C. RENAUX.

SAFETY DEVICE FOR LOCKS.

APPLICATION FILED MAR. 25, 1918.

1,364,452. Patented Jan. 4, 1921.

Fig. 1.

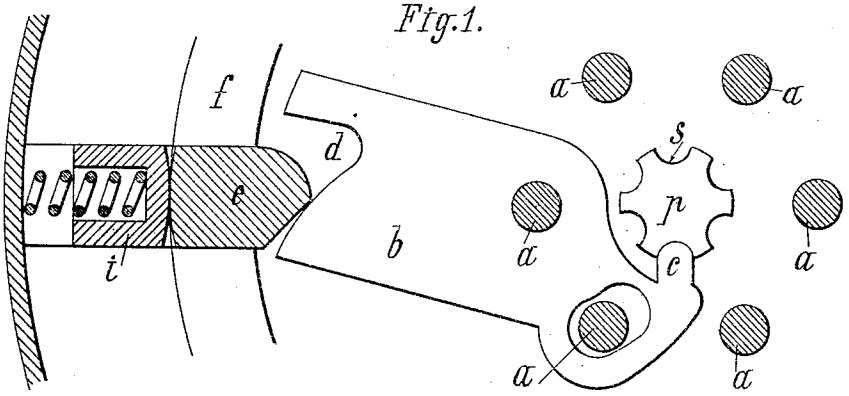


Fig. 3.

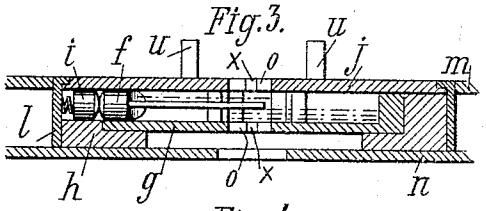


Fig. 2.

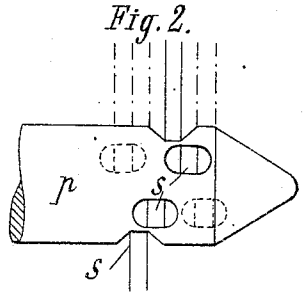


Fig. 4.

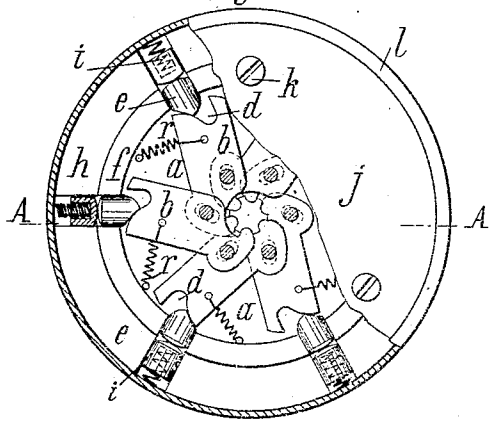


Fig. 5.

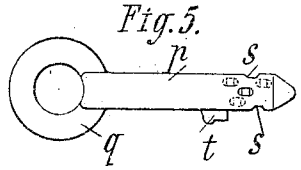


Fig. 6.

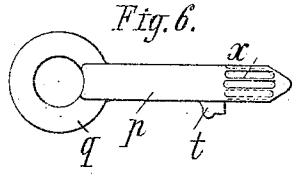


Fig. 7 

Fig. 8.

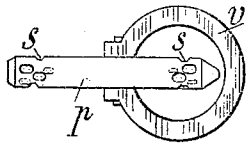
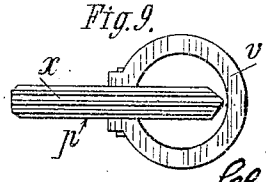


Fig. 9.



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UNITED STATES PATENT OFFICE.

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SAFETY DEVICE FOR LOCKS.

1,364,452. Specification of Letters Patent. Patented Jan. 4, 1921.

Application filed March 25, 1918. Serial No. 224,551.

To all whom it may concern:

Be it known that I, CHARLES RENAUX, a citizen of the Republic of France, residing at 33 Rue du Repos, Paris, in the Republic of France, have invented certain new and useful Improvements in Safety Devices for Locks, of which the following is a specification.

The present invention relates to a safety device in which use is made, as intermediate members, of oscillating tumblers grouped by juxtaposition on different pivots, in order to place, by means of a key provided with notches or longitudinal grooves, spring plugs or other locking members in their respective positions, corresponding to the opening of the lock to which the device is applied.

The particular arrangement of juxtaposed tumblers which are displaced with respect to one another on different axes, enables permutations to be realized in the longitudinal direction of the key and along as many generating lines of the latter as the arrangement comprises tumblers, from which there results a very great multiplication of the said permutations.

Moreover this device enables anyone, after the loss of a key, to modify for himself the lock corresponding to this key, by changing the permutation of the figures of the combination, at the same time retaining the latter, this modification being effected merely by changing the order of the tumblers.

Furthermore this device enables all desired master-key effects to be realized for all the locks of a specified combination. It also enables the opening of the lock to be effected by acting on the safety device that it comprises, either from the inside or from the outside.

It may also be constructed of the smallest thickness, which enables it to be adapted to all locks, even those of the most limited dimensions.

One constructional form of this safety device is illustrated by way of example in the accompanying drawing, in which:—

Figure 1 shows on an enlarged scale one of the tumblers of the device, and the corresponding members with which it combines.

Fig. 2 shows diagrammatically an outside view of the extremity of a key designed to actuate the tumblers of the device.

Fig. 3 is a cross section on A—A of Fig. 4, which is a front view, with a part removed, of a perforated lock to which the device, comprising by way of example six tumblers is fitted.

Fig. 5 shows a longitudinal elevation of a simple key enabling the device to be opened from one side only.

Fig. 6 is a longitudinal elevation and Fig. 7 a cross section of a simple master key enabling all the locks of the same combination to be opened, but only from one side, the outside for instance.

Fig. 8 is a longitudinal elevation of a double key enabling the safety device to be opened from the inside as well as from the outside.

Fig. 9 is a similar view showing a double master key enabling all the locks of one combination to be opened from both sides, that is to say, from the outside as well as the inside.

As shown in Figs. 1 and 4, the invention consists essentially in the arrangement on a series of pivots a, preferably arranged around the circumference of a circle, of a corresponding number of tumblers b, capable of oscillating about their respective pivots a, and each provided with a projection c. Springs r tend to bring the tumblers b back to their initial positions. Each tumbler b is provided, at the extremity of the short arm of the lever that it forms, with a projection e of definite length, while the extremity of its longer arm comprises a notch with a ramp d against which there bears a block e sliding radially in a cavity in the flange f of the barrel g, upon which the tumblers b are mounted.

The barrel g revolves in a rim h in which cavities are formed enabling a number of small spring plugs i corresponding to the number of blocks e and of tumblers b, to move radially and to constitute the locking members preventing the barrel from turning.

A disk j, fixed by means of screws k to the barrel g, keeps the tumblers b in their respective places. The peripheral flange of this disk can rotate under the corresponding flange of a hoop l forming the periphery of the box in which the device as a whole is located. The said hoop l is itself fixed in any suitable manner between the two walls m, n of the lock to which the said device is applied.

The bottom of the barrel g and also the

disk *j*, are pierced at the center with holes *o*, *o*, through which is inserted the key that is to turn the barrel *g* and to work the safety device.

The key *p* comprises, at its extremity that enters the barrel *g*, a number of notches *s* corresponding to that of the tumblers *b*, and the arrangement of which, as well as the dimensions, being infinitely variable, enable the desired conditions of safety to be realized. The stem of the said key *p* possesses a key-bit *t* or two diametrically opposite key-bits, destined to engage in notches *x* formed in the barrel *g* and its disk *j*, in order to enable the latter to be turned when the key is turned.

The large-scale diagram of Figs. 1 and 2 show the relative positions respectively taken up by a tumbler *b*, a block *e* and a plug *i* when the key *p* is inserted in the barrel *g*. This position depends solely on the greater or smaller depth given to the notch *s* corresponding to the tumbler *b* with which it combines.

While at rest, that is to say when the key *p* has left the barrel *g*, the spring *r* pulls over the tumbler *b* in such a manner that the block *e*, being pushed by the plug *i*, completely enters the notch *d* of the tumbler *b*, while the plug *i* itself engages, following the block *e*, in the flange *f* of the barrel *g* and prevents it from turning.

When the key *p* engages in the central hole *o* of the barrel, its conical extremity pushes away radially the projections *c* of the tumblers *b* which oscillate about their respective pivots *a* and allow of the engagement of the key *p* to the bottom. The springs *r* then act on the tumblers *b*, concurrently with the spring plugs *i*, so as to enable these tumblers to oscillate in the opposite direction and to engage their respective projections *c* in the corresponding notches *s* in the key *p*. The amplitude of the movement of oscillation which is then impressed on each tumbler *b* depends on the depth of the notch *s* opposite to which it is located, and which corresponds to one of the figures of the combination.

The difference existing in the movement of oscillation effected by each tumbler *b* in one direction when the key *p* is pushed in, and its return in the opposite direction under the action of its spring *r*, gives the correct value of the travel that the tumbler must effect in order to reach the unlocking position.

To transmit the rotary movement of the barrel *g*, to the bolt of the lock or other mechanism to which the safety device is applied, the disk *j* may comprise two pins *u*, *u* designed to engage in this bolt or mechanism.

When the proper key is inserted in the safety device and turned, the pins *u*, *u* act on the bolt of the lock so as to effect the displacement thereof and consequently the opening or closing of the said lock.

It is to be observed that in consequence of the particular arrangement of the tumblers *b* in a circle around the center of the barrel *g*, a single key will only be able to work this barrel on being inserted from one side only. It will therefore be necessary to possess two single keys to permit of the opening of the device, one from the outer side and the other from the inner side.

With a view to distinguishing the two keys from one another they may be provided with rings of different conformations, or the acting extremity of one may terminate in a point, for example, and of the other in a rounded or square part (Fig. 9). The two keys may also be united into one by arranging the notches *s* symmetrically at each of the extremities of the same shank *p*, and joining the latter by the middle of its length between the branches of a suspension or clapper ring *v*, as shown in Fig. 8.

This device lends itself easily to the establishment of a master key enabling all the locks of the same series to be opened.

In point of fact in this device the permutations of the tumblers are effected along generating lines of the shank of the key. Under these circumstances all that is necessary is to establish in this key grooves *x'* of a depth determined by that of the engagement of the projection *c* of the corresponding tumbler, in order to enable the key to unlock the stud that actuates this tumbler, whatever position the latter may occupy along the generating line of the key.

Fig. 6 shows a single master key, that is to say, a master key opening all the locks of the same combination from the inside only, for example.

Fig. 9 shows a double or return master key, that is to say, a master key opening all the locks of the same combination from the outside as well as the inside, whatever may be the permutations of the tumblers of this combination.

This device enables safety pipes to be arranged in the most limited dimensions.

Moreover in this device the key is of the simplest, and does not possess any hole liable to become stopped up or fouled.

When made of hardened steel the working parts are not subject to wear.

The machining of the notches is effected by milling or punching with adjusting stops enabling all the desired permutations to be obtained, the combinations being realized by varying the positions and the depths of the notches *s*.

The number of possible combinations or arrangements, a function of the number of tumblers and of the number of positions that each tumbler can occupy with respect

to the key (these positions being defined by the depths of the notches s formed in the key), is given by the usual algebraical formulæ of combinatorial analysis.

The arrangements described above are merely given by way of example. The forms, dimensions, constructional details and applications may be varied without going outside the characteristics of the invention.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a safety device for locks a rotatable barrel having a key hole therein, means for connecting said barrel to the bolt of a lock, a stationary member surrounding said barrel, said barrel and said surrounding member having alined openings, plugs within the openings in said stationary member, yielding means urging said plugs into the openings within said barrel and a plurality of oscillatory tumblers having key engaging portions said tumblers being adapted to be oscillated upon the insertion of the key to force the plugs from the openings within the barrel.

2. In a safety device for locks a stationary member, a rotatable member adapted to be connected to the bolt of a lock, and having a key hole therein, alined openings in said members, locking plugs within the openings of said stationary member having means normally urging them into the alined openings in said rotatable member and means for moving said locking plugs from the openings in said stationary member comprising a plurality of oscillatory tumblers in said stationary member.

3. In a safety device for locks a stationary member, a rotatable member adapted to be connected to the bolt of a lock, and having a key hole therein, alined openings in said members, locking plugs within the openings of said stationary member having means normally urging them into the alined openings in said rotatable member and means for moving said locking plugs from the openings in said stationary member comprising a plurality of radially extending oscillatory tumblers in said stationary member.

4. In a safety device for locks a stationary member, a rotatable member adapted to be connected to the bolt of a lock, and having a key hole therein, alined openings in said members, locking plugs within the openings of said stationary member having means normally urging them into the alined openings in said rotatable member and means for moving said locking plugs from the openings in said stationary member comprising blocks located in the openings in said rotatable member and a plurality of block engaging tumblers pivoted in said stationary member.

5. In a safety device for locks a stationary member, a rotatable member adapted to be connected to the bolt of a lock, and having a key hole therein, alined openings in said members, locking plugs within the openings of said stationary member having means normally urging them into the alined openings in said rotatable member and means for moving said locking plugs from the openings in said stationary member comprising blocks located in the openings in said rotatable member and a plurality of radially extending, oscillatory block engaging tumblers pivoted in said stationary member.

6. In combination, in a safety device for locks, two relatively movable members, alined openings in said members, locking means in said openings preventing relative movement of said members, and a plurality of oscillatory tumblers in one of said members adapted to be actuated to throw said locking means to inoperative position.

7. In combination, in a safety device for locks, two relatively movable members, alined openings in said members, locking means in said openings preventing relative movement of said members, a plurality of oscillatory tumblers in one of said members adapted to be actuated to throw said locking means to inoperative position, and a tumbler oscillating key having a plurality of notches each notch being adapted to receive a tumbler projection.

8. In combination, in a safety device for locks two relatively movable members, alined openings in said members, locking means in said openings preventing relative movement of said members, a plurality of oscillatory tumblers in one of said members adapted to be actuated to throw said locking means to inoperative position, and a tumbler oscillating key having a plurality of notches of variable depth each notch being adapted to receive a tumbler projection.

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

CHARLES RENAUX.

Witnesses:
CHAS. P. PRESSLY,
VICTOR DUPONT.