Jan. 3, 1939. A. KITTLER 2,142,610

CYLINDER LOCK

Filed June 21, 1935 2 Sheets-Sheet 1

Fig. 1.

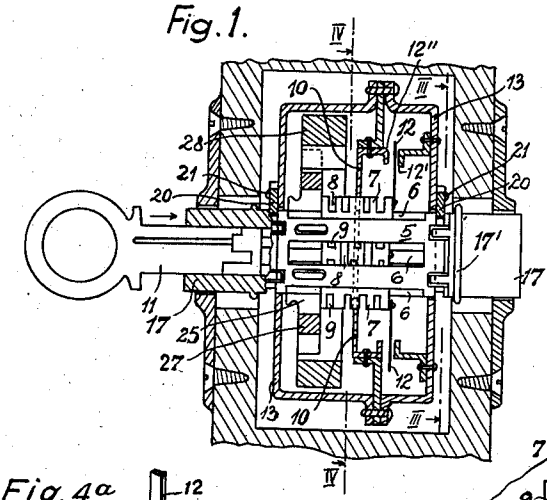



Fig. 2.

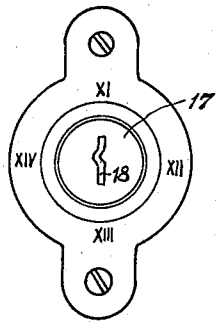



Fig. 4a

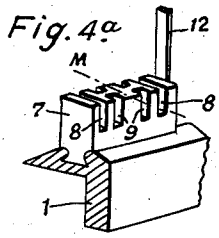



Fig. 4.

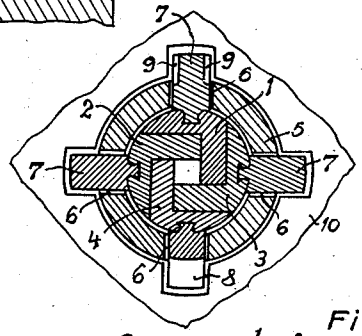
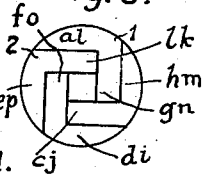



Fig. 5.



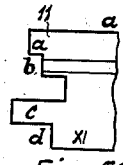




Fig. 5a.

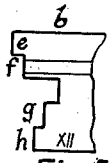



Fig. 5b.

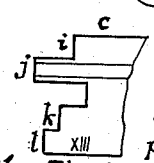



Fig. 5c.




Fig. 5d.

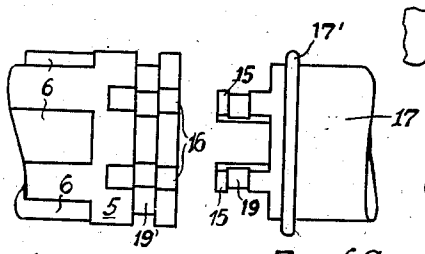



Fig. 6.

Fig. 6a.

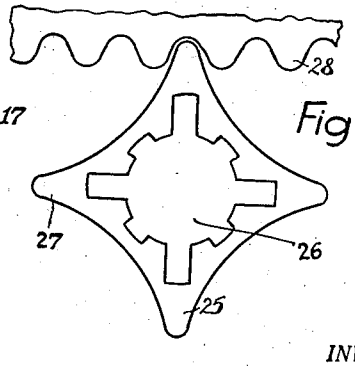



Fig. 7.

INVENTOR.

BY Antonin Kittler

Ben J. Chromy

ATTORNEYS.

Jan. 3, 1939. A. KITTLER 2,142,610

CYLINDER LOCK

Filed June 21, 1935 2 Sheets-Sheet 2

Fig. 8.

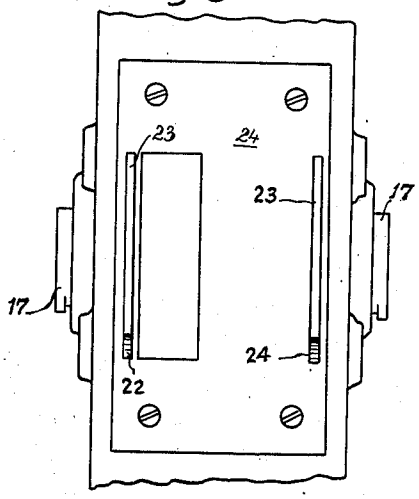



Fig. 3.

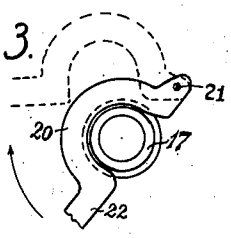



Fig. 11.

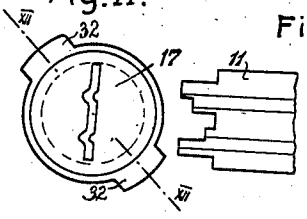



Fig. 11a.

Fig. 9.

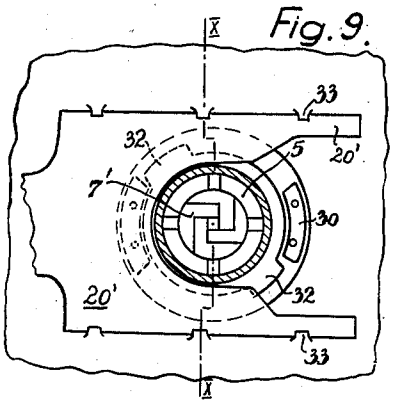



Fig. 10.

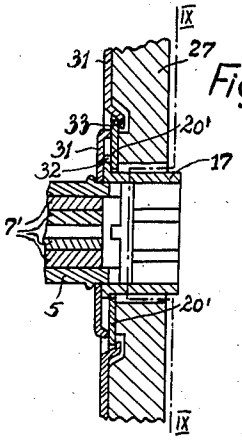



Fig. 13a

Fig. 13.

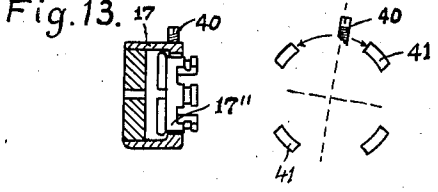
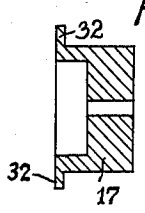



Fig. 12.




INVENTOR.
Antonin Kittler
BY
Ben J. Chromy
ATTORNEYS.

Patented Jan. 3, 1939 2,142,610

# UNITED STATES PATENT OFFICE

2,142,610

## CYLINDER LOCK

Antonín Kittler, Prague, Czechoslovakia

Application June 21, 1935, Serial No. 27,807
In Czechoslovakia September 25, 1934

4 Claims. (Cl. 70—363)

The subject of the invention is a tumbler lock of the kind in which for the purpose of opening the lock a number of tumblers are so displaced in the longitudinal direction, that is, in the direction of the longitudinal axis of the lock, by means of a suitable key, that transverse cut out portions of these tumblers become alined side by side and enable the segments of the guard plate to pass through upon simultaneous rotation of the lock casing about its axis.

According to the invention, these slidable tumblers are so arranged relatively to each other that by their rotation as a whole, the lock can be opened each time with a different key, in the present instance by means of four keys, and in accordance with one constructional example always with one of these keys until a change is desired, or in accordance with a second constructional example, with all four keys successively, in four locking positions of the bolt.

In the drawings these two constructional examples are shown diagrammatically together with appertaining details.

Fig. 1 is a longitudinal axial section through the lock according to the first constructional example with the middle tumbler parts seen from the side.

Fig. 2 is an end view of the outer lock plate (for illustrating the various positions on opening the lock),

Fig. 3 shows a detail of the device for locking the tumbler casing against displacement and rotation, in section on plane III—III of Fig. 1,

Fig. 4 is an enlarged diagrammatical cross section of the tumbler casing and the tumblers according to IV—IV of Fig. 1,

Fig. 4[a] shows a detail,

Figs. 5 to 5[d] show the profiles of the various keys XI, XII, XIII, XIV and indications of the position of their various teeth *a*—*p* upon the tumblers,

Figs. 6 and 6[a] are a side view of one of the tumbler casing ends and one of the opposite inner cylinder ends,

Fig. 7 is a further detail of these tumbler casing parts,

Fig. 8 is an end view of the inserted lock,

Fig. 9 is a partial cross section on IX—IX of Fig. 10 and partial view of the arrangement of the lock according to the second constructional example for opening the lock by means of several keys successively,

Fig. 10 is a corresponding section on X—X of Fig. 9,

Figs. 11 and 11[a] are corresponding details,

Fig. 12 shows a section through the cylinder head 17 on the line XII—XII of Fig. 11,

Figs. 13 and 13[a] show a further modification.

In the constructional example according to Figs. 1 to 8, the tumbler lock according to the invention consists of four tumblers 1, 2, 3, 4 having a rectangular broken cross section profile and arranged slidably upon each other, so that they embrace each other partly, when inserted as a whole in the tumbler casing 5 which latter is provided with four cut-outs 6 (Figs. 1, 4 and 6) through which the ribs 7 of these tumblers project, which ribs possess radial transverse slots of two kinds, namely, recesses 8 which extend right through and blind slots 9. In the illustrated position of the tumblers in Fig. 1, the slots 8 of these tumblers which extend entirely through the ribs 7 are so displaced relatively to each other from a common cross plane of the known per se guard plate 10, that this plate with its knife edge segments can be in engagement only with the segmental intervals between the ribs 7. As soon, however, as these tumblers by the use of a suitable key 11 are, in a usual manner, displaced or set into the opening position, the slots 8 which extend entirely through ribs 7 come exactly into the plane of the knife edge segments of the plate 10 and the inner lock, namely the tumblers and the tumbler casing 5, are freely turnable. In order to prevent the slots 8 from being ascertained by feeling with tools other than the proper keys, there are provided the abovementioned blind slots 9 on both sides of the ribs 7. The slots 8 are arranged upon the individual ribs in differing order with regard to each other but symmetrically as regards the centre of the cylinder 5. The tumblers 1, 2, 3 and 4, on withdrawal of the key, are pressed by corresponding band springs 12 into their initial or locking position; these band springs are arranged radially upon the tumblers and are engageable with corresponding parts of the lock structure, at their free ends (Fig. 1).

The tumbler casing 5 with the tumblers is mounted freely rotatable in the two central openings of the side walls of the lock casing 13 (Fig. 1) from which both ends of the tumbler casing 5 project. Each of these ends of the tumbler casing 5 is provided with four symmetrically arranged longitudinal recesses 16 which engage corresponding longitudinal tooth-like projections 15, upon the inner end of each of the two cylinder heads 17 provided with a keyhole 18 (Figs. 1, 2 and 6). These two interengaging parts are moreover provided with peripheral grooves 19' and 19, respectively. With these grooves engages, according to the invention, at each cylinder head 17, a locking fork 20, which is rotatable about a sta-

tionary pivot 21 (Figs. 1 and 3), and which is swingable into the position shown by dotted lines in Fig. 3, so that it is out of engagement with the peripheral grooves 19, 19'. The forks 20 are, for this purpose, provided each with a flat grip 22 (Figs. 3 and 8) which grips engage in slots 23 in the face plate 24 of the lock (Fig. 8).

The tumbler casing 5 is moreover provided with a toothed pinion 25 (Fig. 7) which is provided with a cut-out 26 which permits of the longitudinal displacement of the tumblers therethrough and which pinion is provided with teeth 27 which engage the toothed rod extension 28 of the bolt proper.

The tumbler casing 5 is so adjusted with the tumblers with regard to the two cylinder heads 17 that the lock can be opened only with one of the four keys, for instance, with the key XI; by means of the remaining keys, the tumblers cannot be moved into the unlocked position. If the owner wishes to transfer the function of this key to another key, for instance, because someone unauthorized has obtained a duplicate of this key, it suffices to release both cylinder heads by swinging outwards the forks 20 and turning the cylinder heads themselves through 90°, 180° or 270°, whereby the keyhole may be set in alinement with any one of the other three rows of tumbler ribs 7 for a totally different arrangement of the effective cut-outs 8 of the tumblers 1, 2, 3 and 4 in accordance with one of the profiles of the remaining keys XII, XIII and XIV (Fig. 5). The sliding out of the cylinder heads is limited by beaded rings 17' provided thereon. These rings are simple circular ribs formed on the heads.

The above described construction of the tumbler lock according to Figs. 1 to 8 can be so modified that the lock can be opened only by using the four keys successively; this arrangement may be used with advantage for locks of safes and like locks, which are intended to be opened only in the presence of say four persons, each of whom has one of the keys.

This modified arrangement is shown in detail in Figs. 9 to 12. This arrangement is identical with that previously described as far as the grouping of the four effective tumblers 1, 2, 3 and 4 in the inner lock casing 5 is concerned, but the two cylinder heads 17'' are free of the tumbler casing 5 and may be rotated forwards and backwards relatively to the tumbler casing 5 and only through 90°; a further turning by means of the same key is prevented by stationary stops 30 upon the front cover wall 31 of the lock behind the usual wooden layer of the door wing 27 or the like and projections 32 upon the outer edge of either cylinder head 17''. After this turning of the tumbler casing and withdrawal of the lock bolt through the first locking length, the first key must be withdrawn, the tumbler casing remaining turned but the tumblers being pressed into locking position by the springs 12 as in the construction of Fig. 1 necessitating the further, for instance three more operations of the tumblers and turning of the toothed pinion 25 and tumbler casing to retract the bolt through three more locking lengths, the passage of the knife arms 10 through the cut outs 8 of the ribs of the tumblers 1, 2, 3 and 4 being locked after each operation. After withdrawal of the key (XI) the corresponding cylinder heads 17'' are turned back by suitable springs or by hand by means of the key. In the turned position of the tumblers it is, for further turning of the tumblers through 90°, necessary to use the key XII, whereupon the above described operation is repeated until the employment of the next following keys XIII and XIV. On using the last key XIV the bolt is slid back from the locking positions through the last portion of its locking length, and the lock is opened.

The connection of the two cylinder heads 17'' with the tumbler casing 5 is, in this case too, effected by means of suitable forks 20' (Figs. 9 and 10) which in this constructional example, are guided longitudinally displaceable in projections 33 of the front wall 31 of the lock.

In a further modified construction according to Fig. 13 there are provided in place of the stops 30 and projections 32 of Figs. 9 and 10, one or more oppositely located small screws or pins 40 upon the outer edge of either of the cylinder heads 17'', 17'' and symmetrically arranged limiting stops 41, the position of which corresponds for instance to the four quarters or turning positions of these cylinder heads.

What I claim:

1. A tumbler lock having a plurality of tumblers of angular cross-section arranged symmetrically about a common axis, selected ones of said tumblers embracing another to form a substantially cylindrical unit including all of said tumblers, ribs attached to each of said tumblers and projecting radially from said cylindrical unit, said ribs having cut-out portions, a casing for said tumblers, said casing having apertures for receiving said ribs, a guard plate with a plurality of knife edge segments corresponding to said ribs, said knife edge segments being adapted to pass through said rib cut-out portions when said tumblers are engaged at the ends thereof by a substantially flat key and shifted along the axis of symmetry thereof with respect to each other to permit opening the lock.

2. A tumbler lock having a plurality of tumblers of angular cross-section arranged symmetrically about a common axis, selected ones of said tumblers embracing another to form a substantially cylindrical unit including all of said tumblers, ribs attached to each of said tumblers and projecting radially from said cylindrical unit, said ribs having cut-out portions, a casing for said tumblers, said casing having apertures for receiving said ribs, a pair of heads adapted to be positioned on opposite ends of said tumbler casing, means for holding said heads in place on said casing, and means for releasing said last-mentioned means, a guard plate with a plurality of knife edge segments corresponding to said ribs, said knife edge segments being adapted to pass through said rib cut-out portions when said tumblers are engaged at the ends thereof by a substantially flat key and shifted along the axis of symmetry thereof with respect to each other to permit opening the lock.

3. A tumbler lock having a plurality of tumblers of angular cross-section arranged symmetrically about a common axis, selected ones of said tumblers embracing another to form a substantially cylindrical unit including all of said tumblers, ribs attached to each of said tumblers and projecting radially from said cylindrical unit, said ribs having cut-out portions, a casing for said tumblers, said casing having apertures for receiving ribs, a pair of heads adapted to be positioned on opposite ends of said tumbler casing, means for holding said heads in place on said casing, and means for releasing said last-mentioned means, a guard plate with a plurality of knife edge seg-

ments corresponding to said ribs, said knife edge segments corresponding to said ribs, said knife edge segments being adapted to pass through said rib cut-out portions when said tumblers are shifted with respect to each other along the axis of symmetry thereof to permit opening the lock, said heads having a substantially flat key-receiving hole formed therein such that when one of said heads is rotated through a predetermined angle or angles with respect to said tumblers and said casing a different key is required to open the lock.

4. A tumbler lock having a plurality of tumblers of L-shaped cross-section arranged symmetrically about a common longitudinal axis, selected ones of said tumblers embracing another to form a substantially cylindrical unit including all of said tumblers, slotted means attached to exposed surfaces of said tumblers, a casing for said tumblers, said casing having longitudinally disposed openings formed therein through which said slotted means are arranged to protrude, key receiving heads adjustably attached to the ends of said casing for permitting key means to engage the ends of said tumblers for shifting said selected ones of said tumblers and the corresponding slotted means into predetermined positions with respect to each other, and means for engaging said slotted means to prevent rotation of said tumblers and said casing unless said slotted means are properly positioned longitudinally with respect to each other by said key means.

ANTONÍN KITTLER.