Aug. 17, 1948. A. F. LICKTEIG 2,447,190

DOOR LOCK

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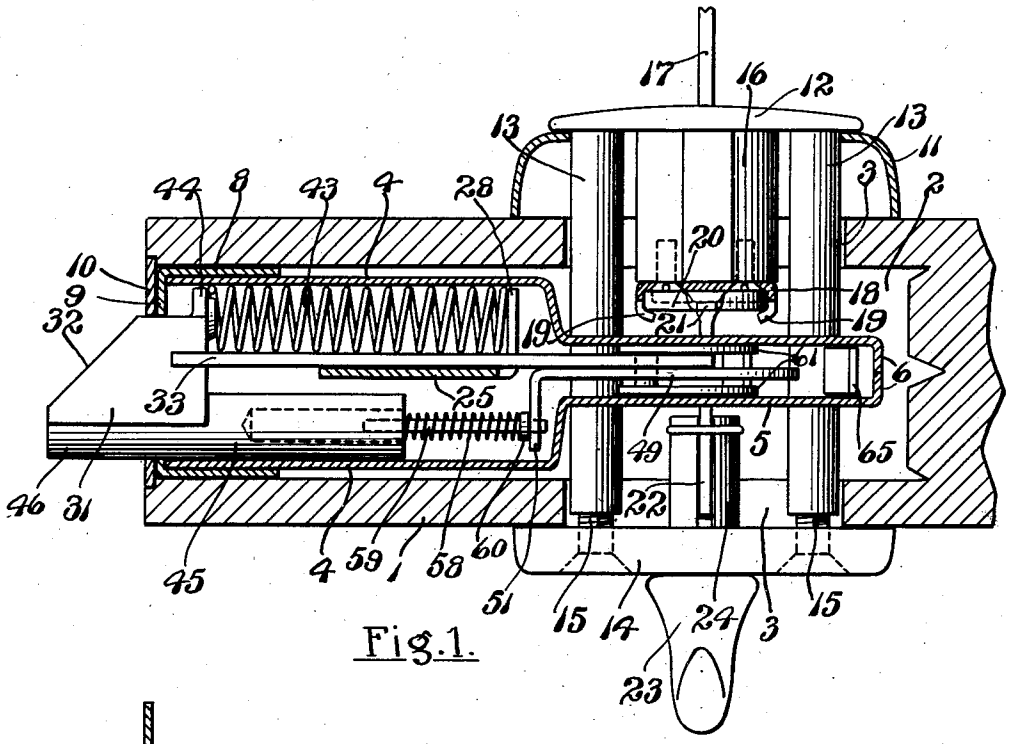


Fig.1.

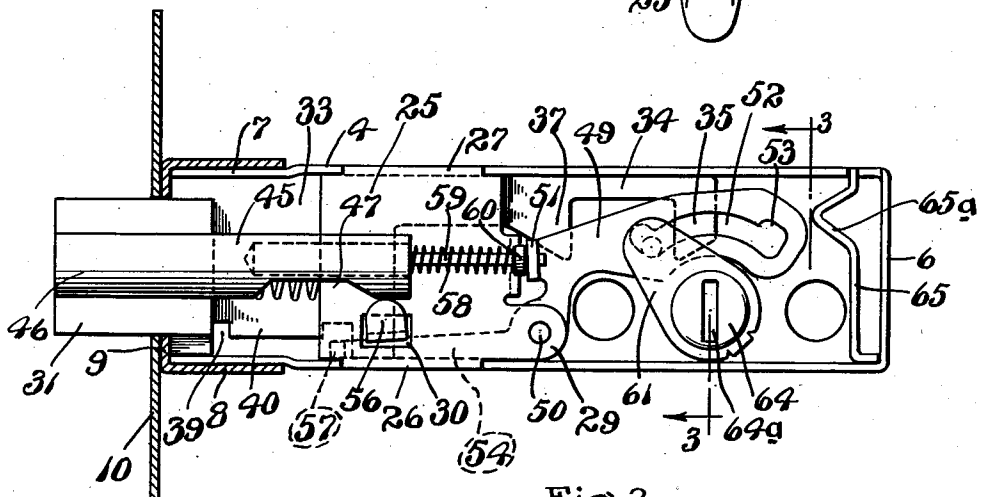


Fig.2.

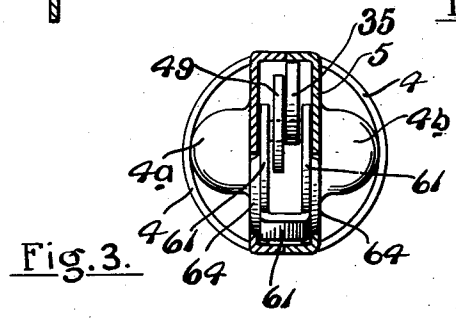


Fig.3.

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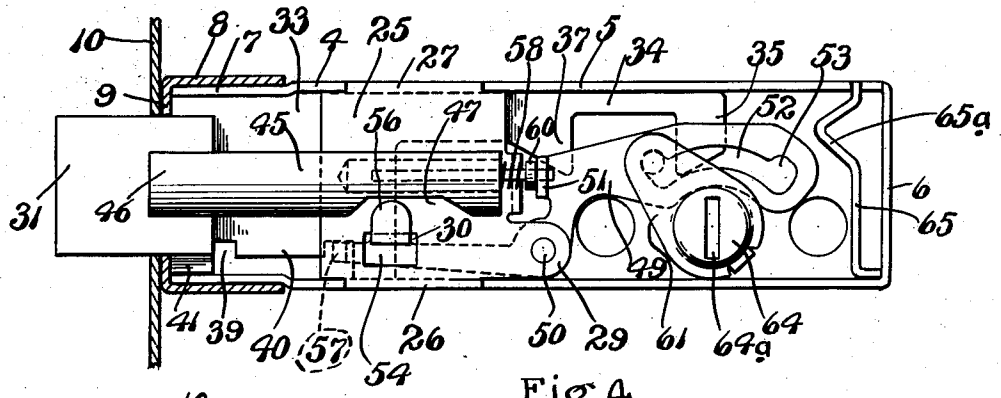


Fig. 4.

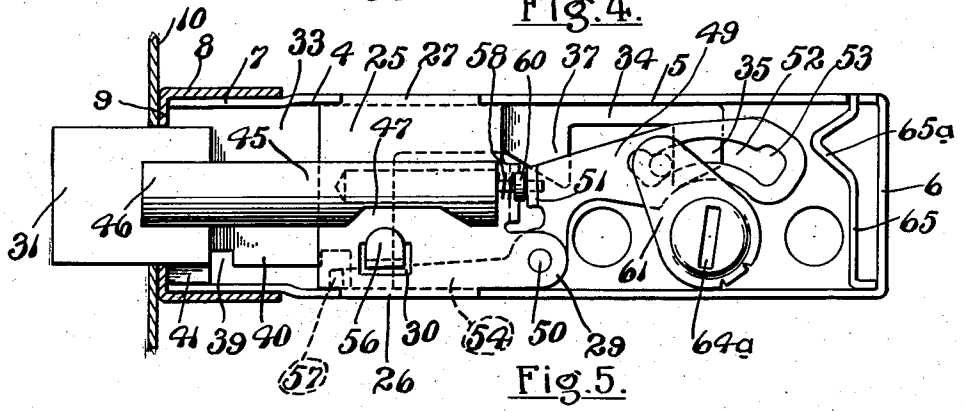


Fig. 5.

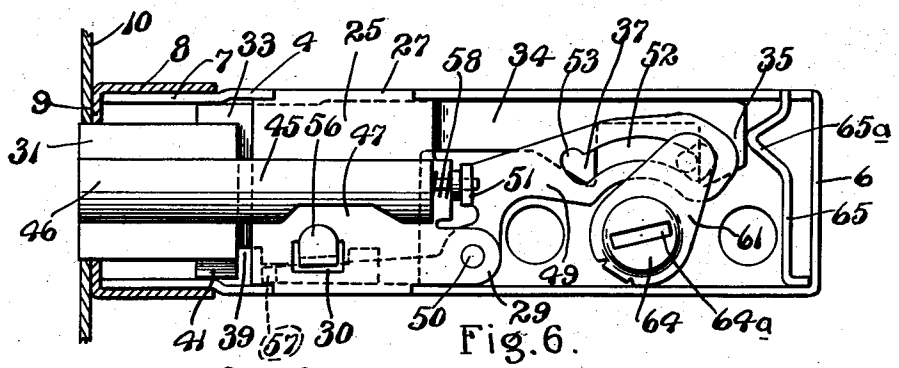


Fig. 6.

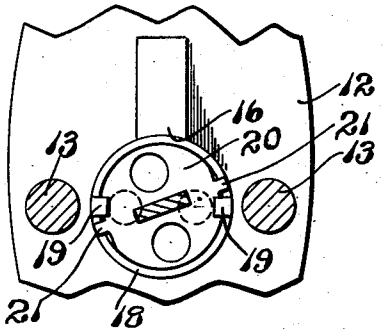


Fig. 7.

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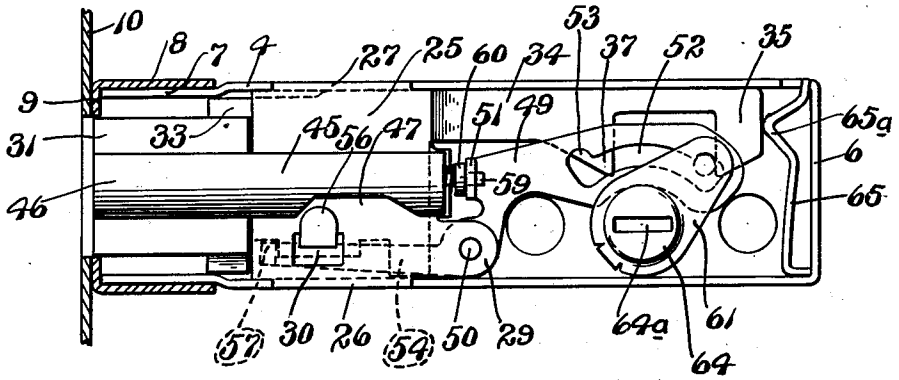


Fig. 8.

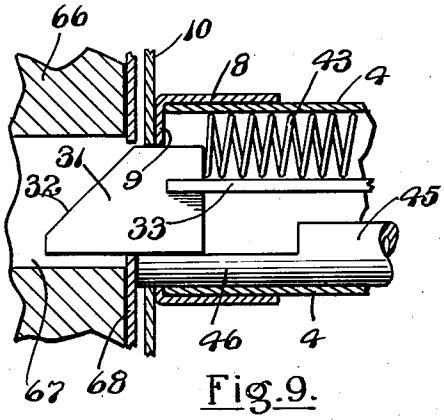


Fig. 9.

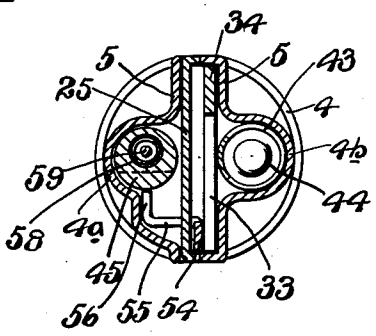


Fig. 10.

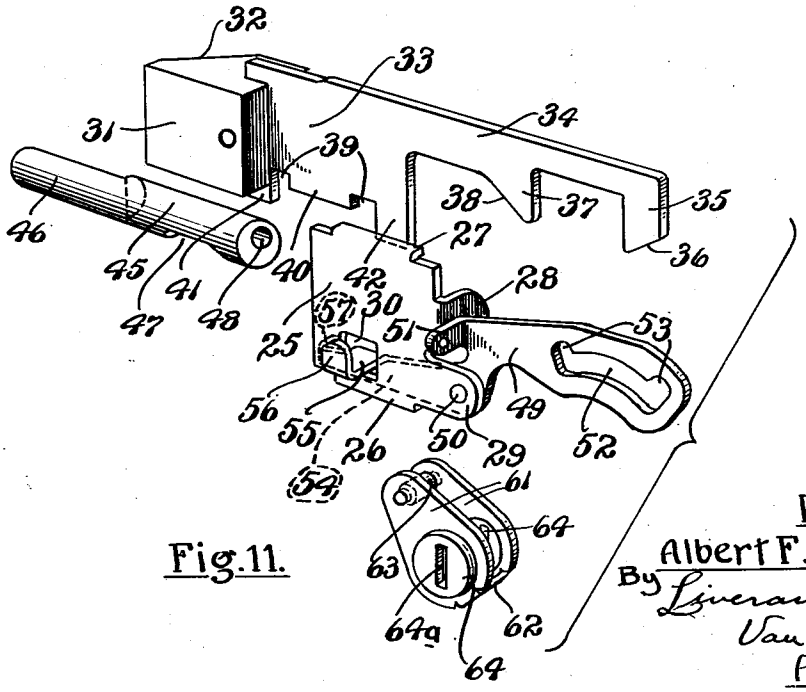


Fig. 11.

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Patented Aug. 17, 1948 2,447,190

UNITED STATES PATENT OFFICE

2,447,190

DOOR LOCK

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Application October 8, 1945, Serial No. 621,121

5 Claims. (Cl. 292—169)

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This invention relates to door locks. It is more particularly concerned with what in the trade is known as a dead locking night latch, one which automatically locks when a door is closed and must be released from the outside by use of a key, with, however, a provision of novel means for securing the lock bolt in a retracted inoperative position, so that the door may be readily opened and closed without the use of a key. Furthermore, such lock, when the door is closed and the lock must be released from the outside by use of a key, may be quickly and easily released from the inside by a simple, manually operable means.

The present invention has for its objects and purposes, among others, the production of a lock of the character stated, which is sure and certain in its operation, is very simply and readily installed on a door, has parts, the major portions of which may be made from sheet metal stampings which are economical to produce, and in which assembly of the parts and their installation on a door may be performed in a simple and very practical manner.

An understanding of the invention may be had from the following description, taken in connection with the accompanying drawings in which,

Fig. 1 is a horizontal section through the lock of my invention with the interior parts thereof shown in plan, the lock being shown as installed at the free vertical edge of a door.

Fig. 2 is a longitudinal, vertical section and side elevation of the lock in the projected position of the bolt when the door is open.

Fig. 3 is a transverse, vertical section substantially on the plane of the broken line 3—3 of Fig. 2 looking in the direction indicated.

Fig. 4 is a view, similar to Fig. 2, with the lock in the position it occupies when the door is closed and the head of the lock bolt is engaged with a keeper or strike plate.

Fig. 5 is a view, similar to Figs. 2 and 4, showing the initial change in the position of the parts upon the beginning of retraction of the bolt, either by an outside key or the inside manually operable means.

Fig. 6 is a view, similar to those shown in Figs. 2, 4, and 5, showing the position of the parts of the lock when the latch bolt has been retracted to release the door.

Fig. 7 is a fragmentary, transverse vertical section through the bolt operating means in a plane parallel to a side of the door.

Fig. 8 is a view, similar to those shown in Figs. 2, 4, 5 and 6, showing the bolt fully retracted and held in retracted position.

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Fig. 9 is a fragmentary horizontal section showing the latch with the bolt thereof engaged with the keeper or strike plate on the door frame or jamb.

Fig. 10 is a transverse, vertical section through the latch structure, the plane of said section being outwardly of the plane of the section shown in Fig. 3, and

Fig. 11 shows in perspective, the interior parts of the latch structure substantially in disassembled relation.

Like reference characters refer to like parts in the different figures of the drawings.

The door in the installation of the lock of the present invention, at its free edges has a cylindrical opening 2 bored therethrough for the required distance, and through the door at a distance inwardly from its free edge, transverse openings 3 are cut or bored which are in communication with the interior opening 2 toward its inner end, as shown in Fig. 1.

The lock structure includes an outer housing made of two parts stamped from sheet metal, the forward portion of each of which is of a substantially semi-cylindrical form as shown at 4, and the rear portion of a channel form in cross section, indicated at 5, the inner ends being turned inwardly toward each other to provide flanges 6, which may be secured together in any suitable manner, as for example as shown in my earlier application Ser. No. 549,644, filed August 16, 1944, now Patent No. 2,423,988, dated July 15, 1947. At its front end each of the parts of the housing is slightly reduced in diameter, as at 7, and when the two parts of the housing are brought with their edge portions in contact engagement, a cylindrical wall 8 of a cup shaped member having a bottom 9 is telescoped over the reduced outer end portions 7 and is detachably connected in a well known manner. At the outer side of the bottom 9 a rectangular plate 10 of flat material is spot welded or otherwise permanently secured, and both said bottom 9 and the plate 10 have openings in conjunction with each other for the passage of the head of the lock bolt and of another member, which will be hereinafter described. Such housing with the lock mechanism therein, when installed on the door, is passed into the opening 2 until the outer end plate 10 comes against the outer free edge of the door and is received in a shallow morticed recess therefor and secured to the door in the usual manner, ordinarily by screws.

The key and other means for unlocking and operating the latch bolt includes in its assembly structure an escutcheon 11, with an opening therethrough at the outer side of which may be a cover plate 12 with an inner steel plate case hardened to prevent drilling the lock from which two spaced apart rods 13 extending through the opening in the escutcheon and thence through the openings 3 nearly to the inner side of the door. The inner end portions of the rods 13 are interiorly bored and threaded. Said rods 13 pass through suitable holes made in the sides of the rear channel sections 5 of the housing.

At the inner side of the door, a plate 14 is located, covering the inner opening 3 and screws 15 pass through said plate threading into the adjacent ends of the rods 13 to bind the parts together against the inner and outer sides of the door (see Fig. 1). A key operated lock 16 is connected to the inner side of the member 12 and extends through the opening 3 at the outer side of the door to the interior opening 2 therein. Such lock is key operated by a key shown at 17. Said lock in accordance with well known construction, has a barrel which may be rotated by the key within the outer cylindrical housing of the lock, to the inner end of which a disk 18 is permanently connected to turn therewith. The disk has an inwardly extending annular flange, from diametrically opposite sides of which tongues 19 extend and are bent toward each other over the edges of a second disk 20 (Fig. 1) which is held in place by the tongues 19, and from which two opposed fingers 21 project permitting limited freedom of movement of the disk 20 with respect to the disk 18 provided by the construction described. However, upon key operation of the lock, the disk 18 is turned, and it will serve to turn the disk 20 upon the inbent fingers 19 coming against the fingers 21.

A flat bar 22 rectangular in cross section is connected at one end to the disk 20 and passes through the opposite sides of the locking housing 5 and nearly to the inner side of the door. On the plate 14 a manually operable head 23 having a longitudinal slotted shaft 24 connected therewith is mounted for rotation, the shaft extending through the plate and the free end of the bar 22 being received within the slot of the shaft 24. Thus the bar 22 may be turned by either key turning the lock from the outer side of the door, or by a manual turning of the shaft 24 by means of the head 23 located at the inner side of the door.

A plate 25 of flat metal is provided at its lower edge with a downwardly projecting portion 26 and at its upper edge with a projecting portion 27 formed as best shown in Fig. 11. This plate is located vertically within the housing and the parts of the housing. The front edge of the plate 25 is located back of the outer end of the housing a distance substantially equal to the length of the bolt head, which will subsequently be described. At its rear edge, approximately midway between its upper and lower edges, the plate has a laterally turned ear 28 and at its lower rear corner portion a rearwardly extending ear 29, substantially in horizontal alinement with which, and a short distance back of the front edge of the plate, a rectangular opening 30 is made.

The bolt head 31 is rectangular in cross section except that at its outer corner it is cut away to provide an inclined cam surface 32 in the usual manner. A plate of flat metal 33 is secured to and extends into the housing from the rear end

of the bolt head, having upper and lower edge portions extending above and below the upper and lower sides of the head 31. The plate is extended at its rear in a horizontal arm 34 at the extreme rear end of which a finger 35 extends downwardly at right angles, which may at its end have an inclined edge 36. A second finger 37 extends downwardly from the arm 34, spaced from and forward of the finger 35, with a downwardly and inwardly inclined forward edge 38, the rear edge of the finger 37 and the front edge of the finger 35 being vertically disposed. The plate 33 immediately back of the head 31 is cut away at its lower edge as shown, providing two spaced apart upwardly extending notches or recesses 39, between which is a downwardly extending portion 40 and with fingers 41 and 42 extending downwardly a greater distance than the part 40 at the front of the front notch and at the rear of the rear notch 39 respectively, as best shown in Fig. 11. A coiled compression spring 43 at its rear end bears against the laterally turned ear 28 on the plate 25 and at its front end against a lateral extension 44 on the bolt head (Fig. 1). Such spring normally tends to move the bolt head and the attached bolt plate 33 outwardly to the position shown in Figs. 1, 2, 4, 5 and 9.

A cylindrical bar 45 with a substantially semi-cylindrical projection 46 at its front end as shown, is positioned with the flat side of the part 46 bearing against a side of the head 31. The shoulder between the parts 45 and 46 comes against the rear end of the head 31 when free to do so, in which position the outer end of the head 31 and semi-cylindrical projection 46 are flush with each other. It is to be noted that on the opposite sides of the housing parts 4, outwardly extending partial longitudinal cylindrical embossings 4*a* and 4*b* are provided for the reception and guidance of the cylinder 45 and the spring 43 (Fig. 10). The cylinder member 45 at its lower side and between its ends has a portion cut away, providing a relatively shallow elongated recess 47 which at its rear end at least has a downwardly and rearwardly inclined side. The cylinder is bored from its rear end forwardly to make a longitudinal opening 48.

A lever member 49 made from flat metal is pivotally connected between its ends at 50 to the ear 29 (Fig. 11). It is provided with a laterally turned ear 51 above the pivot 50 which is turned in an opposite direction from the ear 28. The rear or inner portion of the lever is slotted with a curved slot 52 closed at both ends and at each end having an upwardly extending shallow branch slot 53. The forward arm 54 of the lever extends alongside the plate 25 and has a tongue 55 turned laterally from its upper edge to pass through the opening 30 in the plate 25 which at its free end, terminates in an upwardly turned lip 56, and which in the assembly of the parts lies directly below the lower side of the cylindrical member 45 and in most positions of said member below the recess 47. The forward arm 54 is extended still further forward and at its front end is provided with a laterally turned part 57. A light coiled spring 58 at its front portion is received within the opening 48 of the cylinder 45, and at its rear portion is passed over a rod 59 which, at its rear end, bears against a collar 60 on the rod, the rod back of said collar passing through an opening in the ear 51. The spring 58 normally tends to move cylinder 45 in an outward direction but is readily yieldable so that the cylinder 45 may be moved inwardly. Such spring

58 also has a normal tendency to turn the lever 49 in a clockwise direction about the pivot 50.

The rear portions of the arms 49 and 34 lie alongside each other and are located between the opposite sides of the inner or rear channel portions 5 of the lock housing (Fig. 1). A bolt retracting element is provided, made from sheet metal, having two spaced apart parallel sides or arms 61 connected at one end by an integral cross bar 62 and at their other ends by a pin which carries a roller 63, the roller passing through the slot 52 and between the fingers 35 and 37 of the arm 34. Said arms 61 are embossed outwardly adjacent their ends opposite said roller, as shown at 64, providing bearing portions which are mounted for rocking movement in suitable openings in the sides of the rear channel sections 5 of the housing. Said bearing embossings 64 have rectangular slots 64a therein through which the bar 22 previously described passes, whereby on turning said bar about its longitudinal axis either by the key 17 or head 23 the bolt member 34 is retracted from the position shown in Fig. 2 to that shown in Fig. 6 for release of the door.

A spring 65 is fixed at one end to a side of the housing and extends thereacross to the opposite side, the opposite end of the spring having a freedom of movement in an opening or slot cut in the housing for such purpose. Near said opposite free end of the spring it is formed with a forwardly bent triangular portion 65a against which the rear edge of the finger 35 engages upon sufficient inward retraction of the latch bolt, as shown in Fig. 6, and upon such further or extreme retraction of the latch bolt the spring is moved inwardly from the position in Fig. 6 to that shown in Fig. 8.

The latch structure described and as thus assembled is mounted upon a door and normally the parts will occupy the position shown in Figs. 1 and 2 when free to do so. The door mounted for swinging movement at the door opening is adapted to have its free edge portion, when the door is closed, opposite the inner side of a door casing or jamb 66, in which an opening 67 is made at the proper position for the reception of the projecting end of the latch bolt 31. Over said opening 67 a strike plate 68 is secured with an opening therein sufficient only for the free passage of the latch bolt head 31, but against which the outer end of the semi-cylindrical extension 46 of the cylindrical member 45 engages so that when the door is in a closed position the bolt and the cylindrical member 45 are disposed as shown in Fig. 9.

It is evident that with the described structure of latch and with the parts occupying their normal position as in Fig. 1, upon the door being closed the inclined cam side 32 of the bolt head riding against the strike plate 68 causes the bolt head to be forced inwardly against the compression spring 43 and, simultaneously the bolt head engaging with the shoulder at the front end of the cylinder 45 moved it against its spring 58. When the opening in the strike plate 68 is reached the bolt head is projected thereinto by spring 43, as in Fig. 9, but the cylindrical member 45 is held at an inner position as previously described, as in Fig. 9, and as the parts will be as shown in Figs. 4 and 5.

From the inside of the door the bolt may be retracted by engaging the operating head 23 and turning the bar 22 clockwise. From the outside of the door the bolt may be retracted only by

the one having the proper key 17 to fit the lock 16. With such key, bar 22 may also be rotated or rocked to retract the bolt to open the door from the outside.

When the door is in closed position and locked it is impossible to work the bolt head 31 inwardly as for example by insertion of a knife or other thin blade between the edges of the door and door jamb so as to reach the head and move it inwardly. Under such condition the roller at 63 will be located in the forward upper branch 53 of the slot 52, causing a clockwise turning movement of the lever 49 about the pivot 50 and lifting the laterally turned finger 57 at the front end of arm 54 into the rear recess 39 at the lower side of the plate 33 (Fig. 4). Such turning of the lever 49 is accomplished when the spring 58 is compressed and acts upon the lever 49 to turn it with the lip 56 free to move into recess 47 of the cylinder member 45.

When the bar 22 is operated either by the key 17 or head 23, the first movement is to elevate the rear end portion of the lever 49, the roller 63 passing from the forward branch slot 53 into the curved slot 52 and causing such elevation, which is sufficient to lower the finger at 57 to the position shown in Fig. 5 and thus free the latch bolt for inward movement. A continuation of rocking movement of the bar 22 and with a consequent rocking of the parts 61 carries the roller at 63 through the slot 52 to the position as shown in Fig. 6. Substantially simultaneous with the moving out of the roller 63 from the forward branch slot 53 to slot 52, said roller engages against the front edge of the finger 35. In the following movement from the Fig. 5 position to that in Fig. 6 the latch bolt is retracted through a forcing of the finger 35 rearwardly by the rear movement of roller 63 engaging therewith. When the latch bolt has been retracted to the position shown in Fig. 6, or substantially at the time that the finger 35 comes to the projection 65a of spring 65, the latch bolt head is free of the keeper or strike plate and the door may be opened. If the door is opened and the bolt is retracted no further than shown in Fig. 6, upon release of the key 17 or operating head 23 the bolt head will be projected outwardly by the spring 43 to the position shown in Fig. 1 so that when the door is again closed it is locked and cannot be opened from the outside except by use of the proper key 17.

It is however desirable and in fact essential that the locking bolt may be retracted and held in retracted position, as in Fig. 8. This may be accomplished by a further operation either by the key or head 23 to withdraw the bolt against the yielding force of the spring 65 to the position in Fig. 8, in which the roller at 63 is carried to the rear upper branch slot 53 of slot 52 and seats therein. Upon such action occurring spring 58 again turns the lever 49 in a clockwise direction about the pivot 50 and elevates the finger 57 into the front recess 39 at the lower edge of the plate 33 so that the bolt cannot move outwardly, being held in fully retracted position by said finger 57. The release of the bolt from such position is by turning the key 17 or head 23 in a reverse direction.

The recess at 47 in the rod 45 permits freedom of movement of the lever 49, either by the spring 58 in one direction or by the action against the upper edge of slot 52 by the roller 63 in the opposite direction at all positions except when the lock bolt is projected outwardly with the door

open. Under such condition as in Figs. 1 and 2, the cylinder rod **45** being projected outwardly as shown, said rod has moved so that the lip at **56** is brought underneath and depressed by the rear end portion of the rod, thereby moving the finger at **57** into an inoperative position insofar as it effects the lock bolt movement. Without such provision the spring **58** would turn the lever **49** in a clockwise direction and lift the finger **57** into the rear recess **39** and the door could not be closed because the lock bolt could not be retracted upon engaging the strike plate. The structure described provides for the rear inward movement of the lock bolt upon closing the door, inasmuch as the inner recess at **39** will have been moved far enough to the right when lip **56** subsequently enters the recess **47** that the finger **57** will ride against the under side edge of the part **40** between the notches or recesses **39**.

From the foregoing it is apparent that a practical, foolproof, simple, durable and economically produced lock of the type desired has been produced and one which is easily manufactured and assembled and readily installed upon a door.

The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. A lock comprising an elongated housing, a vertical plate fastened within the housing between its ends, a latch bolt comprising, a bolt head and a plate secured to and extending from the rear end thereof into the housing, said plate lying against one side of said vertical plate, spring means for normally projecting the bolt in an outward direction, said housing having an opening to pass the bolt head, manually operable means for retracting the bolt against said spring means, and a locking member movably mounted on said vertical plate adapted to be brought into locking engagement with said bolt plate to hold the bolt retracted when moved to its innermost position, and to hold the bolt at its outermost position against retraction from outer end pressure against the bolt head, as specified.

2. In a latch construction, an elongated generally tubular housing having an opening in its outer end for the passage of a bolt, a vertical plate secured within the housing, a latch bolt having a head passing through said outer end opening in the housing and a bolt plate secured to the inner end of the bolt head extending inwardly alongside said vertical plate, manually operable means including a rocker member mounted within the housing on the sides thereof adapted to engage with said bolt plate to retract the bolt, spring means normally moving the bolt outwardly, a cylindrical member having at its front end portion a semi-cylindrical extension, said extension in length being substantially equal to the length of said bolt head and lying thereagainst at one side, said opening in the housing permitting the outward passage of said extension, a lever member pivotally mounted between its ends on the vertical plate having a rearwardly extending arm located alongside said operating rocker member and provided with a laterally turned ear above its pivot, spring means between said ear and the cylindrical member normally tending to project the cylindrical member outwardly, said cylindrical member having a recess between its ends at its under side, said lever having a forwardly extending arm lying alongside said vertical plate, said arm at its upper edge having an upwardly turned lip located underneath said cylindrical member and said forwardly extending arm at its front end having a laterally turned finger, said bolt plate at its lower edge having spaced apart upwardly extending recesses one immediately back of the bolt head and the other a distance to the rear thereof into which said finger may be moved when said upwardly turned lip is below the recess in said cylindrical member.

3. A latch comprising a housing having an opening in its front end, a latch bolt slidably mounted in the housing and projecting through said opening, spring means for extending said bolt, manual means for retracting said bolt, and movably mounted locking means associated with said bolt and said manual means for locking the bolt in either extended or retracted position and movable to inoperative position by said manual means.

4. The elements of claim 3 combined with a dead bolt slidably mounted adjacent said latch bolt and also acting to unlock said locking means when extended and a single spring acting to both extend said dead bolt and to thrust said locking means into locking position.

5. The elements of claim 3 combined with spring means acting to exert additional resistance to movement just prior to final retraction of the latch bolt.

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REFERENCES CITED

The following references are of record in the file of this patent:

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