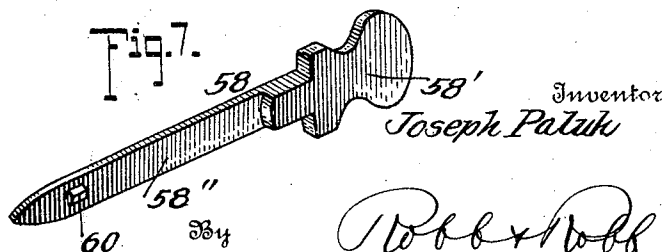
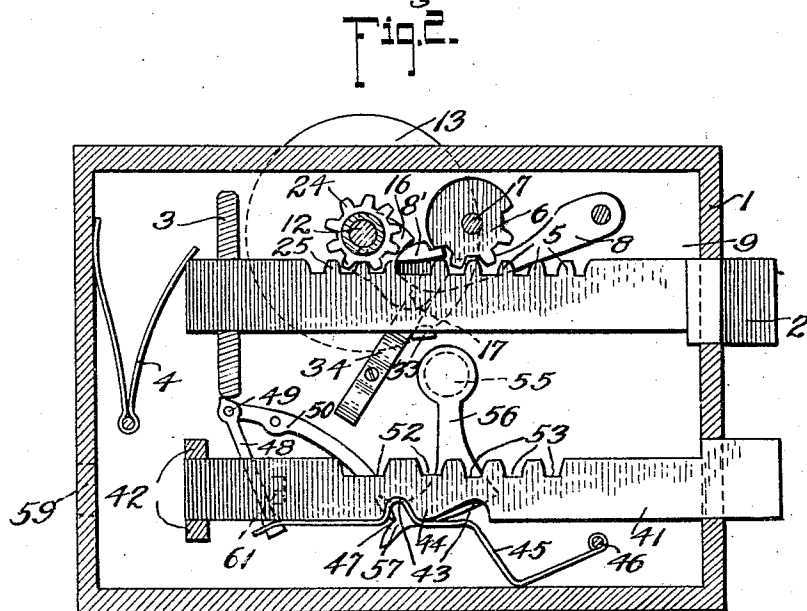
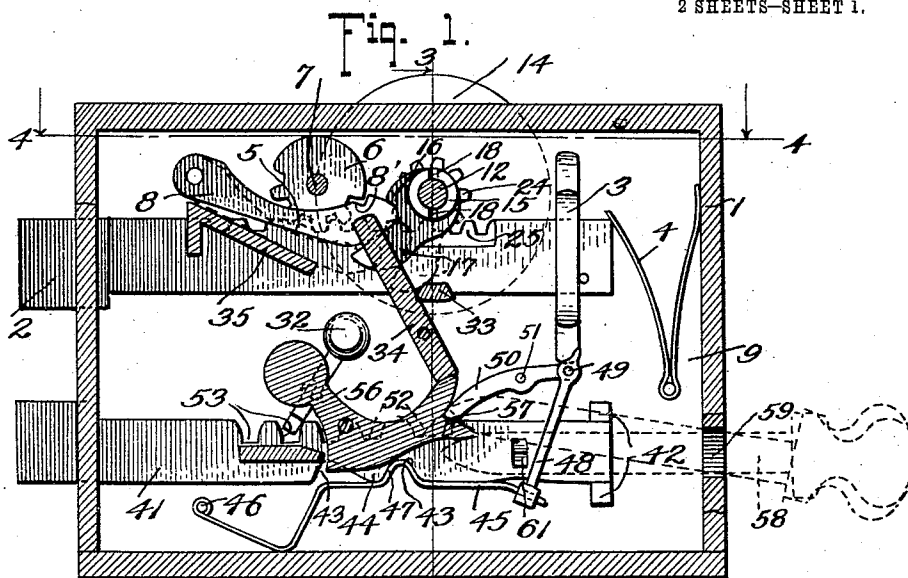


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2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

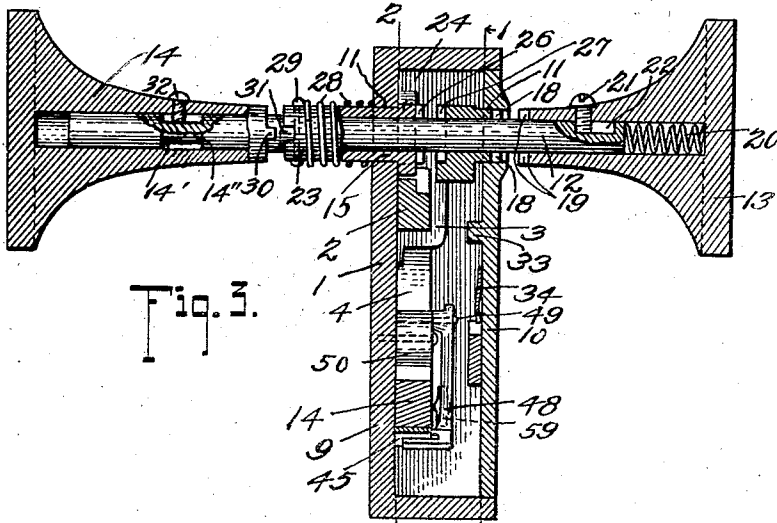


Fig. 3.

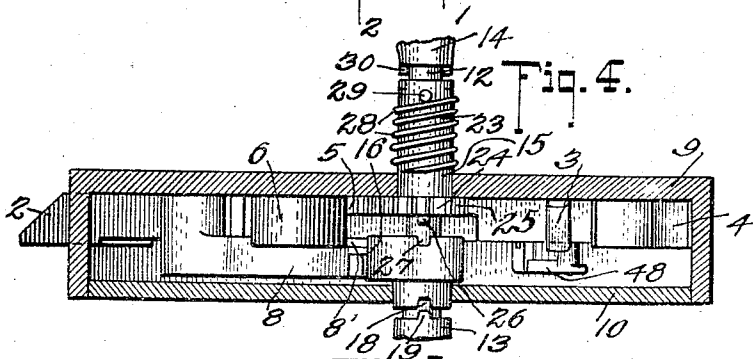


Fig. 4.

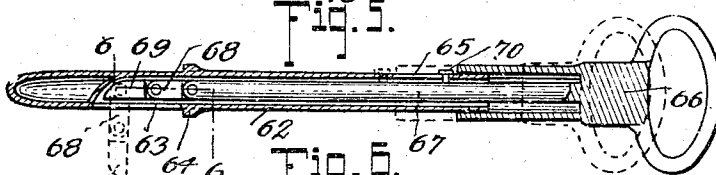


Fig. 5.

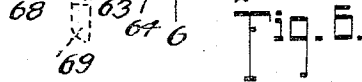


Fig. 6.



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Patented Apr. 1, 1913.

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To all whom it may concern:

Be it known that I, JOSEPH PALUH, a citizen of the United States, residing at Garfield, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Locks, of which the following is a specification.

This invention relates to improvements in locks and an object in view is the effective control and actuation of the locking bolt by a key whose cross section is equivalent only to that of its shank at the time of its introduction into the lock.

With this and further objects in view, as will in part be hereinafter set forth, and in part become apparent, the invention comprises certain novel constructions, combinations and arrangements of parts as herein specified and claimed.

In the accompanying drawings: Figure 1 is a section taken on the plane indicated by line 1—1 of Fig. 3, parts beneath the line of the section being indicated in plan. Fig. 2 is a similar section on line 2—2 of Fig. 3. Fig. 3 is a vertical section taken on the plane indicated by line 3—3 of Fig. 1. Fig. 4 is a horizontal section taken on the plane indicated by line 4—4 of Fig. 1. Fig. 5 is a longitudinal section through a key forming a part of the present invention. Fig. 6 is a transverse section therethrough taken on the plane indicated by line 6—6 of Fig. 5. Fig. 7 is a perspective view of a supplemental key.

Referring to the accompanying drawings by numerals, 1 indicates a housing or casing of a lock which may be either of the rim or mortise type. Reciprocally mounted in casing 1 is the latch bolt 2 which has its forward portion projected through an aperture in the outer edge wall of the casing 1, and has its rear portion guided in a bracket 3, the rear end of the bolt 2 being pressed by a spring 4 in the direction tending to maintain the bolt in its outer or forward position. Along the intermediate portion of the bolt 2, the same is formed into a rack 5 which meshes with a gear 6 journaled on a shaft 7 which latter is fixed to a casing 1. A pawl 8 is pivoted to a casing 1 at one side of gear 6 and is formed with a shoulder 8' adapted to engage teeth of gear 6 to lock the gear against rotation when the pawl is pressed toward the gear whereby the pressing of pawl 8 into locking engagement with

gear 6 will lock the bolt 2 against reciprocation by virtue of the fact that the bolt may reciprocate only when the gear 6 is free to rotate in the course of meshing with the rack 5.

The casing 1 consists of the usual fixed back plate 9 carrying the surrounding edge plates and the usual detachable front plate 10. The plates 9 and 10 are apertured, as at 11, 11, for the accommodation of the knob shaft 12 to the ends of which are connected the knobs 13 and 14. Surrounding the shaft 12, just inside of plate 10 is a sleeve 15 having tangential arms 16 and 17 extending at opposite sides of the end portion of pawl 8, so as to enable movement of the pawl to and from the locking relation with gear 6 when the sleeve 15 is rotated for swinging arms 16 and 17 upwardly and downwardly respectively. The sleeve 15 is shouldered circumferentially and the annular shoulder is disposed to bear against the inner face of plate 10, the outstanding portion of the sleeve extending into aperture 11 of plate 10 and constituting a clutch member by virtue of being provided with clutch member receiving recesses 18. Knob 13 is formed with an inwardly extending sleeve surrounding the shaft 12 and provided at its inner end with inwardly extending clutch teeth 19 adapted at times to engage recesses 18 for actuating sleeve 15. A spring 20 is disposed within the sleeve of the knob 13 in position to engage the end of shaft 12 and a portion of the knob for pressing the engaged parts in opposite directions and thereby pressing the knob longitudinally away from the shaft. To accommodate relative longitudinal movement of the knob and its sleeve with respect to the shaft, a set screw 21 is threaded through the sleeve into engagement with a slot or elongated recess 22 whereby the parts may have relative longitudinal movement while the shaft will rotate whenever the knob is turned. Thus the knob is normally held with its clutch teeth 19 out of engagement with the recess 18.

A sleeve 23 surrounds the shaft 12 and extends through plate 9, and at its inner end carries a pinion 24 which is disposed to mesh with a rack 25 formed of a portion of bolt 2, whereby rotation of sleeve 23 is adapted to reciprocate bolt 2, and the bolt in turn will be held against reciprocation

by the pinion 24 when the latter is held against rotation. Extending inwardly from the pinion 24 are clutch teeth 26 adapted, at times, to engage clutch recesses 27 formed in the sleeve 15 the parts being normally spaced apart and held spaced apart by a spring 28 surrounding sleeve 23, and at one end pressing the exposed face of plate 9 and the other end pressing the laterally extending studs or projections 29 formed preferably by the end portions of a pin passed through the sleeve and through the shaft 12. Thus the shaft is held against independent rotation relative to sleeve 23, and is also held against longitudinal reciprocation independent thereof as the spring 28 prevents the sleeve from having more than limited movement in one direction, and pinion 24 positively stops the sleeve against longitudinal movement in the other direction. The pinion 24 and rack 25 are of a thickness considerably less than the thickness of the bolt 2 so that the clutch teeth 26 are normally spaced from the adjacent end of sleeve 15, material of the bolt 23 being cut away to accommodate free rotary movement of the pinion 24 when the same is moved inwardly until the clutch teeth 26 engage recesses 27, the pinion passing in such movement beyond and out of mesh with rack 25. Knob 14 is formed with a sleeve similar in construction and arrangement to that of knob 13 having the inwardly extending clutch teeth 30 adapted to at times engage clutch recesses 31 in sleeve 23. The shaft 12 extends into the sleeve of knob 14, and therein is formed with an annular elongated reduced portion 14' leaving a longitudinal and annular space 14'' into which extends a bolt or pin 32 which extends through and engages the sleeve of knob 14, the pin 32 being of sufficiently less cross-sectional area than the length of space 14'' to permit the requisite longitudinal movement of the knob 14. Fixed to and extending inwardly from the inner face of plate 10 is a stop 33 interposed in the path of swing of the arm 17 so as to limit the extent of possible rotary movement of sleeve 15, a plate spring 34 being also fixed to the inner face of plate 10 and curved to have its flat face pressed against the flat face of arm 17 and thereby damp the movement of the arm and connected parts for preventing rattling or accidental displacement thereof. A pendant stop 35 extends from the inner face of plate 10 into the path of swing of pawl 8 and serves to limit the extent of movement thereof.

In operation, when the sleeve 15 is turned to release the pawl 8, the bolt 2 is free to be reciprocated either by a direct rotation of knob 13 or by pressing the knob 14 inwardly until clutch members 30 engage clutch recesses 31 and then rotating knob 14. When

it is desired to render difficult the manipulation of the parts pawl 8 is moved to the locking position, so as to temporarily lock latch bolt 2 against reciprocation until the pawl is moved out of its engagement. To accomplish this by the inner knob, or knob 13, it is only necessary to press the same inwardly until the teeth 26 engage the recess 27, and then rotate the knob for swinging the arms 16 and 17 downwardly, during which rotary movement sleeve 23 will be rotated by virtue of the rotation of shaft 12 and its connection with the sleeve 23, which results in a simultaneous rotation of the pinion 24, and thus it will be seen that when the knob 13 is thrust inwardly, and rotated contra-clockwise as viewed from the inside the release of pawl 8 and the inward thrust of bolt 2 will be accomplished simultaneously. The withdrawal of bolt 2 by the use of the exterior knob 14 is, however, rendered more difficult because of the various manipulations of which the knob is capable and through some of which it must be carried before the desired end is attained. If the operator merely rotates the knob, no result follows, and, if he thrusts the knob inwardly until the teeth 30 engage with the recesses 31, and then undertakes to rotate the knob, he will find it held against movement by virtue of the engagement of pinion 24 with rack 25 and the engagement of rack 5 with the pinion 6, which latter pinion is being held against rotation by the pawl 8. The next possible operation is the further thrust of the knob 14 inwardly, whereupon the pinion 24 will be moved past the rack 25 and the clutch teeth 26 will be brought into engagement with recesses 27. If the operator understands the construction of the parts, he will know that whenever they assume this position, it is only necessary to rotate the knob to release the lock for latch bolt 2, but to one unfamiliar with the lock, rotation of the knob at this point will apparently afford no results as the operator must, before effecting movement of the bolt 2, permit the knob 14 to return outwardly a distance sufficient to enable the gear 24 to mesh with rack 25 but must not permit the rod to move outwardly sufficiently to allow the teeth 30 to escape from recesses 31, for if the latter should occur, rotation of the knob will effect no results. To one experienced with the lock, the retention of the teeth 30 in engagement with recesses 31, and rotation of the knob with the parts in this position will effect the desired inward thrust of bolt 2.

A lock bolt 41 is arranged within the housing 1 to have its front end reciprocate through the forward edge plate and have its rear portion guided by inwardly extending lugs 42, 42. The end portions of the bolt 41 are notched as at 43, 43, to form the inter-

mediate cam portion 44, and a preferably flat spring 45 has one end fixed as at 46 to the housing 1, and has its intermediate portion bent into a relatively abrupt open loop 47 directly upwardly toward and adapted to extend within either of the recesses 43, and to ride under the cam 44 during reciprocation of bolt 41. The spring 45 is also bent between the loop 47 and the point of attachment to afford a wall engaging portion contacting with the lower edge wall of the casing 1 and retaining the loop 47 under spring tension in engagement with the bolt 41. The spring 45 also extends beyond the loop 47 and is inclosed by the bifurcated end of a yoke 48 which spans the bolt 41 and has its upper end portion apertured to receive a pin 49 carried by pawl 50, the pawl being pivotally connected to the plate 9 as at 51. The pin and aperture connection between yoke 48 and pawl 50 affords a pivotal engagement subjecting the pawl to the spring pressure of spring 45 which being exerted in an upward direction on yoke 48 presses the forward end of the pawl downwardly, the yoke engaging the pawl at a point in the rear of the pivot. The bolt 41 is formed with notches 52, 52, adapted to receive the pawl 50 at the respective termini of longitudinal movement of bolt 41 whereby the bolt is designed to be retained in either of its projected or retracted positions until forcibly shifted, the pawl acting on the upward portion of the bolt, and the spring on the lower portion thereof to this end. Bolt 41 is also formed with a series of notches 53 for receiving the actuating key bit which, during rotation of the key is adapted to engage any one of the recesses 53 and project or retract bolt 41.

As a precaution against employment of skeleton or other spurious keys, I provide a special key for use with the present improved lock which avoids the necessity for forming a bit accommodating notch as a part of the keyhole, the key hole in the present lock being formed circular as clearly seen at 55, a hole 55 being formed in each of plates 9 and 10, and the two holes being disposed in alinement. As a further guard against introduction of a key by an unauthorized person I provide a tab 56 pivoted to the inner face of plate 10 in a position to swing to and from a position extending across the keyhole 55. For facilitating the operation of the tab 56, the material constituting the same extends beyond the pivot and terminates in a bifurcated end 57 which is adapted in operation to be engaged by a supplemental key 58 consisting of a handle 58' and a shank 58'', the latter being adapted to be directed through a key hole 59 formed in the rear edge plate of the housing 1 in position to enable the shank 58'' to be thrust into the housing or casing 1 and into

the space between the arms or bifurcations 57. A slight lateral movement of the shank 58'' after having its inner end positioned in said bifurcation will serve to throw the tab 56 across the keyhole or to move it away from the keyhole as desired. The keyhole 59 is preferably disposed slightly at one side of the line of bolt 41 so as to be substantially in line with the opening between the yoke 48 and the bolt 41 so that the shank 58'' may be extended through the keyhole 59 longitudinally of the bolt 41, and one face of shank 58'' is provided with a laterally extending lug 60 adapted at times to enter a recess 61, in bolt 41. Thus the shank 58'' may be thrust through keyhole 59 and along bolt 41 until lug 60 drops into recess 61, and the bolt 41 may then be drawn or thrust longitudinally by a longitudinal shifting of the key 58. Obviously the keyhole 59 and key 58 and coöperative parts will be useful only in rim locks or locks disposed to have their rear edge accessible.

To operate the present improved lock whose casing is provided with a circular keyhole, I employ a key of particular construction, especially designed for use with such keyhole, said key consisting of a shank comprising a hollow cylinder 62 having a lateral aperture 63 adjacent its inner end and having an annular flange or shoulder 64 adjacent and outside of the aperture 63. The outer portion of the cylinder or sleeve 62 is slotted as at 65 and the outer end of the cylinder extends into a tubular plunger head 66. Fixed to the said head is a shaft or rod 67 which is connected to the head at the outer end thereof and extends thence inwardly within the sleeve 62. To the inner end of the rod 67 is pivoted a link 68 which carries at its outer end a pivotally connected link 69, the two links being thus free to be directed outwardly through the aperture 63, said aperture being sufficiently elongated for accommodating lateral swinging of the links, so that the links may be moved to a position projecting laterally from the sleeve and forming a key bit from a position lying within and longitudinally of the sleeve. The sleeve 62 has its inner end closed, that is to say, the cylinder constituting sleeve 62 is solid from the inner end of the aperture 63, so that in operation when the plunger head 66 is moved inwardly and thus moves the plunger rod 67 inwardly, the links 69 and 68 will come successively into contact with the solid wall at the inner end of the sleeve and will be caused to be turned outwardly thereby, the free end of link 69 being beveled as at 69' and the end of link 68 to which link 69 is pivoted being correspondingly beveled or rounded off as at 68' which rounded surfaces effect the camming of the link to the lateral position when the same are projected longitudinally against the solid wall at the

terminus of the sleeve. In drawing the links 68 and 69 from the position forming a bit, the plunger head is moved outwardly and plunger 67, of course, moves therewith causing link 68 to strike the wall at the outer end of aperture 63 which serves to throw the links rearwardly into the sleeve and bring them into alinement with the plunger. A lug or pin 70 extends outwardly from the plunger shaft 67 through slot 65 for guiding said plunger shaft in its reciprocal movement and preventing rotary movement thereof independently of the cylinder or sleeve 62. In operation, the links 68 and 69 being within the cylinder 62, the inner end of the cylinder is extended through one of the apertures 54 and is passed inwardly until the flange or shoulder 64 comes in contact with the respective plate 9 or 10, whereupon further inward movement of the sleeve is prevented, and the plunger will then move inwardly with the further inward movement of the plunger head, with the resultant projection of the links to form a key bit which will extend into one of the notches 52 and thus enable projection or retraction of the bolt 41.

Obviously while the bit formed of links 68 and 69 is illustrated as having but a single ward, additional wards may be provided by variation in the width of the link, bifurcation thereof and otherwise notching and shaping the same, always confining the formations to such degree as enables the projection and retraction of the links relative to the sleeve.

It will be observed that the free end of the spring 45 while effecting the action of yoke 48 and pawl 50 as stated, will in a sense be controlled by the position of the pawl 50, for when the free end of the pawl strikes the base of the respective notch 52 the free end of the spring 45 will be prevented from any further approach toward the bolt 41. Thus as the loop 47 is seating itself in either one of the recesses 43 the inward travel of the link will be cushioned and limited by the control of the free end of the spring through the influence of the pawl 50, as just stated. Thus the loop 57 cannot take its seat with a snap or sudden movement but the final seating of the loop will be cushioned.

Having thus described the invention, what is claimed is:

1. In a lock, the combination with a casing, of a latch bolt reciprocally mounted therein and having a rack, a pinion meshing with said rack, a pawl pivoted to swing to and from a position contiguous to said pinion and having a shoulder adapted to engage the teeth of the pinion for locking the pinion against movement and thereby locking the latch bolt against reciprocation, a knob shaft extending through the casing,

a sleeve journaled on the knob shaft, projections extending from the sleeve in position for engaging opposite sides of the pawl and adapted to swing the pawl to and from a locking position relative to the pinion when the sleeve is actuated, means for actuating the sleeve, and means cooperating therewith for reciprocating the latch bolt. 70

2. In a lock, the combination with a casing, of a latch bolt reciprocally mounted therein and having a rack, a pinion meshing with said rack, a knob shaft connected with the pinion and adapted to rotate the same for reciprocating the latch bolt, means for locking the latch bolt against reciprocation, a sleeve journaled on the knob shaft and spaced from the pinion, means carried by the sleeve for actuating the latch bolt, locking means for effecting release thereof, said pinion being movably mounted and adapted to move toward and away from the sleeve, and a clutch connection for the pinion sleeve adapted to assume effective clutch relation when the pinion has been shifted toward the sleeve a distance sufficient to cause the pinion to leave its mesh with the rack. 75 80 85 90

3. In a lock, the combination with a casing, of a latch bolt reciprocally mounted therein, a catch adapted to lock the latch bolt against reciprocation, means for releasing the catch, a sleeve journaled in the casing, a pinion carried by the sleeve, a rack on the latch bolt meshing with the pinion, a spring pressing the pinion to a position meshing with the rack, and means for shifting the sleeve and pinion for moving the pinion out of mesh with the rack and in position for actuating the catch releasing means. 95 100

4. In a lock, the combination with a casing, of a latch bolt reciprocally mounted therein and having a rack, a pinion meshing with the rack and shiftable bodily to and from a position in engagement with the rack, a knob shaft extending through the casing and engaging the pinion for rotating the same, means for locking the latch bolt against reciprocation, means for releasing said lock, means connected with the pinion for actuating the releasing means when the pinion is moved bodily out of engagement with the rack, a knob mounted on the outer end portion of the knob shaft and having reciprocal and rotary connection therewith, and means connected with said knob for shifting and actuating the pinion for releasing the lock. 105 110 115 120

5. In a lock, the combination with a casing, of a latch bolt reciprocally mounted therein, means for reciprocating the bolt, means for locking the bolt against reciprocation, means for releasing the lock, knobs at opposite sides of the casing mounted to rotate and to shift toward and from the casing, and means connected with each of the knobs 125 130

for actuating the lock releasing means when the knob is shifted to a given position.

6. In a lock, the combination with a casing, of a slidably mounted bolt therein having ratchet notches at one edge and spaced recesses at the opposite edge, a spring fixed within the casing and bent to contact with said bolt under spring pressure, said spring being formed with an open loop adapted to extend into the respective recesses according to the position of the bolt, a pawl pivotally mounted in the casing and adapted to engage the ratchet notches of the bolt, and a yoke engaging a free portion of the spring and extending across the bolt and pivotally engaging the pawl in the rear of its pivot for maintaining the same in contact with the respective ratchet notches under spring pressure while the loop of the spring is within one of the recesses.

7. In a lock, the combination with a casing, of a slidably mounted bolt therein having ratchet notches at one edge and spaced recesses at the opposite edge, a spring fixed within the casing and bent to contact with said bolt under spring pressure, said spring being formed with an open loop adapted to

extend into the respective recesses according to the position of the bolt, a pawl pivotally mounted in the casing and adapted to engage the ratchet notches of the bolt, a yoke engaging a free portion of the spring and extending across the bolt and pivotally engaging the pawl in the rear of its pivot for maintaining the same in contact with the respective ratchet notches under spring pressure and while the loop of the spring is within one of the recesses, the cross member of the yoke being spaced above the bolt, and the casing being formed with a keyhole substantially in line with the bolt, the bolt being formed with a recess in its side face, and a key having a shank adapted to be passed through the keyhole and being formed with a lug adapted to be seated in the recess in the side face of the bolt to enable manual longitudinal thrust of the bolt by a similar movement of the key.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH PALUH.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."