Jan. 12, 1937. W. HAAG 2,067,319

SAFETY LOCK

Filed Sept. 22, 1934

Fig. 1

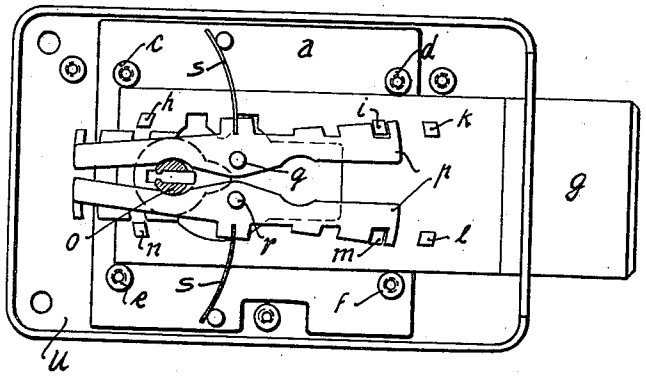


Fig. 2

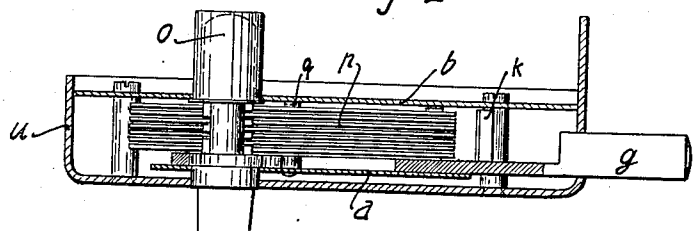


Fig. 3

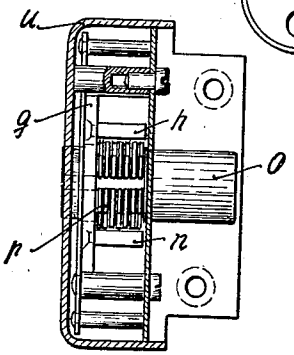


Fig. 4

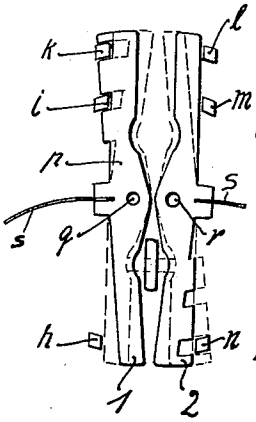


Fig. 5

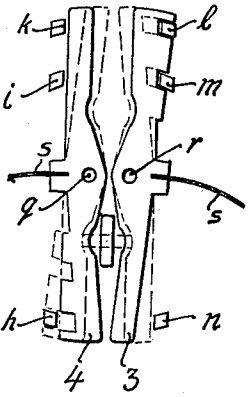
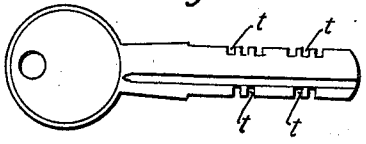


Fig. 6



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SAFETY LOCK

Wilhelm Haag, Pforzheim, Germany

Application September 22, 1934, Serial No. 745,114
In Germany November 21, 1933

1 Claim. (Cl. 70—75)

My invention relates to improvements in key operated locks of the type, the locking bolt of which is slidably mounted in a casing or support and is cooperatively associated with pivoted lever tumblers to be engaged and swung around their pivot by a rotary key.

With the object of enabling manufacturers to make by mass production great numbers of locks of this type and of standard sizes which individually differ from each other in the shape of their key, and thus making those locks as safe as possible against being picked, usually a plurality of tumblers of different design, viz. differing from each other in the shape of their contour lines, working faces, edges, in the position of the notches, gatings, indentations, projections etc. provided thereon for engagement with the key and the bolt, are employed in one and the same lock in such manner, that the said tumblers are assembled on their pivot pins in different permutations and sequence closely on top of each other or differently spaced from each other.

However as a matter of fact known to experts in this field many locks of this design can be picked by thieves almost with certainty, since the characteristics of the swinging motion of the individual tumblers can be feelingly ascertained by reason of the very difference in shape of the tumblers at the place, where they face the keyhole.

The primary object of this invention is to provide an improved lock of the type concerned and of greatly simplified design, which is safer against being picked by thieves than its predecessors known in the trade, and which can be produced by mass production at low cost.

More especially the invention aims at so designing the improved lock, that only tumblers of one single design are employed, viz. which are of identical shape in one and the same lock and in all the great many locks, made by mass production so as to differ from each other in the form of their keys.

The nature and scope of this invention are briefly outlined in the appended claim and will be more fully understood from the following specification taken together with the drawing, in which a lock having 14 tumblers is shown by way of example:

Fig. 1 is a plan view of the lock with cover removed;

Fig. 2 is a view of the lock in cross section taken on its longitudinal axis;

Fig. 3 is another cross section taken through the lock at right angles to its longitudinal axis of symmetry;

Figs. 4 and 5 are plans intended to elucidate jointly with Fig. 2 the gist of this invention, which consists therein, that the tumblers by reason of the symmetric form of their contour line facing the key are invertible and reversible on their longitudinal and their transverse axis, so as to be capable of being assembled on their pivots independently of each other in four different positions and by way of combination and permutation in a vast number of different ways;

Fig. 6 is a plan showing by way of an example a key, of which the outer working edges of the teeth are in alignment with each other.

The main plates of the lock are the plates *a* and *b* which are connected with each other by the pins *c*, *d*, *e* and *f*. Between these main plates there is the bolt *g* with the pins *h*, *i*, *k*, *l*, *m* and *n*, the cylinder *o* and the tumblers *p*, which are adapted to be swivelled on the axes *q* and *r*. The tumblers are held by springs *s* in such a position, that according to their positions, their notches either embrace the pins of the bolt, thus impeding the movement of the bolt *g*, or do not embrace said pins, thus offering no impediment to the movements of the bolt. By turning the key, the tumblers are separated from the pins *h*, *i*, *k* and *l* thereby releasing the bolt and rendering it possible to move it by means of the cam cylinder *o*.

The lock proper is enclosed in the case *u*.

The tumblers employed are formed with two key sweep edges and are all of identical shape, namely symmetrical as to the disposition of said key sweep edges relatively to an axis of symmetry running through their fulcrum point, so as to be capable of being reversed face for face. These axes are firmly connected with the lock plate *a* and enclosed within the lock plate *b*. Figs. 4 and 5 show the different positions of the tumblers *p*. The positions designated by 1 and 3 are locking positions of the tumblers, whereas the positions 2 and 4 represent merely securing positions of the tumblers. The dotted lines indicate the tumblers swung out. To move the bolt, only the tumblers in the positions 1 and 3 must be swung, whereas the tumblers in the positions 2 and 4 must remain unmoved. For this purpose the key is provided with grooves *t* at those points where no tumbler is to be actuated.

The key, therefore, is given the task to swing the locking tumblers embracing the pins of the bolt, i. e. in the positions 1 and 3 and to avoid establishing contact with the tumblers in the positions 2 and 4.

It will be seen from Figs. 4 and 5 that a tumbler *p* can occupy any of 4 positions each different from the others. By means of a spring, *s*, the tumbler is held in the position it is occupying at the time or forced back into it. The tumblers have the function either to arrest the bolt or to secure it, in a position ready for action, according to which of the four different positions they are occupying at the time.

The configuration of the tumblers employed may differ. It is, however, essential, that in any one lock only tumblers are used which are identical in shape, so that the latter may be mutually adjusted and changed from one position to another. The uniformity of the tumblers with regard to size and configuration necessarily includes as a further essential characteristic feature of the present invention that, not only all the locking tumblers and also all the securing tumblers are swung out to the same extent, but that for both kinds of tumblers the angle of oscillation is of the same magnitude, and furthermore, that with each possible position the tumblers always offer themselves uniformly adjusted towards the keyside, so that the key is always made to face a number of uniformly shaped and uniformly adjusted tumbler-arms. These properties which follow as a natural consequence of the uniformity of the tumblers, render it practically impossible that the lock be successfully picked.

Various changes and modifications may be conveniently made in the structural details of locks of the improved design, described above, without substantially departing from the spirit and the salient ideas of this invention.

By abandoning the transposition of the tumblers the employment of a plurality of tumbler shapes, i. e. tumblers of different shape, in connection with one and the same lock would be possible, provided, however, that at least all tumblers arms turned towards the key side are of identical shape and that all tumblers are made to describe an angle of oscillation of the same magnitude. This will not, however, enhance the degree of safety or reliability of the lock. The employment of more than one form or shape of the tumbler would be equivalent to the discarding of the simple constructional principle in favour of one less simple.

With regard to the key, the uniformity of the tumblers render it further essential, that the separate wards, actuating the locking tumblers, must be of equal length. At the points where the key must not actuate the tumblers which are in unlocking position, the key should be provided with grooves between the separate parts of the wards and these grooves must be of such depth, that the unlocking positioned tumblers are not touched by the key. Corresponding to the opposed positions of the tumblers the key is provided with two series of wards, i. e. a series on either edge.

I claim:

In a key operated lock having a support and a bolt formed with locking pins and slidably mounted on said support, the combination of a plurality of tumblers for locking said bolt, each of said tumblers being formed with two key sweeps symmetrically disposed, relatively to an axis of symmetry running through the fulcrum point of the tumblers so as to render the latter reversible as to said axis of symmetry.

WILHELM HAAG.