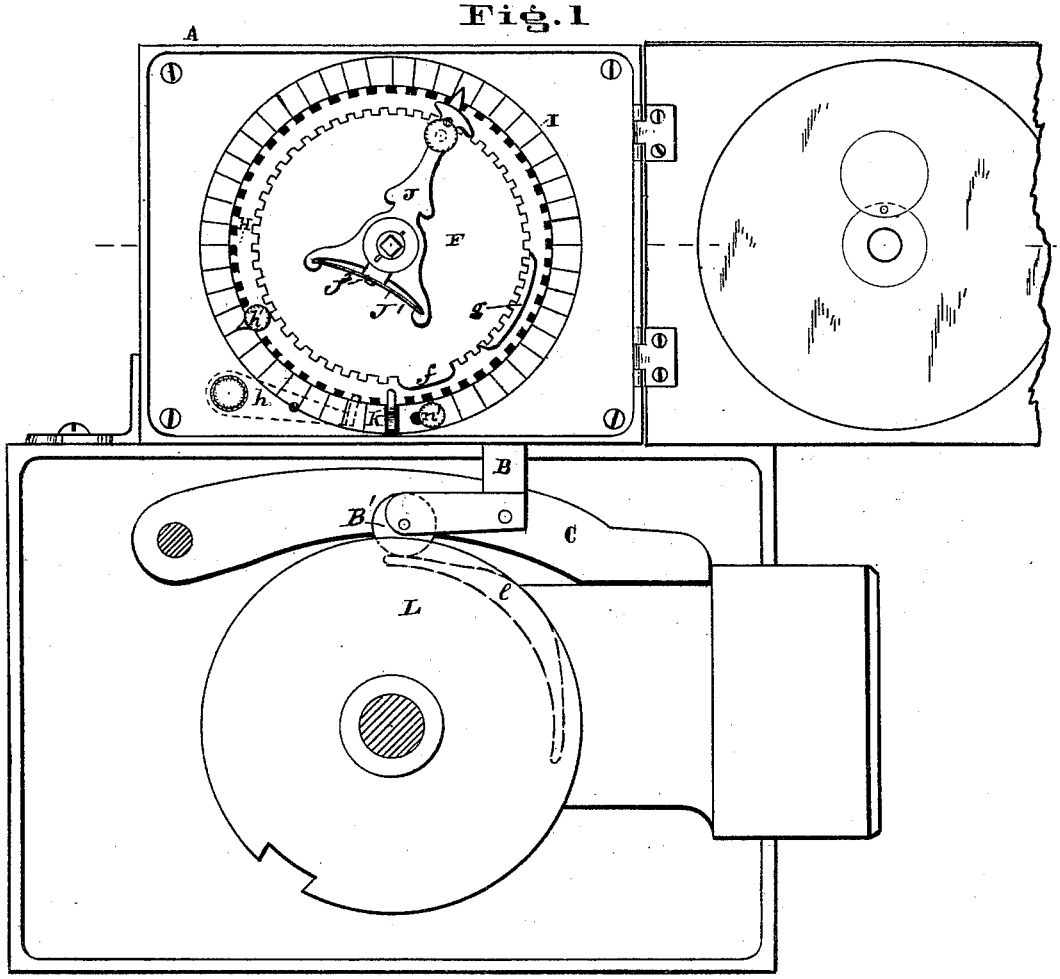
2 Sheets—Sheet 1.

M. A. DALTON.

Time-Lock.

No. 199,520. Patented Jan. 22, 1878.

Fig. 1



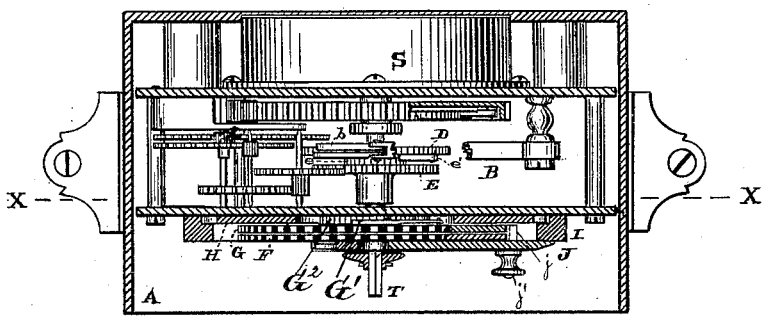


Fig. 2

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2 Sheets—Sheet 2.

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Fig. 3

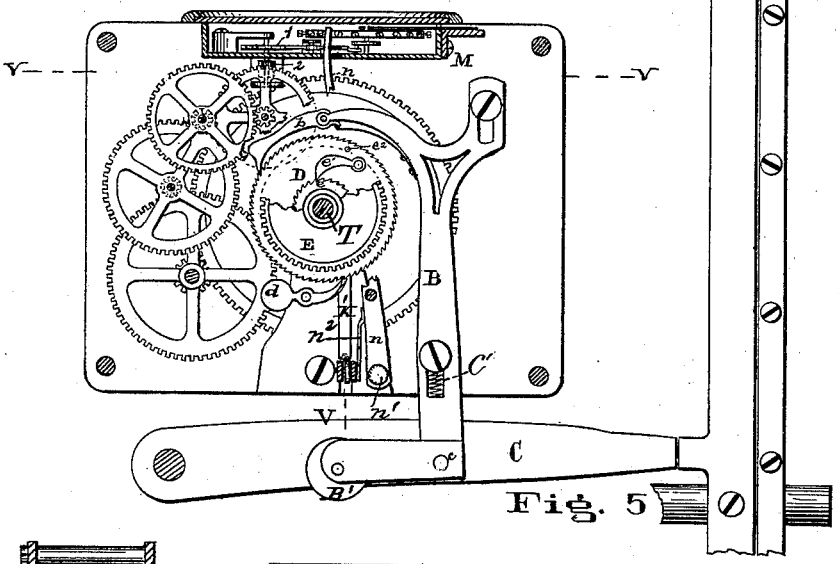

Fig. 5

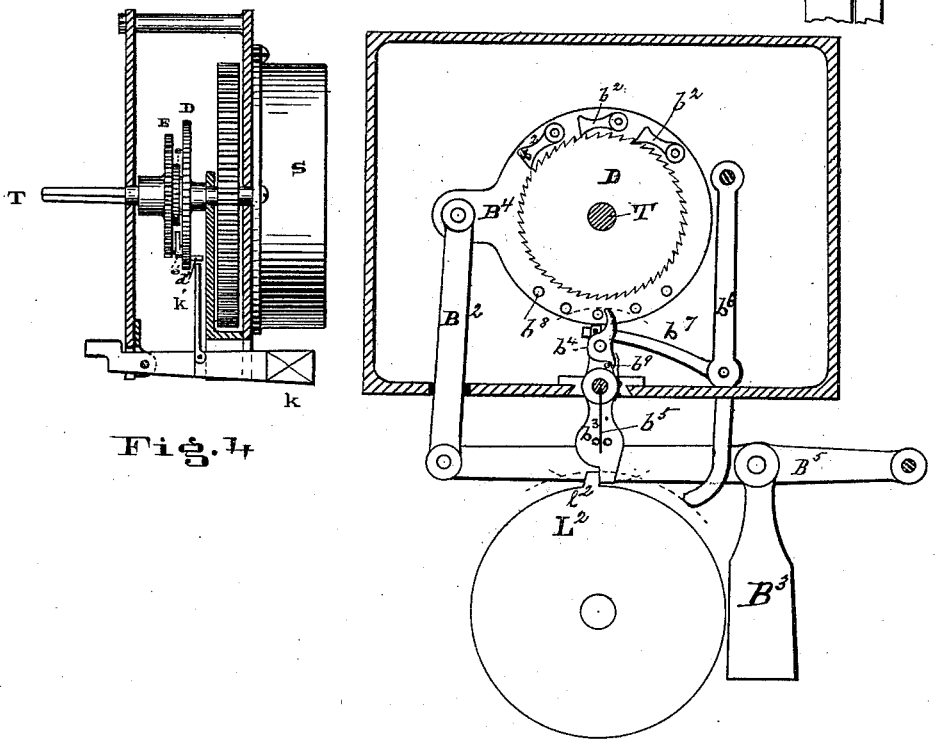

Fig. 4

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UNITED STATES PATENT OFFICE.

MILTON A. DALTON, OF CINCINNATI, OHIO.

IMPROVEMENT IN TIME-LOCKS.

Specification forming part of Letters Patent No. **199,520**, dated January 22, 1878; application filed July 27, 1877.

To all whom it may concern:

Be it known that I, MILTON A. DALTON, of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Time Attachments for Locks, which improvement is fully set forth in the following specification and accompanying drawings.

This invention relates to a time attachment or time-lock involving the same general principle as that described in my application for Letters Patent filed June 13, 1877, so as to provide for the unlocking of the safe, when the time-movement is stopped by accident before the appointed hour, in the same manner and by the same means as when it is stopped at the appointed hour.

My present improvements have more special reference to a time-lock of the aforesaid character in which the time-lock simply puts itself in the condition for unlocking its dogging device whenever the time-movement stops, the actual unlocking of the dogging device being accomplished by manipulation from the exterior of the safe; and they apply more particularly to the time-lock described in my application for Letters Patent filed June 30, 1877, However, some of the novel features to be presently described are applicable to time-locks in general.

The present improvement consists in adding to an otherwise complete time-lock certain auxiliary means which will enable it to automatically unlock itself, or to put itself in the condition which provides for the retraction or unlocking of its dogging device or devices, and to remain in such condition during predetermined periods of time, while the time-movement is running without interruption all the time. This feature enables a banker to so set his time-lock at the close of days preceding holidays, or other days on which business may be suspended, that said time-lock will temporarily suspend its guarding action on the lock or door of the safe for a certain length of time on such a holiday, in order that the safe can be opened, if necessary, and will then automatically resume such guarding action if left undisturbed; also, in so constructing time-locks embodying the general principle of my invention above stated that the major portion of the locking or dogging mechanism will ordinarily be entirely disconnected from the clock-work, so that the latter will run practically unincumbered, and the wear and tear be reduced to a minimum; also, in providing hereinafter-specified means for setting the time-lock again and again without interrupting the movement of its clock-work; also, in providing means, hereinafter specified, for automatically putting the time-lock at a predetermined hour in the condition which admits of the retraction of its dogging device or devices, either by locking the clock-work or by independently locking the ratchet-wheel or adjunct which more immediately controls said dogging device or devices.

In the annexed drawings, Figure 1 is a front elevation of the time-lock and sufficient of a non-time-lock to show the connection. Fig. 2 is a sectional plan view of the time-lock. Fig. 3 is a vertical section taken through line *x x*, Fig. 2, showing the application of the time-lock for dogging the train-bolts of a safe-door. Fig. 4 is a transverse vertical section through line *v v*, Fig. 3; and Fig. 5 is a sectional elevation, showing a modification of the connecting-link between the time-lock and the non-time-lock, which is intended to be used when the link is operated by the driving-wheel instead of one of the tumblers.

The same letters of reference indicate identical parts in all the figures.

A refers to the case of the time-lock, shown in Fig. 1 as mounted on the case of a combination-lock, but which may be placed in any suitable position on the door of the safe or vault which admits of its action on the combination-lock or on the train-bolts. The case contains a well-constructed clock-work of any known or preferred make, of which the escapement and balance wheel should be placed in a separate readily-detachable compartment, M, to provide for their easy removal and application in case they require repairing, which may then be done by any ordinary watchmaker without disturbing the time-lock in other respects.

In the example shown the spindle of the escapement-wheel 1 (see Fig. 3) passes through the bottom plate of this compartment, and is stepped in a bracket attached thereto. The pinion 2, which drives the escapement, is secured to the exterior end of this spindle, and

is driven by a crown-wheel. In removing this compartment, with its contents, it is first moved slightly sidewise to disengage pinion 2 from the crown-wheel, after which it may be lifted out bodily.

Upon the revolving shaft T of the clock-work is journaled a loose ratchet-wheel, D, adjacent to a smaller ratchet-wheel, *e*, formed on or secured to a cog-wheel, E, which is one of the clock-wheels, and also turns loosely on shaft T. Ratchet-wheel D carries a pawl, e^1, on the side facing ratchet-wheel *e*, which the pawl is adapted to engage. Said pawl e^1 is loosely pivoted, and gravitates between ratchet-wheel *e* and a stop-pin, e^2, on ratchet-wheel D, so as to be thrown in and out of gear, according as ratchet-wheel D assumes different positions in turning it. Ratchet-wheel D, which I term the "adjunct," controls the dogging devices of the time-lock, which, in the example illustrated by the first four figures of the drawings, consist of a pivoted dog, C, and a link or lifter-bar, B, carrying one or more pawls, *b*, which engage the said ratchet-wheel D. The lifter-bar is fitted to slide upon stud-pins fixed on the case, and is pivoted to the dog C at *c*. The weight of the said dogging devices, assisted by spring C′, acting on the lifter-bar thereof, tends to hold them in the position shown in Fig. 1, dogging the bolt of the combination-lock or the train-bolts of the safe, as the case may be. The dogging device extends through the case of the time-lock, and its protruding end occupies a position to be operated upon to elevate it through any suitable mechanical means extending to the exterior of the safe. In Fig. 1, where the dog C falls behind a shoulder on the bolt of the combination-lock, one of the tumblers, L, thereof is provided with a cam, *l*, for this purpose, said cam being formed to act, whether turned in one direction or the other, on an anti-friction roller, B^1, carried by an arm of the lifting-bar, so that the dog may be elevated to release the bolt in the act of setting up the combination. Such an arrangement not only obviates the employment of special means for unlocking the time-lock, but is more especially desirable because the user has to do nothing more in opening his safe than he would be required to do if the time-lock were wholly absent. When the time-lock dogs the train-bolts, as in Fig. 3, and cannot be conveniently placed in close proximity to the combination-lock, an extra cam-wheel may be used to liberate the lifter-bar, and said cam-wheel driven by a belt or chain from the arbor of the combination-lock to accomplish the same desirable results.

It will be observed that as long as the adjunct or ratchet-wheel D can turn in the direction in which the dogging devices tend to turn it by their pawl or pawls *b*, the lifter-bar and dog cannot be maintained in an elevated position, but will fall to their normal position—that shown in Figs. 1 and 3—as soon as cam *l* passes from under the lifter-bar.

In the attempt to retract or unlock the dogging devices the adjunct will be turned, and in certain positions its gravitating-pawl e^1 will engage ratchet-wheel *e*, without any effect, however, on the adjunct as long as said ratchet-wheel *e* continues to be moved by the clock-work; but when the ratchet-wheel *e* is stationary, in consequence of the stoppage of the clock-work, and is then engaged by pawl e^1, the latter will prevent progress of the adjunct, whose return movement is checked by stop pawl or pawls *d*, in the ordinary way. When the adjunct has thus become locked, the lifter-bar, on elevating it, will be sustained in its elevated position by its pawl or pawls *b* finding a fixed support on the adjunct, so that the dog C will release the bolt of the combination-lock or the train-bolts, and permit them to be unlocked. As the ratchet-wheel *e* always becomes stationary when the clock-work stops, it is obvious that no lock-out can occur by reason of the stoppage of the clock-work before the appointed hour.

The throw of the lifter-bar and the position and length of the pawl or pawls *b* are so calculated that the latter will always engage the adjunct on one side of a vertical line drawn through its center, so that in every position the weight of the dogging devices will tend to turn the adjunct forward. Should, therefore, the clock-work be stopped before the appointed hour by only a slight impediment, the mere weight of the dogging devices, as soon as exerted through the adjunct and its pawl e^1 upon ratchet-wheel *e*, would again start the clock-work, and thus render futile any attempt to open the safe clandestinely.

From the foregoing description it will be observed that in the normal position of the parts the major portion of the dogging devices is sustained by the studs on which the lifter-bar slides; also, that whenever pawl e^1 is out of gear, as it is designed to be always, except at the times of unlocking the time-lock, the wear of the time-lock is confined to its clock-work.

The protruding end of shaft T carries a fixed ratchet-wheel, G^2, which acts on a pawl, G^1, on the back of a disk, G, to turn the latter when the clock is running, but allows it to remain stationary in winding the clock, which is done by applying the key to the square end of shaft T.

The disk G and a similar disk, F, (the function of both of which will be presently described,) are mounted on shaft T, being pretty tightly fitted thereon, so that they will turn with the shaft in winding the clock until they meet with an obstruction.

The hand J is mounted on shaft T directly in front of said disks, whose edges are notched to be engaged by a laterally-projecting tooth, *j*, on the back of hand J, near its upper end.

The shaft T passes through a slot in hand J, which slot is closed by a key-block, J^2, provided with a spring, J^1, whose ends engage the respective wings of the hand J, as shown

in Fig. 1. The spring draws the hand radially against shaft T, so as to normally hold its tooth *j* interlocked with disks F and G, but permits the hand to be drawn outward to disengage its tooth from said disks at times when the latter require to be set.

The hand is provided with a button, *j'*, to facilitate its manipulation. The extreme point of the hand projects over a stationary annular dial, I, having lines marked upon it to indicate hours or other divisions of time.

At the zero-line a slot is cut through dial I, through which a lateral stud, n^1, of lever *n* projects, to be operated upon by the point of hand J.

Lever *n* is pivoted on the case, reaching with its long arm just past the balance-wheel of the clock-work, as shown in Fig. 3. It is normally held a slight distance from the balance-wheel by the stress of a spring, n^2; but when the hand J strikes its stud n^1 and moves it in opposition to said spring, the upper end of the lever engages the screws of the balance-wheel, so as to prevent its oscillation, and thus stops the clock-work. The time-lock is then in the condition which admits of the retraction or unlocking of its dogging devices, in the manner already set forth.

Preparatory to locking the safe the hand J is turned back on the dial I from stud n^1 the number of hours which may intervene between the hour of closing and the hour it is desired to open the safe on the next business day.

Hand J is frictionally connected through its spring J^1, as well as through disks F and G, to turn back with shaft T in winding the main-spring of the clock-work until it meets an obstruction. Now, as it is desirable to wind the clock-work as often as the time-lock is set, the turning back of the hand should be done by applying the winding-key to shaft T; and in order that the hand may be turned back a determined distance without opening the lock-case, I provide an adjustable stop device, consisting of a notched ring, H, fitted to turn in an annular rabbet of dial I, between which and the front partition of case A said ring H is held in position, as shown in Fig. 2. The ring H carries a stud, *h'*, whose head has the form of a pointer, which overlies the dial I, as shown in Fig. 1. The ring may be turned by means of this stud *h'*, to carry the pointer thereof to any point on dial I, and there locked in such position by a lever, *h*, one of whose ends is adapted to engage any one of the notches in the edge of the said ring. The other end of lever *h* can be manipulated by an exterior button to temporarily disengage ring H when it is to be adjusted. On turning hand J back it will bring up against and will be stopped by pointer-stud *h'*, which thus determines the number of hours which the hand must traverse before it again acts on stud n^1 of lever *n*, to stop the clock-work and put the time-lock in condition for unlocking.

The disk F has a slightly-protruding blank surface, *f*, on its periphery, and the disk G has a similar, only somewhat longer, blank surface, *g*. These surfaces *f* and *g* form cams adapted to depress the outer end of a weighted lever, *k*, so as to throw up its weighted arm, which carries a bar, *k'*. The upper end of this bar *k'* plays behind adjunct or ratchet-wheel D, and, when lifted by the action of either of the cams *f* and *g*, reaches across the path described by a fixed pin, *d'*, on ratchet-wheel D, so as to prevent the latter from being turned.

By a proper adjustment of either of the disks F and G one of these cams may act on lever *k* from the hour of setting the time-lock, and thus hold the adjunct stationary, so that the dogging devices may be retracted or unlocked for a period of time determined by the length of the cam. As soon as the cam passes beyond lever *k* the weighted end thereof will fall and lower the bar *k'* sufficiently to release pin *d'* of the ratchet-wheel or adjunct D, which is then free to turn to prevent the retraction or unlocking of the dogging devices.

The cam on the other disk may in like manner be used to operate on lever *k* for the period of time determined by its length on holidays, or other days when no regular business is transacted. By properly adjusting the disk its cam may come into play at any desired hour on such a day to put the time-lock in the condition which admits of the retraction or unlocking of its dogging devices.

The clock-work continues to move all the while, and as soon as the cam passes beyond the lever the time-lock will again effectually guard the door of the safe.

This feature of automatically suspending and again automatically starting the guarding action of the time-lock is a very desirable one, since it provides for opening the safe in emergencies on other than business days without putting the banker to the inconvenience of resetting the time-lock. The proper position of either or both of these cams with reference to lever *k* on starting the time-lock may be readily determined by the dial I.

It is obvious that, instead of disks, mere hands or arms may be used, provided always that they are geared to shaft T in manner similar to these disks. It should also be understood that I am the first who has constructed a time-lock embodying auxiliary means adapted to suspend the guarding action thereof at any predetermined hour, and after a known lapse of time to again automatically renew such guarding action; and that this feature, broadly considered, may be applied to time-locks in other respects very different from the one hereinbefore described, and may be embodied in a great variety of forms without departing from this principle of my invention.

In Fig. 5 I have illustrated a modification of the mechanism intervening between the dog or bolt of the time-lock and the adjunct, and constituting a part of the dogging de-

vices. The adjunct or ratchet-wheel D is mounted on shaft T, and combined with one of the wheels of the clock-work, in the same manner as shown in the other figures.

A circular yoke, B^4, mounted loosely on shaft T, is connected, by a link, B^2, to pivoted arm B^5, which carries the dog or bolt B^3. The yoke B^4 is provided with a series of pawls, b^2, distributed, as shown, so that one or the other of them engages a tooth of ratchet-wheel D, while another one is ready to drop behind a tooth on the least back motion of the yoke. As long as the adjunct remains movable the mere weight of the dogging devices will maintain the dog in the dogging position; but when the adjunct becomes stationary the dog B^3 may be lifted or retracted by moving the yoke B^4 some distance around the adjunct, by which it will then be sustained through its pawls b^2, to maintain the dogging devices in the elevated position.

The yoke has a series of pins, b^8, on one side, through which it can be turned by a toe, b^4, on the upper arm of a lever, b^3, whose lower arm is arranged in the circuit of a projection, l^2, on a disk, L^2, which may be the driving-wheel of the combination-lock.

Toe b^4 is pivoted to lever b^3, its lower end extending between a stud, b^9, and a spring on the lever, so that it will operate on the pins of the yoke and turn it when the lever is oscillated in one direction, but slip past such pins without turning the yoke when the lever is oscillated in the opposite direction by disk L^2.

The stress of a spring, b^5, always returns lever b^3 to its normal position, ready to be struck and turned by the projection on disk L^2. To render the return of this lever still more certain, its upper end is connected, by link b^7, to a pivoted arm, b^6, whose lower end is in close proximity to the disk L^2. On turning the lever in the proper direction to move the yoke the lower end of arm b^6 is drawn toward the periphery of disk L^2, and will be struck by the projection l^2 thereof, by which it is returned to its normal position—that shown in Fig. 5—drawing lever b^3 also back into proper position to be again operated upon by the projection of disk L^2.

It requires a number of revolutions of disk L^2 to move the yoke so far as to wholly retract dog B^3, and to accomplish this the disk must be turned continually in the same direction. It would therefore be impossible to set up the tumblers of the combination-lock (in case disk L^2 is the driving-wheel thereof) at the same time. Supposing it possible, then, that by a very rapid revolution of this driving-wheel or disk L^2, a person could succeed in retracting dog B^3, notwithstanding that the clock-work of the time-lock was running, he would still have to set up the combination before he could unlock the combination-lock. Now, it would be impossible to set up the tumblers of the combination-lock within the very short time in which the dogging devices would again place the dog to secure the bolt of the combination-lock; hence the two locks combined would still render an entrance to the safe impossible.

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

1. The combination, substantially as specified, with the clock-work of a time-lock provided with regular means for starting and stopping its guarding action, of auxiliary means, substantially such as described, adapted for automatically suspending and again automatically renewing such guarding action at any time before the hour at which the regular means will stop it.

2. In a time-lock, the combination, substantially as specified, of the clock-work, the dogging mechanism, the adjunct which controls said dogging mechanism, and a means for automatically locking and unlocking said adjunct while the clock-work is running continuously, whereby the time-lock is enabled to automatically suspend and to automatically again resume its guarding action.

3. The combination of a time-piece having a ratchet, D, disconnected from its gear-work when the time-piece is in motion, and capable of rigid connection with the said gear-work when the time-piece is at rest, a lock having a cam upon one of its tumblers, the drive-wheel, or some operative part, and a connecting mechanism attached to a dogging-arm in the lock, adapted to be moved by revolving the arbor and retained or allowed to move back by the ratchet, according as the ratchet is held rigid or not so held, substantially as hereinbefore set forth.

4. The combination, substantially as described, of the disks F and G and hand J with a time-piece, the disks being notched to receive the pin projecting from the inner side of the hand, for the purpose of separately setting the disks and holding them together when set.

5. In combination with a time-piece, the ring H and lever h, the ring being fitted to revolve loosely, and notched to receive the detent of lever h, for the purpose of locking the ring with its pin h' in a position to stop the hand J, as and for the purpose specified.

6. In a time attachment for locks, the combination, substantially as described, of the loose ratchet D, the lever k, and the cam-disks of the time-piece, the lever k being arranged with its bar k' in a position to lock the ratchet D, and one of its arms in a position to be operated upon by the cams on said disks for the purpose of locking said ratchet when desired.

7. The combination, substantially as specified, of the dial, the hand, the balance-wheel of the clock-work, and the lever n, having a lateral stud in the radial line, or thereabout, of the zero-point of the dial, to be struck by the hand for vibrating the said lever to lock the balance-wheel.

MILTON A. DALTON.

Witnesses:
GEO. J. MURRAY,
JOHN B. MURPHY.