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(54) **Doors for refrigerating rooms, in particular sliding doors, with external locking device and internal safety opening device**

(57) Door (2) for refrigerating rooms, in particular of the sliding type, comprising a door-lock (4), whereby said door-lock (4) is realized on a horizontal axis laying in the door plane, so as to be housed inside the door thickness; the door-locking is ensured without any cou-

pling elements being mounted on the room external wall; means are provided for the door opening also from inside the room.

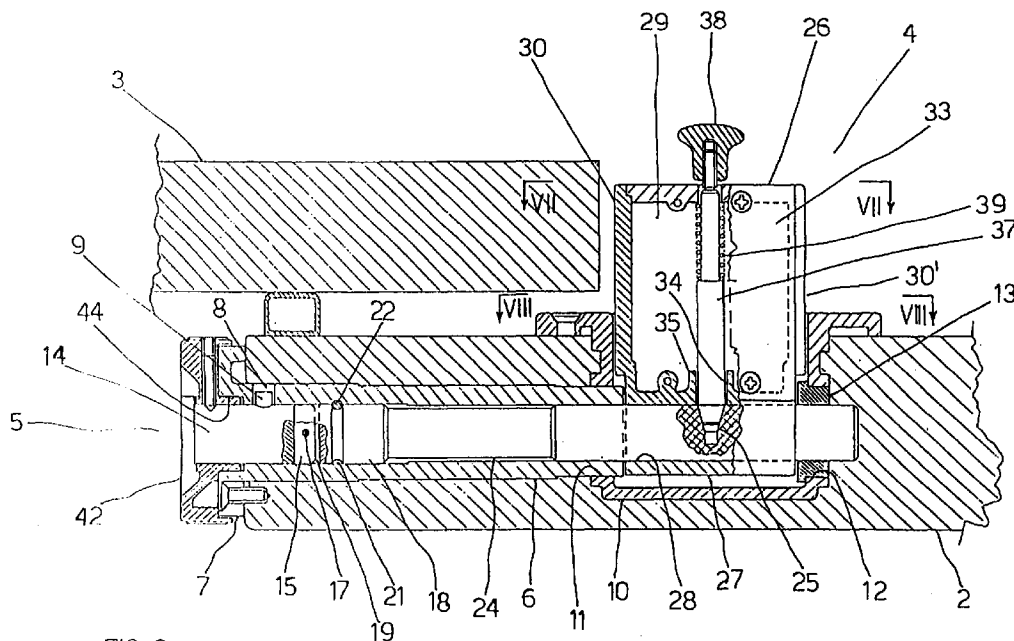


FIG. 2

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Description

The present invention refers to a door for refrigerating rooms, in particular a sliding door, comprising a door-lock.

As known, refrigerator rooms of large dimensions, both for fruits preservation and meat preservation and/or freezing, consist of a chamber with insulated walls, which may also be built into a masonry room.

An opening to get access inside the refrigerating room is closed by a door that can be normally opened like a book or be sliding on guides.

Said doors are generally closed externally by various kinds of locking devices.

Locking devices can be realized to be used by anybody wanting to enter the refrigerating room or be equipped with a key for controlled access to the room.

Said locking devices generally consist of two parts, one part carrying a locking mechanism, i.e. a door-lock, and the other part carrying the means onto which the locking mechanism of the first part engages.

One part, i.e. the door-lock, is assembled on the door external face and the other part on the fixed wall outside the room, near the relevant opening.

This kind of locking is rather complex and expensive as it requires assembly of a number of parts as well as a substantially exact coupling of the part assembled on the door with the one assembled on the room wall.

Moreover, the possibility should be given for internal opening, so that any person erroneously locked inside the room may get out without help from others.

To this purpose, locking devices are provided with means which can release the locking mechanism by a simple pressure of one's hand and open the door by the pressure of said hand or both hands and/or the weight of one's body.

However this system, besides increasing the cost of the locking device, is suited for those doors opening like a book, whereas for the opening of sliding doors it is necessary, after having released the locking device, to act on the door, by making it to slide.

Also for these doors there are locking devices available, which allow door opening from inside the room, by actuating a push-button on the door internal part, which releases the locking mechanism located on the door external side.

To do this, additional components are needed for the door-lock with a consequent higher cost.

It is the object of the present invention to solve the above problems and specifically provide a door with a locking device, which may also be opened from inside the room, which can be manufactured in a simple, easy, safe and inexpensive manner.

To reach said purposes, it is the object of the present invention to provide a door for refrigerating rooms, in particular of the sliding type, comprising a door-lock, characterized in that the door-lock is assembled on a horizontal axis laying in the door plane and

contained within the door thickness, that the door closes without any coupling elements assembled on the external wall of the room and that means are provided to allow door opening also from inside the room.

Further purposes and advantages of the present invention will become apparent from the following detailed description and annexed drawings supplied by way of a non limiting example, wherein:

- Fig. 1 shows schematically a room section with the door in closed position according to the present invention;
- Fig. 2 shows a horizontal section of a door-lock assembled on the room door according to the present invention;
- Fig. 3 shows a vertical section of a door locking element according to the present invention;
- Fig. 4 shows a section of a detail of the restraint elements of the door-lock components in their working position according to the present invention;
- Fig. 5 shows a section of a detail of the rotation locking element for the door-lock according to the present invention;
- Fig. 6 shows an exploded view of the connection of two door-lock elements according to the present invention;
- Fig. 7 shows a section VII - VII of a locking element of the door-lock according to the present invention;
- Fig. 8 shows a section VIII - VIII of a locking element of the door-lock according to the present invention;
- Fig. 9 shows a view in partial section of another embodiment of the locking element according to the present invention.

The present invention is based on the acknowledgment that through an appropriate configuration all locking elements may be assembled within the door thickness.

In Fig. 1, showing schematically a room section with the door in closed position according to the present invention, number 1 indicates the opening to get access inside a room, number 2 a sliding door, number 3 the room walls defining the width of the opening, number 4 a elements or means to lock sliding of the door 2 for its opening (the arrow indicates the opening direction of the door 2), to hinder access inside the room.

In Fig. 2, showing a horizontal section of a door-lock assembled on the room door according to the present invention, number 2 indicates the door, number 3 a wall defining the width of the room opening, number 4 the means to lock the sliding of the door 2 and number 5 a door-lock.

As it can be seen from the above figure, the special configuration of the door-lock 5 and its position along a horizontal axis laying in the door plane 2, allows its insertion within the door thickness and without any element in sight on the door front face 2.

It should also be noted that the external room wall has no elements cooperating with the door-lock for the locking of the door 2, since locking is obtained through the locking means 4 located on the internal part of the door 2.

Number 6 indicates a flanged tube made of plastic material, containing the door-lock 5 and inserted in a cylindrical seat obtained transversally in the thickness of the door 2. Said tube 6 has a flange 7 which has the function of allowing the fixing of the tube 6 to the edge of the door 2 by, means of screws, and has holes 8 and 8' (Fig. 5) for accommodating a pin 9 to stop rotation of the door-lock, as described later.

Number 10 indicates a properly configured casing to accommodate the locking element 4 in its rest position as better represented in Fig. 3.

Said casing 10 is located in a recess on the internal part of the door 2 and has two holes on its side surfaces, which are indicated with number 11 and 12, respectively.

Said hole 11 contains the non flanged end of the tube 6, whereas the hole 12 is supporting an end of the door-lock 5 with an interposed bushing 13 in plastic material, acting as a frictionless bearing the rotation of the door-lock during closing and/or opening operations of the door 2.

Number 14 indicates a first metal small block of extended solid ring section and with rounded offends, whose width is equal to or slightly smaller than the inside diameter of the tube 6.

Said first small block 14 has some mechanisms inside, known as such, which control a vertical movement of the pin 9 through a key.

Moreover, said first small block 14 has a protozoon 15 having a rectangular section, in a central position on one end, whose length is equal to and/or smaller than the length of the small block 14 and whose width is smaller than the width of the small block 14; said protozoon 15 has a hole 16 for a fastening gudgeon pin 17 to go through (Fig. 6).

Number 18 indicates a second cylindrical small block whose diameter is equal to and/or smaller than the inside diameter of the tube 6, which has a groove 19 on one end suitable to accommodate the protozoon 15 of the first small block 14; moreover, it also presents a through-hole 20 perpendicular to said groove suitable to accommodate the gudgeon pin 17, as represented in Fig. 6.

Said gudgeon pin 17 connects the first small block 14 with the second cylindrical small block 18.

Said second cylindrical small block 18 has a groove 21 of semicircular section over all its outside perimeter apt to accommodate a pin 22.

Said pin 22 locks the second cylindrical small block 18 in the tube 6 cooperating with a hole 23 on the tube 6 as represented in Fig. 4.

Said pin 22 has an equal to and/or slightly smaller diameter than the width of the semicircular groove 21.

The height position of the axis of the hole 23 is in line with the outside diameter of the second cylindrical small block.

Said pin 22, inserted in the hole 23 of the tube 6, engages the groove 21 of the second cylindrical block 18 and locks it horizontally in the tube 6; however, it does not jeopardize its rotation since the groove can slide on the pin 22.

Number 24 indicates a portion of the second cylindrical small block 18 with a smaller diameter to reduce the friction of the block 18 with the tube 6 when said small block 18 is rotating within the tube 6.

Moreover, said second cylindrical block 18 has a hole 25 of a truncated cone shape perpendicular to its horizontal axis and parallel to the pin axis 9 of the first small block 14. Said hole 25 is used to connect and control the locking means 4.

Number 26 indicates the body of the locking means 4, which is substantially configured as a rectangle parallelepiped with a semicylindrical base 27 and open on its front (Fig. 3).

Said base 27 has a through-hole 28 over its whole horizontal length whose diameter is equal to and/or slightly larger than the diameter of the cylinder 18 of the door-lock 5.

Moreover, said base 27 has a central upright hole 34 connecting the hole 28 with the higher portion of the body 26.

Said hole 34 has a ring 35 increasing its length, which is obtained half on the body 26 and half on a lid 33 (Fig. 3).

From the base 27 three walls indicated with 29, 30 and 30', respectively, forming the upper portion of the body of the locking means 4, depart vertically along the base.

Said three walls 29, 30 and 30' are connected to each other on the top by a horizontal wall 31, whose depth equals half the depth of side walls 30 and 30'.

Said upper wall 31 has an upright groove 32 of semicircular section on its center.

Number 33 indicates a closing lid for the front part of the locking element.

The section of said lid 33 is in the form of an upturned "L", with the shorter side closing the body upper part 26 striking against the wall 31.

Said shorter side has centrally on its free end an upright groove of semicircular section which, coupled with the groove 32 of the wall 31, form a hole 36 as represented in Fig. 8, whose diameter is smaller than the diameter of the hole 34.

The longer side of the lid 33 closes the open side of the body 26.

Said lid 33 is fastened with screws to the body 26 in a generally known manner.

Number 37 indicates a round pin having a first part with a diameter equal to and/or slightly smaller than the diameter of the hole 34, whose end protrudes out of the body 26 through the hole 34 itself, a second central part

with a diameter equal to and/or slightly smaller than the diameter of the hole 36, whose size is smaller compared with the hole 36, thus forming a step between the two parts, and a third part with a smaller diameter than the diameter of the second part, which protrudes out of the body 26 through the hole 36 and is used as a connection for a knob 38.

Said first part of the pin 37 has a truncated cone end whose dimensions are equal to the truncated cone hole 25 in the cylinder 18, wherein it is inserted for the locking means 4 to be integral with the door-lock 5.

Thus, any rotating movement impressed to the door-lock 5 is transmitted to the locking means 4.

Said third section of the pin 37 is threaded all its length, where the knob 38 is screwed on.

Number 39 indicates a spiral spring inserted in the central part of the pin 37.

Said spring 39 works under compression and is assembled preloaded; it is kept in position by the tooth resulting from the difference of diameter between the first and second part of the pin 37 and the internal surface of both the upper wall 31 of the body and the shorter side of the lid 33.

Said spring 39 is provided to keep the truncated cone end of the first section of the pin 37 inserted in position in the truncated cone hole 25 of the cylinder 18, making the locking means 4 integral with the door-lock 5.

Number 42 indicates a control knob for door-lock 5 rotation. Said knob 42 has a central slot whose size is equal to and/or larger than the section of the first small block 14. Moreover, it has an internal circular centering crown on a ring 44 of the tube 6. To improve knob rotation control, the circular crown is knurled.

The knob 42 is fastened by a threaded dowel, which is pressure screwed on the block 14 in a generally known manner.

In the Fig. 3, which represents a vertical section of a door locking device according to the present invention, number 4 indicates the locking means both in a locking position for allowing the door 2 to slide (solid line) and in a rest position (dashed line), number 2 the door, number 18 the cylindrical small block and number 37 the pin connecting the door-lock 5 with the locking means 4.

For passing from the closed position to the rest position, when the door has to be opened from inside the room, it will be enough to grasp and pull the knob 38 to disengage the pin 37 from the hole 25. Due to its weight, the locking means 4 falls downwards in the casing 10, so that the door can slide for its opening.

Therefore, it can be affirmed that no extra elements are needed to open the door 2 from inside the room, as only the same elements used for its closing are required.

In Fig. 4 representing in section a detail of the locking elements in the horizontal direction of the door-lock 5 in the tube 6 fastened internally to the door 2, number

6 indicates the flanged tube containing the door-lock 5, number 18 the second cylindrical small block, number 21 a semicircular throat on the small block 18, number 23 the through-hole on the tube 6 and number 22 the locking pin of the small block 18 in the tube 6 and consequently locking of the door-lock 5.

The pin 22 in the through-hole 23 and in the throat 21 will not let the door-lock to be extracted any more from the tube when the latter is inserted within the door thickness and fastened therein.

However, this locking mode does not hinder rotation of the small block 18, since this can occur with the throat 21 sliding on the pin 22.

In Fig. 5, representing in section a detail of the locking system of the door-lock rotation, number 6 indicates the tube where the door-lock 5 is inserted, number 9 the rotation stop pin of the door-lock 5, number 14 the small block carrying the control elements of the pin 9 and number 8 and 8' the holes engaging the pin 9.

The figure represents the door-lock position during the door closing stage, i.e. with the locking means 4 in a horizontal position.

To pass from a locking position to the rest position it is enough to insert the proper key in the small block 14 to unlock the pin 9, that goes back into the block, rotate the door-lock with the knob 42 till the locking means 4 reaches its rest position, i.e. the locking means 4 is housed in the casing 10; now it is possible to remove the key and unlock the pin 9, which engages the hole 8' and lock the door-lock in its new rest position.

The same procedure will be followed to go from a rest position to the closing position, by rotating the door-lock in the opposite direction.

In Figs. 7 and 8, representing two traverse sections of the locking means 4, number 26 indicates the body of the locking means 4, numbers 29, 30, 30' and 31 the walls forming the upper part of the locking means 4, number 33 the closing lid of the upper front section of the locking means 4.

Number 36 indicates the hole formed by coupling the semicircular groove 32 of the wall 31 with the semicircular groove of the shorter lid wall 33.

Number 34 indicates the through-hole for pin 37, numbers 40 and 41 the two bosses defining the run of the locking means 4.

For rotation stop of the door-lock 5 either in its closure and/or opening position, with the pin 9 exactly in line with the hole 8 or hole 8', the body 26 of the locking means 4 is provided with bosses 40 and 41, to lock the movement of the locking means 4 when it reaches the closure and/or opening position, striking on the casing 10.

The procedure to manufacture refrigerating room doors, specifically sliding doors with a door-lock, is as follows:

- provide a suitable seat on the door inside part to house the casing 10;

- execute a traverse hole apt to accommodate the tube 6 within the door thickness;
- insert the bushing 13 in the hole 12 of the casing 10 before assembling the casing 10 in the above seat and fasten it with screws;
- assemble the door-lock 5 by inserting the part 15 of the small block 14 in the groove 19 of the small block 18 and lock them together driving the gudgeon pin 17 in the hole 20 of the small block 18 through the hole 16 of the protozoon of the small block 14;
- insert the whole in the tube 6 and lock it horizontally inserting the pin 22 through the tube hole 23 and the throat 21 of the block small 18;
- insert the tube 6, fully assembled with all internal components in the hole previously made on the door, as far as the end of the small block 18 is about level with the internal side wall of the casing 10;
- insert the locking means 4 in the casing 10 with the hole 28 of the base 27 in axis with the small block 18; then, continue to insert the tube 6 and consequently also the small block 18 in the hole 28, making sure the pin 37 is in its unlock position, i.e. with its truncated come end outside the hole 28 till the flange 7 of the tube 6 strikes on the door 2;
- fasten the flange 7 to the door, locking the door-lock 5 on the door;
- assemble the knob 42 on the small block 14 and pressure lock it with the threaded dowel.

The features of the door for refrigerating rooms, in particular a sliding door comprising a door-lock according to the present invention are clear from the above description and annexed drawings as well as its advantages. In particular:

- the door front face has no door-lock components in sight, improving its AESTHETIC aspect,
- no components are assembled in the room to cooperate for the door locking, thus reducing both the cost and assembly difficulties;
- easy manufacture, since the door-lock components do not require any special expensive operations;
- easy assembly, since no coupling between items assembled on different elements, such as door and room, are required;
- easy opening from inside the room, since only a knob needs to be pulled to unlock.

It is obvious that many changes are possible for the man skilled in the art to the door for refrigerating rooms, in particular a sliding door, comprising a door-lock as described above by way of example, without departing from the novelty spirit of the innovative solution.

For instance, as represented in Fig. 9, the opening from inside the room can be obtained by pressing a button instead of pulling a knob.

With reference to this figure, number 45 indicates a

locking element. Number 46 indicates the body of the locking element 45, which is substantially configured as a rectangle parallelepiped with a semicylindrical base 47 and is open on the front.

Said base 47 has a through-hole 48 over all its length, whose diameter is equal to and/or slightly larger than the diameter of the cylinder small 18 of the door-lock 5.

Moreover, said base 47 has a central vertical hole 49 connecting the hole 48 with the upper part of the body 46.

From the base 47 three walls, indicated with 50, 51 and 51', respectively, depart vertically to form the upper part of the body 46 of the locking element 4.

Said three walls 50, 51 and 51' are connected between each other on the top by a horizontal wall 52, whose depth equals half the depth of the side walls 50 and 50'.

Said upper wall 52 has two vertical grooves 53 of semicircular section.

Number 54 indicates a closing lid for the front section of the locking element.

Said lid 54 has the form of an upturned "L", whose shorter side closes the upper part of the body 46 striking against the wall 52.

Said shorter side has two vertical grooves of semicircular section on its free end, which have the same center distance of the grooves 53 of the wall 52, so as to form two holes 55 when they are coupled together.

The longer side of the lid 54 closes the open side of the body 46.

Said lid 54 is fastened to the body 46 in a generally known manner with screws.

Number 56 indicates a pin having a first lower portion with a diameter equal to and/or slightly smaller than the diameter of the hole 49, whose end protrudes out of the body 46 through the hole 49, and a second portion with a larger diameter than the first portion and the hole 49, thus forming a step between the two parts. Said step works as a stop for the run of the pin 56.

Said first portion of the pin 56 has a truncated cone configuration, whose dimensions are equal to those of the truncated come hole 25 of the small cylinder 18 where it will be inserted for the locking element 4 to become integral with the door-lock 5.

Thus, any rotating movement impressed to the door-lock 5 will be transmitted to the locking element 4.

Said second portion of the pin 56 has small teeth 57 over all its length.

Numbers 58 and 58' indicate two small gear wheels keyed on two small shafts on the wall 50 of the body 46, which engage the teeth 57 of the pin 56.

Numbers 59 and 59' indicate two vertically sliding elements within the body 46.

Said sliding elements 59 and 59' have a first portion 60 of rectangular section with an indented area engaging both gear wheels 58 and 58' and a second portion 61 of circular crown section protruding out of the body

46 through the holes 55.

Number 62 indicates a spiral spring assembled between the pin 56 and the internal surface of the upper wall of the body 46.

To maintain the spring 62 in position, its two ends are inserted one on a tang on the end of pin 56 and the other on a tang obtained on the upper body wall. Said spring 62 works under pressure and is assembled preloaded.

The spring 62 keeps the truncated cone end of the first portion 60 of the pin 56 inserted in the truncated cone hole 25 of the small cylinder 18, for the locking element 4 to become integral with the door-lock 5.

Number 63 indicates a knob having two pins 65, which are driven into the hole 64 of the second portion 61 of both sliding elements 59 and 59' to fasten the knob 63 to the locking element 45.

In its operating condition, i.e. with the truncated cone end of the pin 56 inserted in the truncated cone hole 25 of the small cylinder 18 of the door-lock 5, both sliding elements 59 and 59' are in their striking position against the internal surface of the upper wall 52 of the body 46.

In this position, the knob 63 is at distance from the body 46 since the second portion 61 of both sliding elements 59 and 59' where it is fastened to is protruding out of the body 46.

If the locking element 45 has to be released from the door-lock 5, it will be enough to press the knob 63 from inside the room.

The pressure exerted on the knob pushes downwards both sliding elements 59 and 59' of the body 46, which cause both gear wheels 58 and 58' connected with them to rotate counter-clockwise.

Said gear wheels 58 and 58' are connected with the pin 56 and cause the latter to make a movement upwards to release the pin from the door-lock. The locking element 4 released from the door-lock falls down by gravity and the door will open.

Guides or guide lengths obtained in a generally known manner are provided on the body 46 to ensure a straight linear motion without side movements of the sliding elements 59 and 59' as well as of the pin 56.

A further embodiment, such as in the instance of refrigerating rooms working at low temperatures, has a condense-proof wire heater 43 on aluminum foil added to the casing 10, in order to avoid blocking of the pin 37, as this would make it difficult for the door to be opened from inside the room.

In the instance of powered doors, i.e. with both the opening and closure controlled by an electric motor, a push switch actuated by the boss 41 of the locking element 4 may be inserted in the casing 10, to enable the motor operation only when the locking element 4 is in the closed position.

This would hinder a casual opening of the door while the door-lock is in the closed position, and avoid possible damages.

It is anyway obvious, without any prejudice to the principle of the invention, that many changes are possible to the manufacturing features of the door for refrigerating doors, in particular of the sliding type, comprising a door-lock as described above by way of example, without departing from the novelty spirit of the innovative idea, and it is also clear that in practical actuation of the invention the component may often differ in form and size from the ones described above and be replaced with technical equivalent elements.

Claims

1. Door for refrigerating rooms, in particular of the sliding type, comprising a door-lock (5), characterized in that the door-lock (5) is provided on a horizontal axis laying in the door plane (2) so as to be housed within the door thickness, that the door locking does not require any coupling elements assembled on the room external wall, and that locking means (4,45) are provided for allowing the door opening also from inside the room.
2. Door for refrigerating rooms according to claim 1, characterized in that the door-lock (5) actuates locking means (4,45) which rotate protruding out of the door level and acting against the room wall (3).
3. Door for refrigerating rooms according to claim 1, characterized in that the door (2) has housing means (6,10) for the door-lock (5) and the locking means (4,45).
4. Door for refrigerating rooms according to claim 3, characterized in that said housing elements consist of a tube (6) and casing (10) in plastic material.
5. Door for refrigerating rooms according to claim 1, characterized in that the door-lock (5) has means (14,18) for rotating the locking means (4), connecting means (15,17,19) for the rotating means (14,18), blocking means (9) for the rotation of the door-lock (5) and blocking means (22) for the horizontal sliding of the door-lock (5).
6. Door for refrigerating rooms according to claim 3, characterized in that said tube (6) has a flange (7) for fastening the tube (6) on the door (2) and a ring (44) for the assembly of a knob (42) on the door-lock (5).
7. Door for refrigerating rooms according to claim 3, characterized in that said tube (6) has two holes (8, 8') to block the rotation of the door-lock (5) in its two closing and opening positions.
8. Door for refrigerating rooms according to claim 3, characterized in that said housing tube (6) has a

hole (23) for the insertion of a restraint pin (22) for the horizontal sliding of the door-lock (5) in the tube (6).

9. Door for refrigerating rooms according to claim 5, characterized in that said rotation means (14,18) consist of a first metal block (14) of extended solid ring section with rounded off ends, whose width is equal to and/or slightly smaller than the inside diameter of the housing tube (6) and of a second cylindrical block (18). 5
10. Door for refrigerating rooms according to claim 5, characterized in that said connecting means (15,17,19) consist of a protozoon (15) of the first block (14), of a groove (19) of the second block (18) for containing the protozoon (15) of the first block (14), of a gudgeon pin (17) connecting the first block (14) with the second block (18) going through some through-holes (16, 20) on the protozoon (15) of the first block (14) and on the groove walls (19) of the second block (18). 10
11. Door for refrigerating rooms according to claim 5, characterized in that said blocking means of the door-lock (5) consist of a rotation restraint pin (9) located in the first block (14). 15
12. Door for refrigerating rooms according to claim 5, characterized in that said blocking means for the horizontal sliding of the door-lock (5) consist of a gudgeon pin (22) inserted in the hole (23) of the housing tube (6). 20
13. Door for refrigerating rooms according to claim 9, characterized in that said first block (14) is internally provided with control elements of said pin (9) protruding out of said first block (14). 25
14. Door for refrigerating rooms according to claim 9, characterized in that said second cylindrical block (18) has a groove (21) of semicircular section over all its outside perimeter, which is apt to contain said blocking pin (22) of the horizontal sliding of the door-lock (5) in the housing tube (6). 30
15. Door for refrigerating rooms according to claim 9, characterized in that said second cylindrical block (18) has a length whose diameter is smaller to reduce rotation friction of said door-lock (5). 35
16. Door for refrigerating rooms according to claim 9, characterized in that said second cylindrical block (18) has a hole (25) for connection and control of the locking means (4), which is perpendicular to the horizontal axis and parallel to the axis of the pin (9) for rotation stop of the door-lock (5), said hole (25) having a truncated cone configuration. 40
17. Door for refrigerating rooms according to claim 1, characterized in that in its rest position said locking means (4,45) is housed in a casing (10) assembled inside the inner part of the door (2). 45
18. Door for refrigerating rooms according to claim 17, characterized in that said casing (10) has two holes (11,12) on its side surfaces, one hole (11) housing a tube end (6) and the other hole (12) supporting an end of the second cylindrical block (18) with an interposed friction-free plastic bushing (13). 50
19. Door for refrigerating rooms according to claim 1, characterized in that said locking means (4,45) has a substantially rectangle parallelepiped body (26,46) open on its front and with a semicylindrical base (27,47). 55
20. Door for refrigerating rooms according to claim 19, characterized in that said semicylindrical base (27,47) has a hole (28,48) over all its length whose diameter is apt to accommodate the second cylindrical block (18).
21. Door for refrigerating rooms according to claim 19, characterized in that said semicylindrical base (27,47) has a central upright hole (34,49) connecting the hole (28,48) apt to accommodate the second cylindrical block (18) with the body upper portion (26, 46) of the locking means (4,45).
22. Door for refrigerating rooms according to claim 19, characterized in that from said semicylindrical base (27,47) three walls (29,30,30',50,51,51') vertically departs, connected to each other on the top by a horizontal wall (31,52) to form the upper portion of the body (26,46) of the locking means (4,45).
23. Door for refrigerating rooms according to claim 22, characterized in that the upper horizontal wall (31) has a depth equal to half the depth of two said walls (30, 30') forming the body upper portion (26) and a central semicylindrical upright groove (32).
24. Door for refrigerating rooms according to claim 19, characterized in that the open portion of the body (26,46) is closed by a lid (33,54) configured as an upturned "L", where the shorter side closes the upper portion of the body (26,46) striking against the upper wall (31,50) and the longer side closes the open portion of the body (26,46).
25. Door for refrigerating rooms according to claim 24, characterized in that said shorter wall of the lid (33) has centrally on its end an upright groove of semicircular section coupled with the groove (32) of the upper wall (31) to form a through-hole (36), whose diameter is smaller than the diameter of the hole

(34) of the base (27).

26. Door for refrigerating rooms according to claim 1, characterized in that inside the body (26) said locking means (4) has a round pin (37), with a first portion having a diameter equal to and/or slightly smaller than the diameter of the hole (34) of the base (27) and whose end protrudes out of the body (26) through said hole (34), a second central portion whose diameter is equal to and/or slightly smaller than the diameter of the hole (36) of the upper portion of the body (26) so as to form a step between the two parts, and a third upper portion with a diameter smaller than the diameter of the second portion, which protrudes out of the body (26) through the hole (36) of the upper wall of the body (26).
27. Door for refrigerating rooms according to claim 26, characterized in that said portion of the first pin (37,56) has a truncated cone end, whose dimensions are equal to the truncated cone hole (25) of the second cylindrical block (18) where it is inserted to make the locking elements (4,45) integral with the door-lock (5).
28. Door for refrigerating rooms according to claim 26, characterized in that said third upper portion of said pin (37) is threaded.
29. Door for refrigerating rooms according to claim 1, characterized in that inside the body (26) said locking element (4) has a spiral spring (39) inserted on said second central portion of said pin (37).
30. Door for refrigerating rooms according to claim 29, characterized in that said spiral spring (39,62) works under compression and is mounted preloaded.
31. Door for refrigerating rooms according to claim 30, characterized in that the force exerted by the spring (39,62) maintains the truncated cone end of said pin (37,56) engaged in the truncated cone hole (25) of the second cylindrical block (18) to make the locking means (4,45) integral with the door-lock (5).
32. Door for refrigerating rooms according to claim 28, characterized in that a knob (38) for the control of the pin (37) is screwed on said threading to release the locking means (4).
33. Door for refrigerating rooms according to claim 6, characterized in that said knob (42) has a central slot for assembly on the first block (14) and a knurled on the external crown.
34. Door for refrigerating rooms according to claim 33,

characterized in that said knob (42) is fastened to said first block (14) by a threaded dowel.

35. Door for refrigerating rooms according to claim 17, characterized in that stroke end position of said locking means (4,45) in the casing (10) is ensured by rotation stop bosses (40,41) to provide a reference for the engagement of said stop pin (9) in the holes (8,8') of the housing tube (6) of the door-lock (5).
36. Door for refrigerating rooms according to claim 22, characterized in that the upper horizontal wall (52) has a depth equal to half the depth of two walls (51,51') forming the upper portion of the body (46) and has two upright grooves (53) of semicylindrical form.
37. Door for refrigerating rooms according to claim 24, characterized in that on its end the shorter wall of said lid (54) has two upright grooves of semicircular section coupled with the grooves (53) of said upper wall (52) to form two through-holes (55).
38. Door for refrigerating rooms according to claim 1, characterized in that inside the body (46) said locking means (45) has a pin (56) with a first portion having a diameter equal to and/or slightly smaller than the hole diameter (49) of the base (47), which protrudes out of the body (46) through said hole (49) up to inside the hole (48) of the base (47), a second portion with a larger diameter than said first portion and said hole (49) so as to form a tooth between said portions of the pin (56) to stop its stroke (56).
39. Door for refrigerating rooms according to claim 38, characterized in that the second portion of said pin (56) has an indentation.
40. Door for refrigerating rooms according to claim 1, characterized in that inside the body (46) said locking means (45) has a couple of gear wheels (58,58') engaging with said pawls of the second portion of the pin (56).
41. Door for refrigerating rooms according to claim 1, characterized in that inside the body (46) said locking means (45) has two elements (59,59') sliding vertically inside the body (46).
42. Door for refrigerating rooms according to claim 41, characterized in that said sliding elements (59,59') have a first portion (60) with an indented area engaging with said gear wheels (58, 58') and a second portion (61) of circular crown section protruding out of the body (46) through the holes (55) of the upper portion of the body (46).

43. Door for refrigerating rooms according to claim 1, characterized in that inside the body (46) said locking means (45) has a spiral spring (62) located between the pin (56) and the internal surface of the upper wall of the body (46), with one end inserted in a tang on the end of the pin (56) and the other end in a tang on the internal surface of the upper wall. 5
44. Door for refrigerating rooms according to claim 41, characterized in that said second portion (61) of the sliding element (59, 59') protruding out of the body (46) has a control knob (63) for the release of the locking element (45). 10
45. Door for refrigerating rooms according to claim 44, characterized in that said knob (63) has two pins (65) driven in the hole resulting from the circular crown section of said second portion (61) of the sliding element (59, 59'). 15
46. Door for refrigerating rooms according to one or more of the previous claims, characterized in that a pressure exerted on said knob (63) transmits a straight motion to said sliding element (59, 59') causing both gear wheels (58, 58') to rotate, said gear wheels then transmitting a straight motion to the pin (56) in the opposite direction of the motion transmitted by the knob (63) to said movable element (59, 59'), thus causing the end of the pin (56) to release from the hole (25) of the second element (18) of the door-lock (5). 20 25 30
47. Door for refrigerating rooms according to claim 17, characterized in that a condense-free heater (43) is provided inside said casing (10). 35
48. Door for refrigerating rooms according to claim 17, characterized in that said casing (10) is provided with a push-type switch for motor-controlled doors, which deactivates motor operation when the locking means is in the door locking position (2). 40
49. Method for realizing doors for refrigerating rooms, in particular sliding doors, comprising a door-lock according to one or more of the previous claims. 45
50. Method according to the previous claim, characterized in that it comprises the following phases:
- preparing a seat on the door internal panel apt to accommodate the casing (10); 50
 - making a horizontal hole in the door thickness laying on the plane of the door (2) apt to accommodate the housing tube (6) of the door-lock (5);
 - assembling the casing (10) in the above seat and fasten it with screws after mounting the friction-free bushing (13) in the hole (12) of the casing (10);
 - assembling the door-lock (5) with insertion of the protozoon (15) of the first block (14) in the groove (19) of the second block (18), locking them together inserting a gudgeon pin (17) in the hole (20) of the second block (18) and through the hole (16) of the protozoon of the first block (14);
 - inserting the whole in the tube (6) and lock the door-lock (5) in position with insertion of the pin (22) in the hole (23) of the tube (6) and in the throat (21) of the second block (18);
 - inserting the tube (6) assembled with all internal components in the horizontal hole on the door plane (2) previously made on the door as far as the end of the second block (18) is about level with the internal side wall of the casing (10);
 - inserting the locking element (4, 45) in the casing (10) in such a position that the hole (28) of the base (27) is in line with the second block (18), then inserting the tube (6) and consequently also the block (18) in the hole (28), minding the pin (37, 56) remains in its unlocking position till the flange (7) of the tube (6) will strike the door (2);
 - fastening the flange (7) of the tube (6) on the door (2) to block the door-lock (5) on the door (2);
 - assembling the knob (42) on the first block (14) and lock it with the threaded dowel.
51. Method according to the previous claim, characterized in that it comprises the following phases:
- inserting the compression spring (39) in the second central portion of the pin (37);
 - assembling the knob (38) on the threaded portion of the pin (37);
 - inserting the truncated cone end of the pin (37) in the hole (34) to connect the upper portion of the locking means with the hole (28) housing the second cylindrical block (18) and inserting simultaneously the second central portion of the pin (37) in the upright groove (32) of the upper wall (31) of the locking means (4) so that one spring end is against the upper wall and the other end against the step resulting from the difference of diameter between the first and second portion of the pin (37);
 - assembling the lid (33) configured like an upturned "L" and fastening it to the body (26) of the locking element.
52. Method according to the previous claim, characterized in that it comprises the following phases:
- inserting the first portion of the pin (56) in the

hole (49) which connects the upper portion of the locking element (45) with the hole (48) housing the second cylindrical block (18);

- inserting the compression spring (62) between the pin (56) and the internal surface of the upper wall (52) of the body (46) of the locking means (45), minding that one spring end (62) is inserted in the tang of the pin (56) and the other end in the tang of the upper wall of the body (46);
- assembling both gear wheels (58, 58') on their respective shafts with their gears engaging the ones on the pin (56);
- assembling the knob (63) on the two sliding elements (59, 59'), driving the pins (65) of the knob in the hole resulting from the circular crown section of the second portion of both sliding elements (59, 59');
- inserting both sliding elements (59, 59') in the body (46) of the locking means (45) with their gears engaging said wheels (58, 58'), each one with its second portion inserted in one of the upright grooves on the upper wall (52) of the body (46), minding that the tooth between the first and second portion of the sliding element strikes against the internal surface of the upper wall of the body (52);
- assembling the lid (54) configured like an upturned "L" and fasten it to the body (46) of the locking element (45).

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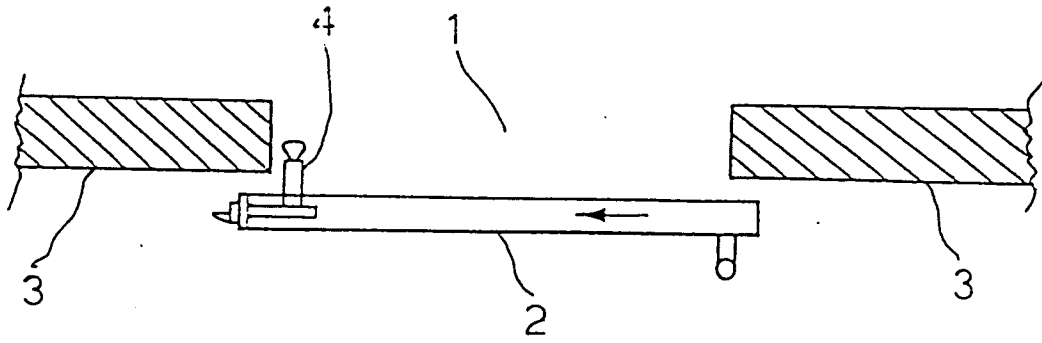


FIG. 1

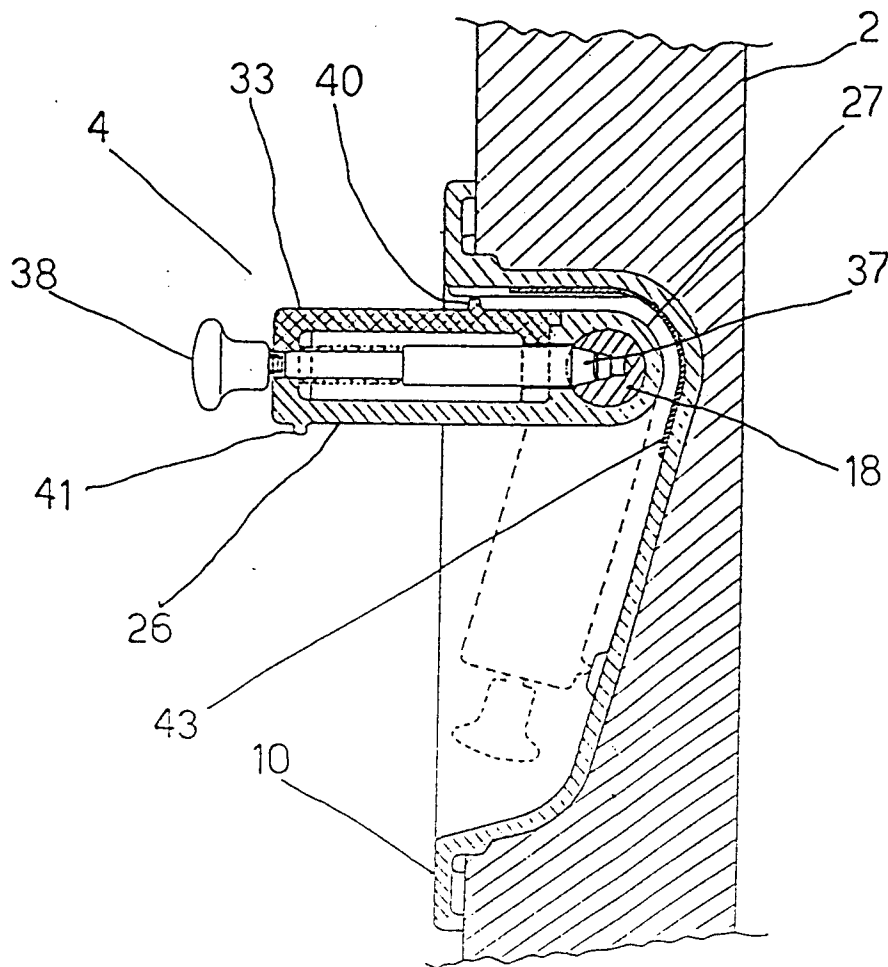


FIG. 3

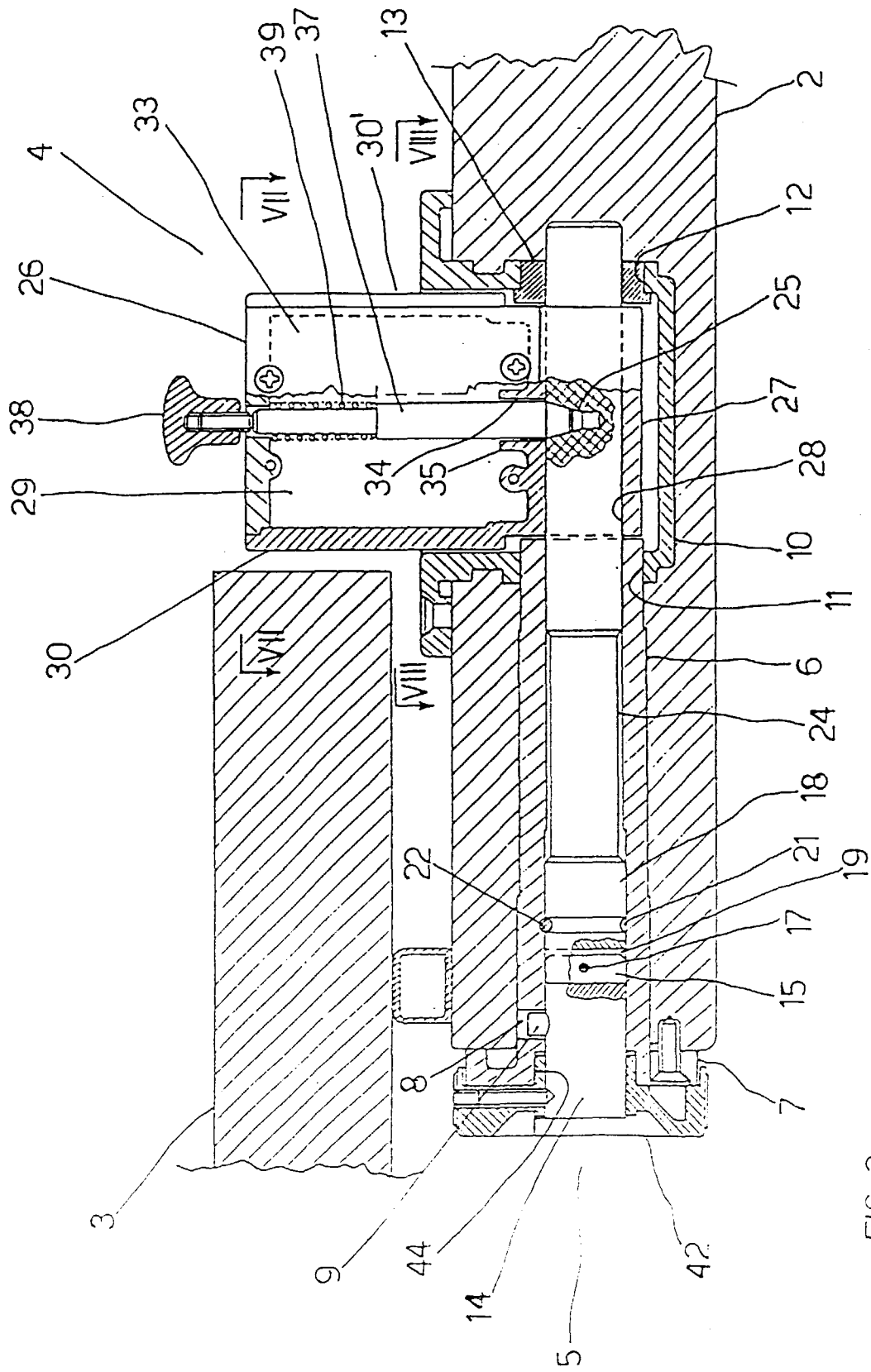


FIG. 2

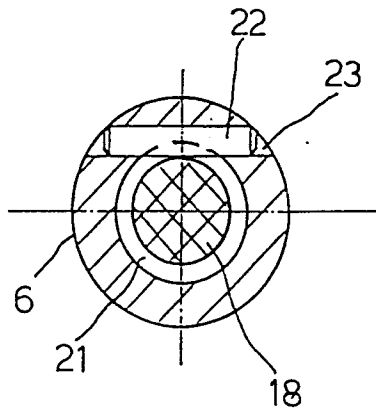


FIG. 4

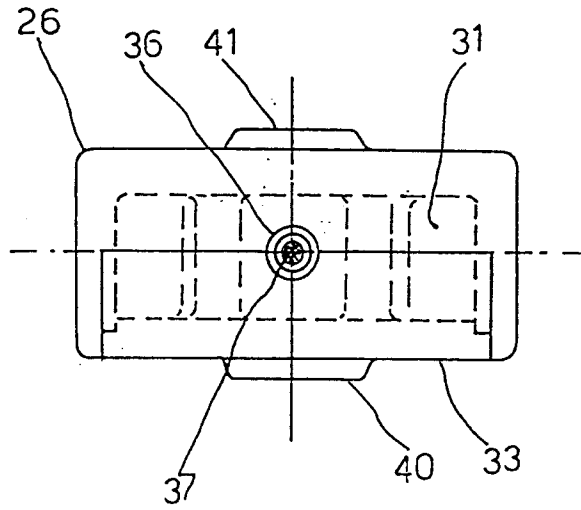


FIG. 7

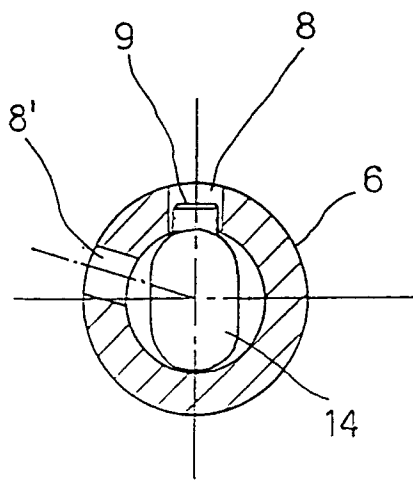


FIG. 5

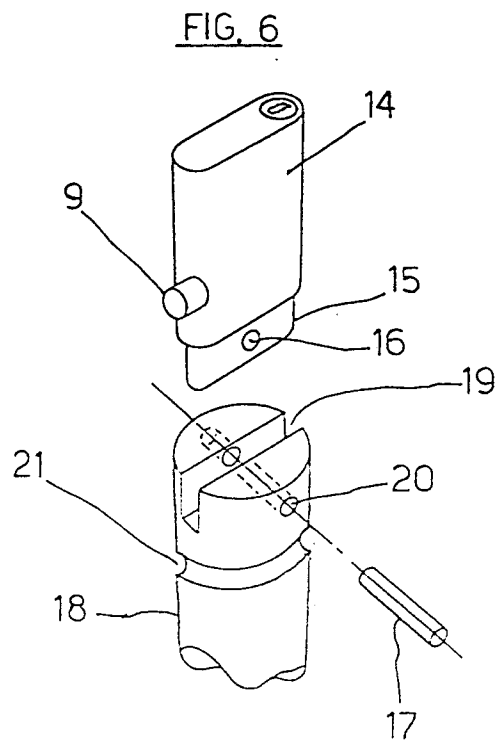


FIG. 6

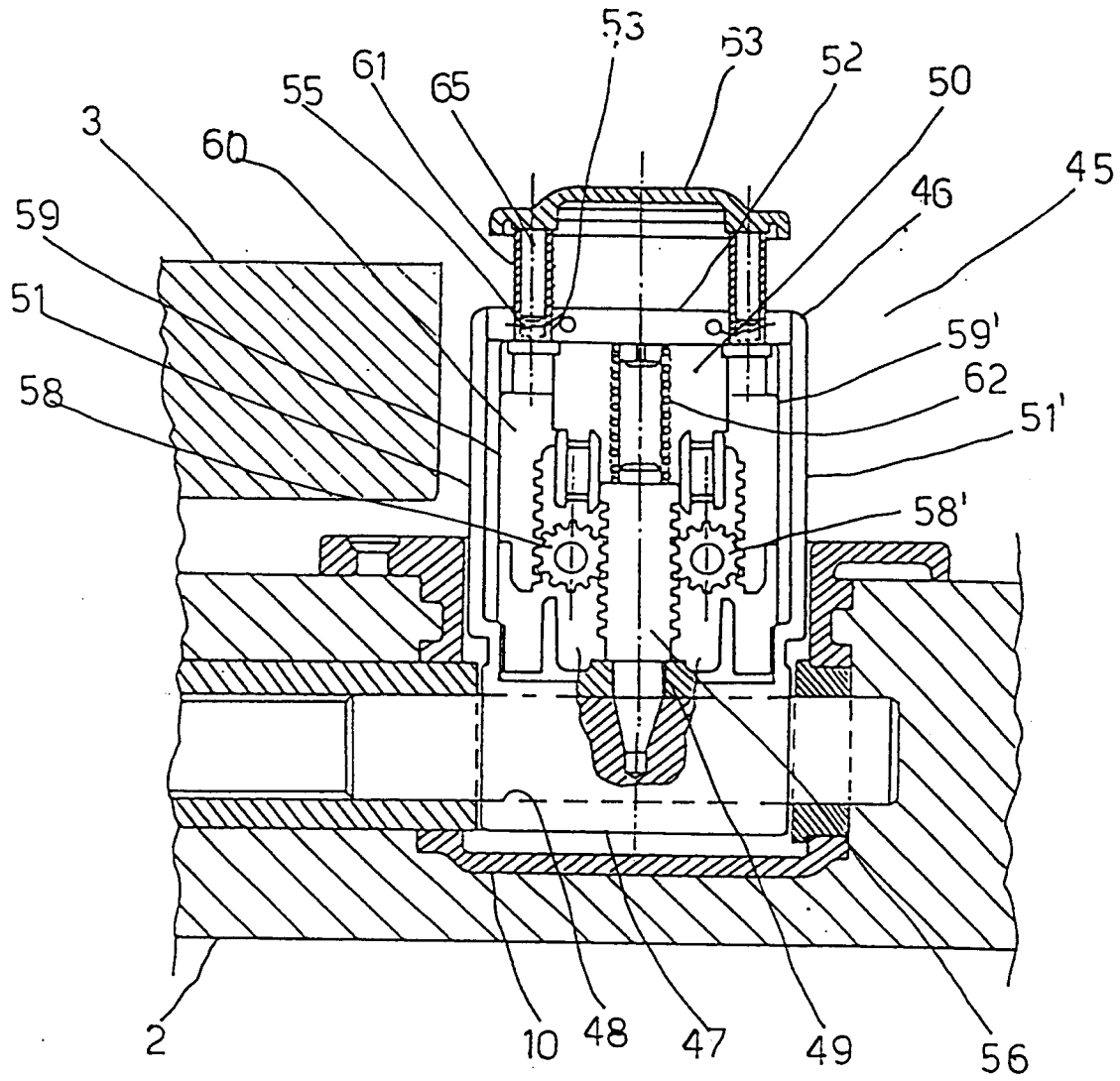


FIG. 9

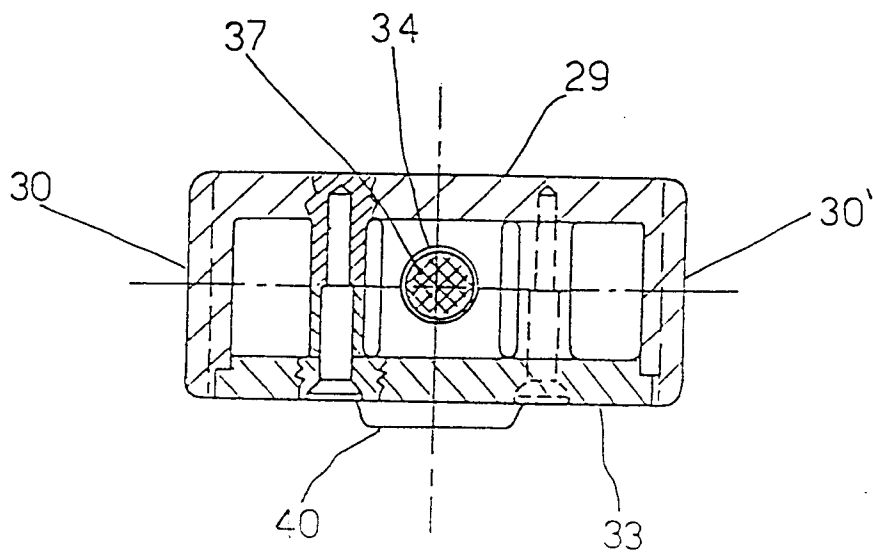


FIG. 8