stop device that can be attached to the door or gate and collaborates with a matching seating in the floor.

[0009] This seating is made in such a way that it is normally closed, so as to eliminate any possibility of accidents to persons or vehicles, and opens when intercepted by the stop device attached to the door or gate when it reaches the seating, and therefore its maximum opening position.

[0010] Further characteristics and details of the invention will be specified in the description which follows, given by way of example but not of limitation, by reference to the annexed drawings wherein:

- figure 1 shows in cross-section the device in accordance with the invention fitted to a gate, before the gate reaches the final closing position
- figure 2 shows the stop device in accordance with the invention in the position in which it stops the gate at the end of its travel
- figure 3 is a view from above of the stop device shown in the preceding figures
- figures 4 and 5 illustrate in cross-section the seating engaged by the stop device in accordance with the invention, in the rest position and the position in which it engages with the device respectively;
- figure 6 is a schematic view of the door or gate fitted with a stop assembly made in accordance with a possible embodiment;
- figure 7 shows a schematic view in vertical cross-section of a gate with a further embodiment of the stop device in accordance with the invention in the gate stop position;
- figure 8 shows the position of the stop device during the opening or closing movement of the gate in a device corresponding to the one of figure 7, but inserted into seating located in the structure of a gate or the like;
- figure 9 is a schematic view of the door or gate fitted with a stop assembly made in accordance with a possible embodiment;
- figure 10 shows a schematic view of the seating in which the stop device operates, made in accordance with a possible embodiment;
- figures 11 and 12 schematically illustrate in cross-section a different embodiment of the stop device in accordance with the invention;
- figure 13 schematically illustrates in cross-section a further embodiment of the stop device in accordance with the invention.

[0011] In figures 1 and 3, no. 21 indicates a gate, door or the like fitted with the stop device in accordance with the invention.

[0012] Later in the description and the claims we will refer for the sake of simplicity to the case of a stop device for gates, but the same solution could obviously also apply to doors and door fittings in general, while still falling within the ambit of the invention.

[0013] The device in accordance with the invention comprises a support structure 22 constituted by a plate 23 attached to the gate, for example by welding, screwing and the like, which said plate is integral with a pair of parallel wings 24 that support a body 25 fitted eccentrically to a shaft 26 attached to wings 24 in such a way that body 25 tends to rotate downwards due to the effect of gravity.

[0014] A wheel 27, which rests on the ground, is attached to body 25, as shown in figure 1.

[0015] From the inside, wings 24 present two projecting parts whose upper surface 28 is inclined. The amplitude of rotation of body 25 around shaft 26 is defined by the projecting extremities of a plate 29, welded or otherwise attached to body 25, which engage with inclined surfaces 28 of the said projecting parts, as shown in figure 2.

[0016] Cavities 30 in the ground in correspondence with the maximum opening and/or closing position of the gate are designed to receive body 25, which penetrates into the cavity and engages with the wall of the cavity,

which thus acts as a door stop.

[0017] The cavity has a body 30 of any suitable shape, for example a cylindrical body, closed at the top by a pair of opposing doors 31 and 31' which are hinged to two substantially horizontal shafts 32 and 32'.

[0018] Doors 31 and 31' are connected via a cable 33 or other known system to a counterweight 34 which, in the case illustrated in the figure, is ringshaped, and slides inside cavity 30.

[0019] The force exerted by counterweight 34 tends to keep doors 31 and 31' in the position shown in figure 4, where they close the cavity, preventing the entry of dirt and the like.

[0020] If pressure is applied to the doors, as occurs when wheel 27 and body 25 rest on them, they open, allowing body 25 to enter the cavity and take up the position shown in figure 2.

[0021] The device operates as follows.

[0022] During movements of the gate, body 25 rests on the ground via wheel 27 and can move freely. When the gate reaches the maximum opening position, body 25 with wheel 27 is positioned above cavity 30.

[0023] The weight of body 25 then overcomes the thrust exerted by counterweight 34 via cables 33, and opens doors 31. Body 25 then enters the cavity, as shown in figures 2 and 5.

[0024] Here, body 25 engages with the wall of the cavity, which thus acts as the door stop and prevents further advance of body 25, consequently stopping the travel of the gate.

[0025] In this position further rotation of body 25 is prevented, because wings 29 engage with inclined surfaces 28.

[0026] When the gate returns to the previous position, the inclined edge of body 25 aids its exit from the cavity, and doors 31 and 31' close the opening again.

[0027] As will be seen, the stop device in question is specially designed and manufactured to meet safety criteria and also to be more compact, thus producing an end product of high quality and ergonomic design.

[0028] The solution offered by this invention also eliminates the traditional floor-mounted door stops consisting of bases and the like, which constitute a potentially dangerous obstacle, thus solving all the problems they present.

[0029] Alternatively, seating 2 which contains the stop devices could form part of the structure of a gate or door, as will be illustrated with reference to figures 8 and 9.

[0030] A further preferred embodiment of the invention is shown in figures 6, 7 and 8.

[0031] A box-shaped container 2, fitted to the bottom of gate 21 in correspondence with the free edge opposite the edge to which the hinges are fitted, forms a seating designed to receive door stop 3 which is normally kept pushed outwards, i.e. downwards, and designed to fit into a corresponding seating 4 in floor 5.

[0032] More specifically, door stop 3 consists of a mobile body, hinged to a fulcrum 6 and fitted with a wheel 7 at the bottom, which projects downwards from the gate and is normally maintained in this position, i.e. pushed towards the ground, by elastic means such as a spring 8 or the like, which is hooked onto the wall of seating 2.

[0033] Door stop 3 can rotate around fulcrum 6 in such a way as to move from an upward recessed position in which it retracts completely inside the gate, with the wheel resting on the ground (fig. 8), to an operating position in which it projects from the gate and is inserted into seating 4 in the ground (fig. 7).

[0034] Seating 4 is located in a position on the floor corresponding to the position of the free edge of the gate when the gate is in the maximum opening or closing position.

[0035] Seating 4 remains covered by a hatch 9 pivot-mounted on hinge 10, which is fitted to one of the upper edges of the seating, which said hatch counteracts a spring 11 or the like that keeps the hatch normally closed, allowing it to open under the thrust of wheel 7 attached to door stop 3.

[0036] The maximum outward extension of door stop 3 is determined when tooth 12, fitted to the top of door stop 3, comes to rest against a fixed rebate 13 in seating 2 (fig. 7) or in the door structure (fig. 8).

[0037] Any other similar device or other system suitable to obtain the same result can obviously also be used.

[0038] This stop device for side-hinged gates and the like operates as follows.

[0039] When the gate is in a position other than the maximum opening or closing position, the stop device is in the condition shown in figure 8, with wheel 7 resting on the ground and its mobile support 3 fully retracted into the gate.

[0040] At this stage, seating 4 in the ground is closed by hatch 9.

[0041] When the gate moves to the maximum opening or closing position, as the case may be, and reaches seating 4, wheel 7 penetrates into the said seating, overcoming the thrust of spring 11, which is inferior to that of spring 8, and door stop 3 comes to rest against the opposite inside wall of the said seating.

[0042] This instantly stops the movement of the gate.

[0043] Other structural and functional variations could obviously be devised, represented, for example, by the shape and design of door stop 3, which could be made to slide instead of rotate, or fitted to a vertically sliding shaft 14 which counteracts a spring 15, as shown in figure 9, or represented by variations in the design of hatch 9 which, as shown in figure 10, could be made in two parts with an accordion fold, or made with other parts more suitable for the same purpose.

[0044] In accordance with another preferred embodiment of the invention, illustrated in figure 11, a rotating support 16 is hinged to the gate structure in proximity to a corner and can rotate through an angle which, in the case illustrated, is approximately 90 degrees, between two extreme positions in which a pair of adjacent sides

17 and 18 thereof engage with the edge of a fixed rebate 19.

[0045] A spring 20 tends to force support 16 into the position illustrated in figure 12, in which it projects from the gate, is inserted into seating 4, and engages with the wall of the said seating.

[0046] A further version of the device, designed to act as stop device in both the closing and opening positions of the gate, is illustrated in figure 13.

[0047] In this version, box-shaped container 2 contains two supports 3 and 3' which are hinged to opposite sides of a support plate P.

[0048] Supports 3 correspond substantially to the supports shown in figures 1 and 2, but are fitted symmetrically in relation to their common axis of rotation.

[0049] In this way the two supports can stop the movement of the gate in both directions.

[0050] A stop device for the opening of gates and the like is thus obtained without parts projecting from the ground, and the risks and drawbacks they present.

[0051] The arched contour of the lower edge of the two supports helps them to slide against the edge of seating 4 when the gate movement is reversed.

[0052] All these variations, and other similar ones which may be devised by one skilled in the art, must be deemed to fall within the ambit of protection of the invention, the special characteristics of which are defined in the claims set out below.

Claims

1. Stop device for automatic gates and/or doors and the like, **characterised by** the presence of stop means (25, 3, 16) which are mounted on the gate and normally forced to the exterior of their seating (22, 2), the said stop means being designed to fit into a seating (30, 4) installed in the ground in correspondence with the maximum opening or closing position of the gate, so that they engage with the said seating and cause the gate movement to stop.

2. Stop device as claimed in claim 1, **characterised in that** the said stop means consist of a mobile body (25) hinged eccentrically to a supporting structure integral with the gate so that it tends to rotate downwards due to the effect of gravity.

3. Stop device as claimed in claim 1, **characterised in that** the said stop means consist of a mobile body (3, 16) which projects downwards from the bottom of the gate and is normally kept pushed towards the ground by elastic means (8, 20).

4. Stop device as claimed in claim 1, **characterised in that** the said stop element (3, 14) slides vertically, counteracting a spring (15).

5. Stop device as claimed in any claims 1 to 4, **characterised in that** the said mobile body (25, 3, 16) is fitted with a wheel (27, 7) that rests on the ground and can perform a movement so as to move from a raised position in which the said wheel (27, 7) slides along the ground to an operating position in which it projects from the said gate and is inserted into a seating (30, 4) in the ground.

6. Stop device as claimed in claim 2, **characterised in that** the said stop element (25) has projecting parts (29) designed to engage with corresponding fixed surfaces (28) so as to limit the rotation of the said stop means (25).

7. Stop device as claimed in any of the preceding claims, **characterised in that** it includes a fixed rebate (28, 13, 19) which is engaged by the said stop element (15, 3, 16) when it exits from the seating so as to limit the outward travel of the said stop means, which said stop means discharges onto the said rebate the thrust determined when the door reaches its closing or maximum opening position.

8. Stop device as claimed in claim 3 or 5, **characterised in that** the said stop means is constituted by a support plate (16), hinged to the structure of the gate, which moves between a position in which it retracts into the gate structure and a position in which it exits so as to engage with a rebate fixed to the ground, which said two positions are determined when a pair of consecutive sides (17, 18) of the said stop means engage with the edge of a fixed rebate (19) integral with the gate structure.

9. Device as claimed in any claims 1 to 3, **characterised in that** the said rotating stop means (25, 3) have an arched lower contour to help them to slide on the edge of seating (30, 4).

10. Stop device **characterised in that** it includes two stop means (3, 4), fitted symmetrically and hinged to a common support, one of which is designed to stop the gate in the closing position, and the other in the opening position.

11. Stop device as claimed in any of the previous claims, **characterised in that** the said seating is constituted by a cavity (30) closed by one or more doors (31) hinged on one side to the mouth of the cavity and connected to means (34) which tend to keep them in the position in which they close the said cavity.

12. Stop device as claimed in claim 4, **characterised in that** the said closing means of doors (31) are constituted by one or more counterweights attached to the said doors.

13. Stop device as claimed in any of claims 1-10, **characterised in that** the said seating in the ground (4) remains covered by a hatch (9) pivot-mounted on a hinge (10) in correspondence with one of the upper edges of the seating and installed so as to counteract elastic means such as a spring (11) or the like, which keeps the hatch normally closed but able to open when intercepted by the wheel of the stop means fitted to the gate.

14. Gate, door fitting or the like as claimed in the preceding claim, **characterised in that** it is fitted with a stop device in accordance with one or more of the preceding claims.

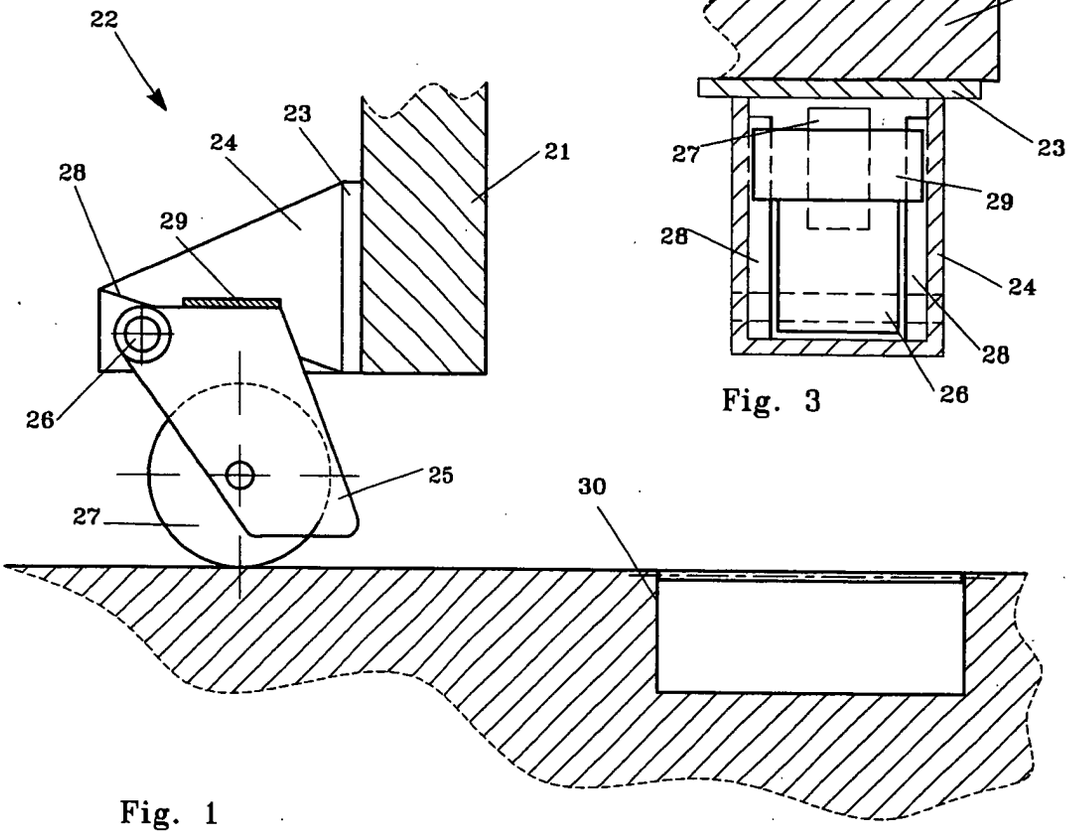

Fig. 1

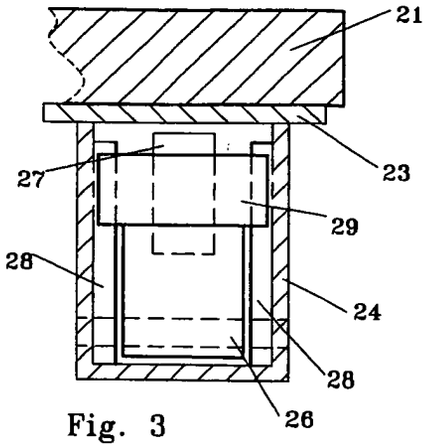

Fig. 3

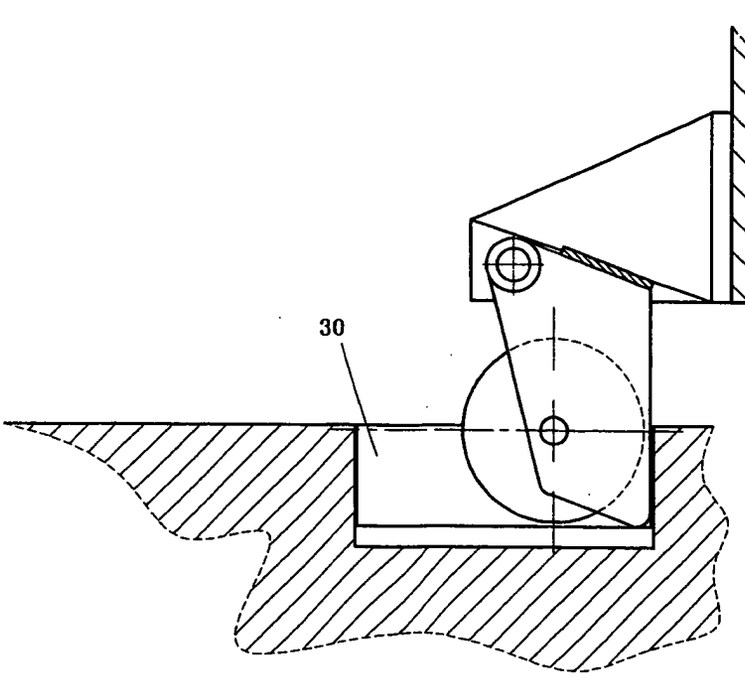

Fig. 2

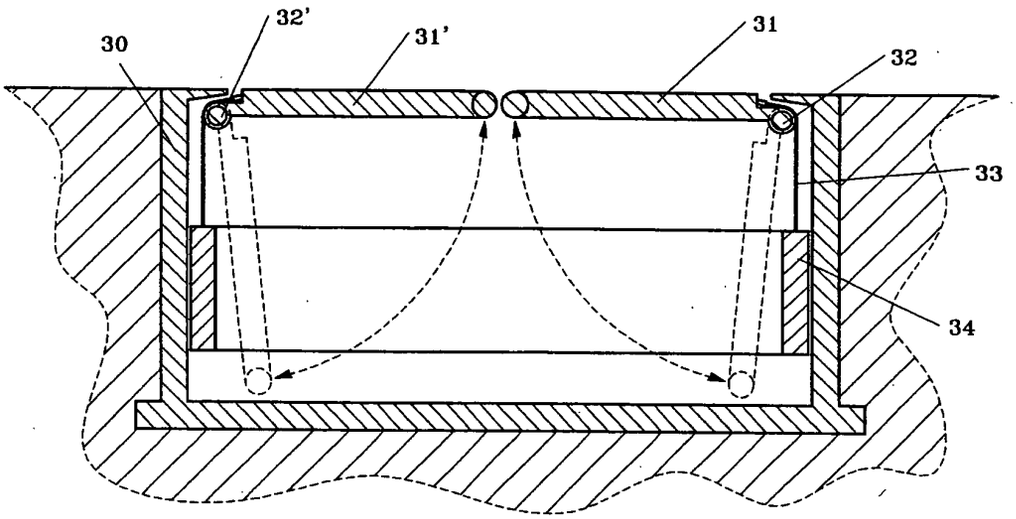

Fig. 4

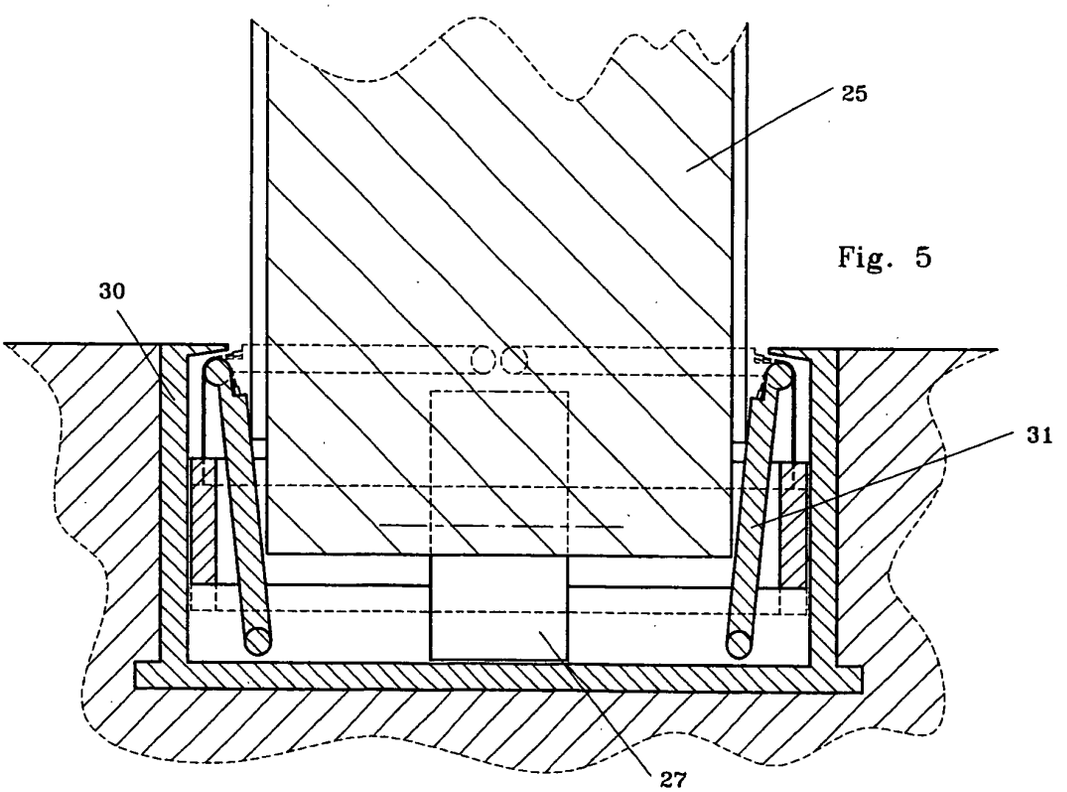

Fig. 5

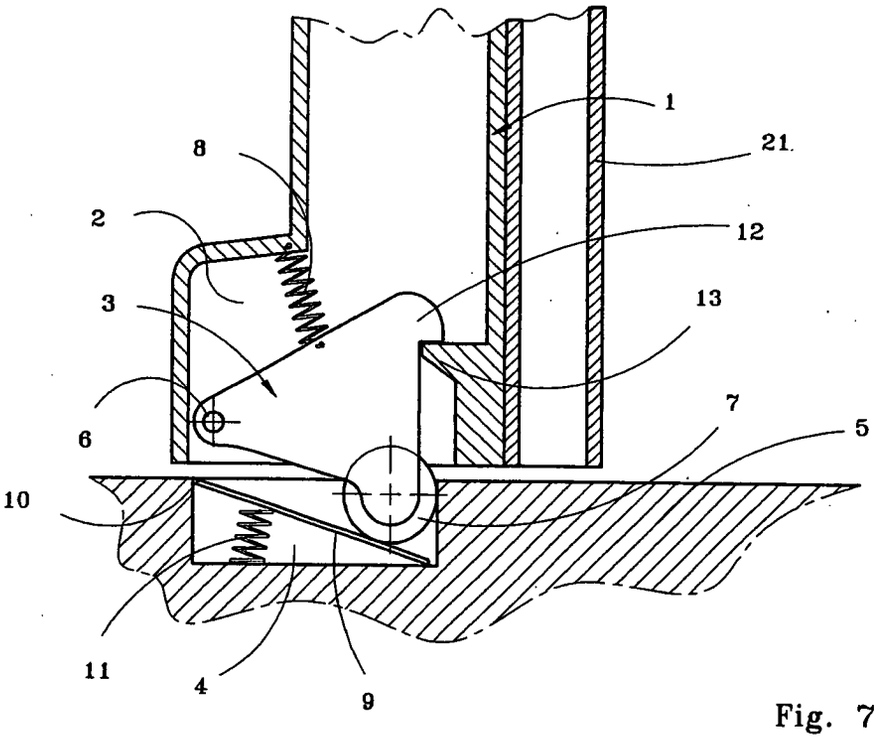

Fig. 7

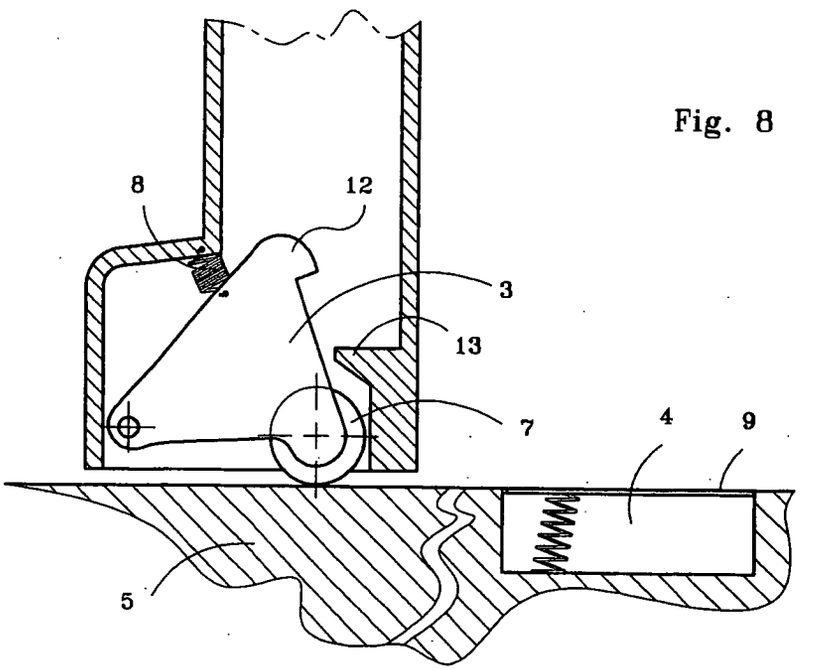

Fig. 8

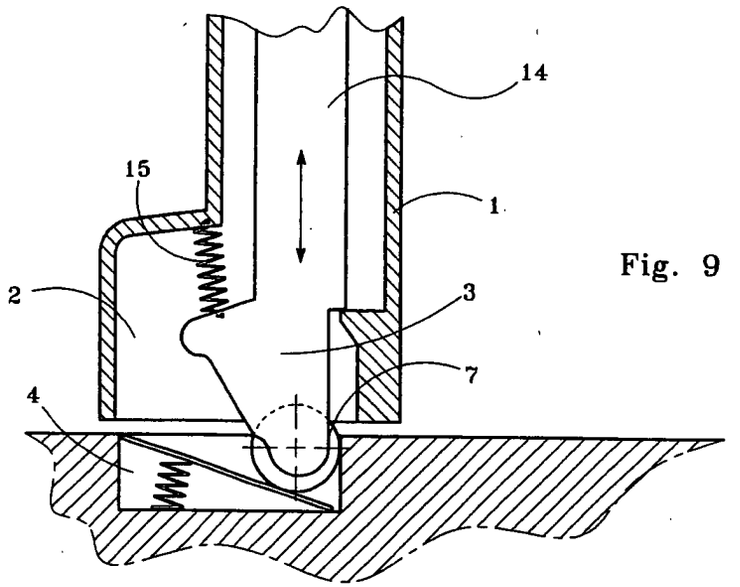

Fig. 9

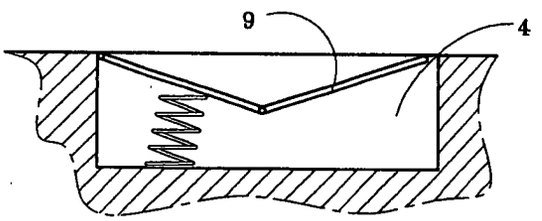

Fig. 10

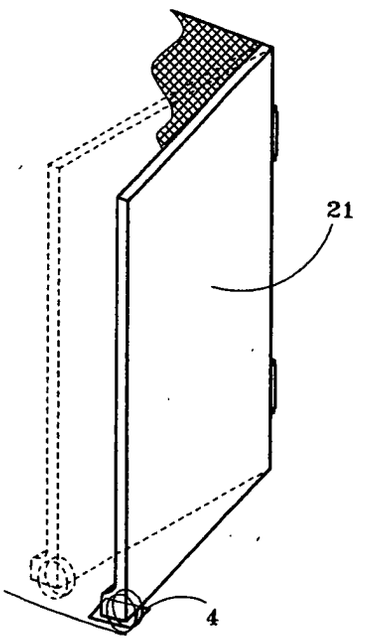

Fig. 6

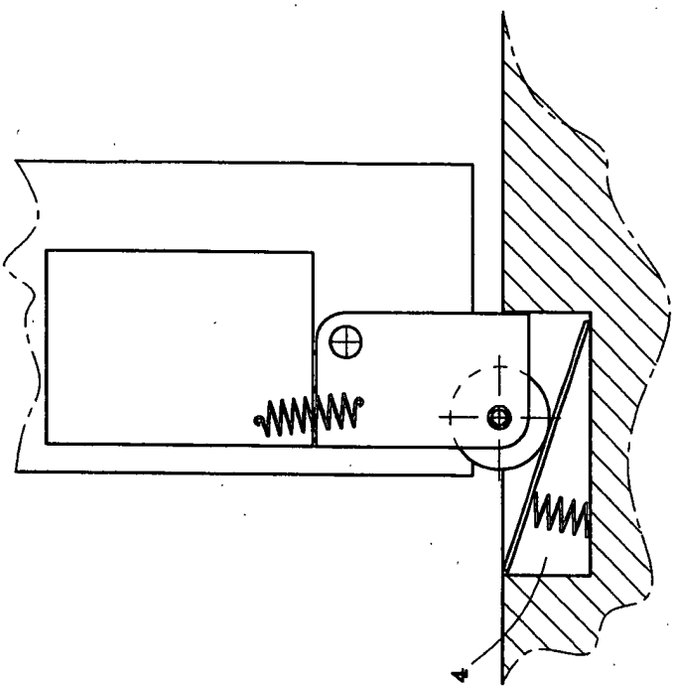

Fig. 12

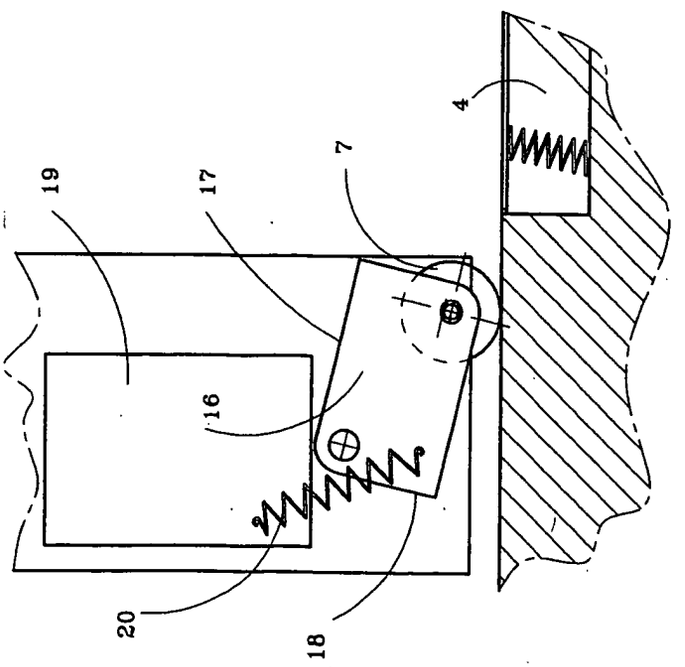

Fig. 11

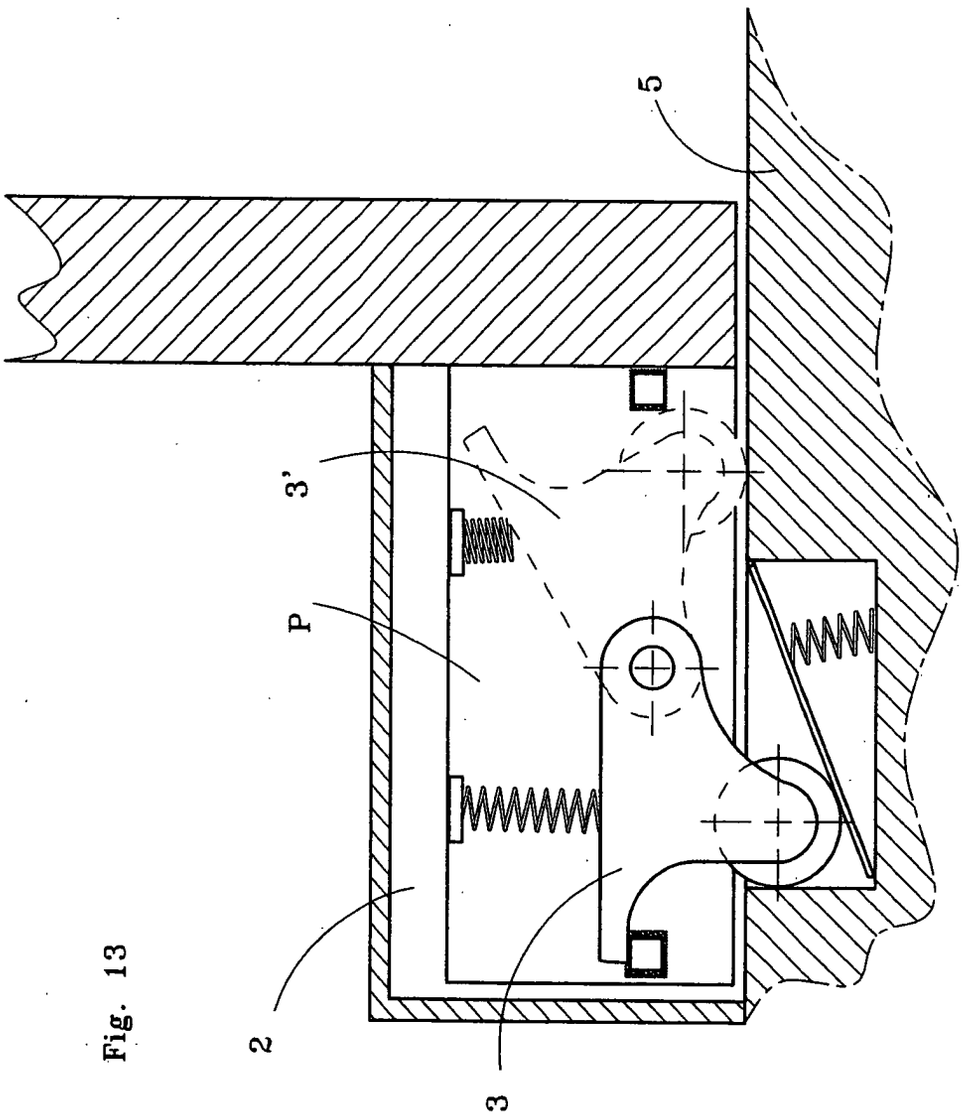

Fig. 13