

(Model.)

2 Sheets—Sheet 1.

J. W. HARD.
TIME LOCK.

No. 428,393.

Patented May 20, 1890.

FIG. 1.

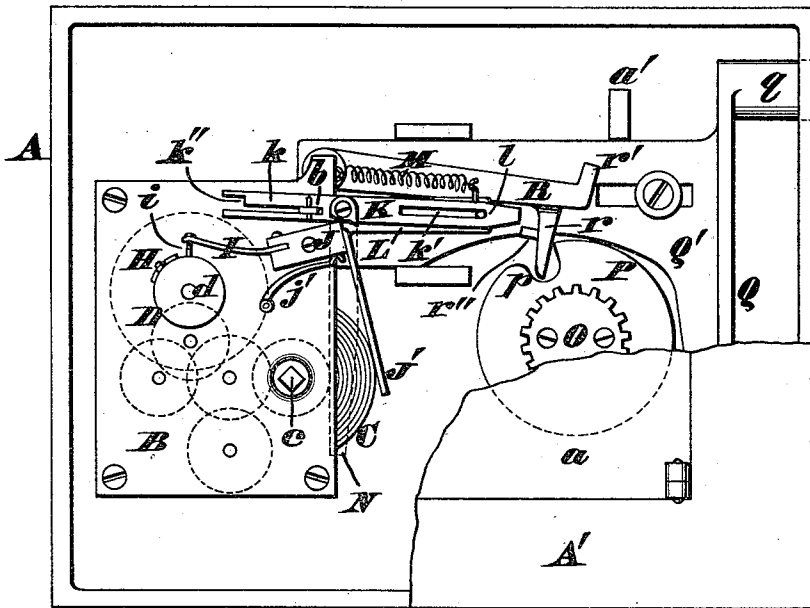


FIG. 2.

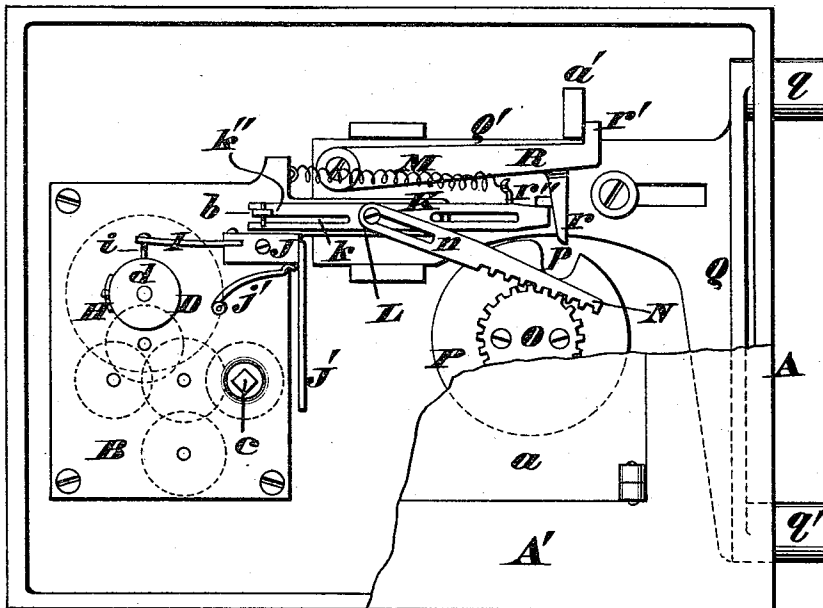
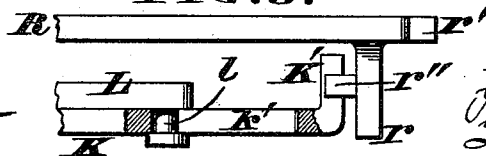


FIG. 3.



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(Model.)

2 Sheets—Sheet 2.

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FIG. 4.

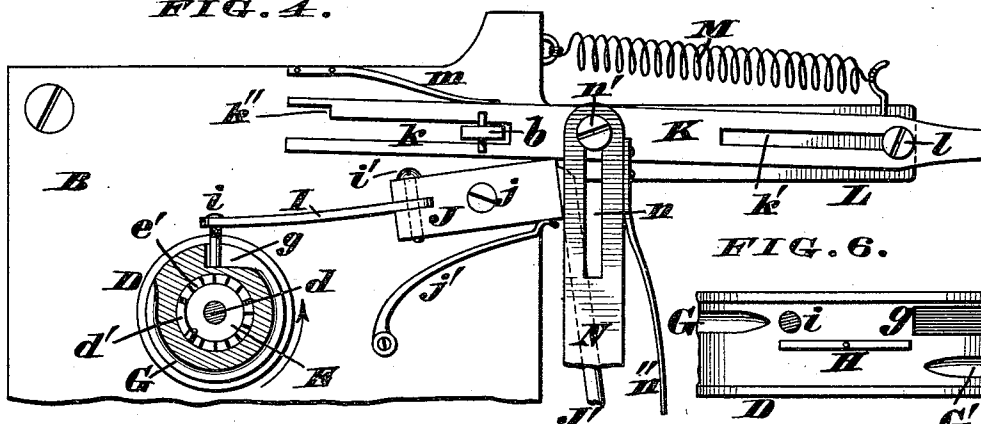


FIG. 6.

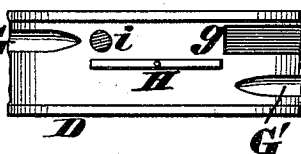


FIG. 4.

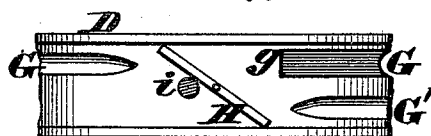


FIG. 8.

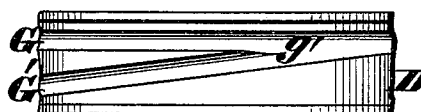


FIG. 9.

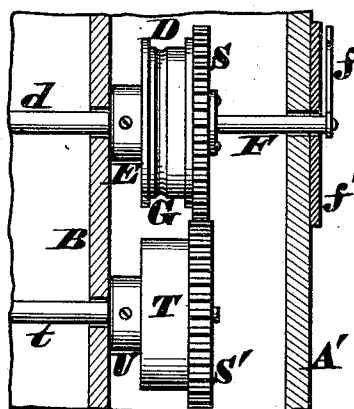
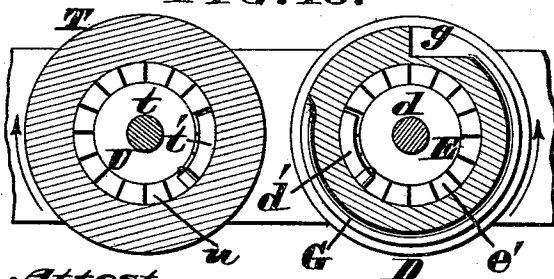


FIG. 10.



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UNITED STATES PATENT OFFICE.

JOHN W. HARD, OF VENICE, PENNSYLVANIA, ASSIGNOR TO THE VICTOR
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TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 428,393, dated May 20, 1890.

Application filed September 18, 1889. Serial No. 324,313. (Model.)

To all whom it may concern:

Be it known that I, JOHN W. HARD, a citizen of the United States, residing at Venice, in the county of Washington and State of Pennsylvania, have invented certain new and useful Improvements in Time-Lock Attachments; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the annexed drawings, which form part of this specification.

This invention relates to those locks which are provided with a series of revolving tumblers and a time attachment that prevents said tumblers being so turned as to retract the bolts until a certain predetermined hour has arrived; and the first part of my improvements comprises a novel combination of devices for maintaining the "fence" in an elevated position until the proper moment has arrived for opening the lock. When this time arrives, the fence is allowed to drop and engage with all the coincident gates or notches of the various tumblers, and then the bolt mechanism is thrown in the usual manner, as hereinafter more fully described.

The second part of my improvements comprises a novel construction of "time-wheel" that automatically liberates the trip mechanism of the attachment when the proper hour has arrived, as hereinafter more fully described.

The third part of my improvements consists in providing the time-wheel with a switch which is capable of being set in such a manner as to enable said wheel to make more than one revolution before the trip mechanism is liberated. By this arrangement the time-wheel can be set to operate at any moment between twenty-four and forty-eight hours, as hereinafter more fully described.

The fourth part of my improvements consists in gearing a pair of my peculiarly-constructed time-wheels together and driving them by independent clock-trains, so as to have a reserve in case an accident should happen to either one of said trains, as hereinafter more fully described.

In the annexed drawings, Figure 1 is an elevation of a lock-case containing my im-

proved time attachment, the greater portion of the case-cap being broken away, the bolts being retracted, the fence being engaged with the coincident gates of the tumblers, the main-spring of the clock-train being run down, and the trip mechanism being liberated by this uncoiled spring. Fig. 2 is a similar elevation of said case, the bolts being advanced, the tumblers being set to restore the combination, and the fence being maintained above the coincident gates of said tumblers by the time attachment. Fig. 3 is an enlarged sectional plan of the fence and its more immediate supporting devices. Fig. 4 is an enlarged elevation showing the trip mechanism liberated by the action of the time-wheel. Fig. 5 is a greatly-enlarged axial section of said wheel and its accessories. Fig. 6 is a plan of a portion of said wheel, the switch of the same being in its normal position. Fig. 7 is a similar plan, but showing said switch set so as to enable the wheel to make more than one complete revolution before operating the trip mechanism. Fig. 8 is a plan of that portion of the time-wheel where its two grooves merge into each other. Fig. 9 is an elevation of the duplex arrangement of my time-wheel. Fig. 10 is a vertical section of said wheel.

A represents a lock-case having a cap A', which latter may have a small door or hinged lid *a* to afford access to the interior of said case without removing its cap. B represents one of a pair of pillar-plates secured within this case and carrying any approved train of clock-work, as indicated by the various dotted circles in Figs. 1 and 2, C being the main-spring of said train and *c* the winding-arbor of said spring.

D represents the time-wheel, carried by a shaft *d* and so geared into the train as to preferably make but one complete revolution in twenty-four hours. This wheel revolves freely around a hub E, secured to shaft *d* by a pin or screw *e*, as seen in Fig. 5, the end of said hub having ratchet-teeth *e'* cut across it in a radial manner, which teeth are traversed by a pawl or click *d'* of the wheel. *d''* is a suitable spring that maintains this click at all times in gear with said ratchet *e'*.

F is a stud-shaft secured to wheel D and having at its exposed end a pointer or index *f*, located in front of a dial *f'*, secured to the case-cap A'. The face of this dial is numbered consecutively from one to twenty-four, the same as with most time attachments for locks. Furthermore, the periphery of this wheel has a groove G, extending almost completely around it, and one end of said groove communicates with a pit *g*. G' is another or secondary groove running about half-way around the time-wheel and merging into the main groove at *g'*, as seen in Fig. 8.

H is a switch pivoted to the periphery of wheel D and capable of being turned obliquely across the same, as represented in Fig. 7; but normally this switch occupies the position seen in Fig. 6. Adapted to traverse either or both of these grooves is a pin *i*, secured to the free end of a limber lever I, the latter being pivoted at *i'* to a trip-block J, which block is pivoted at *j* to plate B, as more clearly seen in Fig. 4.

j' is a spring whose stress tends to tilt the block J in such a manner as to keep the pin *i* at all times in contact with the grooved time-wheel. Depending from this block is a lever J', which is so disposed as to be pressed against by the uncoiled mainspring C, or to be struck forcibly by said spring in the event of the latter breaking. Normally this trip-block is about parallel with the under side of a reciprocating slide K, as seen in Fig. 2, said slide having a pair of longitudinal slots *k k'* and a shoulder *k''*, the slot *k* being traversed by a stud *b*, projecting laterally from the pillar-plate B. Furthermore, this plate has a lateral bracket L, that carries a screw or guide-pin *l*, passing through the slot *k'* of the slide. K' (seen only in Fig. 3) is a lateral bend at the extreme end of this slide. M is a pulling-spring whose constant tendency is to retract said slide. *m* is a spring that prevents the end of the slide accidentally rising up and disengaging its shoulder *k''* from the stud *b*.

N is a rack-bar, slotted longitudinally at *n*, which slotted portion is traversed by a pivot *n'* screwed into the slide K.

n'' is a spring, which may be so attached to rack N as to hold it with moderate firmness in gear with a pinion O, which pinion is rigidly secured to a driving disk or tumbler P, of any approved form of permutation-lock. *p* is the gate or notch of said disk or tumbler. The revolving tumblers may operate any desired bolt mechanism, although I have shown a pair of bolts *q q'*, united by a tie-plate Q to a bolt-slide Q', which latter is suitably guided within the lock-case and has pivoted to it a latch-lever R. Lever R has a fence *r* and detent *r'*, which detent bears against the stop *a'* of the case when the bolts are shot, as seen in Fig. 2.

r'' is a short stud projecting from the fence and extending toward the bend K' of the slide, as more clearly seen in Fig. 3.

My time-lock attachment is set to operate in the following manner: Reference to Fig. 1 shows the positions the various devices assume after the fence *r* has been permitted to drop into the coincident gates *p* of all the tumblers P, which tumblers are turned, so as to completely retract the bolts *q q'* and allow the safe-door to be opened. This illustration also shows the clock-train in its normal or unwound condition, the uncoiled mainspring C being now in contact with the lower end of trip-lever J', the pressure of said spring being sufficient to tilt the trip-block J on its pivot *j*, the result of which action is to cant the end of slide K upwardly, and thereby disengage its shoulder *k''* from the stud *b*. Consequently said slide is instantly retracted by the pulling-spring M, and as said slide cannot be maintained in its advanced position while the trip-block J is inclined it is apparent that the time mechanism cannot be set until the mainspring C is wound up. Therefore there is no possibility of the time attachment being set when the mainspring is so nearly run down as to be incapable of running said attachment but for a few hours. As soon, however, as this spring is wound up the lever J' is relieved from all pressure, and then the spring *j'* restores the trip-block J to its normal position. Index *f* is now set to the hour when it is desired to open the safe-door, and the rack-bar N is swung up and engaged with the pinion O, after which act the spindle is turned in the proper direction to cause the bolts *q q'* to advance, and thus lock said door. As soon as these tumblers are turned the fence *r* is lifted out of the gates and rides upon the peripheries of said tumblers in the usual manner, the slot *n* in the rack N permitting the pinion O to revolve a slight distance before its motion is communicated to the slide K; but the very instant the pivot *n'* comes in contact with the end of slot *n* the slide K is pulled forward until arrested by the stop-pin *l* coming in contact with the end of the other slot *k'*, at which moment the shoulder *k''* engages with the stud *b*, as seen in Fig. 2. This advancement of slide K brings its lateral bend K' in under the stud *r''* of the fence, and thereby maintains said fence in such an elevated position as to prevent it engaging with the tumbler-gates. The tumblers can now be turned indiscriminately back and forth for the purpose of scattering the combination and without disarranging the time attachment, the rack being free to jump over the teeth of the pinion whenever the latter is turned forward; but when the pinion is turned backward the rack-bar N travels with it a limited distance, or as far as the slot *n* and pin *n'* will permit, and then said bar is disengaged from said pinion and depends from the slide K, as seen in Fig. 4 and indicated by the dotted lines in Fig. 1. Consequently there is now no connection between the tumblers and the latch-lever R, and on this account the spindle and tumblers may be ma-

nipulated in every possible manner without having the slightest effect on the time attachment. Just before the time appointed for opening the lock the combination is restored in the usual manner, the gates of the tumblers being all in line with each other and ready to admit the fence. When the proper moment arrives, the revolution of the time-wheel D will have brought its pit *g* directly under the pin *i*, which pin instantly drops down to the bottom of said pit on account of the upward pressure of spring *j'* against the trip-block J, as seen in Fig. 4. Said trip-block accordingly elevates the end of slide K and disengages its shoulder *k''* from the stud *b*, which act leaves the pulling-spring M at liberty to exert its force. This spring instantly retracts the slide K, withdraws its bend *K'* from under the stud *g''*, and permits the fence *r* to drop into the coincident gates of the various tumblers. The latter are then turned by the spindle and the bolts retracted in the usual manner.

The above describes the operation of my attachment when it is set to go off at any time within twenty-four hours, in which condition of the mechanism the switch H is disposed, as seen in Fig. 6, so as to allow the pin *i* to traverse as much of the primary groove G as may be necessary before dropping into the pit *g*; but when it is desired to set the attachment for more than twenty-four hours—as, for example—from Saturday afternoon to Monday morning—the switch is then turned obliquely across the face of wheel D, as seen in Fig. 7; hence when said switch comes in contact with said pin the latter is deflected to one side on account of lever I being pivoted at *i'* to the block J. A little farther turning of the wheel D brings the pin *i* to a position where it will swing the switch back to its normal position and allow said pin to enter the secondary groove G'. Therefore the wheel will be compelled to make more than one complete revolution before the automatic trip mechanism will operate, and by properly setting the index *f* the trip will act at any desired time between twenty-four and forty-eight hours.

In order to insure the prompt and certain action of the attachment in case any of the gear-wheels of the clock-train should break, I prefer to duplicate certain portions of the attachment, as seen in Fig. 9. Here the time-wheel is shown as being provided with a gear S, that meshes into a similar gear S' of wheel T, carried by a shaft *t*, and adapted to revolve around a hub U, secured to said shaft. This hub has end ratchet-teeth *u*, adapted to be engaged by the pawl or click *t'* of wheel T, said ratchet-teeth being arranged in a reverse manner to the teeth *e'* of the other hub E, in order that the wheels D T may turn in the direction of the arrows. (Seen in Fig. 10.) Shaft *t* must be driven by an independent clock-train, which secondary

train may either be journaled in the same pillar-plates with the primary train, or said secondary train can be fitted within a special frame arranged in any convenient place in the lock-case, the only necessary condition being that the wheels S S' must be in constant gear with each other. The wheel T need not be grooved; neither is there any necessity of using more than one trip device, as the reverse teeth *t' t'* enable said wheel to be driven either by its own train or by the secondary train. Finally, in the event of the mainspring breaking, some one of its coils would be certain to strike against the lever J', thereby liberating the trip mechanism and permitting the lock to be opened when the combination is restored.

I claim as my invention—

1. The combination, in a time-lock attachment, of a bolt-slide, a latch-lever pivoted thereto and having a fence that engages with the notched tumblers, a reciprocating slide that supports said lever in its elevated position, a trip that liberates said slide and permits the latter to retract and drop said latch-lever, and a time-wheel that operates said trip, substantially as herein described.

2. The combination, in a time-lock attachment, of a bolt-slide, a latch-lever pivoted thereto and having a fence that engages with the notched tumblers, a reciprocating slide that supports said lever in its elevated position, a trip that liberates said slide and permits the latter to retract and drop said latch-lever, and a time-wheel having a pit into which a pin descends at the proper moment, said pin being applied to the free end of a limber-lever projecting from said trip, substantially as herein described.

3. In a time-lock attachment, a time-wheel having a pit, a main groove, a secondary groove communicating therewith, and a shiftable switch, for the purpose described.

4. The combination, in a time-lock attachment, of a ratchet-hub secured to a shaft of the clock-train, a chambered time-wheel inclosing and revolving around said hub, a spring-pawl fitted within said chamber and engaging with said hub, a stud-shaft attached axially to said wheel, and an index or pointer carried by said stud-shaft, all as herein described, and for the purpose stated.

5. The combination, in a time-lock attachment, of shaft *d*, ratchet-hub E *e'*, secured thereto, and a time-wheel D revolving around said hub, said wheel being provided with a pawl *d'*, that engages with the ratchet *e'* of said hub, as herein described.

6. The combination, in a time-lock attachment, of a pair of geared time-wheels having pawls that engage with reverse ratchet-hubs secured to shafts of independent clock-trains, for the purpose stated.

7. The combination, in a time-lock attachment, of primary time-wheel D, gear S, secondary time-wheel T, gear S', and hubs E U,

secured, respectively, to shafts *d t* and having reverse ratchets *e' u*, for the purpose described.

8. The combination, in a time-lock attachment, of pitted time-wheel *D g*, pin *i*, limber-lever *I*, pivoted trip-block *J j*, spring *j'*, lug *b*, double slotted and shouldered slide *K k k'*
5 *k''*, stop *l*, retracting-spring *M*, and slotted rack-bar *N n*, which bar is pivoted to said
10 slide at *n'*, all as herein described.

9. The combination, in a time-lock attachment, of slide *K k k' k''*, retracting-spring *M*, lug *b*, trip-block *J*, and trip-lever *J'*, which
15 lever is operated by the mainspring *C*, as herein described.

10. The combination, in a time-lock attachment,

of a reciprocating slide that maintains the fence out of gear with the gated tumblers, a slotted rack-bar suspended from said slide, and a series of gated tumblers provided
20 with a pinion, the arrangement of these devices being such as to automatically disengage said rack-bar from said pinion when the tumblers are turned backward, for the purpose described.

25 In testimony whereof I affix my signature in presence of two witnesses.

JOHN W. HARD.

Witnesses:

JAMES H. LAYMAN,
N. ROCKHOLD.