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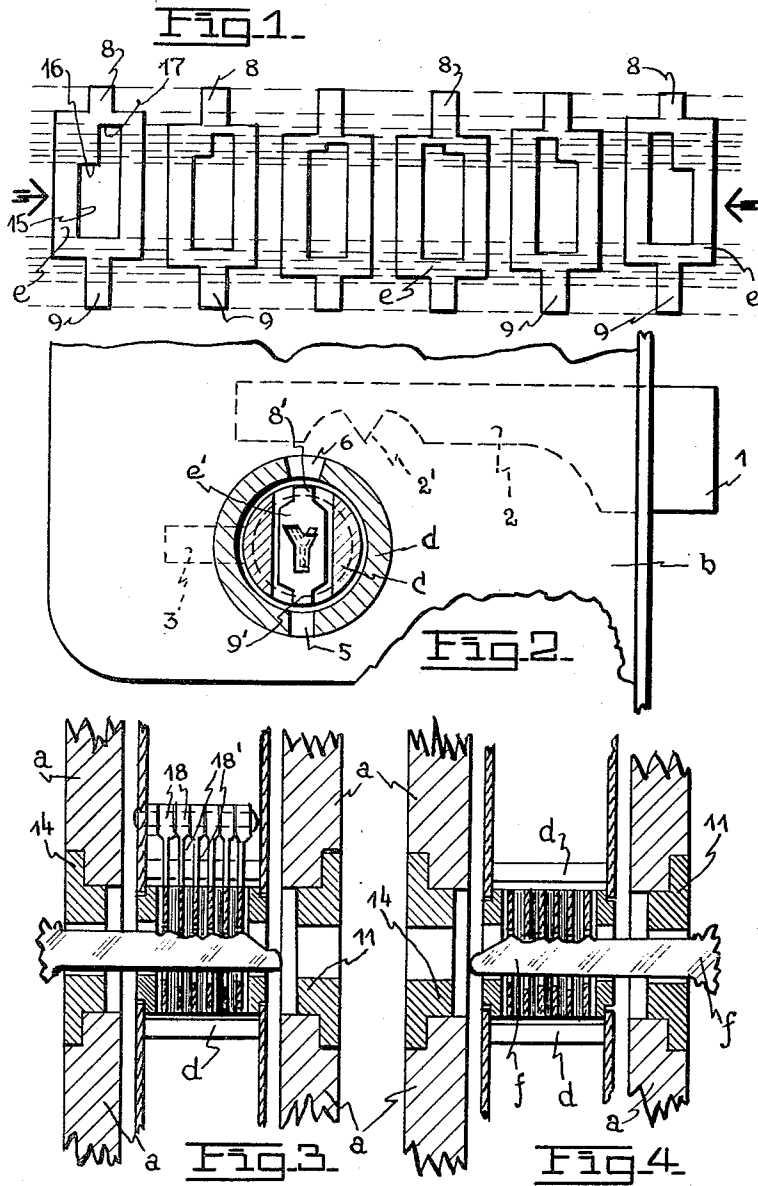
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2,690,665

CYLINDER LOCK

Filed Jan. 26, 1949

3 Sheets-Sheet 1



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FIG. 5.

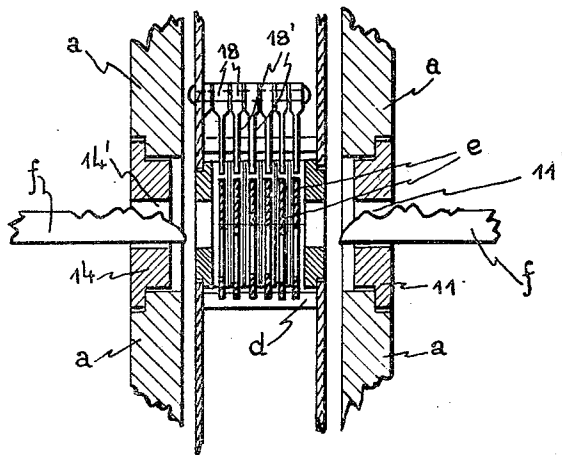
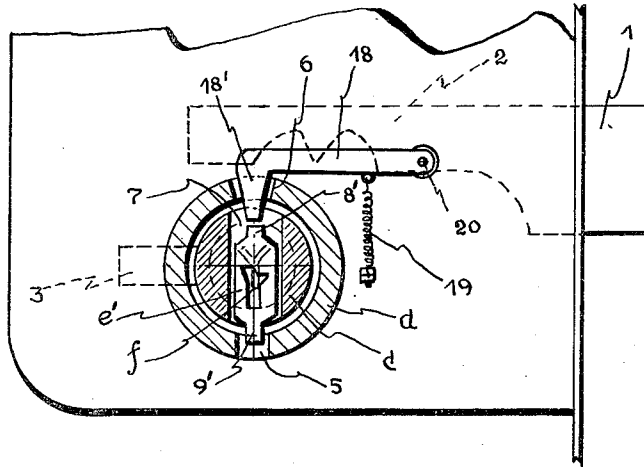


FIG. 6.

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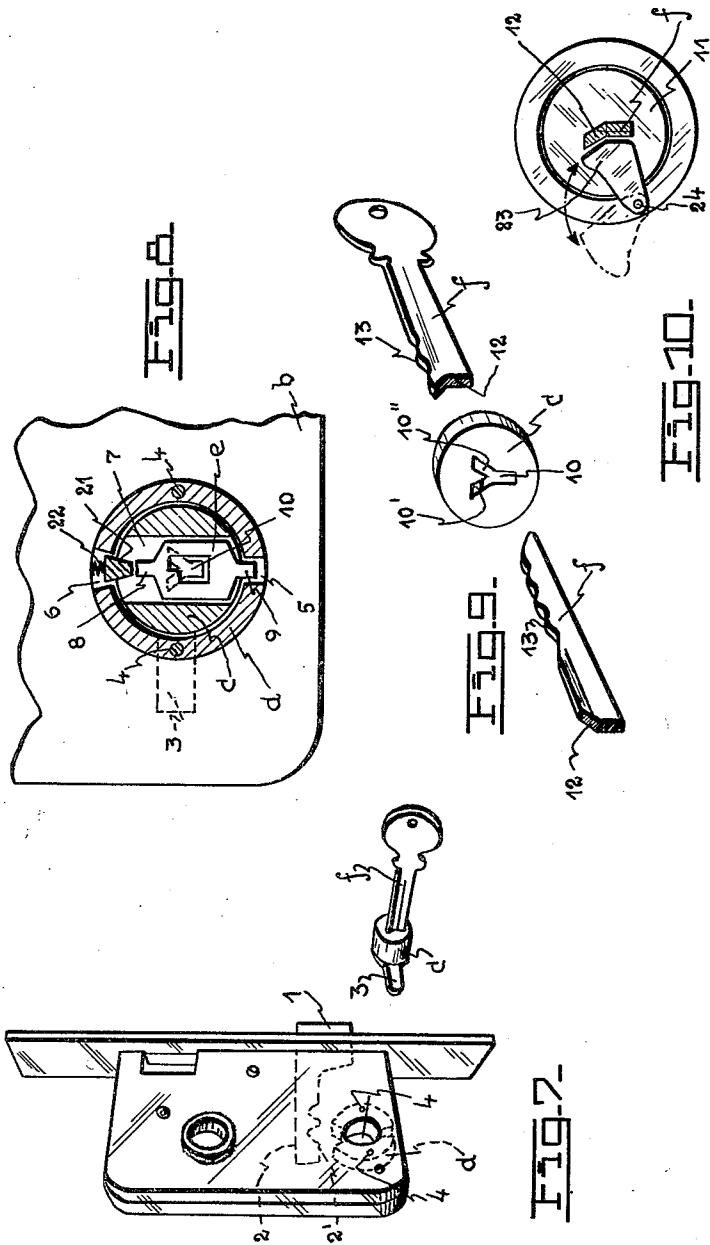
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CYLINDER LOCK

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2 Claims. (Cl. 70—364)

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This invention consists of a new safety lock and more particularly of a cylinder lock which displays several distinct advantages over the usual cylinder locks and is, therefore, of great importance wherever safety and inviolability are required.

Many new locks have been designed and produced in recent times in the constant quest for improved technique and greater inviolability, but in spite of the many ingenious types of devices and mechanisms proposed and manufactured, nothing has yet been able to displace the classic, so-called cylinder lock, consisting of a barrel and a cylinder carrying a set of tumblers of different lengths which only permit the opening of the lock when said tumblers are lined up with the inner surface of the barrel by the insertion of the key carrying the correctly shaped teeth, or lands.

The classic lock, however, does not offer sufficient safety and inviolability and has been studied by the underworld to such effect that it can no longer be used with confidence on such things as outside doors or safes etc., where other and far more expensive means are necessary to make robbery impossible.

Apart from all other considerations, however, such as size, weight etc., the usual and generally known cylinder lock can only be opened and closed by key on one side of the door or panel and when it is desirable to be able to lock or open said door or panel from both sides, two cylinders are requisite, united internally with the mechanism of the lock.

The problem which has been solved by the present invention consists of how to make a single cylinder with a single row of tumblers operable by means of the same key, no matter into which side of the lock said key is inserted.

The new device consists of a small cylinder carrying, apart from the ordinary opening for the key, a transverse opening in which the tumblers are located, disposed vertically with respect to the axis of the cylinder, said tumblers being of the type of flat plates, arranged in loose sliding contact with each other and carrying projections at one or both ends.

Whilst the projections at one end of the tumblers themselves actuate as locking plates by penetrating into the corresponding slot of the barrel, the opposite ends of the tumblers which may or may not have projections make contact with cooperating locking levers which penetrate the opening in the cylinder from another slot in the barrel diametrically opposite the afore-

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mentioned slot and thereby constitute the double lock.

One of the principal advantages of the new lock lies in the fact that the tumblers or segments can be made of thin metal plates and that these plates facilitate the use of a smaller key, or conversely, that a larger number of tumblers can be fitted into the space usually occupied by a smaller number of cylindrical tumblers, consequently increasing the number of combinations obtainable.

Each tumbler carries two guide stops, one of which serves to position the tumbler when the key is inserted in one direction and the other of which is to position the tumbler when the key is inserted in the opposite direction.

These guide stops are disposed side by side at one end of the opening of the said tumblers, so that the row of stops formed on one side of the said tumblers responds to the same key when inserted from the other side of the lock.

In order to arrive at this result, the key hole has the shape of the letter Y and the section of the key displays an obtuse angle which runs along the shank, corresponding to one arm and the leg of the letter Y.

In this way it will be readily seen that the stops in the openings of one side of the tumblers correspond to the key when inserted on one side of the lock and the stops on the other side of the tumblers correspond to the same key when inserted from the other side of the lock.

These two rows of stops are, therefore, exactly similar to each other, end for end of the lock, but in reverse, and have the same effect of movement to the same degree upon the tumblers, which ever way the key is inserted, thereby releasing or unlocking the cylinder from its engagement and allowing it to be turned by the key to operate the lock.

The whole operation of the lock can, therefore, by means of this small device, be performed in no matter what kind or type of lock, including the common door lock, as it is only necessary to make one round hole in both sides of the lock to enable the fitting of the cylinder between said sides.

Apart from the objects already mentioned, attention is called to the simplicity of this new device, the small number of parts, the light weight and consequent economic manufacture of the whole mechanism whilst achieving the highest perfection of combination cylinder locks.

Another object is the fact that this type of lock is peculiarly well adapted for mass production.

without any complicated parts whatever, and the cylinders can be cast or pressed according to the material used.

Yet another object of this invention is the fact that the parts of this new lock can be assembled with the greatest ease and only require putting together without the necessity for special fitting.

Another object of this invention is the substitution by one single cylinder lock for the double cylinder locks now in use wherever a door or the like has to be lockable by key from both sides.

Another object is the greater security obtained by the fact that the tumblers of this new device actually engage or lock the cylinder in two places instead of only in one, as in the ordinary lock of the type in present use, and the manner in which these protruding portions of the tumblers are protected by the main body of the lock, leaving only the key-holes exposed.

Another object is that of avoiding the possibility of the lock being violated by means of the well-known process of drilling a small hole through the line of tumblers, which, in the majority of cases, releases the said tumblers by rupture and allows the cylinder to be turned.

In this new lock, even if one line of locking elements were ruptured, the result would only be the release of a portion of such tumblers, which would fall or remain in locking position and effectively lock the cylinder in a way that no key could afterwards open.

Another object of this invention is the facility with which the cylinder can be changed when this is desirable, owing to change of tenant. No locksmith is required, as only a few screws have to be removed to open any ordinary lock and change the cylinder, substituting a new one with a different combination.

A further object is that the cylinder is held in position in the barrel, which is attached to one side plate of the lock, without requiring any other means of engagement, as the same lock plates constitute the necessary bearings in which the cylinder can rotate.

Other objects will become apparent in the further explanation of the drawings, describing the invention, which show some of the preferred embodiments of the device and will be appreciated by those skilled in the art.

Fig. 1 shows a set of tumblers corresponding to a combination allowing for the insertion of the key from both sides of the lock for effective locking and unlocking, as it is evident that each tumbler carries two stops, side by side at the upper portion of the key opening, the left stop on any one tumbler corresponding to the right stop on the tumbler of the same number when counting from the opposite side of the lock.

Fig. 2 is a vertical cross-section of a cylinder in a portion of a door-lock, showing the position of the tumblers of modified shape when the key has been fitted into the lock from the opposite side to that in sight.

Fig. 3 is a vertical longitudinal section of a cylinder showing how the tumblers release the cylinder on the insertion of the key at one side.

Fig. 4 is a view of the cylinder and tumblers when the key is inserted from the other side. (In this view the upper locking levers have been omitted.)

Fig. 5 is a section of a cylinder in a lock of Fig. 2 shown in locked position, or without the key, in which can be seen the two rows of projections and the ends of the locking levers, bearing on

the upper projections of the tumblers and the lower row of projections locked in position.

Fig. 6 is a longitudinal section of a cylinder.

Fig. 7 is a perspective view showing the simplicity with which a cylinder can be removed or replaced in an ordinary lock.

Fig. 8 shows a section of another embodiment having a spring biased locking bar.

Fig. 9 is a perspective view of a key-hole and cylinder showing the method of using the key from either side.

Fig. 10 is a view of a key-guide element showing one method of providing a sliding plate that engages the key and thereby prevents the rotation of the cylinder.

In the drawings it will be seen that *a* is the moving leaf of a door which can be any kind of door capable of being locked or unlocked from either side and which carries the lock *b*, which can be of the ordinary kind of mortice lock or of a special kind, provided it has a tongue *1* integral with a slide *2* which has recesses *2'* to receive the engaging lever *3* of the cylinder *c*.

The cylinder *c* which is the principal portion of the present invention on account of its construction and the locking elements it contains, is carried in the barrel *d* which latter is fixed to the lock casing by means of the screws *4*.

The barrel *d* has openings *5* and *6* diametrically opposite each other in which the locking devices engage.

The cylinder *c* has a transverse opening *7* in which the tumblers *e* are positioned and these are formed of plain, elongated, flat metal plates which terminate in projections *8* and *9*.

The cylinder *c* has key openings *10* at both ends, which key-holes are shaped exactly like the letter Y, carrying two short shanks *10'* and *10''*, forming two independent lines of entry for the key *f* from the two respective ends of the lock, the key being slightly dihedral in shape, due to which structure, when introduced into one end of the cylinder *c* by the corresponding key-hole *11'* the shank *12* of the key carrying the teeth *13* follows the direction corresponding to the shank *10'* and conversely, when the key is introduced at key-hole *14'* the shank *12* carrying the teeth *13* follows the direction corresponding to the shank *10''*.

The key guides *11* and *14* which are shown embedded in the door on both sides of the lock, carry the same Y-shaped key-holes *11'* and *14'*, which correspond to the dihedral shape of the key *f*.

The tumblers *e* have guide-stops *16* and *17* in the upper part of a common opening *15* and the guide-stop *16* corresponds to the line followed by *10'*, whilst *17* corresponds to the line followed by *10''* of the key-hole *10* according to whether the key is inserted from one side or the other.

The dimensions of the guide-stops *16* on the different tumblers depend upon the particular combination of the key *f* when introduced at *11'* and the dimensions of the guide-stops *17* are the same as those of *16* but in reverse order, as these (*17*) correspond to the combination of the key *f* when introduced at *14'* along key-way *10''*.

The similarity of dimensions corresponds strictly to the order of position, i. e. viewed from the opening *11'* the guide-stop *16* of the first tumbler will be identical in dimension with *17* of the last tumbler, whilst *16* of the second tumbler will be identical with *17* of the penultimate tumbler and so forth, all the guide stops *16* having their respective equivalent *17* but in reverse position, thereby causing the key to actuate all six

of the tumblers into identical positions, whether inserted from one end or from the other end of the lock.

On introducing the key *f* at the opening 11', the tumblers will arrange themselves in identical positions as when the key is introduced at the opening 14', i. e. from whichever side of the door the key is introduced, the tumblers will become aligned at their top and bottom projections 8 and 9 in such a manner that the outermost edges of the said projections are level with the outer circumferential surface of the cylinder *c*, so that, on turning the key, the cylinder will be free to move and will also turn and the lever 3, will effect the displacement of the slide-arm 2 and move the tongue 1, thereby locking or unlocking the door.

From the above description it will be readily understood that only the correct key will lock or unlock the new cylinder lock from either side of same, and that, any but the right key will be unable to free the tumblers from engagement and will fail to unlock the cylinder.

When locked, the tumblers *e* are held in their position of engagement with the barrel by means of springs 19 and levers 18. These levers 18 are pivoted on a stud 20 in one embodiment of this invention, and their free ends have heads 18' which press upon the upper projections 8 of the respective tumblers *e*, depressing same so that the lower extremities 9 of the tumblers actually engage the slotted opening 5 in the barrel, whilst the lever-heads 18' of the respective levers 18 penetrate the upper slot 7 in the cylinder *c* thereby providing a second locking action and preventing all rotary movement of the cylinder *c* which is already locked by the lower ends 9 of the tumblers *e*.

When the corresponding key *f* is inserted in the lock, these levers are raised by the tumblers, which have been lifted by the respective key teeth and the line of contact between the tumblers and the levers corresponds exactly to the circumference of the cylinder *c*, which is then free to turn. The tumblers *e'* shown in Figs. 2 and 5 are of slightly modified shape and terminate in projections 8' and 9'.

In another embodiment of this invention (Fig. 8) the set of levers corresponding in number to the number of tumblers *e* is replaced by a single spring operated bar 21 above the said tumblers *e* and running longitudinally along the whole cylinder *c*.

This bar is pressed down on the projections 8 of the tumblers by a single spring 22 and engages the slot in the cylinder in the same way as the extremities of the levers 18' in the previous embodiment.

As can be seen in Figs. 3 and 7 the whole of the mechanism of the lock is protected by the side plates of the door lock, which are again protected and covered by the sides *a* of the door leaf and only the key guides 11 and 14 of the lock are exposed.

The actual assembly of a lock of this new type is so simple that no specially trained fitters are necessary. Two screws hold the barrel *d* to the casing of the lock, which is all the assembly requires.

Operation

The tumblers *e* being pressed by the common spring 22 or the individual springs 19 according to which embodiment is used, occupy individually different locking positions and therefore establish different locking engagements not only as

regards the penetration of the extremities of the tumblers themselves into the slot 5, but also as regards the partial entry of the bar 21 into the said slot 7 in the embodiment of Fig. 8.

When a key which is not the right key for the lock is inserted, the teeth will not correspond to the stops or guides cut in the respective tumblers and engagement will persist between the cylinder and the barrel until the correct key is inserted in the lock.

When the correct key is inserted, no matter from which side of the lock, the teeth act as wedges against the edges of the corresponding tumblers where the respective guide-stops regulate the exact amount of movement of each tumbler against the retaining tendency of the spring, and each tumbler is moved into the unlocked or free position at the instant that the key is fully inserted and reaches the end of its entering movement.

The cylinder, thus freed, can be turned in either direction and the fixed lever 3 attached to the cylinder then operates the tongue 1 of the lock by entering and engaging the recesses 2' in the sliding arm 2 which is integral with the tongue 1, either for locking or unlocking the door, as the case may be.

Additional security against the opening of a door fitted with this lock can be obtained by leaving the key in the lock after locking the door and engaging the key in the lock by means of a swinging clip 23 pivoted on the pin 24 which holds the key and prevents the insertion of another key from the opposite side of the door.

No doubt many embodiments of this invention can be made in practice, both as regards the construction and in the form or modifications of the cylinder lock herein described, but without altering the fundamental principle herein described and clearly set forth in the following claims.

Having duly and particularly described and explained the nature of the present invention and the form in which the same is applied in practice, I claim:

1. A key-operated lock including a hollow barrel having oppositely positioned slots disposed longitudinally thereof, a cylinder rotatably mounted within said barrel, said cylinder having a key-way extending longitudinally therethrough, a plurality of flat tumblers positioned in the key-way and each is provided with terminal portions, one of the terminal portions of each tumbler normally projecting into one of the said slots in said barrel, said cylinder having transverse slots therein, which slots support said tumblers which are adapted to slide therein, each tumbler being provided with two separate and adjacent key-land engaging surfaces which lie side by side in the tumbler, thereby forming two separate and distinct parallel rows of key-land engaging guide ways with identically varying sets of key-land engaging surfaces, the order of variation of said surfaces in one row being the reverse of the order of variation in the other row, thereby forming identical key-land engaging guideways for the respective entry of the key at either end of the cylinder, said tumblers being biased by a spring actuating upon said tumblers by means of a bar common to all the said tumblers, said bar being disposed in the opposite slot of said barrel to that in which the end portions of said tumblers normally project, said bar acting as an additional locking member when said tumblers are in locking position.

2. A key-operated lock operable from either end by the same key, including a fixed barrel, a cylinder rotatably mounted therein and having a plurality of slidable tumblers of substantially rectangular shape carried therein, said cylinder having slots to receive the tumblers in sliding arrangement, each tumbler having a substantially rectangular central slot whose top is provided with two adjacent surfaces at different distances from the bottom of said slot through 10 said tumblers, thereby providing key land engaging surfaces, a single bar which engages all the tumblers, and a spring which engages the bar to bias all of said tumblers in one direction.

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