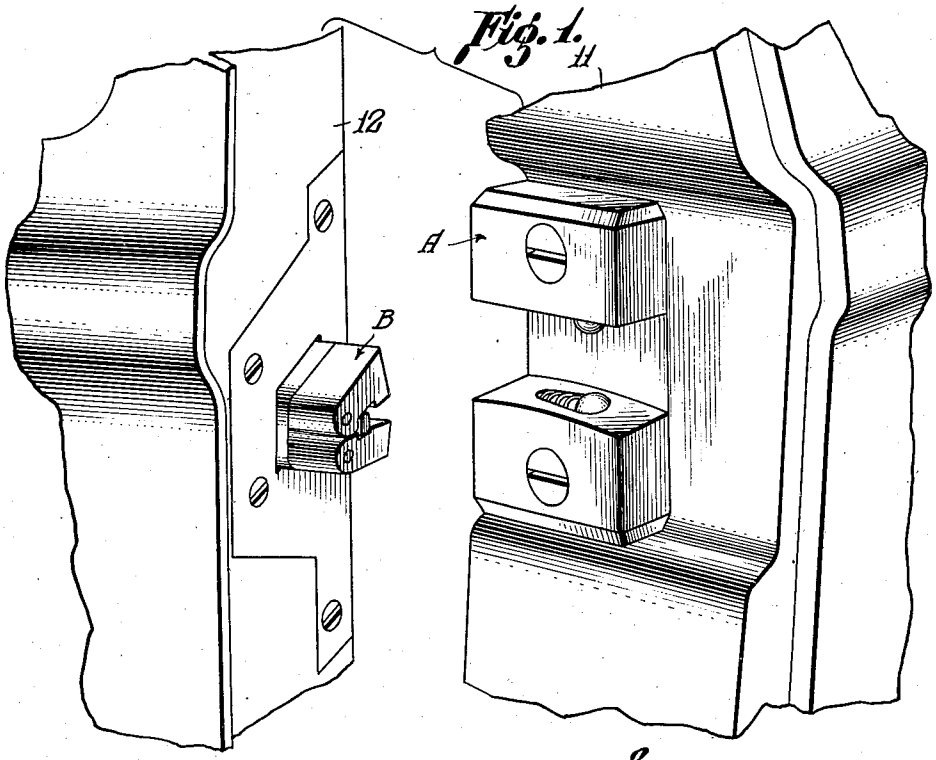
Aug. 13, 1940. A. D. SUTHERLAND 2,210,989

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Fig. 1.



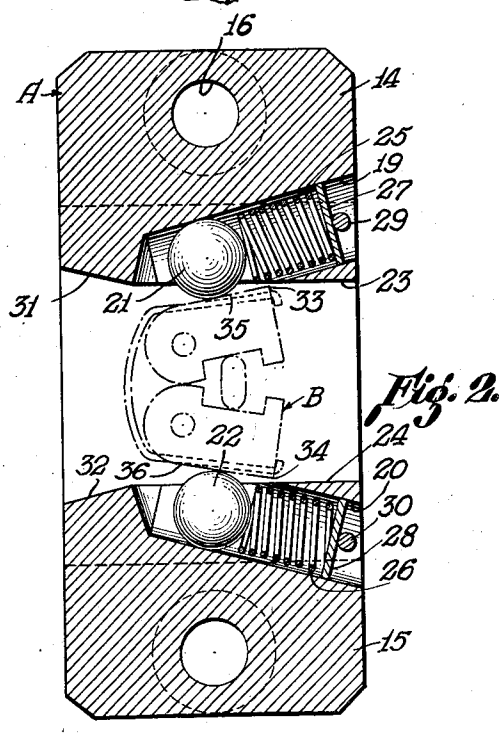




Fig. 2.

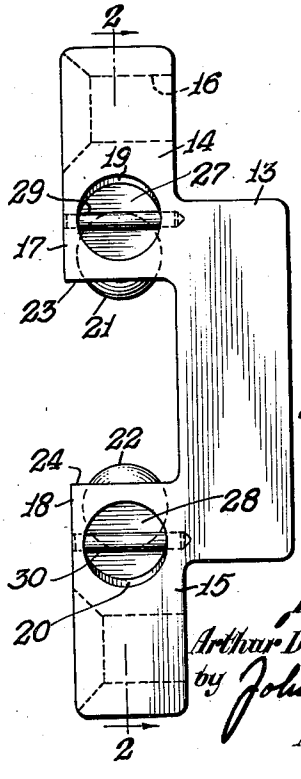



Fig. 3.

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Fig. 6.

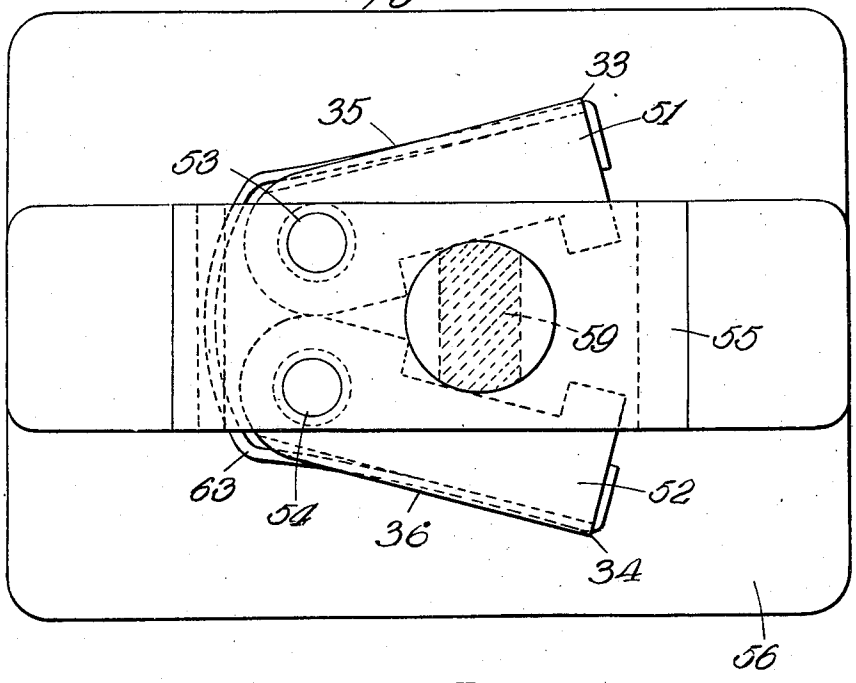
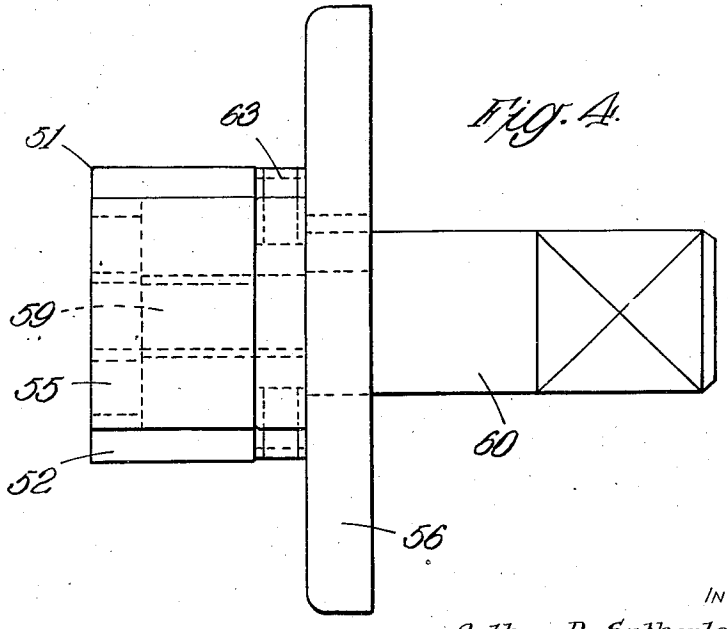



Fig. 4.




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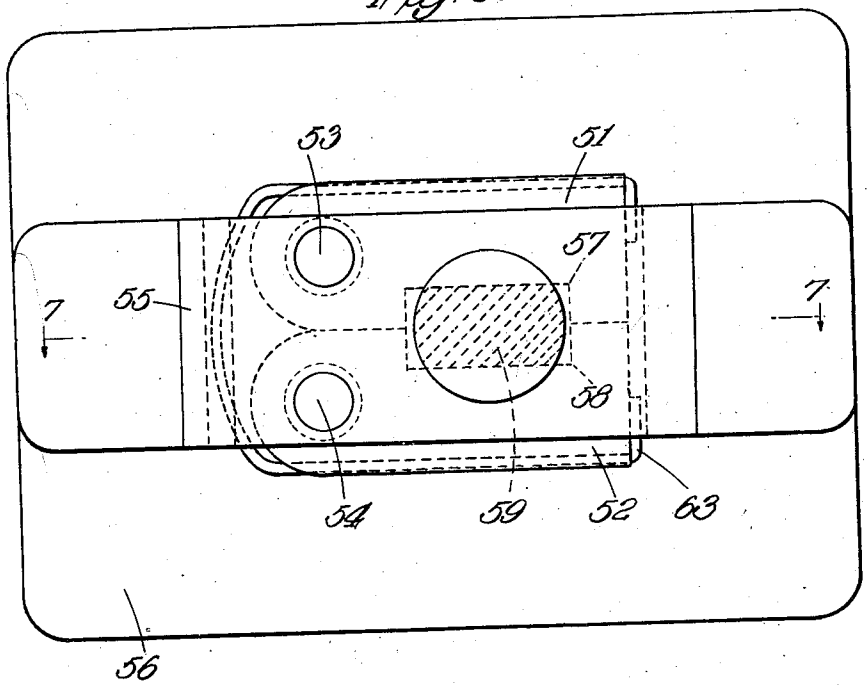
ATTORNEY

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Fig. 5.



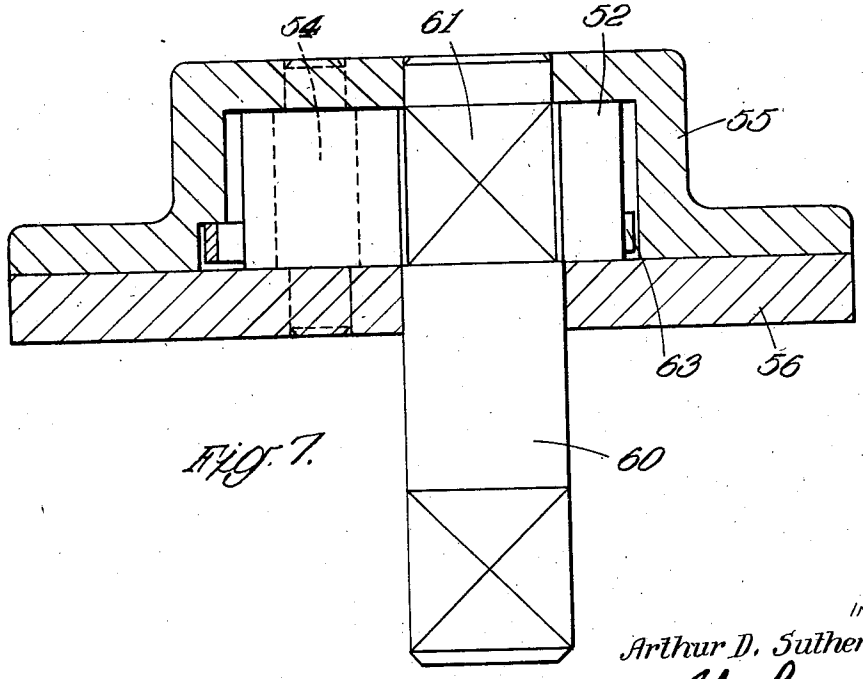




Fig. 7.

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# UNITED STATES PATENT OFFICE

2,210,989

## LOCK

Arthur Duncan Sutherland, Oxford, England, assignor to Pressed Steel Company Limited, Cowley, Oxford, England, a British company

Application November 18, 1937, Serial No. 175,207
In Great Britain November 20, 1936

1 Claim. (Cl. 292—49)

The present invention relates to a lock which comprises a lock bolt and its associated operating mechanism and a striker plate consisting of a female member retaining one or a pair of members for cooperation with the lock bolt which members are arranged to be moved by the lock bolt on its engagement therewith or otherwise to permit the free or unrestricted entry of said bolt but to prevent the withdrawal of said bolt in the direction of its engagement.

The striker plate of such a lock may be generally in the form of a U member adapted for attachment to the door jamb or the rail of the door and retaining in the inside faces of its limb portions members for co-operation with the lock bolt, said members being in the form of wedges, balls or rollers, said inside faces of the limb portions of the striker plate being tapered from a point toward the position of entry of the lock bolt divergently in the direction of normal travel thereof in such manner that on engagement of the lock bolt with said wedges, balls or rollers they are moved along the divergently tapered portions of the limbs of the striker plate, and consequently they also move outwardly thereby giving substantially unrestricted passage to the lock bolt. The wedges, balls or rollers are retained within the limbs of the striker plate and are moved, when engaged by the lock bolt, against the compression of coiled or like springs. The surfaces of the lock bolt engaging the striker plate may be parallel or slightly tapered, such that on an attempt to withdraw the lock bolt from its engagement with the striker plate in the normal path of its travel, the parallel or slightly tapered surfaces thrust the wedges, balls or rollers into firm contact with the divergently tapered limbs of the U striker plate and in this manner the lock bolt is held firmly in engagement with the striker plate.

According to the invention there is provided a novel form of lock bolt for co-operation with a striker plate as described above. The novel lock bolt is collapsible in a direction transversely of the striker plate to permit free or unrestricted withdrawal of said bolt from engagement with said striker plate without retraction of the bolt in the normal way. This lock bolt comprises a pair of pivoted members arranged normally in an expanded position, or in other words, the two members of the bolt are arranged so that their transverse dimension is equal to, or greater than, the transverse dimension of the female portion of the associated striker plate, and when it is desired to disengage the bolt, the pivoted members are collapsed to permit their free passage from the striker plate but normally the transverse dimension is great enough to prevent the composite bolt from being withdrawn from engagement with the striker plate. One method of expanding the pivoted members of the lock bolt is to arrange therebetween a cam member operating, if desired, in undercut portions of the inside faces of said members. The members are normally maintained in their expanded position and in order to open the door they are moved to their collapsed position in which the cam lies within the undercut portions and permits the bolt members to lie close together. On release of the operating means, e. g. door handle, the bolt members are expanded to their holding or locking position.

The cam may be operated in a number of different ways, for example, by means of a normal door handle, by means of cable secured to the cam and operable from a convenient position, the cam itself being held in the up-turned or operative position by means of a spring or simply being free to rotate in either direction under the control of the Bowden cable, or the cam may be operated by means of a push button or by means of a knob which may be pulled or slid, as desired. As an alternative to the cam member for expanding the pivoted members of the bolt, there may be employed a pair of links operating on the principle of a lazy-tongs device or other equivalent means may be used.

It should be understood that when the bolt members are in their expanded position they present in effect a solid bolt, which cannot be collapsed simply by the application of pressure to their outside surfaces, but only on actuation of the cam or equivalent means.

The foregoing describes examples of the manner in which a lock bolt comprised of two pivoted members may be expanded and collapsed for the purpose of this invention, but it should be understood that alternative arrangements could be devised for this purpose.

It will be clear that the normal shock engagement of the lock bolt with the striker plate of the type generally in use is avoided and that there is a smooth and gradual uninterrupted engagement of the bolt with the striker plate over a length of travel determined by the degree of movement within the striker plate of the wedges, balls or rollers, against the compression of their springs and that once the lock bolt has engaged the striker plate it cannot be disengaged therefrom simply by pulling on the door in an at-

tempt to move the lock bolt in the reverse direction. There is provided in effect, a more or less infinite number of engaging positions of the lock bolt and the striker plate each without shock and in each position the lock bolt is held positively, or in other words, there is provided an infinite number of main and safety catches.

The lock bolt itself may be formed without the usual bevel portion for engagement with a striker plate of normal type.

Furthermore, the lock bolt may be a fixture on the door jamb but be capable of retraction by means of a key, or by turning a knob or by pushing a button or the like.

Another very desirable feature of a lock of this kind is the manner in which it functions simultaneously as a dovetail or anti-rattle device for the door, for it will be clear that as soon as the lock bolt is in engagement with the striker plate the thrust of the bolt on the wedges, balls or rollers in addition to preventing the withdrawal of the bolt will also hold the door positively in an up and down direction.

The invention is illustrated by way of example in the accompanying drawings, of which,

Figure 1 is a perspective view of the striker plate and lock bolt mounted respectively on a door post and a door (shown fragmentarily);

Figure 2 is a front sectional elevation on the line 2—2 of Figure 3;

Figure 3 is a side elevation of the striker plate;

Figure 4 is a side elevation of the lock bolt mechanism;

Figures 5 and 6 are front views (shown to a larger scale) of a novel form of lock bolt, in the collapsed and expanded positions respectively; and

Figure 7 (also to a larger scale) is a section on the line 7—7 of Figure 5.

In Figure 1 the striker plate designated generally by the letter A is mounted on the door frame rail 11 and the lock bolt designated generally by the letter B is carried on the jamb rail 12 of the door.

The striker plate A is comprised of a substantially U shaped metal block 13 formed with integral extensions 14 and 15 to facilitate its mounting on a door frame by means, for example, of screws extending through holes 16. The limbs 17 and 18 of the U block 13 are drilled obliquely as at 19, 20, the slots converging towards the side of entry of the lock bolt B. Balls 21 and 22 are placed in the slots 19 and 20 and thrust outwardly to project from the faces 23, 24 of the block 13, by means of the coil springs 25, 26 retained within the slots 19 and 20 by discs 27, 28 and pins 29, 30. The surfaces 23 and 24 are generally parallel, but at the side of entry of the lock bolt B are given a lead 31, 32 to facilitate engagement of the lock bolt in the event of misalignment. The slots 19 and 20 are drilled into the block 13 to an extent sufficient only to permit the balls 21 and 22 to project beyond the surfaces 23 and 24 a predetermined distance, as shown in the drawings. The obliquity or divergence of the slots 19 and 20 will be such that the resultant reaction of the thrust of the bolt will be insufficient to move the balls against their springs. The greater the obliquity the stronger will be the springs to prevent such movement.

When now the lock bolt B (shown in dotted lines in Figure 2) engages the striker plate the leading edges 33, 34 impinge against the balls 21 and 22 which consequently move divergently against the thrust of their associated springs 25 and 26 to permit full entry of the bolt B into the U recess bounded by the surfaces 23 and 24 of the block 13. Immediately the leading edges 33 and 34 have passed the centre line of the balls 21 and 22 these latter are thrust outwardly to engage the inclined surfaces 35, 36 of the bolt B, the inclination of these surfaces being convergent towards the side of entry of the bolt B with the striker plate A, and thus it will be clear that any tendency to withdraw the bolt B from engagement with the striker plate in the reverse direction of entry is prevented by the thrust of the balls 21 and 22 on the inclined surfaces 35 and 36 and that the greater the force used in an endeavour to disengage the lock bolt the greater will be the resistance to disengagement. It will be clear also that the bolt B will be held immediately the leading edges 33 and 34 pass the centre line of the balls 21 and 22 and that whatever the position of the bolt may be subsequently it will not be possible to withdraw the bolt in the reverse direction of entry.

As shown in Figures 4 to 7 the lock bolt capable of being expanded and collapsed for the purpose of this invention consists of two pivoted members 51 and 52 pivoted at 53 and 54 to a housing 55 carried on a base plate 56. Each member 51 and 52 is under cut as at 57, 58 and within the under cut recess lies a cam 59 which may be formed integrally with an operating shaft 60 or which in effect is a portion of the shaft 60 formed with flats as at 61 (see Figure 7).

The members 51 and 52 are moved to their collapsed position by means of a bow spring 63. The position of the shaft 60 is such that the members 51 and 52 are normally in their expanded position as shown in Figure 6 under the action of the cam 59, and it will be clear that when the composite bolt described engages the striker plate the leading edges 33, 34 will engage the balls 21 and 22 in the described manner. On rotation of the shaft 60, the cam 59 is rotated whereupon the members 51 and 52 collapse under the action of spring 63 until their faces 35, 36 are substantially parallel in which position no resistance is offered by the balls 21 and 22 to the retraction of the composite bolt in the reverse direction to that of its normal entry.

From the foregoing it will be clear that there is provided a novel form of lock which has the advantage of smooth engagement of the lock bolt with the striker plate, of firm engagement over a wide range of positions of the lock bolt within the striker plate and one which functions as a positive dovetail or anti-rattle device.

The lock comprises simply a male member, which is the lock bolt and with which may be associated any known form of operating mechanism and a female member which is the striker plate, which female member carries the wedges, balls or rollers and their associated springs, the male or female members being mounted respectively either on the door jamb or the door rail.

I claim:

A bolt construction for use in connection with a keeper comprising a base plate which is provided with two opposing surfaces, these surfaces being spaced from each other but inclined in the direction of the relative closing movement of said bolt toward said keeper construction, said bolt construction comprising a base plate and two arms pivoted thereto, said arms being adapted to enter the space between the two surfaces of said keeper, the axes of the pivots for said arms extending perpendicular to the directions of rela-

tive movement between said bolt construction and said keeper, and said arms extending from the pivots in the direction of the relative closing movement of the bolt construction, said arms being furthermore provided each with one surface which opposes in the closing position of the lock one of said surfaces of the keeper, movable means adapted to exert a wedge action between said surfaces of the keeper and said surfaces of said arms, and hand controlled means for increasing and decreasing the distance between the free ends of said arms.

A. D. SUTHERLAND.