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(54) **Lock**

(57) A lock (1) comprising a spring latch moving with respect to a housing (5) along a path defined at least between a closed position and an open position of the lock. A first control member (23) and a second control member (24) are mounted on opposite sides with respect to the path followed by the spring latch (40) and are connected to it by means of transmission means.

The latter comprise a lever (33) inserted between said first and second control members, each of which defines a fulcrum of said lever (33) when the other control member is operated. Said lever (33) comprises a curved rod which extends between two push buttons (25) moving in a direction transversal to the path followed by the spring latch (40).

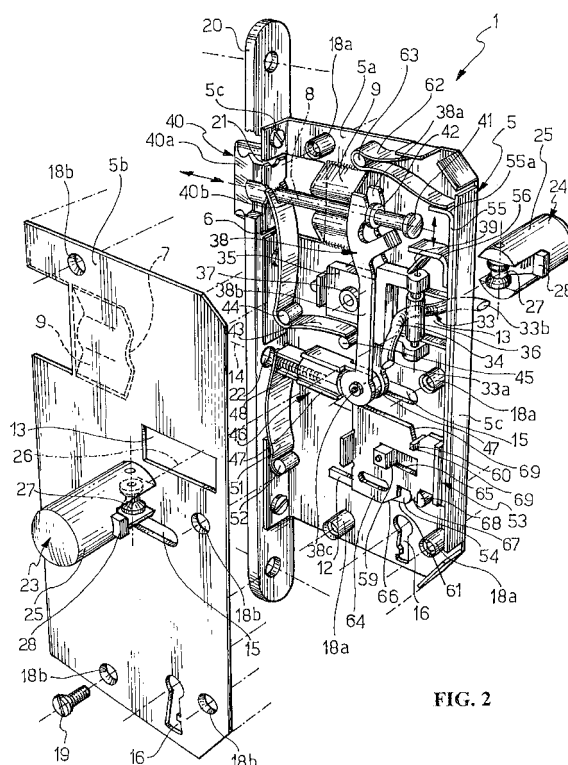


FIG. 2

Description

[0001] The present invention refers to a lock comprising a spring latch movable along a path defined at least between a closed position and an open position of the lock, a first control member and a second control member mounted on opposite sides in relation to the path followed by the lock, and transmission means operatively placed between said control members and the spring latch to transmit a force from the control members to the spring latch and move the latter along said path.

[0002] More in detail, the invention refers to a lock intended for use, for example, with doors and windows.

[0003] As is known, the locks of the above-mentioned type can comprise different configurations of control members, which can be mainly summarized in two types: handles pivoting on the lock itself or push buttons. In fact, in the latter case, the locks are generally called push locks.

[0004] In particular, to easily open and close, for example, door locks, the necessity to manufacture a relatively simple structure in which the force applied to the respective control member is gradually and smoothly transmitted to the spring latch, substantially constant in time and with minimum effort by the user, is of considerable importance.

[0005] The locks with a pivoted handle generally have a rather complex structure due to the necessity to comprise means to transform the alternate rotary motion of the handle into an alternate translatory motion of the spring latch. Furthermore, they also have the disadvantage of comprising a projecting handle, in other words with one end free to which clothes and similar often get hooked.

[0006] On the other hand, push locks can have a simpler structure but, at the moment, are unable to satisfy the above requirements since they require a certain effort by the user and they have problems of jamming and play between the parts, especially after frequent use of the lock.

[0007] Moreover, the so-called push locks, in which the transmission means generally comprise an inclined plane for each control member, are operated exclusively by means of a pressure force on the push button and do not permit variations in control member configuration without completely varying the structure of the lock.

[0008] The problem at the basis of this invention is to propose a lock having structural and functional characteristics such as to satisfy the above requirements and, at the same time, to overcome the disadvantages mentioned with reference to the known art.

[0009] This problem is solved by means of a lock of the above-specified type, characterized in that said transmission means comprise a lever inserted between said first and second control member, each of which defines a fulcrum of said lever when the other control member is operated.

[0010] Further characteristics and advantages of the

lock according to the invention will be clear from the description given below of preferred embodiments, given as an illustrative but not limiting example, with reference to the attached drawings, in which:

- 5 - figure 1 shows a perspective view of a door comprising the lock according to the invention;
- figure 2 shows a partially exploded view in perspective of the lock in figure 1;
- 10 - figure 3 shows a partially sectioned front view of the lock in figure 2, without closure cover and in a first operating condition;
- figure 4 shows a partially sectioned frontal view of the lock in figure 2, with closure cover and in a second operating condition;
- 15 - figure 5 shows a partially sectioned view along a horizontal plane, of the door and lock in figure 1, in which some elements have been omitted to highlight others;
- 20 - figure 6 shows the lock in figure 5 in a second operating condition;
- figure 7 shows a view in perspective of a possible modification of the embodiment of the lock in figure 2;
- 25 - figure 8 shows a partially sectioned view of the lock in figure 7, on a horizontal plane, in which some elements have been omitted to highlight others;
- figure 9 illustrates the lock in figure 8 in a second operating condition;
- 30 - figures 10, 11, 12 show a front view of a detail of the lock in figure 2 or 7, in different operating conditions;
- figure 13 shows a side view of a detail of figure 7.

[0011] With reference to the enclosed drawings, 1 has been used to indicate a lock usable for example with doors 2, as illustrated in figure 1. To receive the lock 1, the door 2 is provided with a conventional seat 3 accessible from an opening in a side portion 2a of the door itself. Other openings 4a and 4b are made on frontal portions 2b of the door 2 and communicate with the seat 3.

[0012] According to the embodiment illustrated in figures 2-6, the lock 1 comprises a box-shaped housing 5, having a first wall acting as a base 5a, a second wall parallel to the first acting as a cover 5b and side walls 5c, of which the side wall facing towards the outside of the door 2 has an opening 6. The housing 5 has a slot 7 which extends along an axis 8 passing through the above opening 6. Said slot is defined by two shaped walls 9, welded to the base 5a and the cover 5b respectively. The housing 5 further comprises first guides 10, second guides 11 and third guides 12. The first guides 10 are parallel to the above-mentioned axis 8 and extend to the openings 13 made in the base 5a and in the cover 5b and which, when the lock is inserted into the seat 3, face the openings 4a made in the door 2. The second guides 12 extend parallel to an axis 14, in its turn parallel to the above axis 8. Both the base 5a and the cover 5b have a slot 15 which extends in a prefer-

ential direction parallel and preferably coincident with the above axis 14. Near the axis 14, the side wall 5c which faces towards the outside of the door 2 has an interruption. Finally, the third guides 12 extend parallel to the first and second guides and near the shaped openings 16 which, when the lock is inserted into its seat 3, they respectively face the openings 4b in the door 2 to receive a key 17. In addition to that described above, the housing 5 comprises support elements and blocking and/or abutment elements which interact with the parts moving inside the lock 1 and which will be described later. Conventionally, the base 5a comprises threaded slots 18a, while the cover comprises holes 18b which face said threaded slots. Threaded elements 19 are inserted through the holes 18b and screwed into said threaded slots 18a to block the cover onto the base.

[0013] A plate 20 is mounted on one side of the housing 5, substantially rectangular and with the short sides rounded, which remains visible in the side portion 2a of the door 2. Said plate comprises conventional means to fix the lock 1 to the door 2, for example composed of threaded elements. The plate 20 further provides an upper opening 21 and a lower opening 22 which respectively face the opening 6 on the side wall 5c and the axis 14 and, therefore, the other uninterrupted side wall 5c which faces the outside of the door 2.

[0014] The lock 1 further comprises a first control member 23 and a second control member 24 mounted respectively on the two frontal portions 2b of the door 2 on opposite sides of the lock 1 and the seat 3.

In the example illustrated in figures 1-6, said control members comprise a push button 25 having a cylindrical structure which extends along a longitudinal axis 26. One end of the push button 25 has a cavity in which a free-moving cylindrical element 27 is mounted, while on the side of the push button 25, a transversal protrusion 28 is provided. Each push button 25 is smoothly inserted into a cylindrical slot 29, for example made at one end of a handle 30. Each cylindrical slot 29 has a groove 31 in which the transversal protrusion 28 of the push button 25 is smoothly inserted. Said groove 31 comprises an abutment wall 32 which interferes with the above transversal protrusion 28, preventing the push button 25 from coming out of the corresponding cylindrical slot 29. The two handles 30 are applied to the opposite sides of the door 2 in such a way that the respective cylindrical slots 29 and the respective push buttons 25 are aligned along the longitudinal axis 26. Furthermore, said cylindrical slots 29 face the openings 4a of the door 2 and the openings 13 of the housing 5.

[0015] A lever 33, made of a curved rod, extends from the first control member 23 to the second control member 24, passing through the openings 4a of the door 2 and the openings 13 of the housing 5. In particular the lever 33 has a first portion 33a and a second portion 33b in contact with the cylindrical elements 27 of the push buttons 25 respectively. The shape of the above rod is such as to have its concavity facing towards the plate

20 of the lock 1 and it extends according to an arch-shaped configuration further shaped in the central area to present a hollow 34 defining a third portion of the above lever.

[0016] A slide 35 is for example made in two specular portions connected by means of arc welded points and manufactured in sheared and bent sheet. The slide 35 is mounted smoothly running on the first guides 10 of the housing 5 and is forkshaped with two prongs arranged respectively one above and one below the openings 13. Between the two prongs a free-moving cylinder 36 is mounted which is arranged transversely to the openings 13 and which enters into contact with the lever 33 and in particular with the hollow 34. The body of the slide 35 further comprises a protrusion 37 which extends transversally to the extension of the slide 35 and the path it follows along the first guides 10.

[0017] A further lever 38, for example manufactured in specularly sheared and bent steel sheet, is mounted inside the housing 5. Said further lever 38 comprises a first, a second and a third portion 38a, 38b, 38c. The third portion 38c corresponds to the fulcrum of said further lever 38 mounted on the housing 5 of the lock in a position which can be adjusted in accordance with the description which follows. The second portion 38b concerns the interaction and contact area with the slide 35 and in particular with the protrusion 37. The first portion 38a is composed of the two upper extensions of said further lever 38. Said further lever 38 further comprises an abutment portion 38d corresponding for example to the bridge which joins the two parts of bent sheet which make up said further lever 38. Said abutment portion interacts with a stop 39 integral with the base 5a of the housing 5.

[0018] The lock 1 further comprises a spring latch 40 moving along a straight path between a lock closed position, illustrated in figures 3 and 5, and an open position, illustrated in figures 4 and 6. The spring latch 40 is conventionally composed of a head 40a which, in the closed position, partially protrudes from the housing 5 and the plate 20 through the opening 6 and the upper opening 21 respectively, and which, in the open position, returns within the housing 5 and the plate 20. The spring latch 40 further comprises a stem 40b which extends from the head 40a towards the inside of the housing 5 and is smoothly mounted in the slot 7 in such a way that its longitudinal axis coincides with the above axis 8. A first and a second annular projection 41 and 42 are placed at the free end of the stem 40b and at an intermediate point along the axis 8 respectively. A first elastic element 43 is mounted in the housing 5 between a support pin 44 and an abutment 45, while one end of the first elastic element 43 abuts against the head 40a of the spring latch keeping it in a closed position (figure 3).

[0019] According to the above description, the lever 33, the slide 35 and said further lever 38 therefore constitute transmission means operatively placed between the control members 23 and 24 and the spring latch 40.

Said transmission means further comprise slack take up means 46, illustrated in detail in the figures 10, 11 and 12 in different adjustment conditions. As previously stated, the fulcrum of said further lever 38 is mounted on the housing 5 in a position which can be adjusted in relation to the housing itself. For this purpose, said further lever 38 has its fulcrum on a register 47 whose position can be adjusted from the outside of the lock since the register is mounted, together with the fulcrum of said further lever 38, smoothly running along the second guides 11 and between the two slots 15 in the housing 5. Said register 47 comprises a threaded element 48 which can be operated from the outside of the lock and inserted into a threaded slot 49 of the register 47, in such a way that the longitudinal axis of the threaded element 48 and the threaded slot 49 are parallel and preferably coincident with the axis 14. The threaded element 48 is prevented from sliding in relation to the housing 5 by means of stops 50 integral with the base 5a. Besides the above-described components, the slack take up means comprise a second elastic element 51 operatively associated to the threaded element 48 and an abutment 52 integral with the base 5a.

[0020] Besides the above-described elements, the lock 1 and in particular the transmission means comprise means 53 to block the spring latch 40 in a closed position.

[0021] Said means 53 comprise a first blocking slide 54 slidably mounted on the base 5a of the housing 5, in a direction which, in figures 3 and 4, is perpendicular to the axes 8 and 14. Said first blocking slide is composed of a rod 55 which is placed in parallel to a side wall 5c of the housing 5. The upper end of the rod 55 is bent at 90° in relation to the rod itself to form support surface 55a. An angular element 56 is welded along the longitudinal extension of the rod 55, a portion of said element extending at substantially 90° from the rod 55. The lower end of the first blocking slide 54 has a wider portion 57 which is bent at 90° in relation to the rod 55, taking on the configuration of a plate parallel to the base 5a. The wider portion 57 comprises a slot 58 into which a transversal element 59 integral with the base 5a is inserted. Said slot has a rectangular shape whose longer side is perpendicular to the axes 8 and 14. The wider portion 57 further comprises a tongue 60 bent at 90° in relation to the wider portion 57 and which, therefore, extends transversely to the base 5a. The lower part of the wider portion 57 has an arched edge 61 with concavity facing downwards.

[0022] The means 53 further comprise a third elastic element 62 mounted on the base 5a by means of a support pin 63 and interacting with the side walls 5c of the housing 5 and with the support surface 55a of the upper end of the rod 55.

[0023] Besides the above-described elements, the means 53 comprise a second blocking slide 64 slidably mounted on the third guides 12 in a direction parallel to the axis 8 and 14. Said second blocking slide 64 has the

shape of a plate parallel to the base 5a and comprises a slot 65 into which the transversal element 59 is inserted. Said slot has a rectangular shape whose longer side is parallel to the axes 8 and 14. The lower part of the second slide 64 further comprises an inclined plane 66 and a tooth 67 which extends towards the shaped opening 16 and which has a side abutting against a stop 68 integral with the base 5a. Furthermore, the upper edge of the second slide 64 has a substantially funnel-shaped hollow 69 such as to receive the tongue 60.

[0024] Figures 7, 8 and 9 illustrate two possible embodiment modifications in the lock in figure 2. Said embodiments, indicated as a whole with 100, shall be later described with regard to the different elements compared to that illustrated in figure 2.

[0025] The lock 1 illustrated in figure 7 comprises a first control member 123 and a second control member 124, respectively comprised of a moving element 125 mounted on the front portions 2a of the door 2. Said moving elements externally comprise a gripping portion 125a with a knurled profile, while towards the inside of the door a cavity 125b is provided. Each moving element 125 further comprises a stop 126 and two protruding profiles 127 arranged on opposite sides of the cavity 125b. The protruding profiles 127 are shaped according to guides 128, mounted on the frontal portions of the door near the openings 4a of the door itself and 13 of the housing 5. The guides 128 are parallel to the axes 8 and 14 and, therefore, parallel to the path followed by the spring latch 40. An abutment 129, interacting with the stop 126, is arranged transversally to the guides 128. The guides 128 are provided in a support 130 applied to the frontal portion 2b of the door 2 in a position corresponding to the openings 4a of the door and 13 of the housing 5 (figures 8 and 9). The support 130 comprises a slot 131 passing through the thickness of the support itself and positioned in such a way as to face the openings 4a and 13. A lever 133, made of a straight rod extending from the first control member 123 to the second control member 124, is inserted through the slots 131 and the openings 4a of the door 2 and 13 of the housing 5, partially protruding inside the cavity 125b.

[0026] The lever 133 thus comprises a first portion 133a operatively connected to the first control member 123 and a second portion 133b operatively connected to the second control member 124. Furthermore, the lever 133 has a central portion placed in contact with the slide 35 so as to define a third portion 133c operatively connected to the spring latch 40.

[0027] In the solution illustrated in figures 8 and 9, the moving elements 125 are integrated into a handle 134 which, therefore, can move in relation to the door 2 along the guides 128. According to a further embodiment, partially illustrated in figure 7, the guides 128 and the corresponding support can be made in one end of the handle not illustrated and mounted fixed in relation to the door 2.

[0028] A description is given hereunder of the opera-

tion of a lock according to this invention, and in the first place according to the embodiment illustrated in figure 2.

[0029] Figure 3 and figure 5 illustrate the lock 1 in a closed position, in other words in a position in which the spring latch 40 protrudes in relation to the housing 5 and the plate 20 and which can be inserted into a slot conventionally made in the fixed door-frame. Furthermore, figure 4 and figure 6 illustrate the lock 1 in an open position, in other words in which the spring latch 40 remains inside the housing 5 and the plate 3, enabling opening of the door 2.

[0030] Transition from the position in figures 3 and 5 to that in figures 4 and 6 is carried out by pushing indifferently one of the two push buttons 25. To facilitate explanation hereunder, reference shall be made to the situation illustrated in figure 6 in which the door is opened by pushing the push button 25 corresponding to the second control member 24 while the push button 25 corresponding to the first control member 23 remains momentarily fixed. It is evident that said situation can be indifferently overturned by pushing the first control member 23 and keeping the second control member 24 momentarily fixed.

[0031] Following pressure applied to the push button 25 of the second control member 24, the push button runs along the respective cylindrical slot 29 and along the corresponding longitudinal axis 26. The force applied to the push button 25 is then transmitted to the spring latch 40 through the lever 33 and then with a multiplicative effect which depends on the shape of the lever and the respective positions of the point where the operating force is applied, through the control members, and the reaction point, through the slide 35. In particular, the first portion 33a of the lever 33 defines the fulcrum since the above first portion is in contact with the first control member 23, momentarily fixed. The second portion 33b is operatively connected to the second control member 24 and in particular it is in contact with the cylindrical element 27 so as to define an area where the operating force of the lever 33 is applied. Said operating force is exerted by means of the second control member 24, by pushing on the push button 25. More in detail, the cylindrical element 27 can rotate around its own longitudinal axis while the push button 25 moves in its cylindrical slot 29, in consequence of which the position of the second portion 33b is variable along the lever 33 during operation of the push button 25. As the push button 25 runs along the longitudinal axis 26, one end of the lever 33 gradually and smoothly moves in a direction substantially perpendicular to said longitudinal axis. The third portion corresponding to the hollow 34, where the lever 33 is operatively connected to the spring latch 40 by means of the slide 35 and said further lever 38, defines an area where the resisting force of said lever 33 is applied and consequently moves according to the rotation undergone by the lever 33 around its fulcrum.

[0032] Operation of the lever 33 is, therefore, that of

a second class lever, where the hollow 34 to which the resisting force is applied is located between the first and second portion corresponding respectively to the fulcrum and to the area where the operating force of the lever itself is applied.

[0033] The rotation imposed on the lever 33, and therefore the movement undergone by the hollow 34, causes movement of the slide 35 along the first guides 10 from the position in figure 3 to the position in figure 4. During said movement, the protrusion 37 of the slide 35 causes rotation of said further lever 38 from the position in figure 3 to that in figure 4 around the fulcrum 38c. In particular, said further lever 38 is operatively connected to the lever 33 by means of interaction between the slide 35 and the second portion 38b of said further lever itself. Said second portion therefore defines an area where the operating force of said further lever is applied. More in detail, said operating force is exerted by means of the lever 33.

[0034] During rotation of said further lever 38, the first portion 38a interacts with the spring latch 40 and in particular with the second annular projection 42 of the stem 40b. The first portion 38a therefore defines a area where the resisting force of said other lever 38 is applied. It follows, therefore, that said further lever 38 constitutes a third class lever, where the second portion 38b, corresponding to operating force application area, is placed between the fulcrum 38c and the first portion 38a corresponding to the resisting force application area.

[0035] Movement of said further lever 38 is finally interrupted by the interaction between the abutment portion 38d and the stop 39.

[0036] Consequently, corresponding to the rotation of said further lever 38, the spring latch 40 moves along the axis 8 between the position in figures 3 and 5 and the position in figures 4 and 6, overcoming the resisting offered by the first elastic element 43.

[0037] By releasing the push button 25, the first elastic element 43 pushes the spring latch 40 into a closed position, making it project from the opening 6 of the housing 5 and from the upper opening 21 of the plate 20. Consequently, said further lever 38 rotates counterclockwise around the fulcrum 38c, the slide 35 moves to return to the position in figure 3 and the lever 33 rotates counterclockwise on the plane in figure 6 to return to the position illustrated in figure 5.

[0038] The transmission means between the control members and the spring latch may show some play between the single components, arising as a result of the lock naturally going out of adjustment in time or following substitution of the control members from push button to translational element or vice-versa. For example, play can be caused by imperfect assembly of the lock on the door and, in particular, by misalignments between the openings 4a, the control members and the corresponding openings 13. To overcome this problem, it is possible to vary the position of the register 47, screwing or unscrewing the threaded element 48. For this purpose, a

suitable tool is introduced into the lower opening 22 of the plate 20 and through the gap in the side wall 5a and is inserted into the head of the threaded element 48. Figures 10-12 illustrate some possible positions of the register 47 and, therefore, of the fulcrum 38c of said further lever 38. Said positions can be obtained by rotating the tool in one direction or the other, and so rotating the threaded element 48. The latter maintains its position along the axis 14, abutting against the stops 50, while the register 47 runs along the second guides 11 and the slots 15. The function of the second elastic element 51 is to keep the head of the threaded element 48 against the stops 50 and to prevent the mechanical stress to which the lock is subjected from causing rotation of the elastic element itself, in particular displacing the relative position between said further lever 38 and the slide 35.

[0039] Figures 3 and 4 illustrate the means 53 to block the spring latch in two different operating conditions obtained by turning the key 17. In figure 4, the means 53 are represented in a resting position in which they allow sliding of the spring latch 40 along its slot 7, while in figure 3 the means 52 are represented in a working position in which they prevent the spring latch from sliding from the closed position to the open position, consequently preventing opening of the door following operation of the control members.

[0040] Transition from the resting position in figure 4 to the working position in figure 3 takes place by turning the key 17 counterclockwise in relation to the plane of the respective figures. During rotation, the key 17 interacts first with the edge 61 and, due to its shape, causes raising of the first blocking slide 54 from the resting position to the working position. During said raising, the tongue 60 comes out of the hollow 69 and the slot 58 runs along the transversal element 59. The rod 55 runs upwards, overcoming the resisting of the third elastic element 62, in consequence of which the angular element 56 reaches the same height of the axis 8 corresponding to the first annular projection 41 of the stem 40b. Movement of the spring latch 40 is, therefore, prevented and the latter remains projecting from the lock 1. During further rotation, the key 17 interferes with the inclined plane 66 of the second blocking slide 64 to keep the rod 55 in a raised position. Said interaction causes movement of the second blocking slide 64 from the resting position to the working position by means of movement of the second blocking slide 64 along the third guides 12 and consequently of the slot 65 with respect to the transversal element 59. The upper edge of the second blocking slide 64 is, therefore, placed below the tongue 60, so preventing the first blocking slide 54 from moving downwards following the thrust exerted by the third elastic element 62.

[0041] To return to the position in figure 4 from the position in figure 3, the key 17 is turned the other way, i.e. clockwise in figures 3 and 4. During this rotation, the key interacts with the tooth 67 pushing the second blocking slide 64 into the position in figure 4. Correspondingly,

the hollow 69 is again placed below the tongue 60 and thus the third elastic element 62 can push the first blocking slide 54 downwards and lower the angular element 56. Translational movement of the second blocking slide 64 can proceed until the tooth 67 interacts with the stop 68.

[0042] Hereunder a description is given of the operation of a lock 100 according to a further embodiment of the lock in accordance with this invention, corresponding to the embodiment illustrated in figures 7-9.

[0043] The elements contained within the housing 5 substantially coincide in all the embodiments illustrated, and in particular they are substantially identical both to the slack take up means 46 and the spring latch blocking means 53. Consequently, operation will also substantially be the same as that described for the lock in figure 2 and, therefore, will not be repeated hereunder.

[0044] The lock 100 illustrated in figures 8 and 9 differs from the embodiment in figure 2, both for the conformation of the control members and the conformation of the lever, while the transmission means are substantially identical, from the slide 35 to the spring latch 40. Therefore, operation is slightly different during the transmission of force and movement from the control members to the lever, while it will be substantially identical to that previously described during transmission of force and movement from the slide 35 to the spring latch 40.

[0045] In fact, figure 8 illustrates the lock 100 in a closed position, wherein the spring latch 40 projects from the housing 5 and the plate 20, to be inserted into a seat conventionally made in the fixed frame of the door 2.

[0046] Transition from the position in figure 8 to the position in figure 9, corresponding to an open position of the door 2, takes place by grasping the handle 134 and pulling it substantially in the same direction as the sliding direction of the spring latch. The handle 134, corresponding to the second control member, therefore moves with respect to the guides 128, while the first control member, in other words the handle mounted on the opposite side of the door, remains momentarily fixed. During said movement, the handle 134 drags the second portion of the lever 133. In this way the above second portion defines an area where the operating force of said lever 133 is applied. Said operating force is exerted by means of the second control member, i.e. by means of movement of the corresponding handle 134.

[0047] Simultaneously, the handle 134 corresponding to the first control member remains momentarily fixed, in consequence of which the first portion of the lever 133 defines the fulcrum of the lever itself.

[0048] Therefore, during movement of the second control member, the lever 133 rotates around its momentary fulcrum. Correspondingly, the lever 133 interacts with the slide 35 in a central area of the lever itself corresponding to the third portion, consequently operatively connected to the spring latch. Said third portion defines an area where the resisting force of said lever

133 is applied which, also in the embodiment illustrated, constitutes a second class lever, since the third portion is intermediate between the first and second portion.

[0049] Transition from the open position to the closed position takes place by releasing the handle 134 corresponding to the second control member, in the same way as that described for the embodiment in figure 2.

[0050] Finally, operation of the lock illustrated in figure 7 is substantially the same as the operation of the lock in figure 8 and figure 9. As previously mentioned, while the lock in figures 8 and 9 comprises a translational element 125 integral with the respective handle 134, the lock in figure 7 comprises a translational element 125 separate from the respective handle, not illustrated, which is fixedly mounted to the door with the only purpose of pushing or pulling the door itself. Consequently, to open the door 2, it is not necessary to move the entire handle, but it is sufficient to operate the translational element 125 corresponding to the second control member, while the corresponding handle remains fixed on the door 2.

[0051] As can be appreciated from the description, the lock according to this invention makes it possible to satisfy the requirement of manufacturing a relatively simple structure, without the necessity to operate using pivoted handles and, therefore, without transmission means which transform the rotary movement of the handle into the translatory motion of the spring latch.

[0052] In particular, the above-described lock has all the advantages of a push lock of the traditional type together with the advantages described hereunder.

[0053] In fact, the lock according to the invention originally uses a lever 33 or 133 which transmits movement from the control members to the slide 35 and, therefore, to the spring latch 40. Use of said lever, which extends substantially continuously between the two control members and which has at least one fulcrum in operating conditions, makes it possible to apply the transmission force gradually, without blocking and without projecting elements, at the same time offering a multiplication effect which makes it possible to open the lock more easily or, the pressure exerted being equal, to obtain safer closure given that it is possible to increase the rigidity of the first elastic element 43 acting on the spring latch 40. Said multiplication effect can be obtained with both the configurations illustrated, whether arched or straight.

[0054] The original presence of the above lever also makes it possible to maintain the internal structure of the lock unvaried as the control members change by simply modifying the conformation of the lever itself. Using the elements contained within the housing 5 as a basis, and maintaining them unvaried, it is in fact sufficient to mount an arched lever 33 to obtain a push lock or to mount a straight lever 133 to obtain a "translation" lock, i.e. wherein the control members are made up of translating elements 123 and 124. Therefore, the same lock can be used indifferently for different control mem-

bers, without completely upsetting the production means and technologies.

[0055] The fact that the above lever is a second class lever, i.e. wherein the application portion of the resisting force is intermediate between the fulcrum and the application portion of the operating force, makes it possible to act indifferently on both sides of the door, with a completely symmetrical effect.

[0056] The remaining elements of the transmission means contribute advantageously to making application of the opening force of the control members to the spring latch gradual and smooth.

[0057] Furthermore, the slack take up means 46 advantageously enable an optimal transmission sequence of the opening force from the control members to the spring latch, independently of the type of control members used. In fact, the presence of the above means 46 is particularly advantageous for adjustment of the relative position of the slide 35 and of the further lever 38 when the push lock is modified into a "translation" lock and vice-versa, or to compensate any misalignment between the openings in the door and those in the lock housing, i.e. due to relative positioning of the lock in its respective seat, and thus any misalignment between the control members and the lock itself.

[0058] The advantageous arrangement of the means 46 has a further advantage in that it makes it possible to compensate for misadjustments due to prolonged use of the lock, maintaining optimal operation substantially constant in time and with minimum effort by the user.

[0059] Besides this, there is the further advantage concerning the spring latch blocking means 53 which make it possible to obtain stable closing of the door without the introduction of bars and without excessive structural complications of the lock itself.

[0060] A further advantage of the lock according to the invention lies in its uncommon structural simplicity which makes fabrication possible at a very reasonable cost.

[0061] It is evident that variations and/or additions can be made to what has been described and illustrated.

[0062] For example, in the same way as the translating elements 125 can be independent of or integrated into the handle, so the push buttons can slide in cylindrical seats 29 made in structures independent of the respective handle.

[0063] Furthermore, to simplify the description, a first control member 23, 123, disposed near the cover 5b of the lock, and a second control member 24, 124 disposed near the base 5a, were referred to. Said indication can be inverted without modifying the structure and the operation of the lock according to this invention.

[0064] With the purpose of satisfying contingent and specific requirements, to the preferred embodiment of the lock described above, the skilled in the art can make numerous modifications, adaptations and substitutions of elements with others equally functional, all however contained within the protection scope of the invention as defined in the claims hereunder.

Claims

1. Lock (1, 100) comprising:

a spring latch (40) movable along a path defined at least between a closed position and an open position of the lock;
 a first control member (23, 123) and a second control member (24, 124) mounted on opposite sides with respect to the path followed by the spring latch (40);
 transmission means operatively placed between said control members and the spring latch to transmit a force from the control members to the spring latch and move the latter along said path;

characterized in that said transmission means comprise a lever (33, 133) on which said first and second control members (23, 123; 24, 124) act, and that each of said first and second control members defines a fulcrum of said lever (33, 133) when the other control member is operated.

2. Lock according to claim 1, wherein said lever (33, 133) comprises:

a first portion (33a, 133a) defining the fulcrum of said lever;
 a second portion (33b, 133b) operatively connected to the control member in operation and defining an area where the operating force of said lever is applied, said operating force being exerted by means of said control member; and
 a third portion (34, 133c) operatively connected to the spring latch (40) and defining an area where the resisting force of said lever is applied.

3. Lock according to one of the preceding claims, wherein said lever (33, 133) constitutes a second class lever.

4. Lock according to claim 3, wherein said transmission means comprise a further lever (38), operatively placed between said lever (33, 133) and the spring latch (40).

5. Lock according to claim 4, wherein said further lever (38) constitutes a third class lever having:

a first portion (38a) operatively connected to the spring latch (40) and defining an area where the resisting force of said further lever is applied;
 a second portion (38b) operatively connected to said lever (33, 133) and defining an area where the operating force of said further lever

(38) is applied, said operating force being exerted by means of said lever (33, 133); and
 a third portion (38c) operatively connected to a housing 5 of said lock and defining the fulcrum of said further lever (38).

6. Lock according to claims 4 or 5, wherein the transmission means further comprise a slide (35) operatively placed between said lever (33, 133) and said further lever (38).

7. Lock according to one or more of the preceding claims, wherein said lever (133) comprises a straight rod which extends from said first control member (123) to said second control member (124).

8. Lock according to claim 7, wherein said first and second control member (123, 124) comprise respectively a translational element (125) moving in a direction having at least one component parallel to the path followed by the spring latch (40).

9. Lock according to claim 8, wherein said translational element (125) is integrated into a handle (134) operatively connected to said lock, said handle being able to move with respect to the lock itself.

10. Lock according to one or more of the claims from 1 to 6, wherein said lever (33) comprises a curved rod which extends from said first control member (23) to said second control member (24).

11. Lock according to claim 10, wherein said first and second control member (23, 24) comprise respectively a push button (25) moving in a direction transversal to the path followed by the spring latch (40).

12. Lock according to claim 11, wherein said push button (25) comprises a cylindrical element (27) mounted free-moving to one end of the push button itself and placed in contact with said lever (33).

13. Lock according to claims 2 and 12, wherein, near the push button (25) in operation, said cylindrical element (27) defines on the lever (33) said second operating force application portion (33b), the position of said second portion being variable along the lever (33) during operation of the push button.

14. Lock according to one or more of the preceding claims, wherein the transmission means comprise a first elastic element (43) operatively connected to the spring latch (40) to keep it in a closed position.

15. Lock according to one or more of the preceding claims, wherein said transmission means further comprise slack take up means (46).

16. Lock according to claims 4 and 15, wherein said slack take up means (46) comprise said further lever (38) whose fulcrum (38c) is mounted on a housing (5) of the lock in a position which can be adjusted with respect to the housing itself. 5
17. Lock according to claim 16, wherein said further lever (38) has its fulcrum on a register (47) whose position can be adjusted from the outside of the lock. 10
18. Lock according to claim 17, wherein said register (47) comprises at least one threaded element (48) which can be operated from the outside of the lock to move the register itself, and thus the fulcrum (38c) of the further lever (38) with respect to said housing (5). 15
19. Lock according to claim 18, wherein said slack take up means (46) comprise at least one second elastic element (51) operatively associated to said threaded element (48). 20
20. Lock according to one or more of the preceding claims, wherein said transmission means further comprise means (53) to block the spring latch (40) in a closed position, and which can be operated by means of a key (17). 25
21. Lock according to claim 20, wherein the means (53) to block the spring latch comprise a first blocking slide (54) moving from one resting position to a working position wherein it prevents movement of the spring latch (40) from the closed position to the open position. 30
- 35
22. Lock according to claim 21, wherein said means (53) to block the spring latch further comprise a second blocking slide (64) moving from a resting position to a working position wherein it maintains the first blocking slide (54) in a working position. 40
23. Lock according to claims 21 or 22, wherein the means (53) to block the spring latch further comprise a third elastic element (62) operatively connected to the first blocking slide (54). 45

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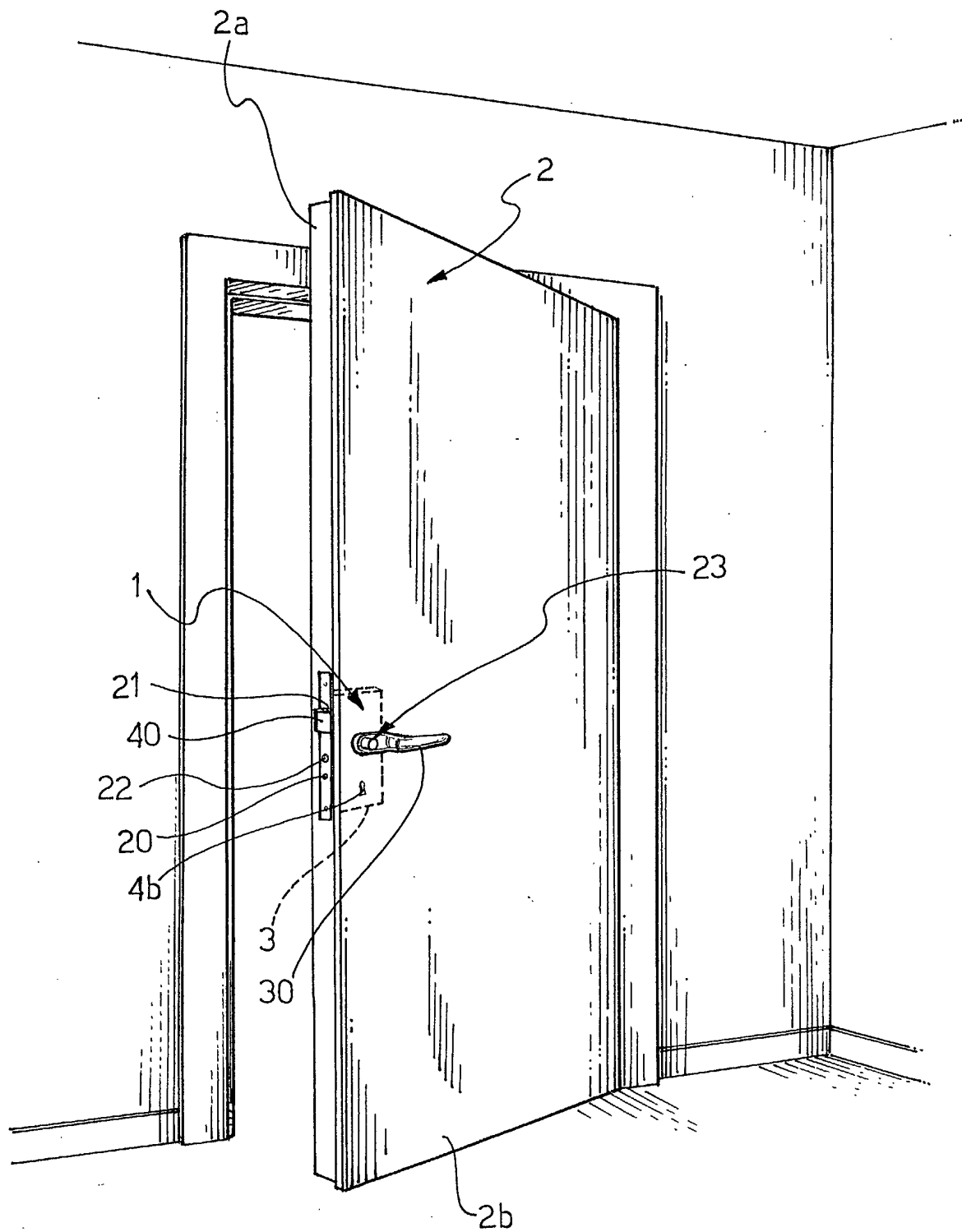


FIG. 1

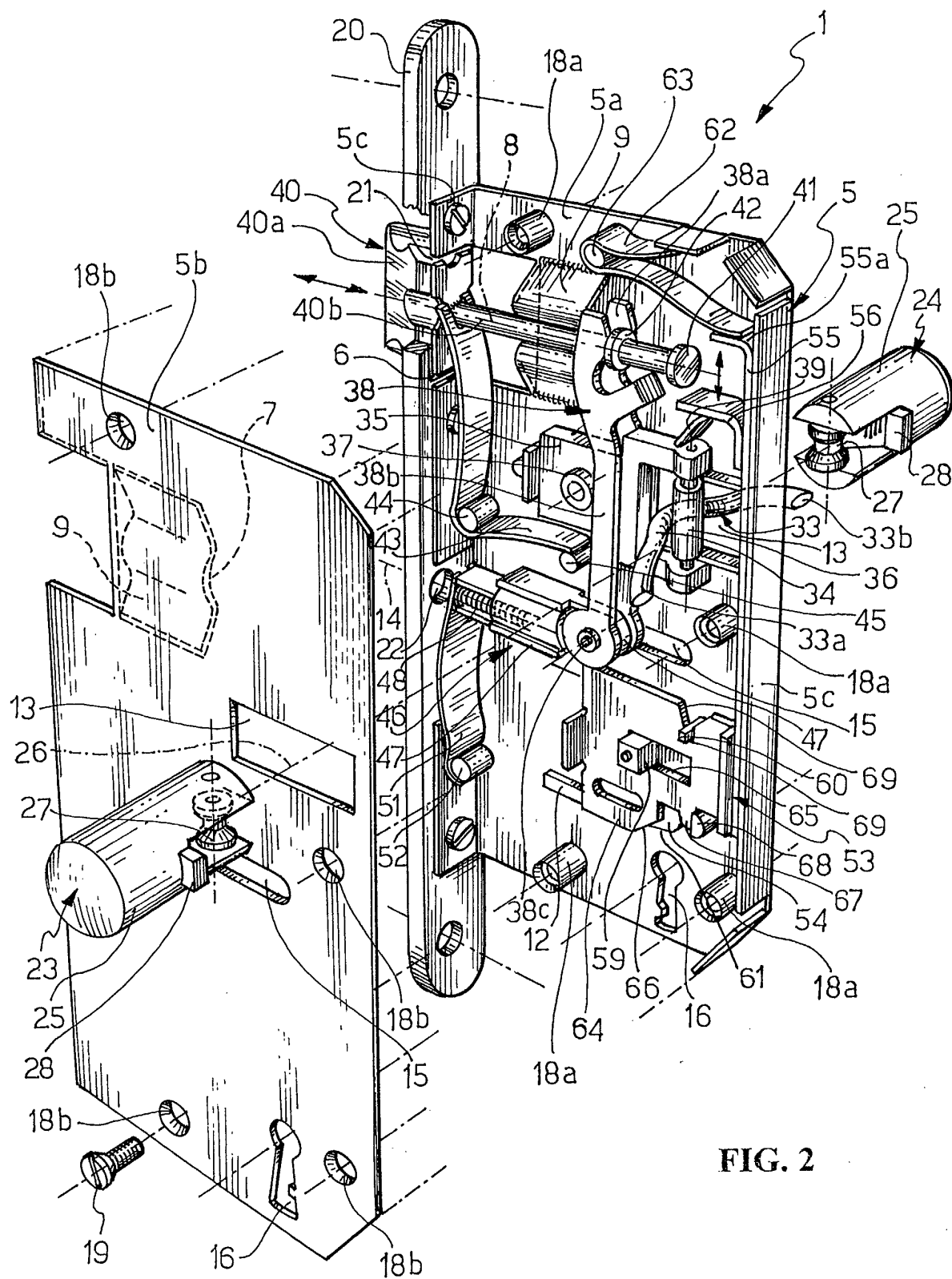


FIG. 2

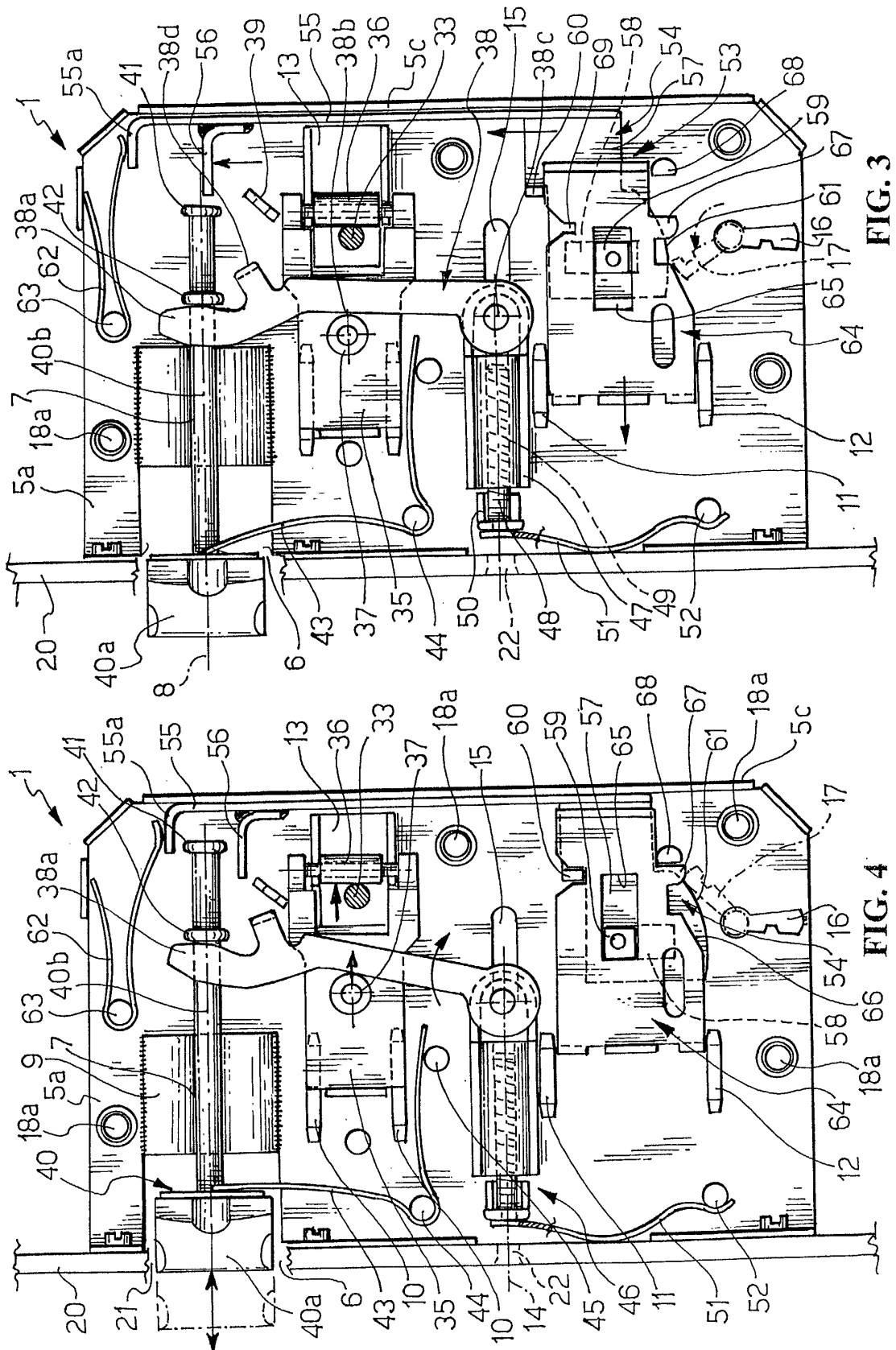


FIG. 3

FIG. 4

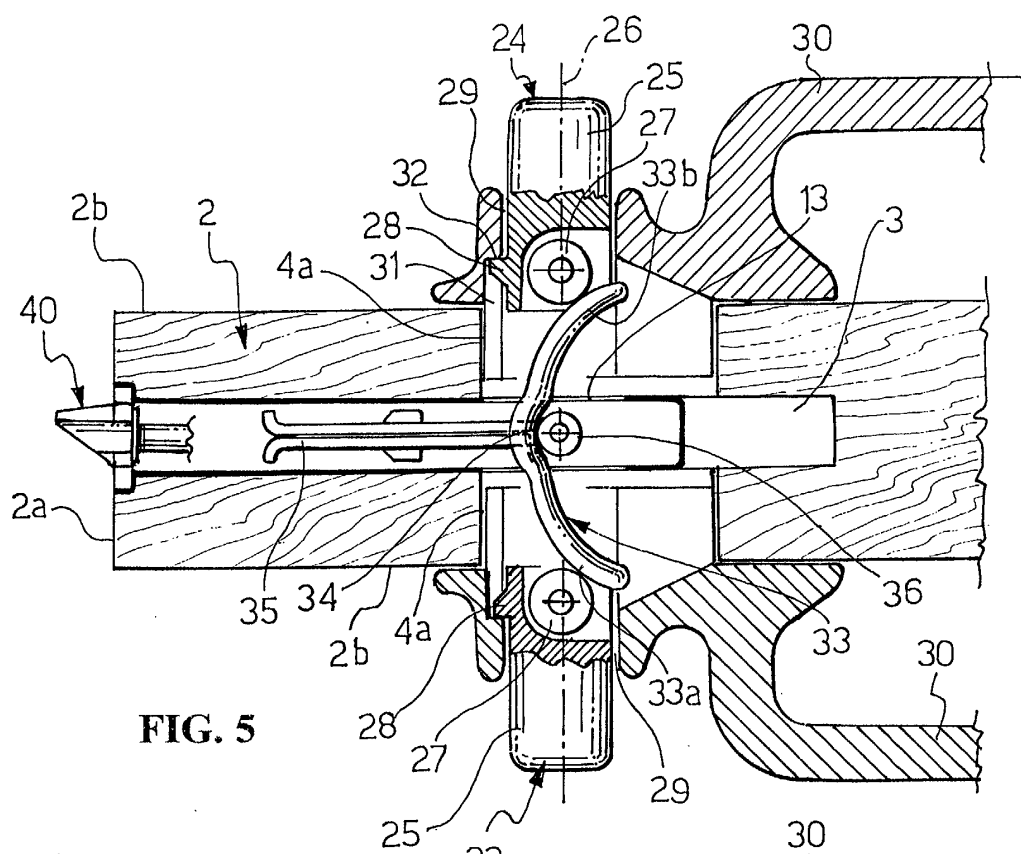


FIG. 5

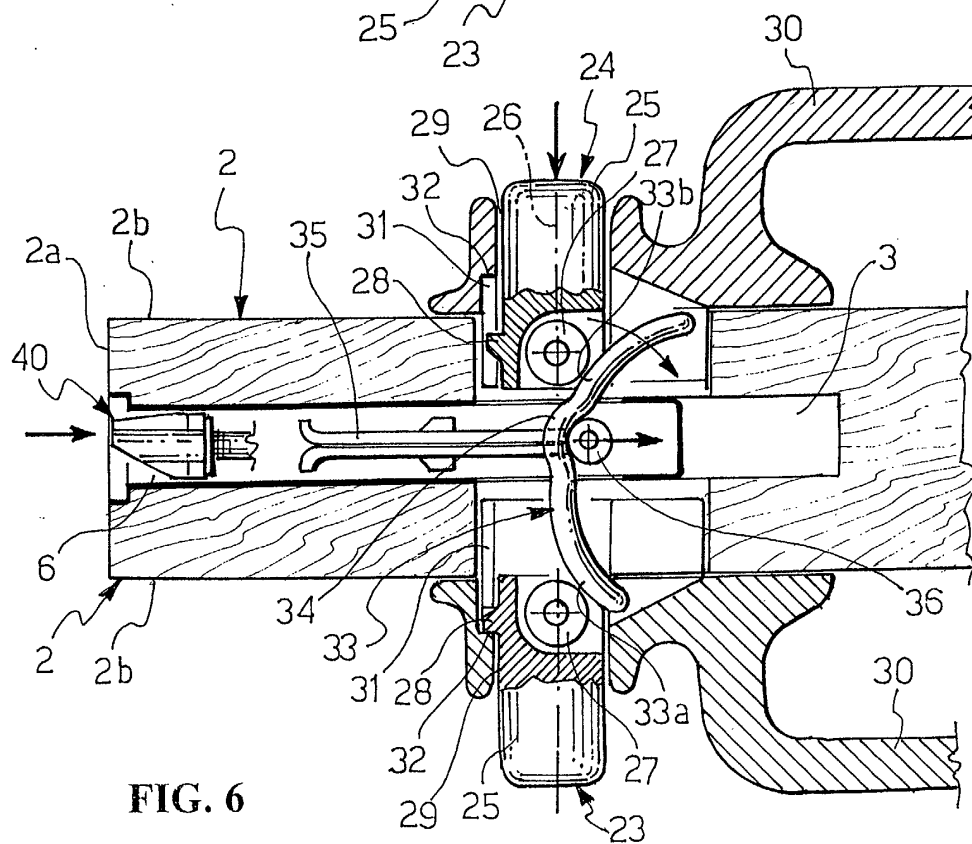
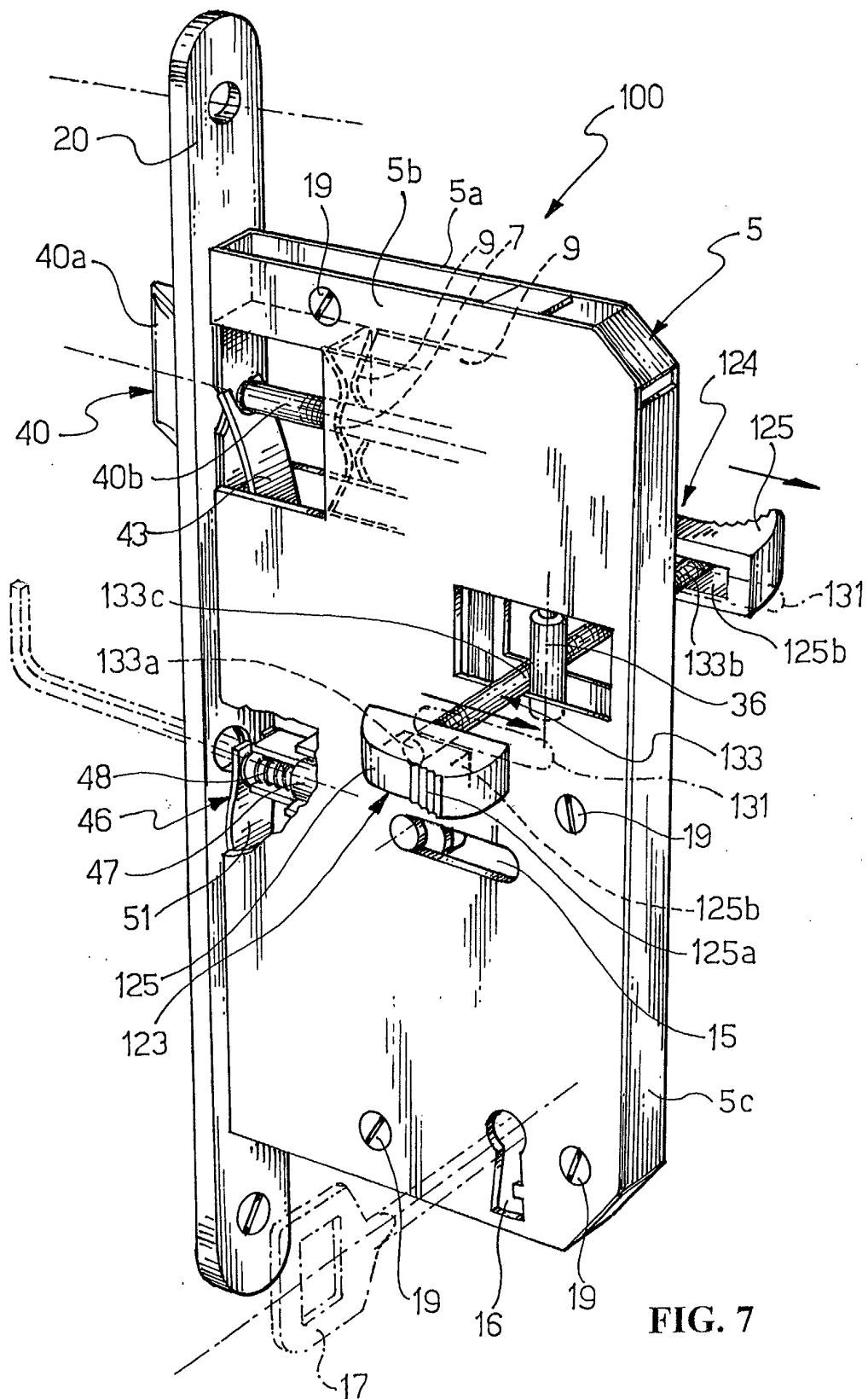
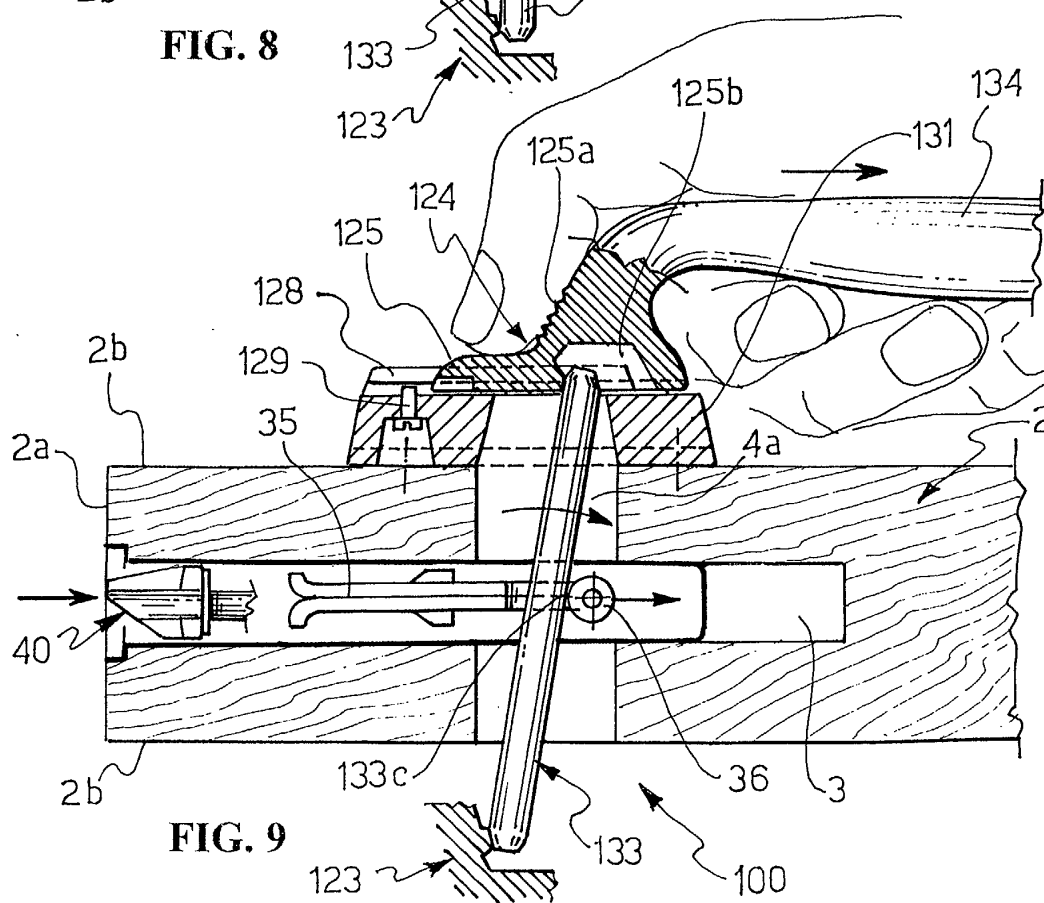
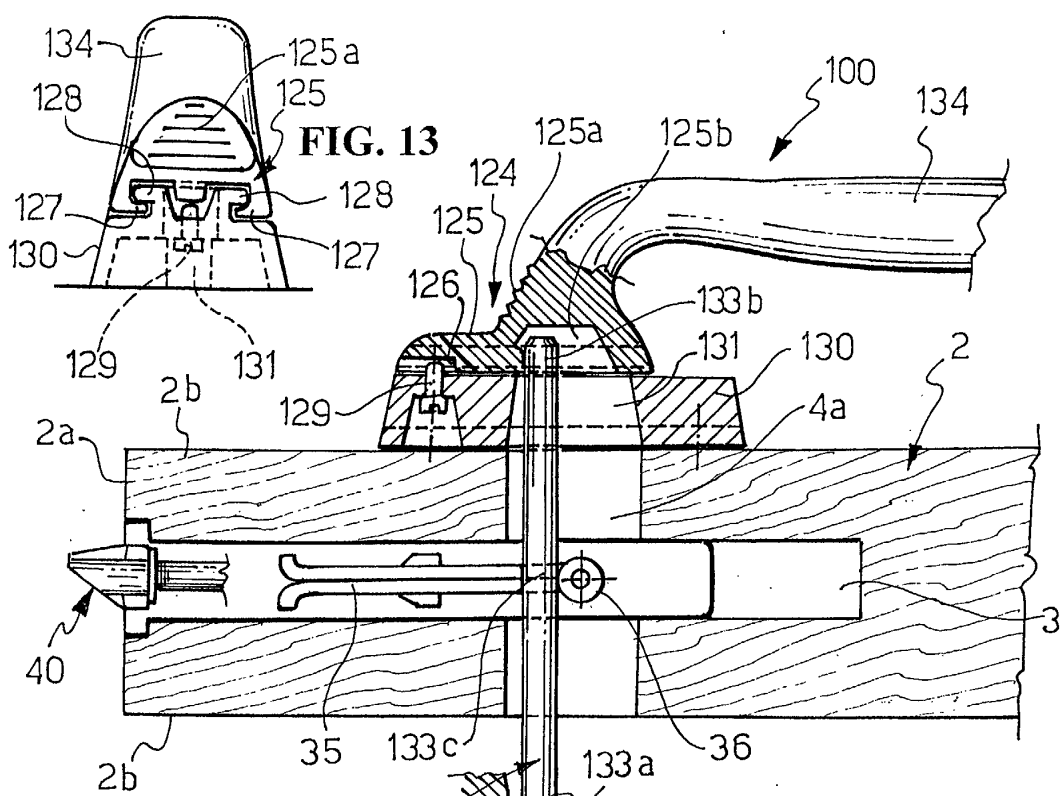
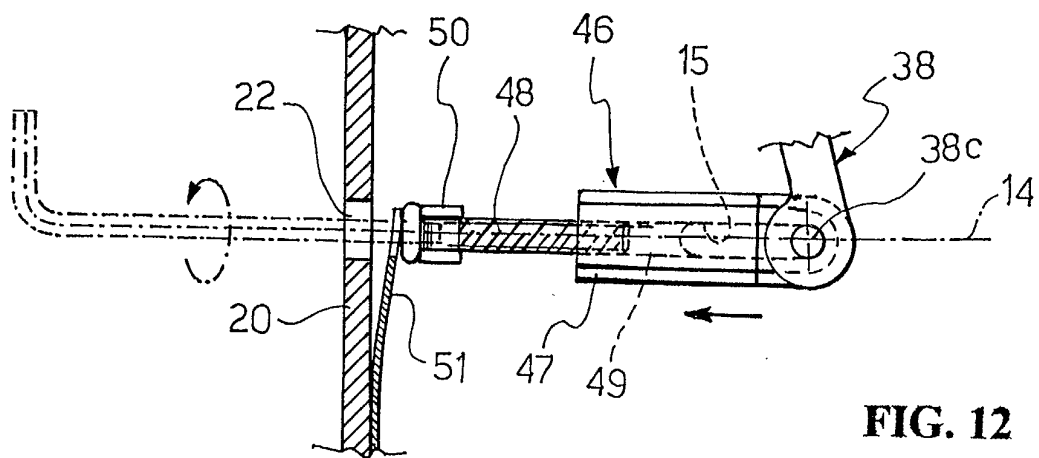
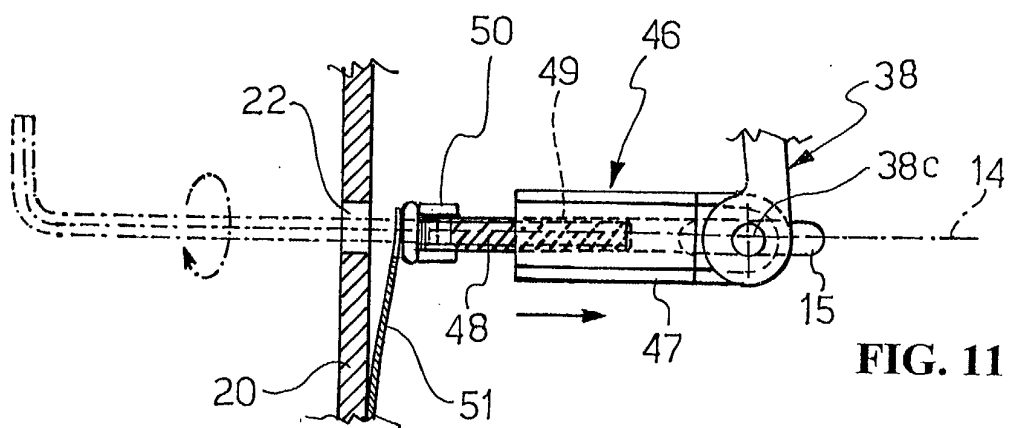
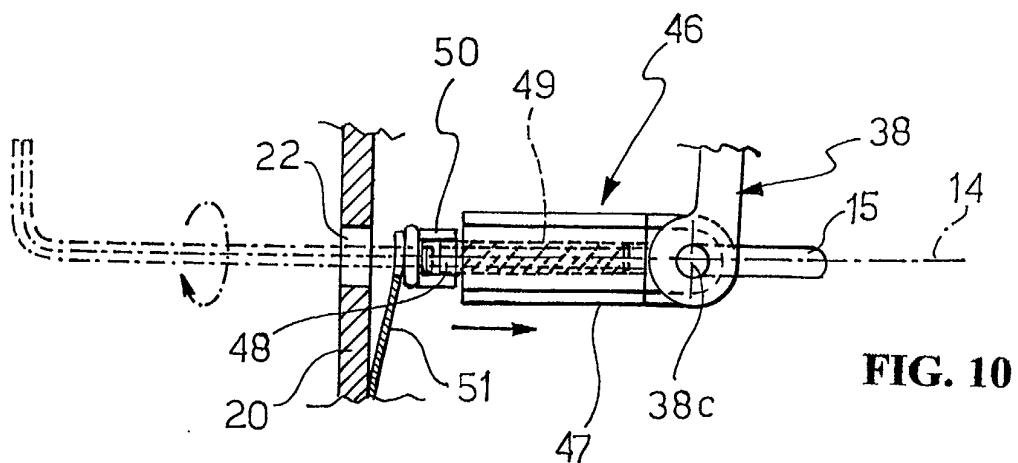


FIG. 6









European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 01 20 4590

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26 March 2002	Examiner PEREZ MENDEZ, J
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EPO FORM 1503 03/82 (P04001)

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ON EUROPEAN PATENT APPLICATION NO.**

EP 01 20 4590

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26-03-2002

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