Oct. 30, 1962 F. J. BUTTER 3,060,716

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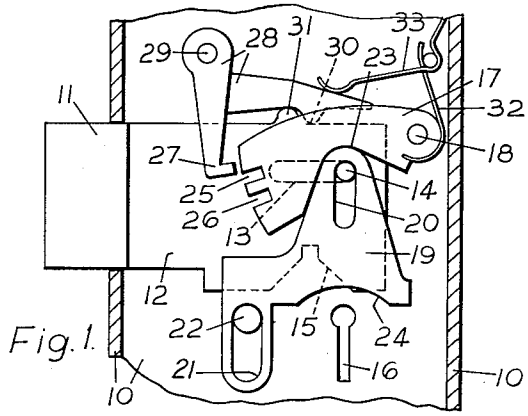


Fig. 1.

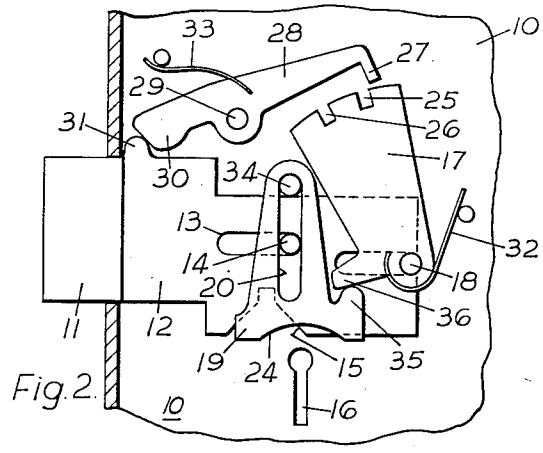


Fig. 2.

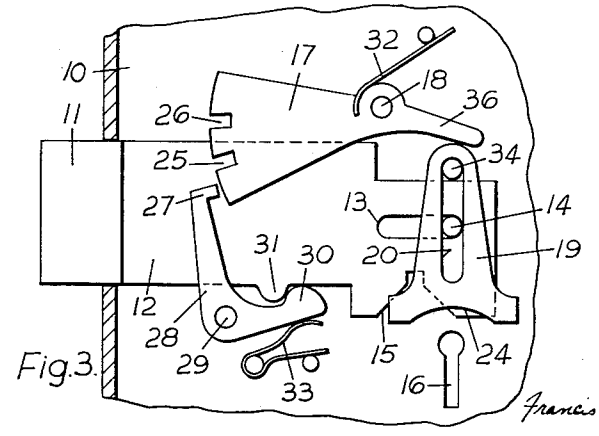


Fig. 3.

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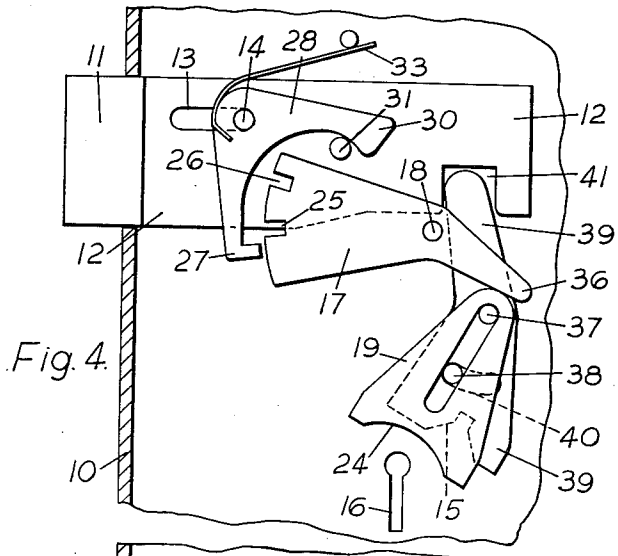


Fig. 4.

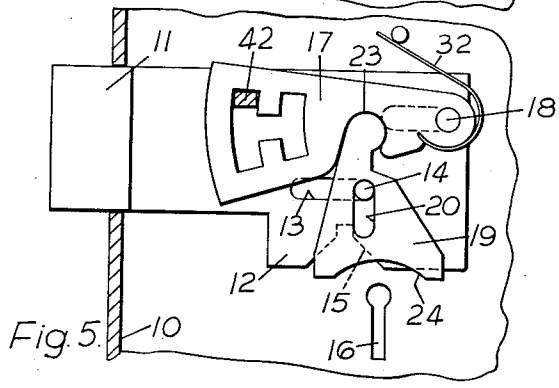


Fig. 5.

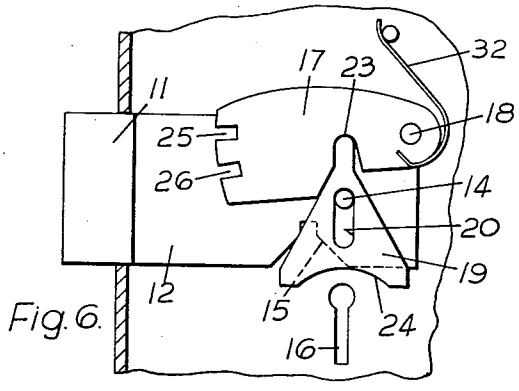


Fig. 6.

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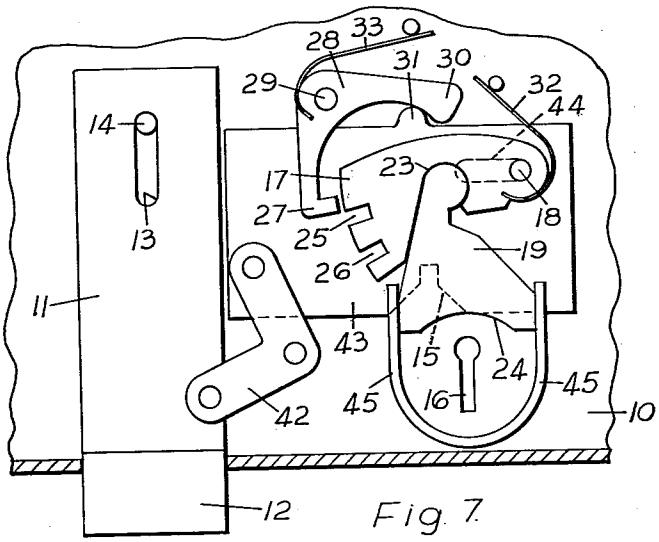


Fig. 7

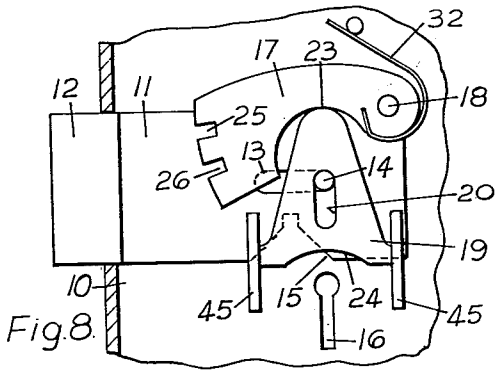


Fig. 8

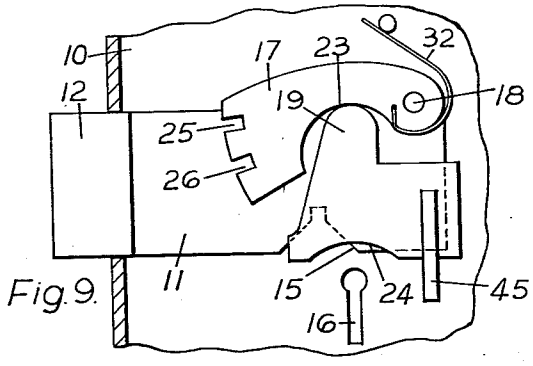


Fig. 9

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United States Patent Office 3,060,716 Patented Oct. 30, 1962

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7 Claims. (Cl. 70—134)

This invention relates to locks of the type in which pivoted security levers require to be lifted by respective correct amounts in order to release the bolt for direct or indirect operation by the key. In this type of lever lock, the correct lifting of the security levers in order to release the bolt for operation is usually effected by corresponding steps of respectively appropriate radial dimensions on the key bit, which steps co-operate directly with the security lever under edges or bellies which are shaped to suit the radial dimensions of the respective key steps so as to ensure that each security lever will be lifted the correct amount, whether the key is turned clockwise or anticlockwise.

The above-described usual arrangement of lever lock is generally satisfactory where it is required to be operated always by the same key, or by one or other of a number of identically similar keys, but this is not so satisfactory in a lock which requires to be operated by either of two keys which are not identically similar, for example by a servant key and also by a master key. In the latter connection, any particular security lever with its under edge or belly shaped to suit one of the two different keys will not suit the other key and will be lifted either too much or too little by said other key in one of its turning directions. For this reason key-operated sliders or so-called "sliding levers," instead of pivoted security levers, have been resorted to for releasing the bolt in cases where operation by different keys is required, since the lift imparted to a slider by any particular key is the same irrespective of the direction in which said key is turned; the disadvantage, however, of using sliders is that they are lifted bodily or as a whole by amounts corresponding only to the respective key steps by which they are operated, whereas the advantage of using pivoted security levers is that they have a lift-magnification factor, that is to say, that end of a lever which is remote from the pivot moves through a longer arc than does that portion of the lever which is engaged by the key step, and this affords more scope for notching or otherwise forming the remote end of the lever for co-operation with a blocking element, such as an abutment or stump on the bolt, or on its runner, if any, or on a bolt-dogging lever, to suit different lifts imparted by different keys.

According to the present invention, a lock of the type referred to is characterised in that the pivoted security levers are lifted by key-operated members, one for each lever, which members are constrained or guided by substantially rectilinear movement and each of which when operated by a step of any particular key imparts the same lift to its associated lever irrespective of the direction in which that key is turned. Thus the advantage of pivoted security levers, due to their lift-magnification factor, is retained and the disadvantages, hitherto associated with such levers when required to be directly operated by different keys, are avoided by the constrained or guided key-operated lifting members which ensure that with any particular key each lever will be lifted the same amount no matter in which direction said key is turned. In this way, the invention provides a security system which is eminently suitable for locks of a master-keyed set or suite.

It will, of course, be appreciated that the under edges

or bellies of the key-operated lifting members may be of arcuate shapes for co-operation with the respective steps of the key or keys, although in this connection it will usually be satisfactory to make the said lifting members all alike or identically similar with their under edges or bellies shaped to an arc having the radius of the longest key step used.

The invention will now be described with reference to and by the aid of the accompanying drawings in which:

FIG. 1 is a fragmentary sectional side elevation of a lock mechanism embodying principles of the present invention, and

FIGS. 2–9 inclusive are similar to FIG. 1 and illustrate modifications of the invention.

For the sake of clarity only one of the pivoted security levers and its associated key-operated lifting member is shown in each figure; also in each figure the bolt is in the locking position with the parts of the associated security mechanism in the positions they assume when the locking turn of the key has been completed to enable the key to be withdrawn from the keyhole.

Referring to FIG. 1 of the drawings, **10** is the lock casing; **11** is the bolt head which is guided in the usual opening in the forend of said lock casing **10**; **12** is the bolt lath or tail; **13** is a lanket hole in the bolt lath **12**; **14** is a guide stump fixed in the lock casing **10** and engaged with said lanket hole **13**; **15** is the usual key notch or talon in the under edge of the bolt lath **12**; **16** is the keyhole in the lock casing **10**; **17** is the pivotally mounted security lever; **18** is a fixed stump upon which the security lever **17** is mounted, and **19** is the key operable member for lifting the security lever **17**.

The member **19** is a plate with an approximately triangular portion having a vertical slot **20**, engaged with the guide stump **14**, and a forward portion having a vertical slot **21** engaged with a guide stump **22** fixed in the lock casing **10** at a position forwardly of the keyhole **16** and below the bolt lath **12**. The triangular portion of the member **19** has a part circular or radiussed apex which engages in a complementary bearing recess **23** in the underside or belly of the lever **17** at a point between its ends, said recess having side clearances, or being of a wide angle, sufficient to accommodate angular movement of the lever **17** relatively to said lifting member **19** during operation, whilst the under edge or belly of the lifting member **19** is formed to an arcuate shape at **24** for co-operation with the appropriate step of either of two keys, for example a servant key and a master key.

In the latter connection, the security lever **17** has formed in its arcuate forward edge two notches **25, 26** and this edge of the lever is closely confronted by a rearwardly directed toe **27** on a depending arm of a bell-crank dogging lever **28** which is pivoted at **29** and has a rearwardly directed arm with an abutment **30** for co-operation with a cam-like protuberance **31** on the upper edge of the bolt lath **12**.

The security lever **17** and the dogging lever **28** are loaded downwardly toward the positions shown by strip springs **32, 33** respectively.

The arrangement is such that, with the parts in the positions shown, the bolt cannot be pushed in because neither of the notches **25, 26** is in register with the toe **27** of the dogging lever **28** and consequently the latter cannot be rocked sufficiently to clear its abutment **30** from the path of the cam **31** on the bolt lath **12**. If, however, the correct servant key is used and turned in the bolt withdrawing direction, the member **19**, which is guided for rectilinear movement at right angles to the bolt movement by the pins **14, 22** engaged with the vertical slots **20, 21** respectively, is lifted directly by the appropriate key step and, in turn, lifts the security lever

17 by an amount such that the notch 25 registers with and receives the toe 27 of the dogging lever 28 when the latter is rocked by the tripping action of the protuberance 31 as the bolt is withdrawn by the continued turning of the key. The operation when using the master key is similar to that with the servant key except that the lift is sufficiently greater to cause the notch 26 to co-operate with or receive the toe 27 of the dogging lever 28 in order to permit bolt withdrawal.

In the remaining figures of the drawings, the same reference numbers, as used in FIG. 1, are employed to indicate like or analogous parts.

Referring now to the embodiment shown in FIG. 2, the key-actuated member 19 has its vertical slot 20 slidably engaged not only with the stump 14 but also with a fixed stump 34 vertically above it and the upper edge of the bolt lath 12, whilst said member 19 has a rear portion 35 with a part circular or radiussed upper edge which engages the under edge of a forwardly extending arm 36 on the security lever 17, the main portion or body of which is inclined so that its arcuate notched end edge is presented to a downwardly presented toe 27 of a dogging lever 28 with aligned arms. The rear end of the bolt lath 12 is slotted to clear the pivot stump 18 and the operation is generally similar to that described with reference to FIG. 1.

Referring to FIG. 3, the embodiment shown is similar to FIG. 1 except for the inverted arrangement of the dogging mechanism and the fact that the member 19, which is vertically guided as in FIG. 2, operates upon a rearwardly extending arm 36 on the security lever 17 so that the forward end of the latter moves down as the said arm 36 is raised by the key-actuated lifting member 19.

A more complicated embodiment is shown in FIG. 4 in which the security lever 17 is mounted on a pivot stump 18 below the bolt lath 12 and has a rearward arm 36 which is operated upon by the key-actuated lifting member 19. The said member 19 has its longitudinal slot 20 slidably engaged by stumps 37, 38 which guide it for rectilinear movement in a direction which is radial to the axis of key rotation in the keyhole 19 but is inclined upwardly and rearwardly from the vertical, whilst the talon 15, instead of being formed in the bolt lath 12, is formed in the lower end of a double-armed transfer lever 39 which is pivoted on the stump 37 and is arcuately slotted at 40 to clear the stump 38, the upper end of said key-actuated transfer lever 39 being engaged with a notch at 41 in the bolt lath 12.

In the embodiment illustrated in FIG. 5 the bolt lath 12 has a rectangular section stump 42 which engages the end pockets of a conventional H gating in the security lever 17 so as to retain it in either of its extreme positions except when the said lever 17 is lifted by the correct key so that the gating will allow the passage of the stump 42 from one end pocket to the other as the bolt is operated by the bolt step of the said key. The radiussed upper end of the member 19 makes an operative pivotal connection with a complementary bearing recess 23 in the under-edge of the security lever 17, and this pivotal connection combines with guide stump 14 to constrain or guide the member 19 to move in a line which is nearly radial to the rotational axis of the key in the keyhole 16, so that said member 19 when actuated by the key will rock only slightly.

The FIG. 6 embodiment is similar to FIG. 5 except that the arcuate forward edge of the security lever 17 is notched for co-operation with a dogging lever (not shown) and the pivotal connection between the security lever 17 and the key-actuated lifting member 19 is substantially vertically over the guide stump 14 and the keyhole 16 so that said member 19, though not positively restrained or guided for truly rectilinear movement will deviate or rock therefrom only very slightly when actuated by the key.

In the embodiment illustrated in FIG. 7 the bolt is guided for vertical movement and is operated through a bell-crank 42 by a horizontally disposed runner 43 having a lanket hole 44 slidably engaged with the stump 18 upon which the security lever 17 is pivoted. The key-operated lifting member 19 is guided for vertical movement between cheeks 45 afforded by opposite limbs of a U-shaped fence around the keyhole 16; the operative connection between the said member 19 and the security lever 17 is similar to that shown in FIG. 5, but the security lever 17, instead of being gated for co-operation with a bolt stump, has its arcuate forward edge notched for co-operation with a dogging lever 28 similar to that shown in FIG. 4 and operated by the co-operation of its abutment 30 with the protuberance 31 on the runner 43.

The FIG. 8 embodiment has its key-actuated lifting member 19 guided upon the stump 14 and between fixed vertical cheeks 45, and the operative bearing or connection between said member 19 and the security lever 17 is similar to that shown in FIG. 1. The dogging lever for co-operation with the notches 25, 26 in the security lever 17 is not shown.

In FIG. 9 the security lever 17 and the manner in which it is engaged by the key-actuated lifting member 19 is similar to that shown in FIG. 8, but the said member 19 is formed with a vertically slotted rearward extension the slot in which is slidably engaged with a fixed vertical guide cheek 45. Here again, the dogging lever for co-operation with the security lever notches 25, 26 is not shown.

Obviously any of the dogging lever arrangements shown in FIGS. 1, 3, 4 and 7 could be adopted for any of the embodiments illustrated in FIGS. 6, 8 and 9.

Having fully described my invention, what I claim and desire to secure by Letters Patent is:

1. A lock of the type referred to comprising a casing, a bolt slidably mounted in the casing and movable from a locked to an unlocked position, means including a plurality of security levers pivotally mounted in the casing normally positioned to prevent movement of the bolt from said locked to said unlocked position, and means for moving said levers to a position allowing movement of the bolt to the unlocked position comprising a plurality of key-operated lifting members, one for each lever, said members being mounted in the casing for substantially rectilinear movement therein and each of which when operated by a step of any particular key imparts the same lift to its associated lever irrespective of the direction in which the key is turned.

2. A lock as set forth in claim 1 wherein each security lever has a free bearing engagement with the associated key-operated lifting member.

3. A lock as set forth in claim 1 wherein each key-operated lifting member is provided with an upper partly circular portion engaging a complementary bearing recess formed in the lower edge of the associated security lever, each recess being provided with side clearances to accommodate angular movements of the levers relatively to said lifting members.

4. A lock as set forth in claim 1 wherein each key-operated lifting member is provided with a slot receiving a stump fixed in the casing for ensuring rectilinear movement of the member.

5. A lock as set forth in claim 1 wherein each key-operated lifting member is provided with a slot receiving a pair of spaced stumps fixed in the casing for ensuring rectilinear movement of the member.

6. A lock as set forth in claim 1 wherein each key-operated lifting member is guided for rectilinear movement by at least one guide cheek fixed in said casing.

7. A lock as set forth in claim 2 wherein each security lever is pivotally mounted at one end in said casing and said free bearing engagement between each lever and its associated key-operated lifting member is positioned be-

tween the pivoted end of the lever and the free end thereof.

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