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(54) Hinge arrangement

(57) A hinge arrangement 30 comprising a first leaf 32, a second leaf 34, and mounting means 36, in the form of a mounting plate 38, studs 40 and slots 41 in this example. The hinge arrangement 30 is illustrated installed in a conventional double rebated door arrangement. The leaves 32 and 34 are pivotably inter-connected by a hinge pin 42. The first leaf 32 is slidably mounted on the mounting plate 36 via the studs 40, within limits set by abutment of the studs 40 with the ends of the slots 41. The leaf 32 also defines channels 43 which receive compression springs 44. The effect of the springs 44 is to move the pivot axis as the door opens, so that the second leaf 34, and hence the door style 48, move away from the mounting plate 38 and the door frame 46. The second leaf 34 comprises a cam 50, having a curved innerface 50a. The cam face 50a co-operates with a roller 52 carried by the mounting plate 38, to pull the leaf 32 towards the rebate 47, as the hinge 30 closes.

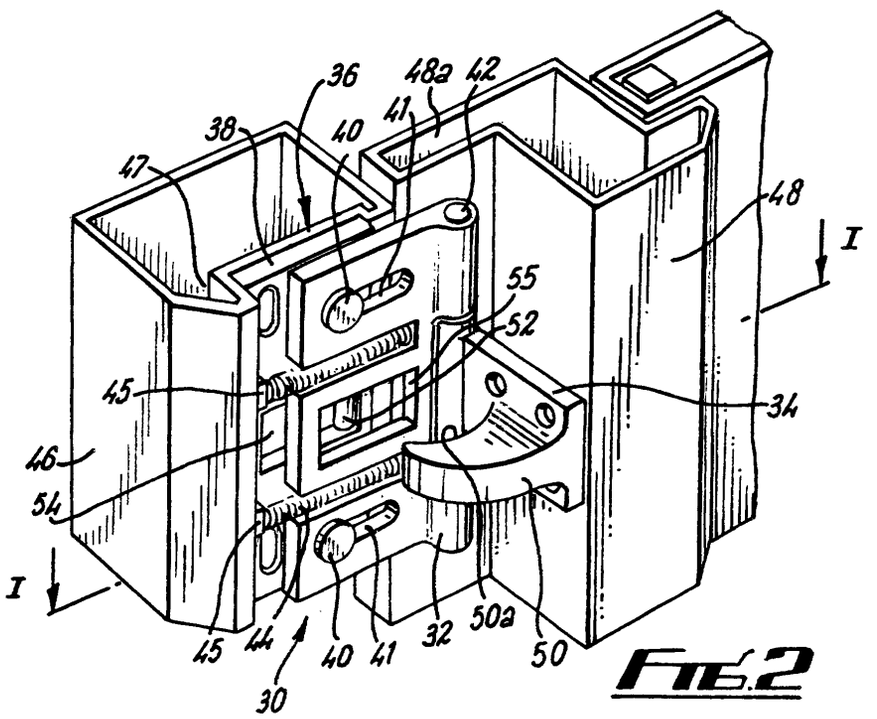

FIG.2

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Description

[0001] The invention relates to hinge arrangements, particularly but not exclusively for use on a double rebated door.

[0002] A double rebated door has a first lip, known as a rebate, provided on the non-hinged face of the door frame and a second rebate provided on the hinged face of the door stile. When the door is closed, the rebate on the door frame overlies the non-hinged face of the door stile and the rebate on the door stile overlies the hinged face of the door frame. On existing double rebated doors the hinge is provided externally of the rebate on the door stile, so that the door is free to open without the rebate fouling the door frame as the door is opened and closed.

[0003] It is an object of the present invention to provide an improved hinge arrangement.

[0004] According to the present invention there is provided a hinge arrangement comprising first and second leaf members, the leaf members being pivotably interconnected, there being mounting means by which the first leaf member is slidably mountable to allow the first leaf member to move, as the hinge arrangement moves between a closed condition and an open condition, thereby changing the position of the hinge axis.

[0005] The hinge arrangement is preferably for use on a door, desirably on a double rebated door.

[0006] The hinge arrangement preferably further comprises activation means for effecting movement of the first leaf member, and hence of the hinge axis, as the hinge arrangement opens and closes. The activation means may comprise first means for effecting movement of the first leaf member in a first direction as the hinge opens, and second means for effecting movement of the first leaf member in a reverse direction as the hinge closes.

[0007] The mounting means desirably comprises retaining means cooperable with the first leaf member, for slidably mounting the first leaf on a surface, such as a door frame. The retaining means preferably comprises at least one stud member, preferably having an oversize head, and is cooperable with a slot in the first leaf. The mounting means may additionally comprise a mounting plate. The retaining means are desirably provided on the mounting plate.

[0008] The first activation means preferably comprises resilient bias means biasing the first leaf member to move as aforesaid. The resilient means may be a spring.

[0009] The first activation means may alternatively or additionally comprise a lever means. The lever means preferably comprises a generally curved lever surface provided on the door stile rebate and a cooperating surface provided on the corresponding face of the door frame, the lever surface acting on the cooperating surface to push the door stile, as the hinge opens, to cause the first leaf to move as aforesaid.

[0010] The second activation means may comprise a cam member shaped to cooperate with a cooperating surface as the hinge closes, thereby causing the first leaf member to move. The cooperating surface may be a roller member. Desirably the roller member is provided across an aperture or recess suitable for accepting the cam member. The roller member is preferably provided across an aperture or recess formed in the mounting plate. The cam member may be provided on the second leaf member. Preferably an aperture is provided in the first leaf member for providing for access by the cam member to the roller member.

[0011] Alternatively, the roller member may be provided across an aperture or recess formed in the door frame. The cam member may alternatively be provided on the door stile. The roller member and the cam member may be located remote from the first and second leaf member and the mounting means.

[0012] The second activation means may alternatively or additionally comprise a cam plate provided on the door frame and a pin means provided on the door stile, or vice versa. Preferably the cam plate includes a shaped guide means for guiding the travel path of the pin means as the hinge arrangement opens and closes, to thereby effect movement of the first and second leaf members and the hinge axis. The guide means may be an aperture provided in the cam plate. The pin means may comprise a roller means. The cam plate and pin means are preferably located remote from the first and second leaf member and the mounting means.

[0013] Embodiments of the invention will be described in more detail by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a sectional view of a conventional double rebated door;

Fig. 2 is a diagrammatic perspective view, partly in section, of a hinge arrangement according to the present invention installed on a double rebated door;

Fig. 3 is an exploded view of the hinge arrangement of Fig. 2;

Figs. 4, 5 and 6 are a sectional views along line I-I of the hinge arrangement of Fig. 2 in the open, partially closed and closed conditions, respectively;

Figs. 7, 8 and 9 are a diagrammatic sectional views of an alternative hinge arrangement according to the present invention, in the closed, partially open and open conditions, respectively;

Fig. 10 is a diagrammatic plan view of an alternative second activation means according to the present invention; and

Fig. 11 is a diagrammatic front view of a door, indicating the positions of the first and second leaves, and the second activation means of Fig. 10.

[0014] A conventional double rebated door arrangement 10 can be seen in Fig 1. The door arrangement includes a frame 12 which frames an aperture in a wall 13 and has a lip 14, known as a rebate, provided along

an edge of its face 12a, projecting away from the wall 13. The door stile 16 is a close fit within the frame 12 and has a rebate 18 provided along an edge of one face 16a, projecting toward the wall 13. A hinge 20 is provided externally of the rebate 18, attached to the face 16a of the door stile 16 and to the face 12a of the frame 12 so that the rebate 18 can move clear of the frame 12 as the door 10 is opened and closed on the hinge 20. When the door 10 is closed, as shown, the rebate 14 on the door frame 12 overlies the non-hinged face 16b of the door stile 16 and the rebate 18 on the door stile 16 overlies the hinged face 12b of the door frame 12. This provides weatherproofing for the arrangement, and may be enhanced by seals (not shown) or brush piles.

[0015] Referring to Figs. 2 and 3, there is shown a hinge arrangement 30 according to the present invention, and comprising a first leaf 32, a second leaf 34, and mounting means 36, in the form of a mounting plate 38, studs 40 and slots 41 in this example. The leaves 32 and 34 are pivotably interconnected by a hinge pin 42 in a manner conventional in itself. The hinge arrangement 30 is illustrated installed in a door arrangement which is similar to that shown in Fig. 1.

[0016] The first leaf 32 has elongate slots 41 formed to receive the studs 40, each of which has an oversize head for retaining the stud 40 in the respective slot 41. The slots 41 are closed at each end. The first leaf 32 is thus slidably mounted on the mounting plate 36 via the studs 40, within limits set by abutment of the studs 40 with the ends of the slots 41.

[0017] The leaf 32 also defines channels 43 which run substantially perpendicular to the axis of the hinge pin 42 and are open-ended at the end facing away from the pin 42, to receive compression springs 44. The compression springs 44 are able to act between the closed end of the channels 43, and a corresponding lug 45 upstanding from the plate 38. A lug 45 is provided opposing each channel 43.

[0018] The springs 44 are provided to bias the first leaf 32 to move across the mounting plate 38 as the hinge 30 opens away from a rebate 47 which corresponds with the rebate 14 of Fig. 1.

[0019] The effect of the springs 44 is to move the pivot axis as the door opens, so that the second leaf 34, and hence the door stile 48, move away from the mounting plate 38 and the door frame 46. The length of the slots 41 is sufficient to allow the rebate 48a (corresponding to the rebate 18 of Fig. 1) on the door stile 48 to move clear of the frame, and allow the door to open without the rebate 48a fouling the door frame 46.

[0020] Reverse movement of the first leaf, when the door is closed, is achieved as follows. The second leaf 34 comprises a cam 50, having a curved inner face 50a. The mounting plate 38 carries a roller 52 mounted across an aperture 54 in the plate 38, the aperture being positioned to receive the cam 50. An aperture 55 is provided on the first leaf 32, allowing the cam 50 to penetrate the leaf 32 prior to entering the aperture 54. The cam face 50a cooperates with the roller 52, to pull the leaf 32 toward the rebate 47, as the hinge 30 closes. The sequence of positions is shown in Figs. 4 to 6, as the first leaf 32 moves back across the mounting plate 38 to its closed condition, shown in Fig 6. The springs 44 are progressively compressed as the door closes. This sequence of positions is the reverse of the positions reached as the door opens, under the influence of the springs 44.

[0021] The cam 50 can additionally act as a hinge protector when the door is closed, to thereby provide extra strength and security to the hinge arrangement 30, by providing mechanical engagement between the door and the frame, to resist the door being broken apart by force.

[0022] An alternative embodiment of the invention is shown in Figs. 7 to 9. Again, the hinge arrangement is shown mounted on a double rebated door, and consequently, the same reference numerals are used for corresponding features. In this example, the springs 44 of the previous embodiment are not present. Instead, movement of the hinge axis while opening the door is created by a curved lever surface 60 provided on the tip of the door stile rebate 48a, and a cooperating surface 62 provided on the door frame 46. As the hinge arrangement 64 opens, the lever surface 60 meets and pushes against the cooperating surface 62, thereby pushing the first leaf 32 on the studs 40 to move the hinge axis. The first leaf 32 is returned to its original position, upon closing the door, by means of a cam arrangement as described above in relation to Figs. 2 to 6.

[0023] A further embodiment of the invention is shown in Figs. 10 and 11. Again, the same reference numerals are used for corresponding features where appropriate.

[0024] In this version, an alternative movement arrangement 70 is provided, in the form of a cam plate 72 and a pin 74. The cam plate 72 is located on the door frame 46 and the pin 74 is mounted on the door stile 48. The pin 74 is able to move along a guide means, in the form of a slot 76 provided in the cam plate 72, as the door opens and closes. The slot 76 is shaped to define a path of travel for the pin 74 such that when the hinge arrangement opens and closes, the first and second leaves 32 and 34, and the door stile 48, move away from or toward the door frame 46 as previously described.

[0025] A movement arrangement 70 is provided at the head and foot of the door, as illustrated in Fig. 11. Hinges would be provided at convenient locations along the edge of the door, again as illustrated. The hinges would comprise leaves 32,34 as shown in Figs. 2 to 9, but the function of the springs 44 and of the surfaces 60,62 would be provided by the arrangements 70. The cams 50 would not be required, but could be provided to act as hinge protectors, if required.

[0026] There is thus provided a hinge arrangement in which the hinge axis translates (i.e. moves transverse to its axis) as the hinge arrangement moves from a closed condition to an open condition, and vice versa.

It will be appreciated, as shown in the examples in the drawings, that the hinge is particularly advantageous for use on a double rebated door. The movement of the hinge axis during opening and closing of the hinge arrangement allows the door stile to be moved to a position clear of the door frame as the hinge and the door open. This allows the hinge to be concealed between the door frame and the door stile, rather than being externally arranged as is common heretofore. This offers the advantage of improved security, since the hinge arrangement is protected from attack by the rebates, and gives the door an improved appearance. The invention offers the further advantage that the cam may additionally function as a hinge protector, to thereby give added strength and security to the hinge arrangement. The increased strength and security of the hinge arrangement may allow a reduced number of hinges to be used on a door as compared to conventional door systems.

[0027] Various modifications may be made within the scope of the invention, for example, whilst the embodiments show discrete hinge arrangements it will be appreciated that a single continuous hinge arrangement may be provided on a door. The length of the hinge arrangement can be varied from approximately 10 cm up to substantially the full length of the door, and any number of cams and rollers, lever means or cam plates and pins may be provided. As is evident from the embodiments, the cam and roller may be incorporated into the second leaf and the mounting plate respectively, or may be provided at a separate location on the door. Any resilient means may be used in place of the springs shown in the drawings. The cam plate and pin may be provided at a different location to that shown in the drawings, and it will be appreciated that the number of cam plates and pins may be varied from that shown in the drawings.

[0028] Means for adjusting the position of the hinge arrangement on the door frame and door stile may also be provided, to allow for adjustment in both the vertical and horizontal directions, to thereby align the door stile on the door frame.

[0029] The above description refers only to doors, but the arrangements are equally applicable to windows and other hinged aperture closures.

[0030] Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

Claims

1. A hinge arrangement comprising first and second leaf members, the leaf members being pivotably interconnected, there being mounting means by which the first leaf member is slidably mountable to allow the first leaf member to move, as the hinge arrangement moves between a closed condition and an open condition, thereby changing the position of the hinge axis.

2. An arrangement according to claim 1, in which the hinge arrangement is for use on a door.

3. An arrangement according to claim 2, in which the door is a double rebated door.

4. An arrangement according to any preceding claim, in which the hinge arrangement further comprises activation means for effecting movement of the first leaf member, and hence of the hinge axis, as the hinge arrangement opens and closes.

5. An arrangement according to claim 4, in which the activation means comprises first means for effecting movement of the first leaf member in a first direction as the hinge opens, and second means for effecting movement of the first leaf member in a reverse direction as the hinge closes.

6. An arrangement according to any preceding claim, in which the mounting means comprises retaining means cooperable with the first leaf member, for slidably mounting the first leaf on a surface.

7. An arrangement according to claim 6, in which the surface is a door frame.

8. An arrangement according to claims 6 or 7, in which the retaining means comprises at least one stud member.

9. An arrangement according to claim 8, in which the stud member has an oversize head.

10. An arrangement according to claims 8 or 9, in which the stud member is cooperable with a slot in the first leaf.

11. An arrangement according to any of claims 6 to 10, in which the mounting means additionally comprises a mounting plate.

12. An arrangement according to claim 11, in which the retaining means are provided on the mounting plate.

13. An arrangement according to any of claims 5 to 12, in which the first activation means comprises resilient bias means biasing the first leaf member to move.

14. An arrangement according to claim 13, in which the resilient means is a spring.

15. An arrangement according to any of claims 5 to 14, in which the first activation means comprises a lever means.

16. An arrangement according to claim 15, in which the lever means comprises a generally curved lever surface provided on the door stile rebate and a co-operating surface provided on the corresponding face of the door frame, the lever surface acting on the cooperating surface to push the door stile, as the hinge opens, to cause the first leaf to move.

17. An arrangement according to any of claims 5 to 16, in which the second activation means comprises a cam member shaped to cooperate with a cooperating surface as the hinge closes, thereby causing the first leaf member to move.

18. An arrangement according to claim 17, in which the cooperating surface is a roller member.

19. An arrangement according to claim 18, in which the roller member is provided across an aperture or recess suitable for accepting the cam member.

20. An arrangement according to claims 18 or 19, in which the roller member is provided across an aperture or recess formed in the mounting plate.

21. An arrangement according to any of claims 17 to 20, in which the cam member is provided on the second leaf member.

22. An arrangement according to claim 21, in which an aperture is provided in the first leaf member for providing for access by the cam member to the roller member.

23. An arrangement according to claim 18, in which the roller member is provided across an aperture or recess formed in the door frame.

24. An arrangement according to any of claims 17 to 20 and 23, in which the cam member is provided on the door stile.

25. An arrangement according to any of claims 18 to 24, in which the roller member and the cam member are located remote from the first and second leaf member and the mounting means.

26. An arrangement according to any of claims 5 to 25, in which the second activation means comprises a cam plate provided on the door frame and a pin means provided on the door stile, or vice versa.

27. An arrangement according to claim 26, in which the cam plate includes a shaped guide means for guiding the travel path of the pin means as the hinge arrangement opens and closes, to thereby effect movement of the first and second leaf members and the hinge axis.

28. An arrangement according to claim 27, in which the guide means is an aperture provided in the cam plate.

29. An arrangement according to any of claims 26 to 28, in which the pin means comprises a roller means.

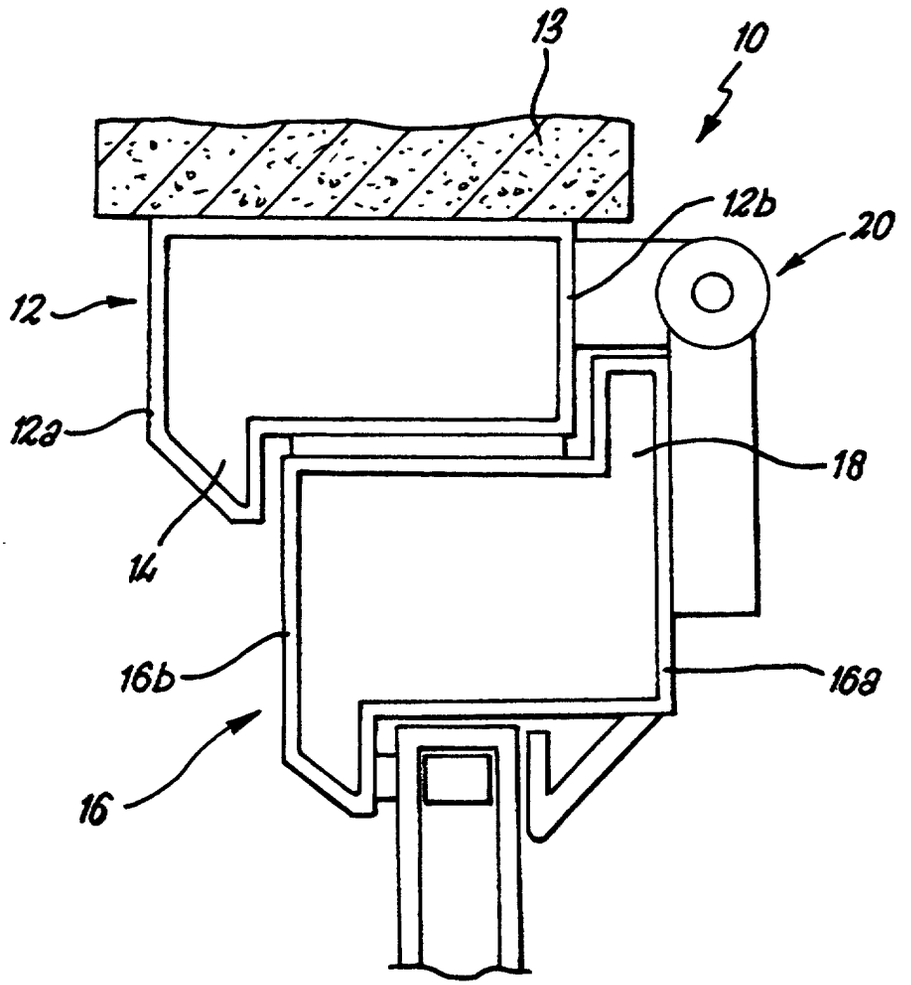
30. An arrangement according to any of claims 26 to 29, in which the cam plate and pin means are located remote from the first and second leaf member and the mounting means.

31. A hinge arrangement substantially as described above with reference to Figs. 2 to 6.

32. A hinge arrangement substantially as described above with reference to Figs. 7 to 9.

33. A hinge arrangement substantially as described above with reference to Figs. 2 to 6, 10 and 11 or Figs. 7 to 11.

34. Any novel subject matter or combination including novel subject matter disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.



ФИГ.1

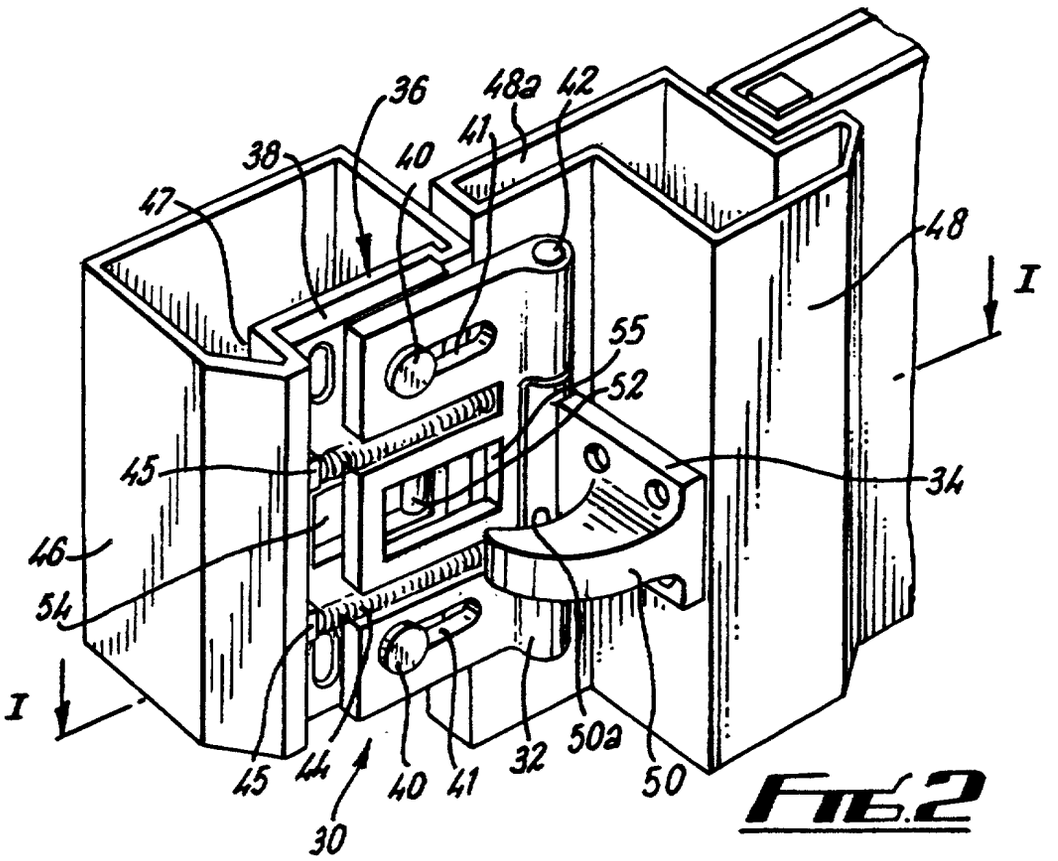

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FIG.2

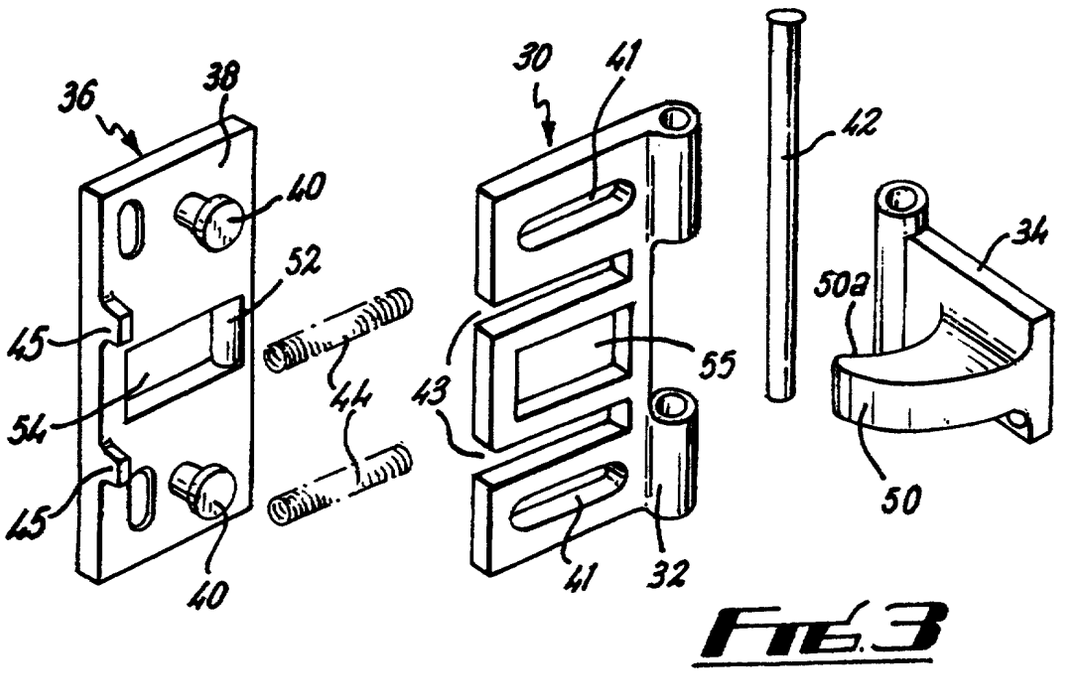
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FIG.3

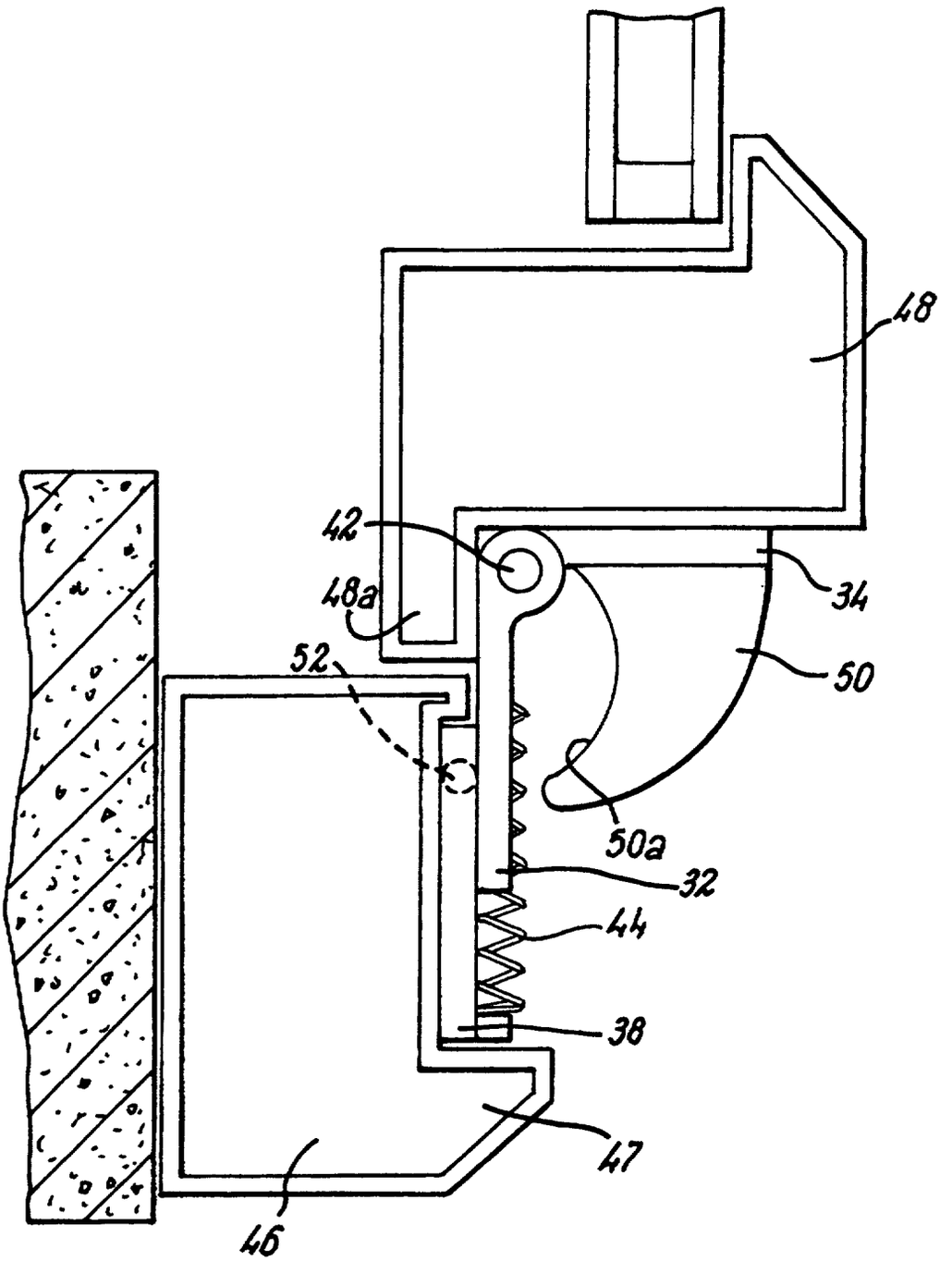


FIG.4

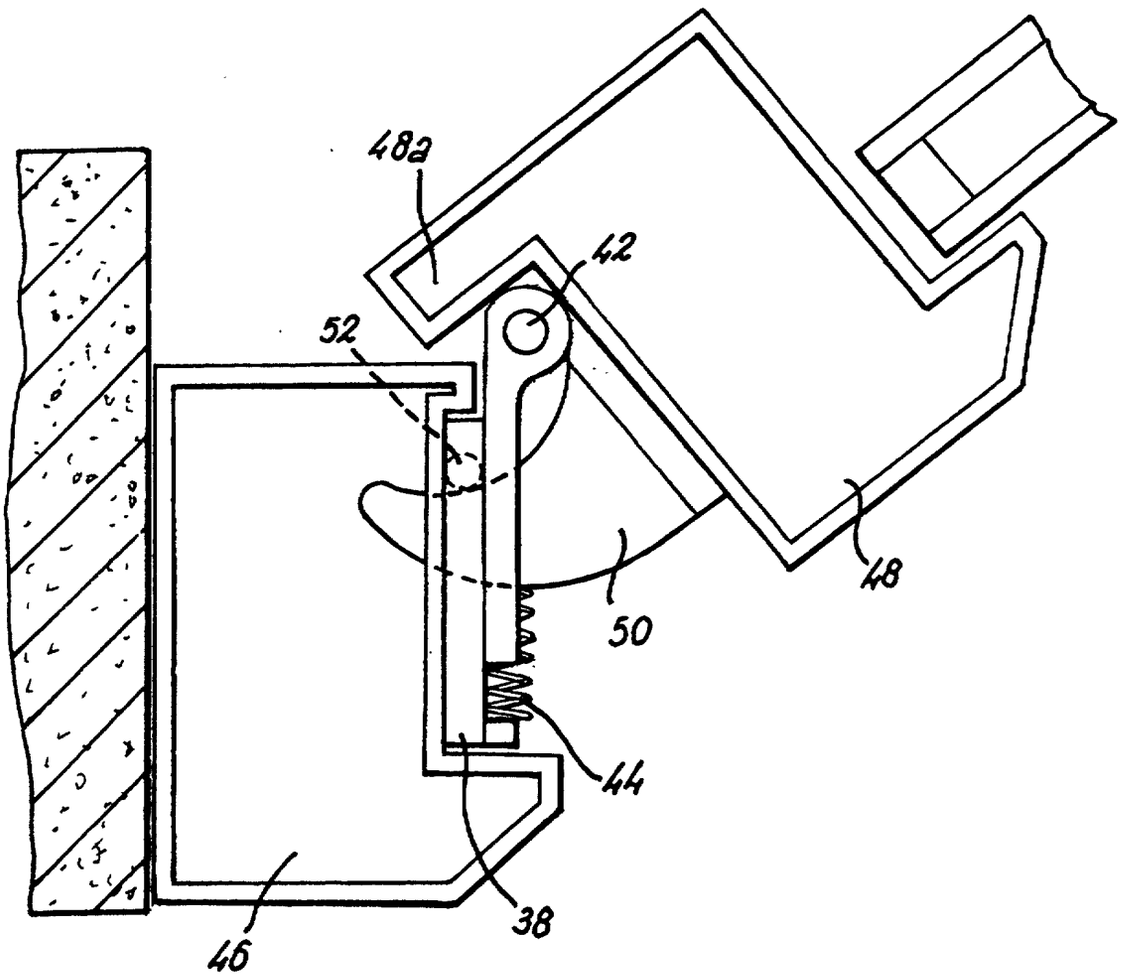
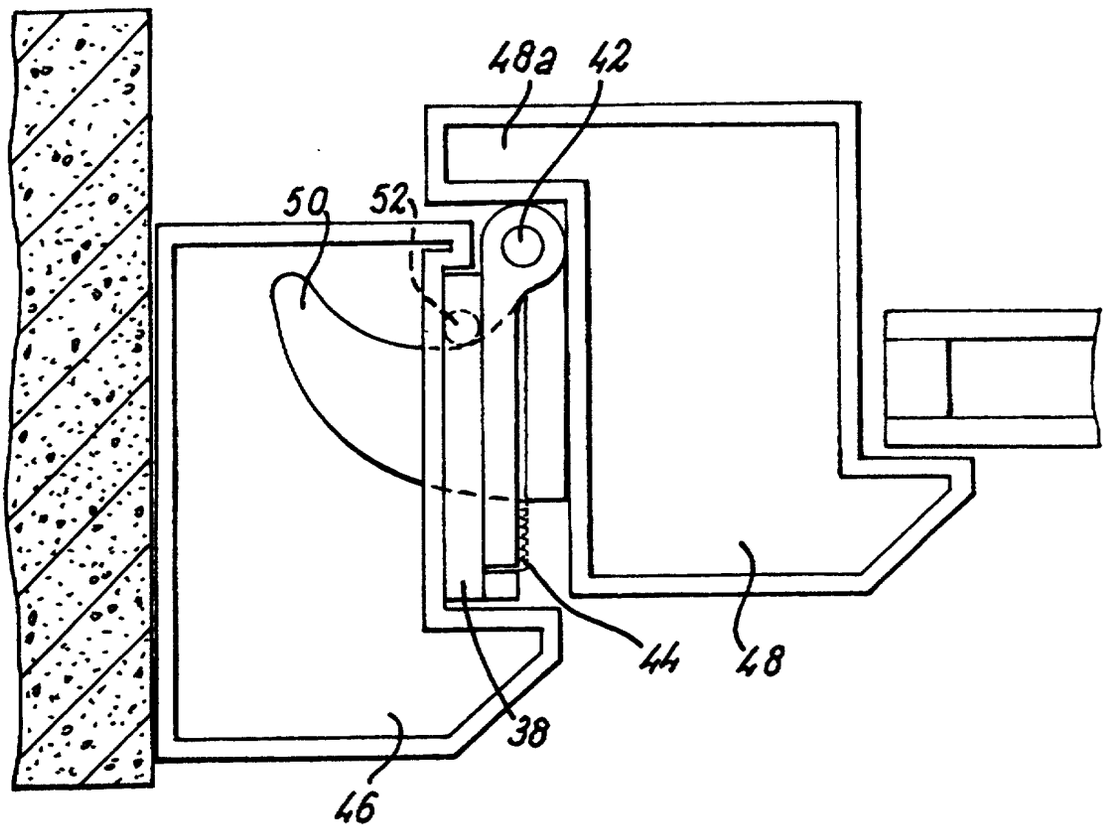


FIG. 5



Фиг.6

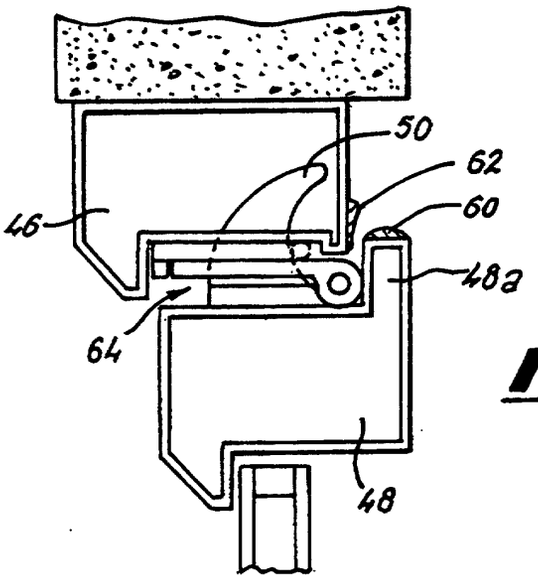


FIG.7

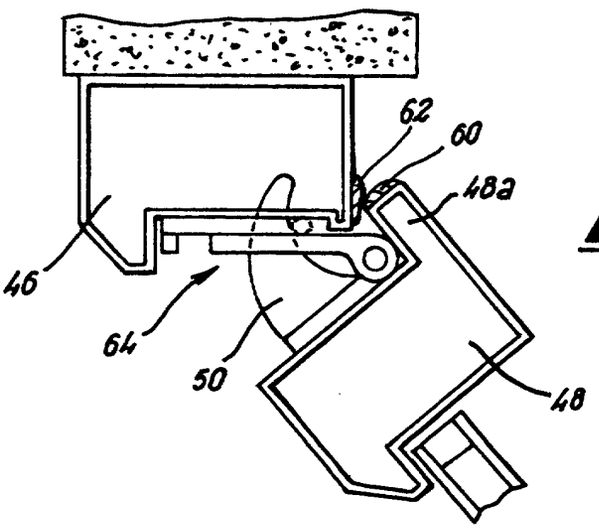


FIG.8

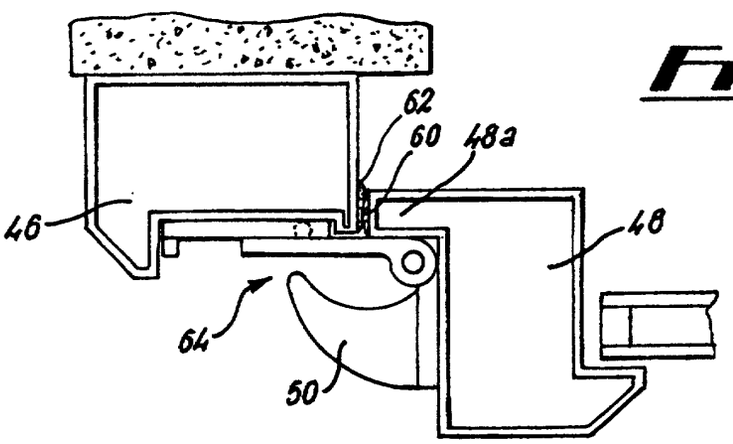


FIG.9

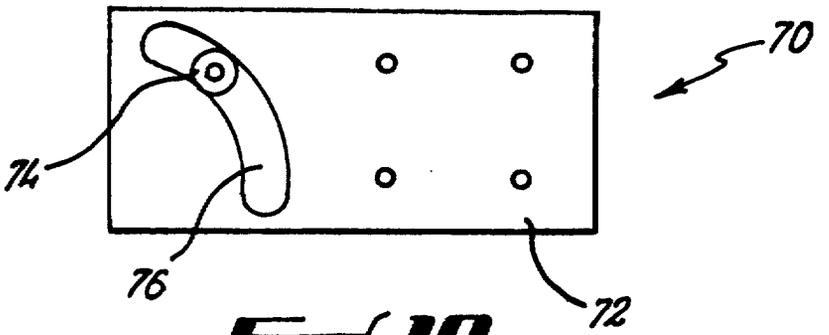


FIG.10

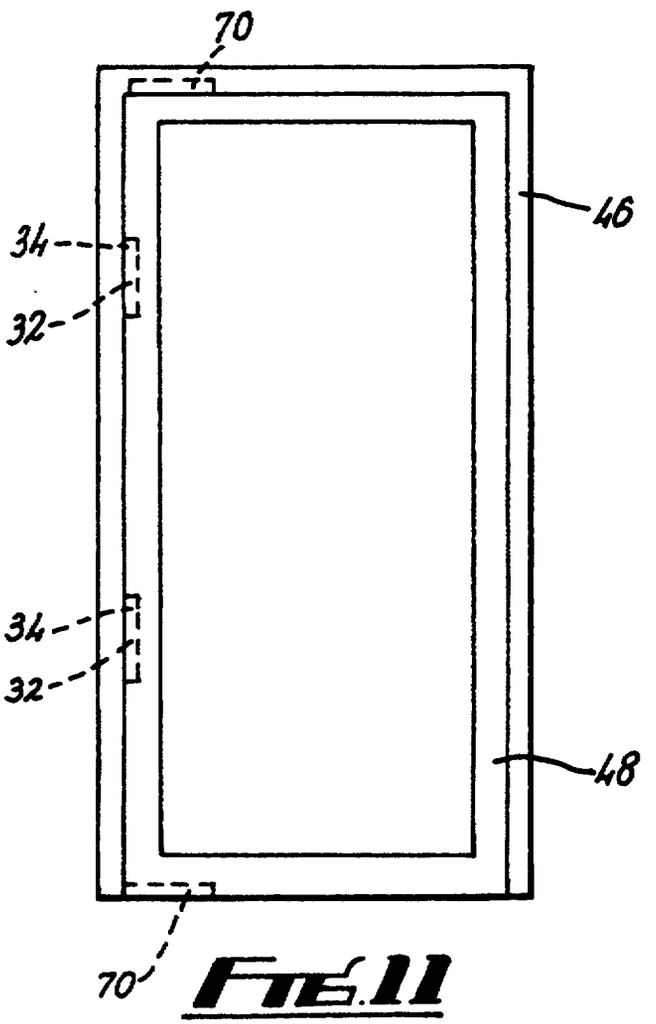


FIG.11