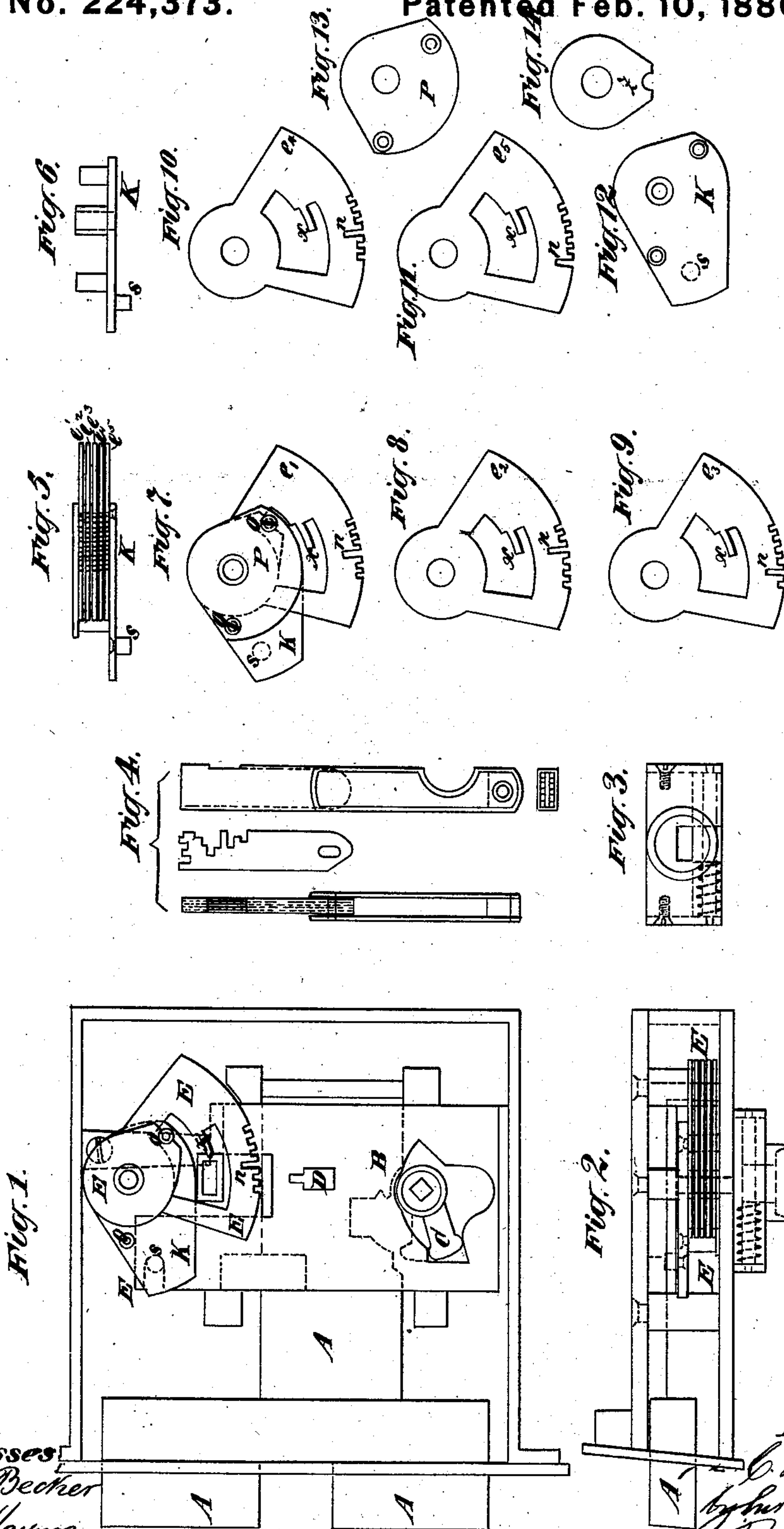


C. W. ADE.  
Lock.

No. 224,373.

Patented Feb. 10, 1880.



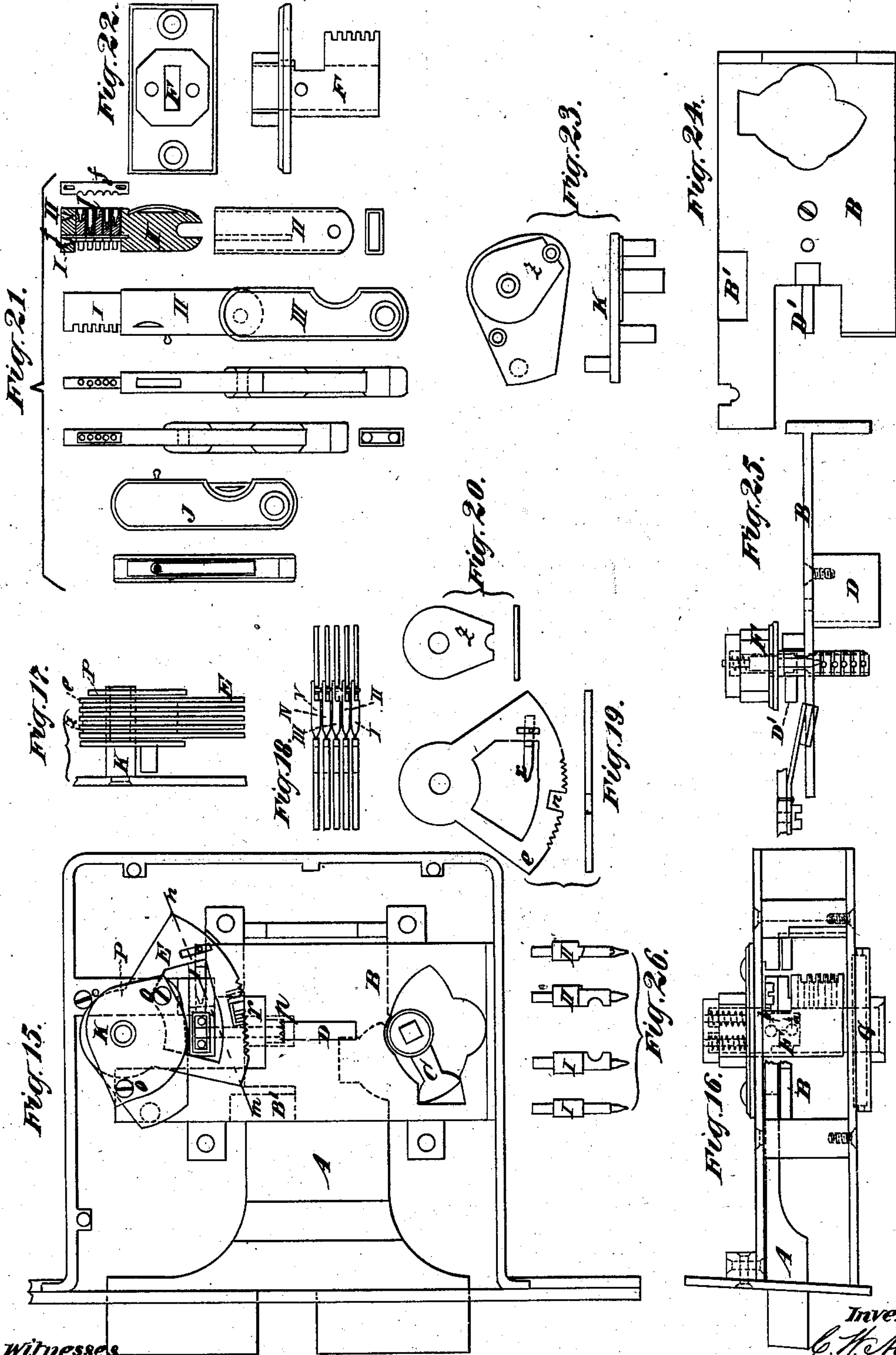
Witnesses  
John Becker  
Fred. Haynes

Inventor  
C. W. Ade  
by his Attorneys  
Brown & Brown

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# UNITED STATES PATENT OFFICE.

CARL W. ADE, OF STUTTGART, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO  
JOHANN AUGUST STANISLAW BIERNATZKI, OF HAMBURG, GERMANY.

## LOCK.

SPECIFICATION forming part of Letters Patent No. 224,373, dated February 10, 1880.

Application filed July 9, 1879. Patented in Germany, August 5, 1877, and September 6, 1877, and in England, May 6, 1879.

*To all whom it may concern:*

Be it known that I, CARL WOLFGANG ADE, of the city of Stuttgart, in the Empire of Germany, have invented certain new and useful  
5 Improvements in Safety-Locks, of which the following is a specification.

The present invention is one for which a German patent, P. R. No. 1,585, dated August 5, 1877, and an additional patent, No. 1,767,  
10 dated September 6, 1877, and also an English patent, No. 1,784, dated May 6, 1879, were granted me.

My invention relates to locks in which a key is inserted to regulate the movement of certain  
15 parts of the lock while the said parts are operated by a handle.

My invention consists in a lock in which the operation of the bolt-work is controlled by a tumbler, which, when the bolt-work is locked,  
20 obtrudes itself in the way of said bolt-work and prevents its withdrawal, the amount of movement of such tumbler being regulated by a series of oscillating sectors, to which motion is imparted by friction from said tumbler, and  
25 each of said sectors being provided in its periphery with a notch, and also provided with a horn projecting from it. When a key is inserted and the sectors oscillated by the first movement of the tumbler, the said horns of  
30 the sectors come in contact with notches in the key, which form points or faces of different projection, and by which the further movement of said sectors is prevented. If the faces of the key upon which the sectors impinge are  
35 properly arranged relatively to the notches in the peripheries of said sectors, said notches will all be coincident and in such a position that a projection upon the tumbler may enter them, thus permitting a further movement of  
40 the tumbler sufficient to enable the bolt-work to operate.

In the accompanying drawings, Figure 1 represents a view of the lock having the back plate removed. Fig. 2 is a top view thereof  
45 with the upper plate removed. Fig. 3 is an exterior view of the key-hole. Fig. 4 represents different views of the key. Fig. 5 represents an under-side detail view of the safety-sectors and their attachments. Fig. 6 is a view  
50 of an oscillating turn-bolt to which the safety-

sectors are secured. Fig. 7 is a face view of the safety-sectors and their attachments. Figs. 8, 9, 10, 11, 12, 13, and 14 are detail views, illustrating the construction of different parts of my lock. Fig. 15 is a face view of a lock of modified form, having its back plate removed. Fig. 16 is a top view thereof, having the top plate removed. Figs. 17, 18, 19, and 20 are detail views, illustrating the safety-sectors and their attachments. Fig. 21 represents different views  
55 of the key. Figs. 22, 23, 24, and 25 are detail views, illustrating the construction of various parts of my lock, and Fig. 26 is a detail view of certain portions of a modified form of safety attachment therefor.  
60  
65

Similar letters of reference designate corresponding parts in all the figures.

A is the lock-bolt. B is the tumbler. C is the nut, being turned by means of a handle. D is the tumbler-pin, and E the safety apparatus.  
70

In Fig. 2 I have shown a top view of the safety apparatus E and the box containing the key-hole, which closes in a self-acting manner. The key represented in Fig. 4 contains two  
75 toothed plates, and may be laid together like a knife. There is also shown separately one of the toothed plates.

The safety apparatus E consists, essentially, of a turn-bolt, K, Figs. 1, 5, 6, 7, and 12, pivoted to a fixed tap, and receiving its oscillation by the round pin *s*, which enters a slot of the tumbler B. Upon the nave of the turn-bolt K are placed a series of perforated sectors, *e*, *e*<sup>1</sup>, *e*<sup>2</sup>, *e*<sup>3</sup>, *e*<sup>4</sup>, and *e*<sup>5</sup>, Figs. 8 to 11, (here represented as five in number,) four intermediate  
80 disks, *z*, Fig. 14, and a press-plate, P, Fig. 13. Between every two plates or sectors *e* is placed a disk, *z*. The press-plate P, when secured to the turn-bolt K by means of screws *o*, clamps  
85 between it and the latter the five sectors *e* in such a manner that they will, during the rotation of this turn-bolt, be taken along with it by friction until they meet with a resistance.  
90

In order to produce an obstacle, each one  
95 of the five sectors *e* carries in its perforation a horn, *x*, fitting into a corresponding interstice of one of the two toothed plates of the key, Fig. 4, when the said key is inserted in the lock.  
100



Now, if the key is placed in the key-hole till it rests upon the bottom and the nut C turned by the handle, the tumbler B will be raised, causing the turn-bolt K, in conjunction with the five sectors *e*, to oscillate; but each sector ceases its motion as soon as the horn *x* strikes against the bottom of one of the teeth or faces in the key. In that position where all five horns *x* rest on the bottom of the teeth or faces of the key, which form points of different degrees of projection, the sectors occupy such a position in relation to one another that the deepest notches *n* made in the periphery of them become coincident, and in such a position that the tumbler-pin D can easily enter such notches at the further raising of the tumbler B, which only in its highest position allows the lock-bolt A to be drawn back by continuing the rotation of the nut C.

If one of the five sectors *e* of the safety apparatus occupies any other position, there is no further raising of the tumbler B, and consequently no opening of the lock, possible.

Any attempts to turn a safety-sector, *e*, into the position in which the lock may be opened are made quite unsuccessful by having provided this sector at its circular circumference, besides the proper notch *n*, with a certain number of false notches or teeth, *r*, of smaller depth, whereby the proper adjustment of the sectors is rendered entirely impossible without the aid of the key.

In the other modification of this invention, which is represented by the figures from 15 to 25, the springless rotary safety apparatus E is also represented as consisting of five perforated sectors revolving about a pivot, Fig. 17. These sectors *e*, Fig. 19, prevent the tumbler B, and, of course, also the lock-bolt A, from being moved as long as they are not brought into such a position by means of the introduced key J that the deeper notches *n* in their peripheries are not coincident, so as to permit the tumbler-pin D to enter the notch *n*. In this case, however, each of the five sectors *e* is provided with a movable pin, Figs. 15 and 19, with a conical point, instead of the horn *x*, Figs. 7 to 11, formed of the same piece of metal as the sector, for the purpose of bringing these sectors in right position. Each of these five points fits into one of small tubes *l* placed in the key J, Fig. 21, the bores of which are conical at different steps, so that the profile of the bore of one tube is different from that of each of the others.

By introducing the key J and turning the nut C by means of a handle the tumbler B is first raised, which imparts oscillating motion to the turn-bolt K, which, by friction, operates the five sectors *e*. As soon as a pin of a sector, *e*, hits in the bore of the corresponding tube in the key, this sector will no longer be able to follow the motion of the turn-bolt K; therefore it will stop. This operation is effected successively by all sectors. The notches *n* in their peripheries are then coincident, thus permitting the tumbler-pin D to enter them

by raising the tumbler B, which now allows the lock-bolt A to be drawn back. In any other position of these sectors *e* this is impossible, as the angular teeth *p* of the tumbler-pin D will catch the corresponding teeth or notches *r* of the five sectors, thus preventing any further motion or manipulation.

Any violent attempt at striking back the lock-bolt A is rendered impossible by the solid tumbler-hook B', which will not go out of its slot in the lock-bolt A till the tumbler B is raised in its highest position.

The five pins of the sectors *e*, as well as the corresponding tubes in the key J, can be exchanged one with another, so that the same lock not only may be put together and operated in one hundred and twenty different manners, but by exchanging the tubes in the key J one with another, after having closed the safe or chest to which the lock is applied, the opening of the lock cannot be effected by any person having surreptitiously got possession of the key.

The exchange of the tubes in the slide I of the key J, Fig. 21, can only take place when the slide I is pulled out of the key-body II. The small spring-joint tongue placed in a groove of the slide is then pushed forward. It must, however, be observed that the tubes ought not to fall down freely, which is the case when the slide I looks with the openings of these tubes toward the floor. The several pins are all held in position by a thin plate of metal, *f*, (see Fig. 21,) which is inserted in a groove in the slide I of the key, and which has in its edge rounded notches, which fit in grooves in the pins and hold them securely against accidental displacement.

The succession of the five pins in the safety apparatus E and of the small tubes in the key J is clearly indicated in the drawings.

To augment still more the safety of the lock I employ a second safety device, F, Fig. 25, consisting of two separate conical pins, I II, Fig. 26, which are placed at the bottom of the key-hole and fit into two holes made in the end of the key J. These holes I and II are conical in form and are of different depth, each corresponding to one of the pins I II shown in Fig. 26. By introducing the key these two pins I and II are pressed back so far that two semicircle-shaped notches in their sides form together a round hole, *a*, which, when pushed to *b*, allows the round tumbler-pin D' to pass through between the two pins, as shown in Fig. 25.

To avoid dust and foreign matters from entering into the interior of the lock, and to render difficult the opening of the lock by violent attempts, a safety-cover, G, is applied to the inside of the key-hole. This cover consists of a damper, which is pressed from the inside upon the key-hole by the action of a spiral spring.

A hardened-steel plate fixed on the cover-plate of the lock prevents the safety tumbler-pins D and D' from being bored out.



What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the bolt-work A of a lock, of a tumbler, B, whereby the operation of such bolt-work is controlled, a turn-bolt, K, oscillated by said tumbler, and a series of sectors held in frictional contact with said turn-bolt and oscillated thereby, and each provided in its periphery with a notch, which, when brought into coincidence with the notches of the other sectors, permits the further movement of the tumbler to release the bolt-work, substantially as specified.

2. The combination, with the tumbler B, of the turn-bolt K, deriving motion therefrom, and having clamped upon it a series of sectors, which turn therewith, but when a key is inserted, against which any of said sectors

strike, permit the turn-bolt to turn independently of such sectors, substantially as specified.

3. The combination, with the tumbler B, the oscillating turn-bolt K, and a series of sectors held in frictional contact with said turn-bolt and oscillated thereby, each having a horn, *x*, extending from it, of a key provided with faces of different degrees of projection, against which the said horns of the several sectors impinge, and by which the further movement of the sectors is prevented, substantially as specified.

CARL WOLFGANG ADE.

Witnesses:

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JOHS. KRACKE.