E. A. CHRISTOPH.

LOCK.

APPLICATION FILED MAR. 9, 1914.

1,244,450.

Patented Oct. 23, 1917.

2 SHEETS—SHEET 1.

Fig. 3.

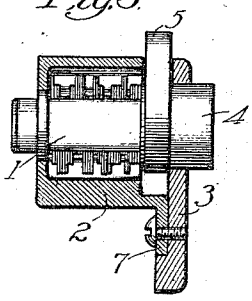


Fig. 1

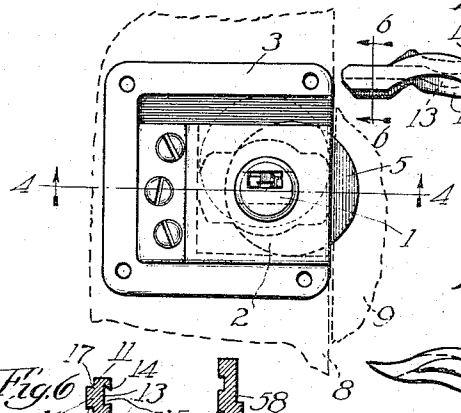


Fig. 5

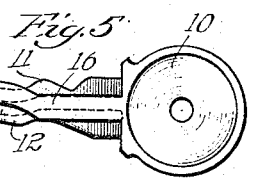


Fig. 9.

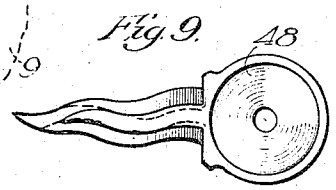


Fig. 2

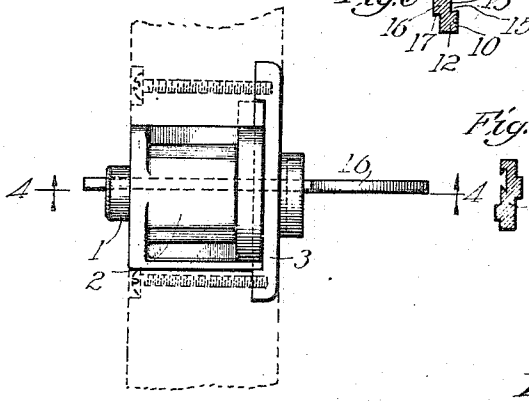


Fig. 6

Fig. 7.

Fig. 8.

Fig. 4

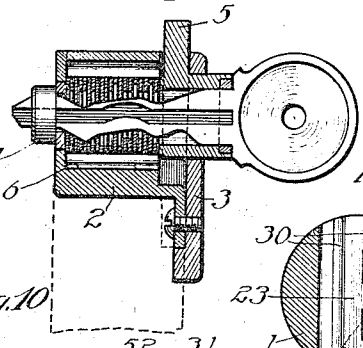


Fig. 11.

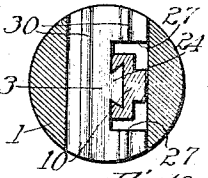


Fig. 10

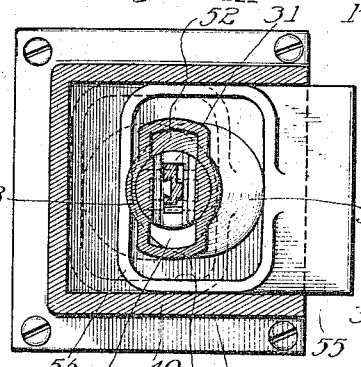


Fig. 14

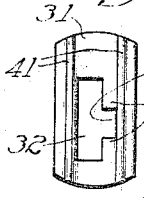


Fig. 15.

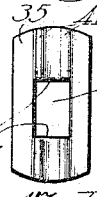


Fig. 16

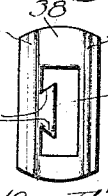


Fig. 12

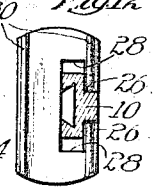


Fig. 17.

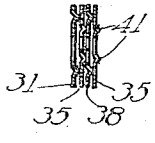


Fig. 19

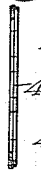


Fig. 18

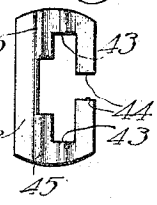
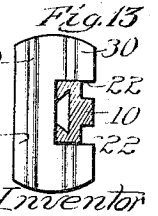


Fig. 13



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2 SHEETS—SHEET 2.

Fig. 20.

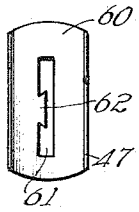


Fig. 35.

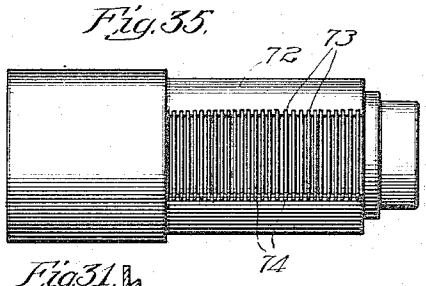


Fig. 21

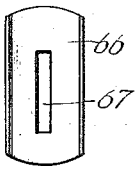


Fig. 31.

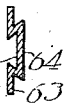


Fig. 36.

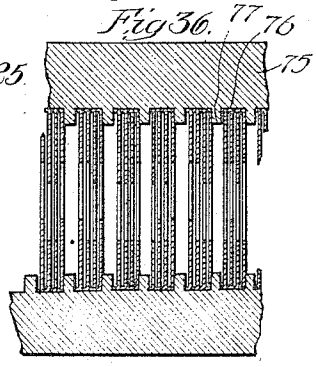


Fig. 22.

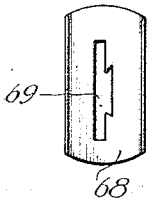


Fig. 25.

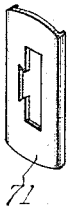


Fig. 23

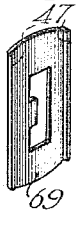


Fig. 24.

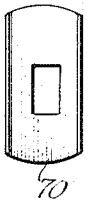


Fig. 37.



Fig. 32.

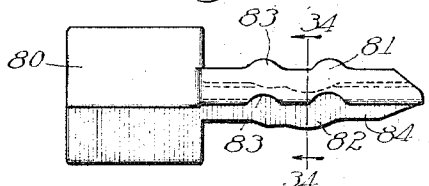


Fig. 34

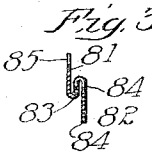


Fig. 33.

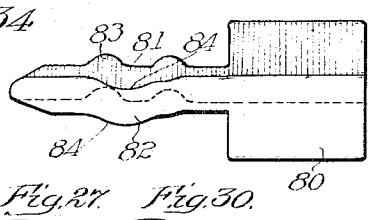


Fig. 29.

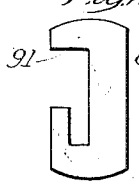


Fig. 26.



Fig. 28.



Fig. 27.

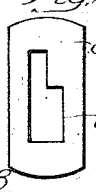


Fig. 30.

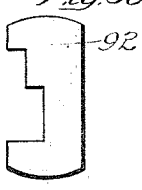
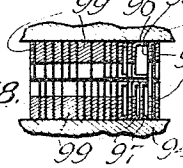


Fig. 38.



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Attorneys.

UNITED STATES PATENT OFFICE.

EMIL A. CHRISTOPH, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE KING LOCK COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

LOCK.

1,244,450. Specification of Letters Patent. Patented Oct. 23, 1917.

Application filed March 9, 1914. Serial No. 823,462.

To all whom it may concern:

Be it known that I, EMIL A. CHRISTOPH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Locks, of which the following is a description.

My invention belongs to that general class of devices known as locks, and relates particularly to a key-controlled or actuated lock, similar to those described in my two pending applications, Serial No. 795,662 and Serial No. 805,327. The invention has among its objects the production of a lock of the kind described in which is embodied a plurality of plate tumblers, suitable means being provided for spacing the plates so as to decrease the friction, thereby making the lock more sensitive, as well as reducing the chances of the sticking of the plates and the parts of the lock to a minimum. The lock shown also is arranged for the omission of the lock-bolt of the type shown in the two applications mentioned. The lock also is designed to be constructed with a minimum of parts, although an extremely sensitive and substantially non-pickable lock. The invention has among its further objects the production of a lock of the kind described that is simple, convenient, compact, durable, efficient, and satisfactory, and a lock in which innumerable numbers or combinations of varied keys may be constructed, each lock of which can be operated only by its particular key.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts,

Figure 1 is a rear elevation of one form of lock;

Fig. 2 is substantially a side elevation of the same;

Fig. 3 is a sectional view through the lock, the key withdrawn and the parts locked against movement;

Fig. 4 is a sectional view taken substantially on line 4, 4 of Fig. 4, and similar to Fig. 3, showing the key inserted and the several parts of the lock released;

Fig. 5 is a side elevation of one form of key, the key illustrated in Fig. 4 being shown;

Fig. 6 is a sectional view taken substantially on line 6, 6 of Fig. 5;

Fig. 7 is a sectional view of a modified form of key;

Fig. 8 is a similar view of another form;

Fig. 9 is a side elevation of another form of key;

Fig. 10 is a sectional view of another form of lock, in which is embodied a latch bolt;

Fig. 11 is a sectional view through the barrel 1, illustrating one form of plate;

Figs. 12 and 13 illustrate other forms of plates, the key being shown in section;

Figs. 14, 15 and 16 illustrate other plates;

Fig. 17 is a sectional view through several assembled plates, similar to those shown in Figs. 14 and 16;

Fig. 18 is a view of another plate;

Fig. 19 is a side elevation of the same;

Figs. 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30 illustrate other forms of plates;

Fig. 31 is a sectional view through another form of key, one adapted for plates shown in Figs. 20 to 22;

Fig. 32 is a side elevation of another form of key;

Fig. 33 is a similar view of the opposite side;

Fig. 34 is a sectional view taken substantially on line 34, 34 of Fig. 32;

Fig. 35 is a plan view of a modified form of barrel with plates similar to those shown in my applications mentioned;

Fig. 36 is a sectional view of another form of barrel, in which are positioned plates similar to those shown in Figs. 23, 24 and 25;

Fig. 37 is a sectional view through a number of plates similar to those shown in Figs. 23, 24 and 25, and

Fig. 38 is a sectional view through a portion of a plurality of plates, and container therefor.

Referring to the drawings, in which several constructions are shown, illustrating a simplified lock, different forms of plate tumblers, barrels and keys, it may be mentioned that the present application covers improvements and modifications over the lock shown in the two applications referred to. Figs. 1, 2, 3 and 4 illustrate a simplified lock construction, consisting of a barrel 1, arranged

in a suitable casing 2, which may be mounted upon a lock plate 3 if desired. The lock illustrated is adapted for use only with a primary key, as I have not considered it necessary to illustrate a lock embodying mechanism controllable by a master key as shown in the pending application, Serial No. 805,327. The barrel 1 is provided with a suitable slot therethrough for the reception of the plates, and with a key-way through the ends for guiding and maintaining the keys in the desired position. As shown, the barrel 1 is provided with an extension 4, extending to the exterior of the plate 3, and a locking member 5, preferably in the form of a cam, that is, it is arranged eccentrically on the barrel, and projects from the casing. The locking member or part 5 may be arranged at either end of the barrel 1. As shown, it is located at the front end of the same. The casing shown is extended as at 7, and suitably secured to the plate 3, and is provided with slots or chambers 6 therein, for engagement with the plates. Any suitable style of plate may be used, plates similar to those illustrated in Figs. 11, 12 and 13 being shown in this particular lock. The lock may be mounted upon either the door or door casing, and arranged to engage the coöperating part, that is, 8 may be the door and 9 the casing, or vice versa. When the key is inserted to control the plate tumblers, and aline their ends, the barrel 1 may be turned, carrying with it the lock member 5 to lock or unlock the door, as the case may be. This will be more fully understood in the further description. The key 10 shown consists of a suitable shank provided with faces for engaging the plates contained within the barrel 1, the operation being substantially similar to applications referred to.

In Figs. 11, 12 and 13 are shown plates suitable for this particular key. As will be seen by referring to the figures previously mentioned, the plates are provided with keyways at one edge or side, the key being off center relative the barrel 1, when the same is inserted in the barrel. The plates shown in Fig. 14, 15 and 16 are similar, except the keyways are centrally arranged. In Fig. 11 the plate 23 is cut out at one side and formed with a projection 24, arranged to engage in the recess or groove 13 of the key, and coöperate with the faces 14 and 15 (see Fig. 6) of the key. The ends 27 of the keyway are a sufficient distance apart so as not to interfere or engage with the edges 11 and 12 of the key. The plate 25 shown in Fig. 12 is constructed with projections 26, adapted to coöperate with the faces 17, 17 on the bead 16 of the key, the ends 28 of the keyway being sufficiently far apart so as not to interfere with or engage with the edges 11 and 12. The plate 20 shown in Fig. 13 is arranged with a keyway having faces 22 at the ends of the keyway, adapted to coöperate with the faces 11 and 12 of the key. When the key is inserted in position in a lock containing any of the plates mentioned, or any combination of plates 20, 21 or 23, mixed as desired, the plates are moved back and forth in the slot in the barrel 1, in the same manner as in the locks shown in the applications referred to. In order to prevent any friction between the plates, or at least to minimize the same, any suitable means may be provided for spacing the plates, one from another. In Figs. 11 to 13 the plates are shown with grooves or beads 30, so that when the plates are assembled they are slightly separated throughout the greater portion of the face. It will be noted by referring to these three figures that the projections 30 are not in the same position on the plates, so that the bead 30 of one plate, where the plates are pressed as shown, will not lie in the depression of the face of an adjoining plate, its projection being turned to space the next plate. However, I do not wish to be understood as meaning that the projections 30 on all the plates 23 are as shown, as some will be as shown in Fig. 11, and some will be separated farther, as shown in Fig. 12, this depending upon the assembling of the plates. In assembling the plates in a lock it is only necessary to see that similarly spaced projections 30 are not on adjacent plates.

The plates shown in Figs. 14, 15 and 16 are similar except as previously mentioned, the apertures or keyways are arranged centrally. The plate 31 has an aperture 32 and notch 33, having faces 34. Plate 35 has a keyway 36 with key-engaging faces or ends 37, while plate 38 has a projection with faces 40 adapted to enter in the slot 13 in the key. These faces are all provided with projections or beads 41, similar to 30 shown in the other form of plate. Several plates are so assembled in Fig. 17, this figure illustrating very clearly how either style of plates are spaced by the beads 41, the plates with the keyways at the sides being similarly spaced by the beads 30. Figs. 18 and 19 illustrate another form of plate (the key therefor not being shown) which is somewhat similar to both types of plates described. Referring to the figures, plate 42 is provided with a keyway having faces 43 adapted to clear the edges of the key, and with faces 44 and 45. It is also provided with beads or projections 46. The particular plate shown is adapted to coöperate at faces 44 with the bead upon a key, the other faces being arranged to clear the key, it being understood that more or less similar or modified plates are employed in combination with the one illustrated, if so desired.

In the lock shown in Fig. 10, plates similar to those shown in Figs. 14, 15 and 16 are employed, it being understood that any

of the other styles of plates shown may be used. The lock shown in Fig. 10 is very similar to the lock shown in Fig. 1, except that the cam or eccentric member 54 is arranged to throw a bolt 55. Referring to this figure, 50 is the plate and barrel casing, in which is arranged the barrel 53, carrying the plates. The casing 50 is carried by the casing 49, the same being formed integral therewith, or connected thereto, as desired. Secured to the barrel 53, or formed integral therewith, is the eccentric member 54. The latch-bolt 55 is provided with an opening 57, formed in the end 56, the same forming substantially a yoke upon the end of the latch-bolt. As is obvious, as the eccentric member 54 is thrown, the latch-bolt is moved in or out. In this connection it should be noticed that the latch-bolt is positively locked in or out by the eccentric member, so that the bolt could not possibly be thrown by a knife or similar blade inserted between the door and the door frame. The only substantial difference between this lock and the one shown in Fig. 1, is that in Fig. 1 the cam or eccentric member acts as the latch-bolt or locking element, while in Fig. 10 the same actuates and locks the latch-bolt 55.

In Figs. 20 to 30 inclusive several different types of plates are shown. While these plates are designed to particularly show a number of combinations of plates and keys, those shown in Figs. 20 to 25 are particularly intended to show an equivalent for the beads or projections 30 and 41 in the other two types of plates. These plates are shown with their edges or sides flanged as at 47, so as to space the plates when assembled substantially as shown in Figs. 36 and 37. The plates shown in Figs. 20, 21 and 22 are designed to coöperate with a key similar to that shown in Fig. 31. Plate 60 is provided with an opening 61, having a projection 62. Plate 66 is provided with a keyway 67, and plate 68 with a notched keyway 69. These plates engage with the key shown in Fig. 31 at the edges of the key and in the groove 65 and bead 64. The key may be pressed or otherwise suitably formed. Plates 69, 70 and 71 are designed to co-act with keys similar to Fig. 5.

In Fig. 35 a barrel 72 is shown, which is provided with grooves or the equivalent 74, with projections 73, so that flat plates similar to those described in my previous applications may be inserted in the slots 74, the same being spaced the same as if the plates were provided with projections. This is the full equivalent of the other constructions, but is somewhat more expensive to construct. In Fig. 36 is shown a combination of the plates formed similar to any of those previously described herein, with the barrel formed very similar to the barrel 72. As shown, the barrel 75 in Fig. 36 is provided with grooves 76, between which are the projections 77. The plates are arranged between these, those provided with the flanged edges being illustrated. In this construction the plates are separated from each other, and are arranged in what might be termed series. Fig. 37 shows a plurality of assembled plates, similar to any of those shown in Figs. 20 to 25 inclusive. Figs. 32, 33 and 34 illustrate a modified form of key, and Figs. 26 to 30 plates for the same. The key shown is first pressed, or otherwise formed, so as to form a plurality of sections similar to 81 and 82. They are then cut as at 83 and 84 to form a plurality of dissimilar faces. Plates 85 with apertures 86, or plates 91 or 92, are arranged to co-act with this form of key.

In Fig. 28 a plate for this form of key, or its equivalent, is shown, which is somewhat dissimilar to any of the key plates previously shown. In this case the plate is really two plates, 87 and 88, each provided with holes or keyways 89 and 90 respectively. With this type of plate each half of the plate moves independently of the other. By this construction the effect is the same as if the number of plates in the lock were double. In Fig. 38 is shown a sectional view through a portion of a plate container, and a number of plates similar to the plates shown in Fig. 28. Referring to the figure, it will be noted that 95 represents a portion of the plate container, in which are arranged plates 95—98, 96—97 and 99. Plates 95 are similar to plates 87 and 88, but without any spacing flanges or beads. Plates 97 are similar except provided with the spacing flanges, while plate 96 shows a plate with an exceptionally large flange, illustrating how the plates may be modified so as to change the different locks. A plate 18 is also shown in this lock, which is similar to one or the other of the plates 85, illustrating how one or the other forms of plates may be embodied in the same lock. Plates 99 are similar to any of those previously described, except the plates are made without the flanges or beads, but of various thicknesses. These plates may be constructed to fit any preferred form of key. It is, of course, obvious that any of the plates shown in Figs. 27 to 30 may be formed with the beads or projections flanged similar to that of the other plates previously described.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same within the scope of the appended claims without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement or combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:—

1. A plate tumbler for locks, consisting of a sheet of metal provided with a keyway therethrough, said plate provided with parallel corrugations extending lengthwise thereof and spaced from the side edges.

2. A plate tumbler for locks, consisting of a thin sheet of metal provided with a keyway therethrough adjacent one edge, said plate provided with two parallel corrugations extending lengthwise thereof and spaced from the side edges.

3. The combination in a lock of a plurality of plate tumblers arranged face to face, each plate provided with corrugations extending lengthwise thereof, the corrugations on adjacent plates being similar but disposed at different points on the plates whereby the plates will be spaced from each other.

4. The combination in a lock of a plurality of plate tumblers arranged face to face, each plate provided with corrugations extending lengthwise thereof, the corrugations on adjacent plates being similar but disposed at different points on the plates whereby the plates will be spaced from each other, said plates cut away at one side to provide a keyway.

5. The combination in a lock of a plurality of plates, each having a portion cut away at one edge to provide a keyway therethrough, and corrugated to provide a plurality of beads on the face of each plate, the location of the beads on adjacent plates being varied whereby the bead on one plate will contact with the uncorrugated portion on an adjacent plate.

6. In a lock, the combination of a plate, a tubular casing secured at one side of said plate and provided with an internal groove at each side of the tubular opening, a portion of said casing cut away to provide a space between the plate and casing, a rotatable barrel projected into the casing, plate tumblers carried by said barrel and movable to engage the groove in said casing, said barrel provided with a locking element of a length to project through the space between the said casing and plate, each of said plates being corrugated to constitute beads at one face of the plate, whereby the plates are spaced one from the other.

7. The combination in a lock of a plurality of parts, one movable relatively the other, and means for controlling the operation thereof including suitably formed plates mounted in one of said parts, and provided with means for spacing the plates from each other, said spacing means consisting of corrugations formed on the plates and extending from end to end thereof.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

EMIL A. CHRISTOPH.

Witnesses:

ROY W. HILL,

CHARLES I. COBB.