

C. O. YALE.

TIME-LOCK.

No. 174,996.

Patented March 21, 1876.

Fig.1.

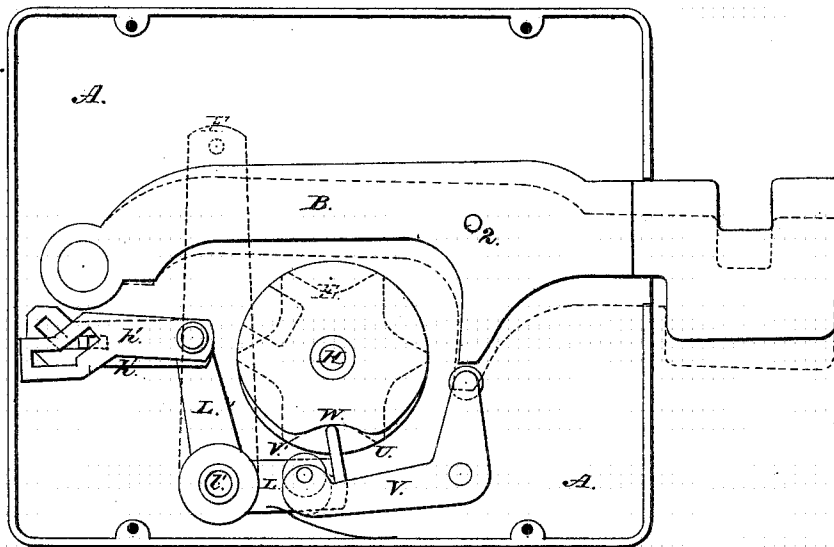


Fig. 2.

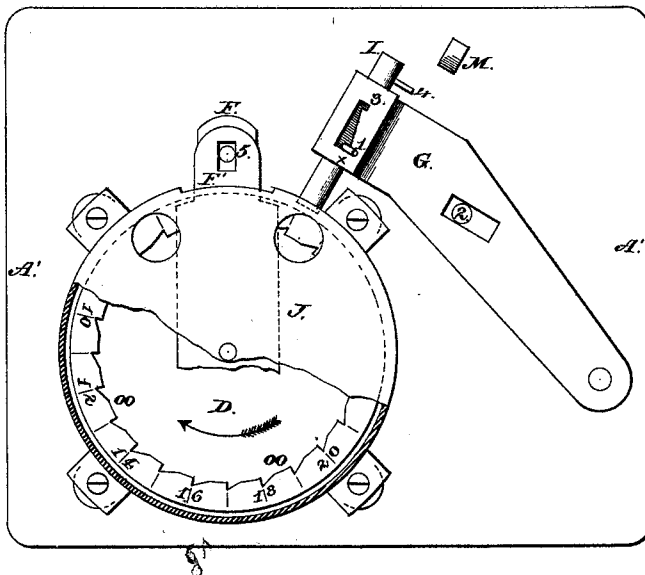
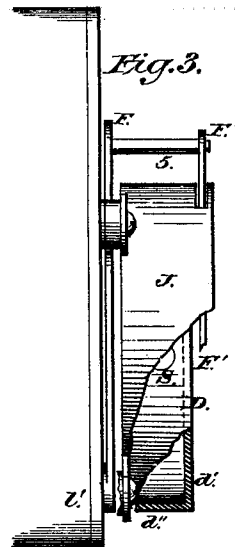


Fig. 3.



Attest:

John
N. E. R. Smith

Inventor:

Chas. O. Yale
by Earle H. Smith
Atty.

C. O. YALE.
TIME-LOCK.

No. 174,996.

Patented March 21, 1876.

Fig. 4.

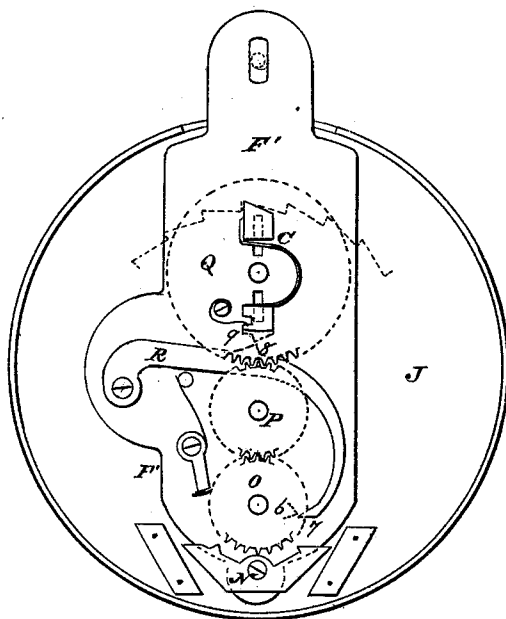
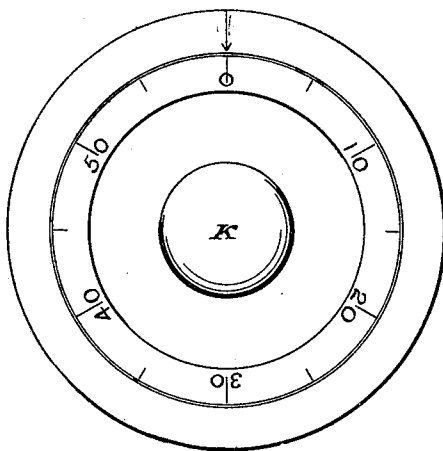


Fig. 5.



Witnesses.
John Lox,
W. C. B. Smith

Chas. O. Yale
by Earle H. Smith
Atty.

UNITED STATES PATENT OFFICE.

CHARLES O. YALE, OF NEW YORK, N. Y., ASSIGNOR TO HERRING AND COMPANY, OF SAME PLACE.

IMPROVEMENT IN TIME-LOCKS.

Specification forming part of Letters Patent No. 174,996, dated March 21, 1876; application filed January 5, 1876.

To all whom it may concern:

Be it known that I, CHAS. O. YALE, of the State, county, and city of New York, have invented certain new and useful Improvements in Time-Locks, whereof the following is a specification:

These improvements relate to time-locks, particularly as applied to safes and vaults, wherein a device, which may be termed the "obstruction," prevents the retraction of the lock or safe bolts until it is automatically removed by the time mechanism; or, in case that fails to act, by an alternative provided for the purpose, and operated by hand from the exterior of the safe.

The nature of my invention consists, primarily, of the combination, with such locks, of mechanism for checking and limiting the speed of the hand operation, whether the time mechanism be used or not.

For the mechanism of the hand operation I use a train of gearing with which and the lock-spindle, or its substitute, are combined a train of levers operated by a cam on the said spindle.

The obstruction to the releasement of the bolts is represented by a cylinder having ratchet-teeth engaged at long intervals by a clutch attached to one of the train of gear-wheels. For that purpose the teeth of the wheels so vary in number from each other that certain cam-points thereon and on the clutch, between which an intermediate lever is arranged, can only effect the necessary co-operation with said lever and the clutch once in a great number of revolutions of said wheels. The said cylinder has an opening for admitting a device moved by the bolt when the latter is to be unlocked, but at no other time.

The device representing the mechanism for checking the speed of the hand-operation consists, in this instance, of a pair of sliding bars having cam-slots working over a square or cornered stud.

To enable others skilled in the art to make and use my improvements, I have shown in the annexed drawing a lock and apparatus illustrating the invention, and which I will now proceed to describe.

Figure 1 is an elevation of said lock. (Shown

as with the back of the case removed.) Fig. 2 shows the outside of case and parts attached thereto. Fig. 3 shows the case covering the clock-movement as seen from the side, and in partial section. Fig. 4 shows, enlarged, the said cover as removed and reversed, exposing the mechanism within. Fig. 5 shows a dial and knob, to which the lock-spindle is affixed.

A A' is the lock-case. B is the bolt. D is the cylinder or obstruction to the bolts, rotated by an ordinary clock-movement inclosed within it. E (dotted) is a cam affixed to the lock-spindle H, adapted to act upon and vibrate a train of levers consisting of a two-armed lever, L, to which is affixed, at l', a lever, F, arranged on the outside of the lock-case A', which lever imparts its motion, by a pin and slot, 5, to a lever, F', attached to the inside of a cover, J, placed over the cylinder D. The spindle H passes out through the safe-door, (to which the lock is attached in use,) and is there affixed to a knob, K. The bolt B has a pin, 2, that enters a slot in a lever, G, carrying a piston, I, that must enter a certain opening in the cylinder in order to permit the bolt to be unlocked, as hereinafter mentioned. The cylinder D is, in construction, a shell, consisting of a disk, d', with a rim, d'', which surrounds and incloses the clock-movement, and the disk d' is attached to the central shaft thereof, which is geared to make about one revolution to two of the hour-hand of a clock, or at a slower speed, and is adjustable, like such hand, on or to said movement. It is marked off in a number of divisions, representing one hour each, and the opening s therein is brought, by rotation of the cylinder, under the piston I when the time arrives for releasing the bolt or bolts.

The bolt B is operated by a cam, W, affixed to the spindle H, and is held locked by said cam and a number of rotary tumblers, U, notched as usual, for the admission of a suitable fence controlled by the bolt—in this instance consisting of a projection, V', situated at one end of the lever V, on the other end of which the bolt rests.

The approach to the depressed portion of the cam W is by a curve slightly eccentric to the circle of the tumblers, so that in process

of setting them for unlocking, the contact of the cam with the fence is made and broken so gradually as not to be felt in revolving the spindle H.

Before raising or locking the bolt the piston I is to be drawn back and held by the spur or pin *x* catching in a notch, 3.

When the bolt is raised or locked a projection, 2, thereon, working in a slot in the lever G, lifts it, and the piston I, causing a spur, 4, to strike a cam-post, M, disengaging the pin *x* and releasing the piston, which is then forced downward by a spring surrounding it, and engages the pin *x* in the notch 1, where the piston remains suspended over the cylinder D. The cylinder may now be adjusted by turning it backward from its releasing position the number of divisions representing the number of hours desired to elapse before the time for unlocking, after the usual manner of adjusting a time-lock, after which the time mechanism may be started.

When the time mechanism, for any reason, fails to advance the cylinder to bring the opening *s* under the piston, and so remove the obstruction to the releasement of the bolts, it may be removed by advancing the cylinder, by the hand operation, from the knob K, through means of the aforesaid train of levers and certain extra gearing, which I will now describe.

A partial or complete revolution of the knob will vibrate the lever F', through levers L and F, causing a double pawl, N, attached to F', to engage and move a train of gearing additional to, and separate from, the clock mechanism, consisting of a small spur-wheel, O, which turns a like wheel, P, gearing into a larger wheel, Q, that carries a clutch, C, part of a spring sliding bar in wheel Q. In the face of the cylinder D are a number of ratchet-teeth, *o o*, corresponding to the divisions thereon. The wheel O has a cam-point, 6, for meeting a like point, 7, on the lower extremity of the lever R, near the mid-length of which said lever has a tooth, 8, adapted to act on a corresponding lug, 9, part of the clutch-bar C, and so force the clutch outward to engage it in the ratchet *o o* in the cylinder, as shown in Fig. 4.

The cylinder D can be moved by hand but one division at a time, and only when the cam-point 6 and lug 9 meet the points 7 and 8 of the lever R, at the same instant, and with a constant motion of the knob K or levers F F', this can happen only about once every two hours, as will appear.

The number of teeth on the wheel Q varies from that of the others, or a multiple thereof, by at least one tooth—say, as 61 to 30—and hence the lever R is acted on simultaneously at both its points only once in sixty-one revolutions of wheel Q.

The wheel O is moved one tooth with every two motions of the levers F F', and by a suitable contrivance their motion is limited so

that they are prevented from moving more rapidly than once every second.

The device for so limiting the speed of the hand operation consists, in this instance, of sliding bars *h'*, having cam-slots working over a square stud. The slots have square corners in the oblique portions, which catch on the corners of the stud when the levers are moved too quickly, but when the rate of speed—about that of the pendulum of an ordinary house-clock—allows their weight to act, they follow the stud without interruption.

By means of this feature of my invention, the cylinder or obstruction is caused to be advanced by hand for releasing the bolts at a slower speed (in this case about half) than it would be or is when moved by the clock-work, rendering it impossible to use the hand operation to unlock safe clandestinely or under compulsion in a shorter time than it could or would be accomplished by the time mechanism.

When and after the knob or spindle has been rotated or oscillated the number of times about sufficient to engage the clutch O with the cylinder D—say, for two hours—the tumblers U are to be adjusted or set by the knob and dial in the usual manner of rotary tumbler locks.

If now the cylinder has been advanced sufficiently to bring its opening *s* under the piston I, with the cam W in position shown in drawing, it will enter said opening, unlocking or releasing the bolt; if not, then the motions of the knob or spindle for operating the levers are repeated another two hours—for instance, when another trial may be made by again setting the tumblers, and so on—these operations being continued until the cylinder has been made to move by hand the entire distance remaining untraversed at the period when the automatic operation ceased.

In the within-described improvements I do not confine myself to the precise mechanism specified. It is practicable, for illustration, to attach a clock movement and pendulum to the knob K, and run down the time-piece inside the safe by the clock-movement outside, the slow movement of the pendulum serving as a comparative check, even if worked by hand. Instead of using the force of gravity to insure the slow motion of the checking mechanism, the principle of inertia may be used, as by a loose weight on a vibrating arm, that is carried with the arm at a given speed of such arm, but at a higher speed remains at rest.

Instead of moving or advancing the obstruction by hand, with an intermittent motion, a continuous motion, with proper contrivance may be used, by combining therewith a suitable checking mechanism, to insure a limited speed of such motion. In some cases the lock, the obstruction, and the mechanism for moving it by hand, may be used without a time mechanism by sacrificing an hour or two of time, more or less, for opening the lock by the hand operation. Any mechanical

instrumentality adapted to convey physical force, applied at the outside, to the inside of the safe, may be substituted for the lock-spindle, to serve the purposes for which it is used in this connection.

I claim as my invention—

1. The combination, with a lock having an obstruction to the unlocking of the bolt and provided with mechanism for removing such obstruction by hand, from the exterior of the safe, substantially as specified, of mechanism for checking and limiting the speed of the hand operation, for the purposes set forth.

2. The combination, with a lock having a time mechanism and also provided with mechanism for removing the obstruction to the unlocking or releasement of the bolt, by hand, substantially as described, of mechanism for checking and limiting the speed of the hand operation, for the purposes set forth.

3. The combination, with the time mechanism of a time-lock, and with a cylinder or its equivalent operated thereby for an obstruction to, and the releasement of, the bolt at a set time, of a supplementary train of gearing, arranged for operation by hand, substantially as and for the purpose specified.

4. The combination, with such extra gearing and the lock-spindle or its equivalent, of a train of levers, operated by a cam on the spindle, for the purposes specified.

5. The combination, with the levers and extra gear wheels, of a clutch for engaging and moving the cylinder D or its equivalent.

6. The combination, with the train of levers, of the sliding slotted bars *h'*, constructed and operating substantially as and for the purpose set forth.

7. In a combination of gear-wheels for the purposes specified, the wheels having the number of their teeth varying, as described, and constructed and arranged for operation with an intermediate lever that forms a connection between cams on said wheels and the clutch, whereby the cylinder D is engaged by such clutch and moved, at long intervals only, for the purposes set forth.

CHAS. O. YALE.

Witnesses:

EARLE H. SMITH,
WM. MUNCH.