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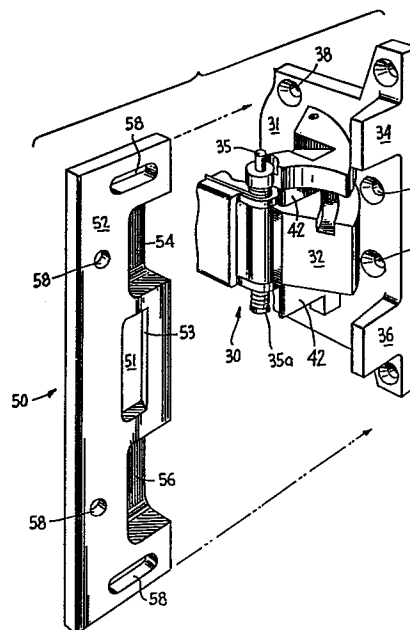
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54 **Latching device.**

57 A latching device comprises a latch-bolt assembly (30) anchored to a door (10) and a strike assembly (50) mounted on a door frame (20). The latch-bolt assembly (30) has a rigid base plate (31) which has integral projections (34, 36) positioned at each side of a latch-bolt (32) of said assembly (30). The strike assembly (50) has recesses (54, 56) for receiving said projections (34, 36) when the door (10) is closed. When the device is subjected to a major force such as in a fire the projections (34, 36) will restrict linear extension of the door frame (20) in the latching region of the device by engagement with the projections (34, 36), the walls of the recesses (54, 56) thereby preventing excessive strain from occurring on the latch-bolt (32), which could lead to disengagement thereof from the strike assembly (50). Additionally, the projections (34, 36) limit lateral movement of the strike assembly and door frame away from the latch-bolt assembly and limit inward movement of the strike assembly and door frame theretowards.



LATCHING DEVICE

This invention relates to a latching device for a door or like closure member comprising a latch-bolt assembly and a mated strike assembly, wherein the latch-bolt assembly comprises a base plate and a latch-bolt mechanism including a latch-bolt, together with means for securing the mechanism on the base plate, and wherein the strike assembly comprises a front plate having a recess for receiving the latch of the latch-bolt mechanism, means being provided for securing the base plate of the latch-bolt assembly to a door or like closure member and for securing the front plate of the strike assembly to a frame for such door or like closure member.

One such device is described in US-A 3877622, said device being for use in emergency exits, where it is generally considered desirable or indeed necessary for release of the device to be effected without any hindrance.

It is also recognised in the prior art, however, that at times it is desirable, if not essential, to maintain a closure such as a door in a closed condition. For example, when an automobile is involved in an accident it is a common belief that it is best if the doors remain closed to prevent the occupants from being thrown from the automobile onto the roadway or roadside. It has been found, however, that in an accident where the automobile is subjected to substantial force the doors of the automobile will swing open under the impact of the collision due to distortion of the door frame permitting the latch-bolt to disengage from the strike assembly. Similarly, emergency or fire doors which preferably are to remain locked during a fire oftentimes spring open due to distortion of the door or door frame member, permitting the latch-bolt to disengage from the strike assembly. Again, distortion and disengagement of door members can occur when excessive force is applied to a door member such as a result of the

force of water being applied from a fire hose during a fire.

In the prior art, various attempts have been made to provide latching devices which preclude the accidental opening of a closure such as a door by distortion of a door member. U.S. Patent No. 2,709,612 is directed to a latching device for use on an automobile door to prevent accidental opening of the door by distortion of the car frame. The disclosed device includes provisions for a door member which projects beyond a free or non-hinged edge of the door and cooperating socket means in a door jamb for reception of the door member when the door is closed. In order to provide the desired interlocking engagement, the outer free or projecting end of the door member is offset from its root portion in a direction vertically and/or inwardly with respect to the cooperating door jamb to provide an overhang and the socket means is correspondingly formed in the jamb to receive the offset door member. In one preferred form, the device includes a lug or dovetail member secured to the free end of the door so as to project outwardly beyond and away from such edge a short distance, this member being adapted and arranged for reception in a cooperating socket member in the frame.

U.S. Patent No. 4,401,330 discloses a latching device for securing or maintaining secured a closure such as a door when the door members are subjected to thermal distortion caused by a fire. According to said patent, the opening or disengagement of the primary latching device is caused because the door frame member such as a mullion which retains the door strike is fixed at its lower end to the floor and at the upper end to the ceiling. Upon heating the door member attempts to become elongated. However, because of being fixed the door member cannot expand, thus causing distortion and deformation and subsequent disengagement of the primary latching device. To avoid opening of the door it is proposed in this patent

to provide an additional latching device which under normal conditions is always in disengagement but upon elongation due to thermal forces will become engaged and retain the door and door frame such as a mullion in locking relation.

5 U.S. Patent No. 4,437,693 discloses a latching device having a cover which melts upon the presence of excessive heat as on the occurrence of fire, thereby allowing a blocking plate to slide into operative position to prevent retraction of the latch-bolt and consequently
10 preventing unlatching of the device.

Although the aforesaid patents define the problem confronting the present applicant, the solutions to the problem are not completely acceptable because of complexity and/or the need for modifying the closure structure.

15 It is thus the object of the present invention to provide an improved latching device which is simple in construction and which can be incorporated into existing doors or like closures without modification to the latter being required.

20 This object is resolved in accordance with the present invention, in a latching device as set out in the first paragraph above, in that the base plate has two projections arranged one at each side of the latch-bolt of the latch-bolt mechanism and extending from the base plate
25 in the direction of movement of the door towards the frame, and the front plate of the strike assembly has corresponding recesses formed therein for receiving said projections when the door is closed, said recesses thus being arranged at opposite sides of the recess for
30 receiving the latch-bolt.

Thus when the latching device in accordance with the invention is installed, in the event of a fire or other major distorting force, the projections, while being free to permit limited movement in a vertical direction, will
35 restrict linear extension of the frame in the region of the latching device by engagement of the projections with the

walls of the recesses, thereby preventing excessive strain from occurring on the latch-bolt which could cause disengagement of the latch-bolt from the strike assembly. Additionally, the projections in the recesses will limit the lateral movement of the strike assembly and door frame member away from the latch-bolt assembly. The rigid face of the latch-bolt assembly will also limit inward movement of the strike assembly and door frame member towards the latch-bolt assembly. Accordingly, the latch-bolt assembly is prevented from becoming disengaged from the strike assembly even when subjected to major forces such as thermal forces caused by a fire, or other physical forces such as an impact from a collision or the like. The latching device in accordance with the present invention has application primarily with an outwardly opening door where the latch-bolt assembly is applied to one surface of the door.

There now follows a detailed description, to be read with reference to the accompanying drawings, of one embodiment of the invention, which embodiment, it will be appreciated, has been selected for description merely by way of non-limiting example.

In the accompanying drawings:-

Fig. 1 is a fragmentary front elevational view illustrating the installation of the latching device in accordance with the invention on a door or like closure member;

Fig. 2 is an enlargement of a part of the device shown in Fig. 1;

Fig. 3 is a sectional view taken along line 3-3 of Fig. 1;

Fig. 4 is an exploded perspective view showing a latch-bolt assembly and a strike assembly of the latching device of Fig. 1;

Fig. 5 is a sectional view taken along line 5-5 of Fig. 3;

Fig. 6 is a sectional view taken along line 6-6 of Fig. 5;

Fig. 7 is a sectional view taken along line 7-7 of Fig. 5;

5 Fig. 8 is a top view of the latch-bolt assembly shown in Fig. 4;

Fig. 9 is a view of one side of the latch-bolt assembly, partly fragmented for convenience;

10 Fig. 10 is a view of the opposite side of the latch-bolt assembly, parts thereof being omitted for convenience;

Fig. 11 is a bottom view of the latch-bolt assembly shown in Fig. 8;

15 Fig. 12 is an elevational view similar to Fig. 2, but showing two latching devices in accordance with the invention installed on each door of a double-door arrangement; and

Fig. 13 is a sectional view similar to Fig. 3, but taken along line 12-12 of Fig. 12.

20 The device now to be described is generally similar, except as hereinafter described, to the device disclosed in US-A 3877622. Thus, Figs. 1 to 3 illustrate a door 10 and door frame 20 in which is installed a latching device in accordance with the invention and generally designated 12. The device 12 comprises a housing 14 mounted on one surface 10a of the door 10, said housing accommodating a latch-bolt assembly generally designated 30 and being closed by a cover 16 for enclosing the latch-bolt assembly 30 in said housing. A push-bar 18 is also provided for actuating or releasing a latch 32 of the latch-bolt assembly 30 and in addition, as seen in Fig. 3, a knob 19 is positioned at an opposite surface 10b of the door 10, with the actuating mechanism therefor extending through the door also for releasing or actuating the latch 32. The latching device also comprises a strike assembly 50 which is anchored to the door frame or mullion 20 for

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cooperation with the latch-bolt assembly 30. (It will be understood that although the assembly illustrated includes a knob 19, it may be preferable to simply use an internal lock mechanism, permitting the door to be opened from the outside with a key. At other times it may be desirable not to have either a knob or key mechanism. These aspects are not significant to the presently disclosed and claimed invention.)

The latch-bolt assembly 30 of the latching device 10 12 comprises a base plate 31 having projections or lugs 34, 36 extending therefrom in the direction of movement of the door 10 towards the frame member 20. It will be appreciated that the base plate 31 can be constructed integrally with said lugs or projections 34, 36 as a 15 unitized structure from a rigid metal. For mounting the base plate 31 to the door 10, a plurality of mounting holes 38 is provided in the base plate for receiving fasteners 37 (Fig. 5) which are screwed or otherwise secured in the door 10. For reinforcing the door 10, a reinforcing plate 10c 20 is provided through which the fasteners 37 pass. It is to be noted that the base plate 31 has mounting holes therein which are positioned on each side of, and symmetrically arranged in relation to, the pivot pin 35 (Figs. 8 and 9), providing enhanced support whereby twisting of the 25 latch-bolt assembly may be prevented in the event of a major force such as a fire at a critical point.

As will be described hereinafter in more detail, there is supported on the base plate 31 a latch-bolt mechanism 40 which comprises a main latch-bolt 32 and an 30 auxiliary latch-bolt 33, both mounted for pivoting movement on a pivot pin 35 having associated therewith a return spring 35a. The auxiliary latch-bolt 33 serves a dead-locking function, as described in US-A 3,877,262. The latch-bolt 32 has a pin 32a projecting from each side 35 thereof and spaced from the pivot pin 35, which pin rides in arcuate slots 32b (Figs. 9 and 10) provided therefor in

upstanding support plate portions 42 which form part of the latch-bolt mechanism 40, which are secured to the base plate 31, and in which the pivot pin 35 is also captive. The pins 32a, riding in the slots 32b, prevent cocking of the latch-bolt 32 in the support plate portions in the event of a major force such as a fire.

As illustrated in Fig. 11, the support plate portions 42 of the latch-bolt mechanism 40 are secured to the base plate 31 by means of stakes 31a which extend downwardly through openings in the base plate and are bent over beneath the base plate. For accommodating such bent-over portions, the base plate 31 has in its under-side a recess 31b, so that the bent-over portions lie flush with the surface of the base plate 31 surrounding said recess 31b. Additional anchoring of the support plate portions 42 to the base plate 31 is provided at 31c (Fig. 11). The stakes 31a are secured to the under-side of the base plate 31 by means of screws 31d which thus prevent the breaking away of the latch-bolt mechanism 40 from the base plate 31, again in the event of a major force such as a fire.

The strike assembly 50 comprises a front plate 52 having a plurality of holes and slots 58 for mounting the strike assembly to the door frame 20 by means of fasteners 57 (Figs. 6 and 7) screwed or otherwise secured to the door frame 20. The latter is reinforced by a reinforcing plate 20a through which said fasteners 57 pass. The front plate 52 is provided with recesses 54, 56 for receiving the projections 34, 36 of the latch-bolt assembly 30 when the door 10 is moved to its closed condition. As illustrated in Figs. 5 and 7, the recesses 54, 56 are wider than the projections 34, 36, permitting limited vertical movement of the projections in the recesses, while the depth of the recesses 54, 56 is not substantially greater than the thickness of the projections 34, 36, thereby limiting lateral movement. The front plate 52 also comprises, at the side thereof opposite the recesses 54, 56 and arranged

centrally therebetween, a slot 51 and a ramp 53 for receiving and retaining the latch-bolt 32 when the door 10 is in its closed condition, thereby holding it in its closed condition. The front plate 52 of the strike assembly 50 is also of unitized construction from a rigid metal.

Figs. 12 and 13 are views similar to the views of Figs. 2 and 3, except that in Figs. 12 and 13 a double door installation is illustrated, each door 10 thereof being provided with a latching device in accordance with the invention, and the strike assemblies 50 of said devices being attached to opposite surfaces of the mullion 20.

When the latching device in accordance with the invention is in use, the latch-bolt 32 locks the door 10 to the door frame 20 by engagement with the slot 51 and ramp 53 (see Fig. 6). When the door 10 and frame member 20 are in such closed condition, the projections 34, 36 are spaced from the side walls of the recesses 54, 56 by the distance x , thus permitting limited vertical movement of the door 10 in relation to the door frame 20 (see Fig. 5). Similarly, because of the depth of the recesses 54, 56 in relation to the thickness of the projections 34, 36, the projections 34, 36 are spaced from the surface of the reinforcing plate 20_a and from the bottom wall of the recesses 54, 56 respectively by the distances y and z , thus permitting limited lateral movement of the door 10 in relation to the door frame 20 (see Fig. 7).

In normal operation, the latching device in accordance with the invention functions in a similar manner to any conventional latching device comprising mated latch-bolt and strike assemblies. However, when the latching device described above is subjected to a major distorting force of a type which normally will cause a bowing action that can cause the latch-bolt to disengage from the strike assembly by the introduction of a camming angle, projections 34, 36 on the base plate 31 prevent the

door 10 from separating from the door frame 20 by engagement with the walls of the recesses 54, 56 of the strike assembly 50, thereby forcing the door 10 to move with the door frame member 20 in the same relative manner, 5 by restricting linear extension of the door frame 20 in said region and by preventing excessive strain from occurring on the latch-bolt 32 and other components of the latch-bolt assembly as a result of the raised portions of the front plate 52 of the strike assembly 50 forcibly 10 engaging the sides of the latch-bolt 32. This restriction also prevents the auxiliary latch-bolt 33 from becoming disengaged from the appropriate surface portion of the front plate 52, which disengagement would allow the dead-locking of the latch-bolt 32 to become inoperative. 15 The projections 34,36 of the base plate 31 limit lateral movement of the strike assembly 50 and door frame 20 away from the latch-bolt assembly 30 and the rigid face of the base plate 31 of the latch-bolt assembly limits inward movement of the strike assembly 50 and door frame member 20 20 towards the latch-bolt assembly 30, thereby stabilizing the latching device.

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Claims:

1. Latching device for a door (10) or like closure member comprising a latch-bolt assembly (30) and a
5 mated strike assembly (50), wherein the latch-bolt assembly (30) comprises a base plate (31) and a latch-bolt mechanism (40) including a latch-bolt (32), together with means (31a-d) for securing the mechanism (40) on the base plate (31), and wherein the strike assembly (50) comprises a
10 front plate (52) having a recess (51) for receiving the latch (32) of the latch-bolt mechanism (40), means (37,57) being provided for securing the base plate (31) of the latch-bolt assembly (30) to a door (10) or like closure member and for securing the front plate (52) of the strike
15 assembly (50) to a frame (20) for such door (10) or like closure member,
characterised in that the base plate (31) has two projections (34,36) arranged one at each side of the latch-bolt (32) of the latch-bolt mechanism (40) and
20 extending from the base plate (31) in the direction of movement of the door (10) towards the frame (20), and the front plate (52) of the strike assembly (50) has corresponding recesses (54,56) formed therein for receiving said projections (34,36) when the door (10) is closed, said
25 recesses (54,56) thus being arranged at opposite sides of the recess (51) for receiving the latch-bolt (32).

2. Latching device according to Claim 1 characterised in that the recesses (54,56) of the strike
30 assembly (50) are wider than the projections (34,36) on the base plate (31) to permit limited vertical movement of the projection (34,36) in the recesses (54,56).

3. Latching device according to either one of
35 Claims 1 and 2 characterised in that the depth of the recesses (54,56) of the strike assembly is not

substantially greater than the thickness of the projections (34,36) of the base plate (31) thereby limiting lateral movement of the projections (34,36) in the recesses (54,56).

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4. Latching device according to any one of the preceding Claims characterised in that the latch-bolt assembly (30) includes an auxiliary latch-bolt (33).

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5. Latching device according to any one of the preceding Claims characterised in that the latch-bolt mechanism (40) comprises a pivot pin (35) for the latch-bolt (32) and in that for securing the base plate (31) to the door (10) or like closure member the base plate (31) comprises a plurality of holes (38) arranged symmetrically about the axis of said pivot pin (35).

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6. Latching device according to any one of the preceding Claims characterised in that the means (31a-d) for securing the latch-bolt mechanism (40) to the base plate (31) comprises stakes (31a), said base plate (31) having openings for receiving said stakes (31a) and screw means (31d) for anchoring said stakes (31a) to the base plate (31).

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7. Latching device according to Claim 6 characterised in that the bottom of the base plate (31) comprises a recess (31b) and free end portions of said stakes (31a) are bent over so as to lie flush with said recess (31b), said free end portions of the stakes (31a) being secured to the base plate (31) by said screw means (31d).

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8. Latching device according to any one of the preceding Claims characterised in that the latch-bolt (32) of the latch-bolt mechanism (40) comprises pins (32a)

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spaced from the pivot pin (35) for the latch (32), said pins (32a) being received in curved slots (32b) formed in the latch-bolt mechanism (40).

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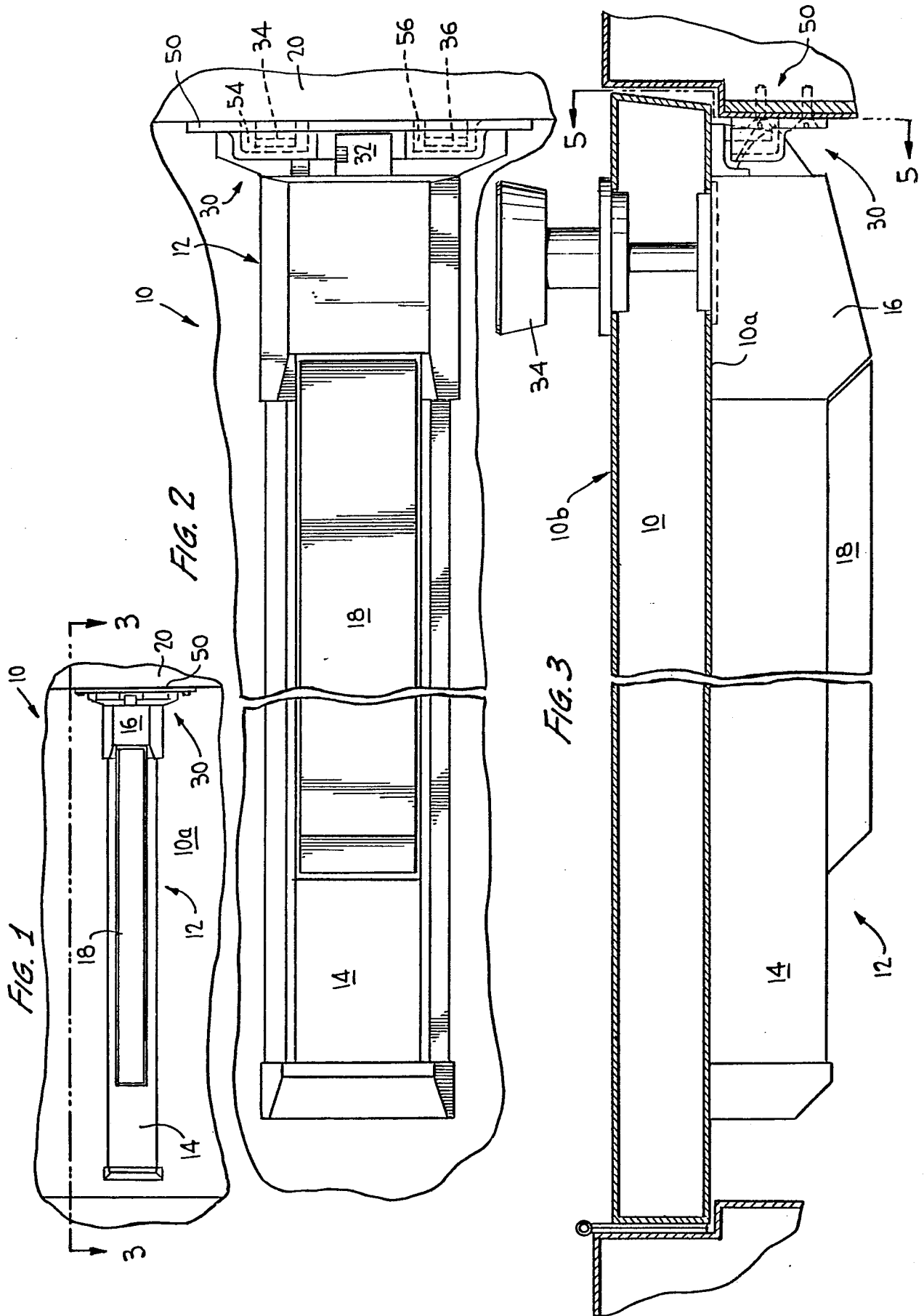


FIG. 4

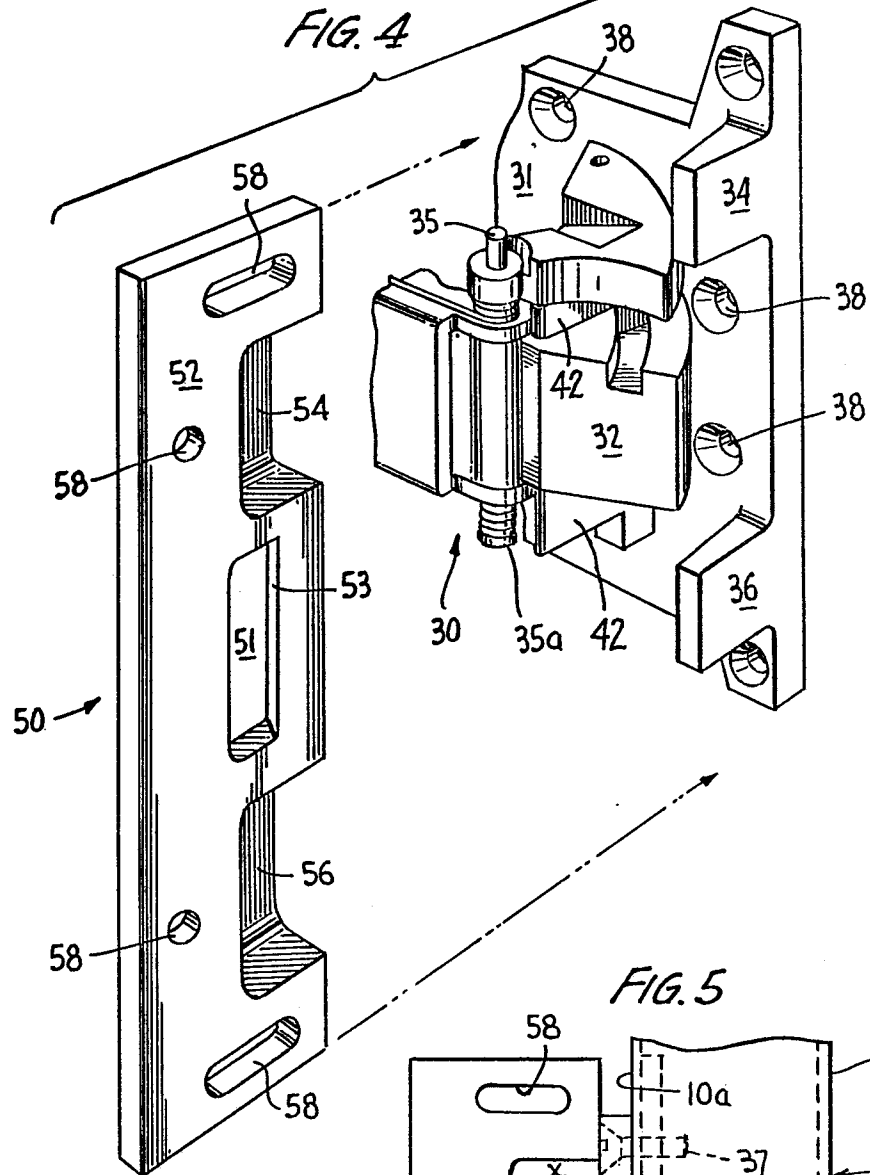


FIG. 5

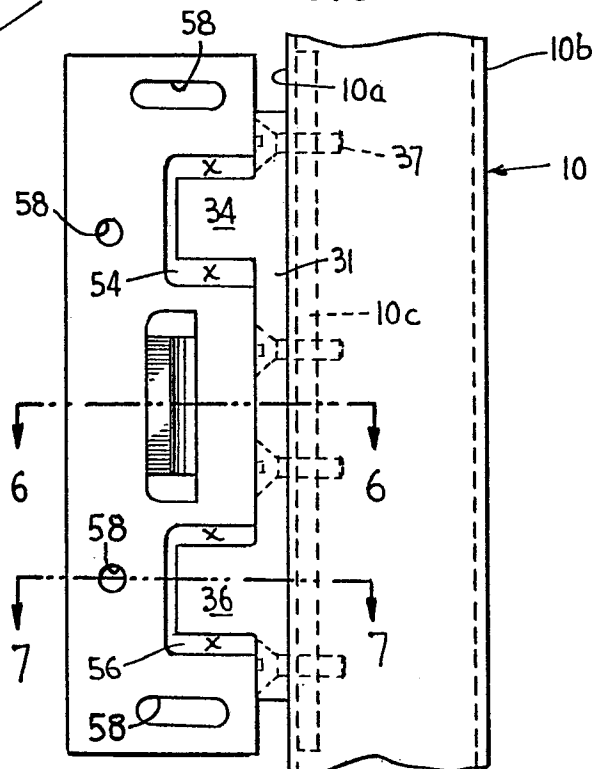


FIG. 6

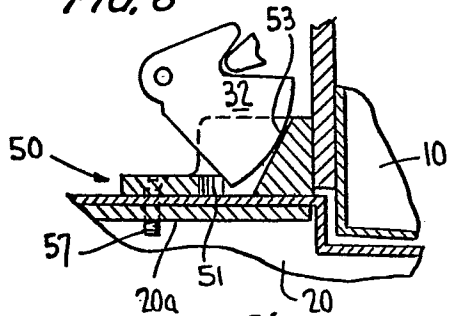
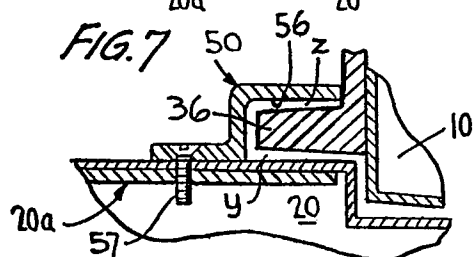
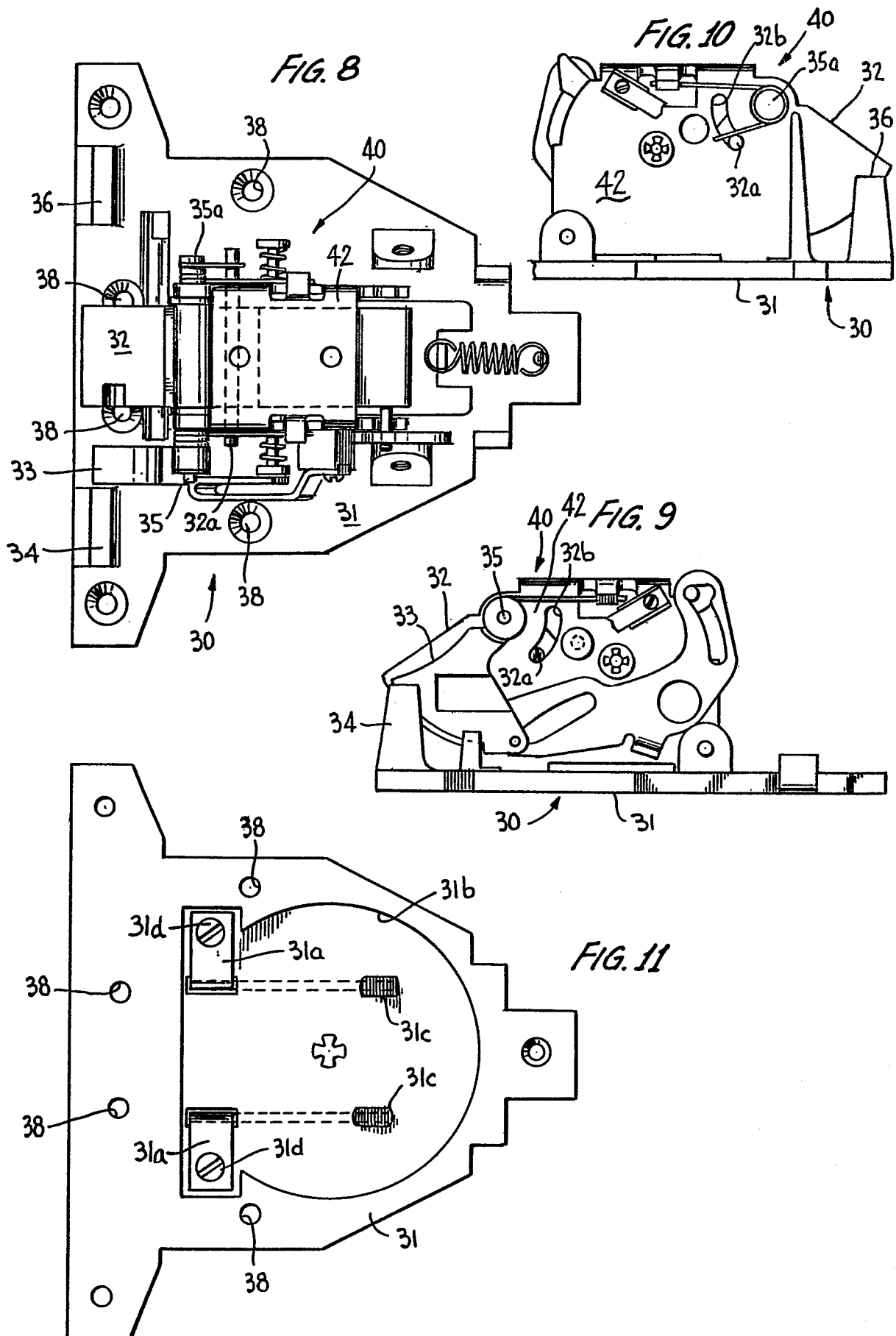


FIG. 7





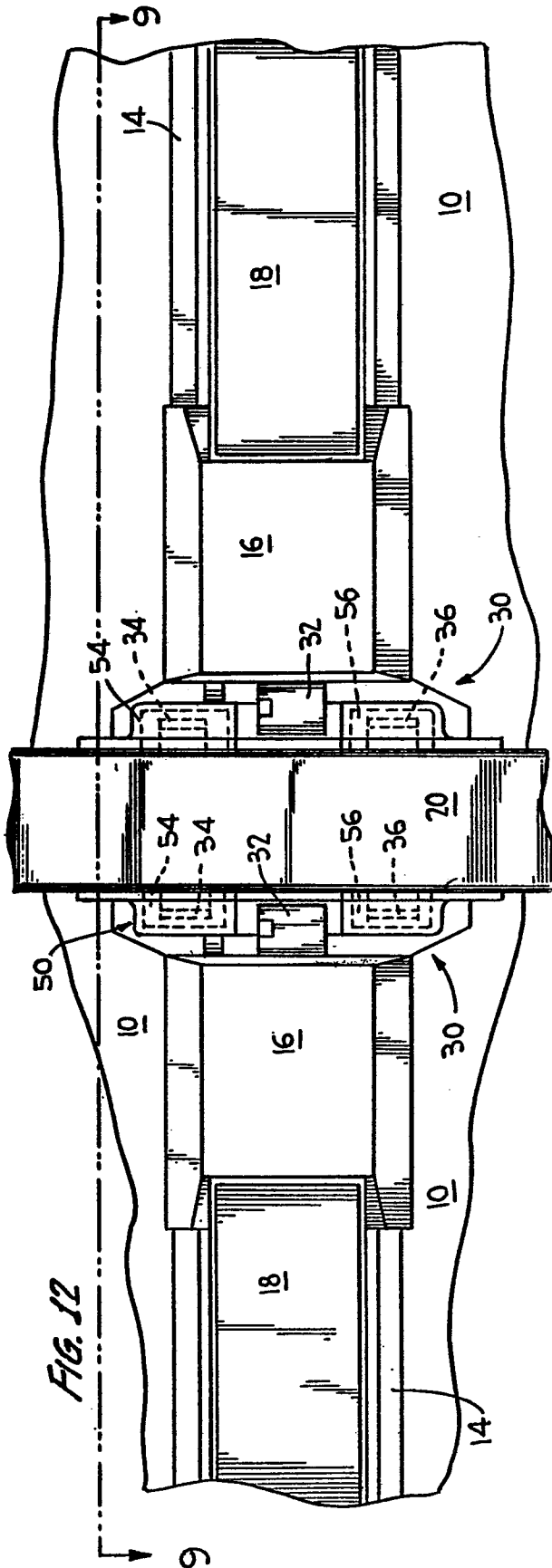


FIG. 13

