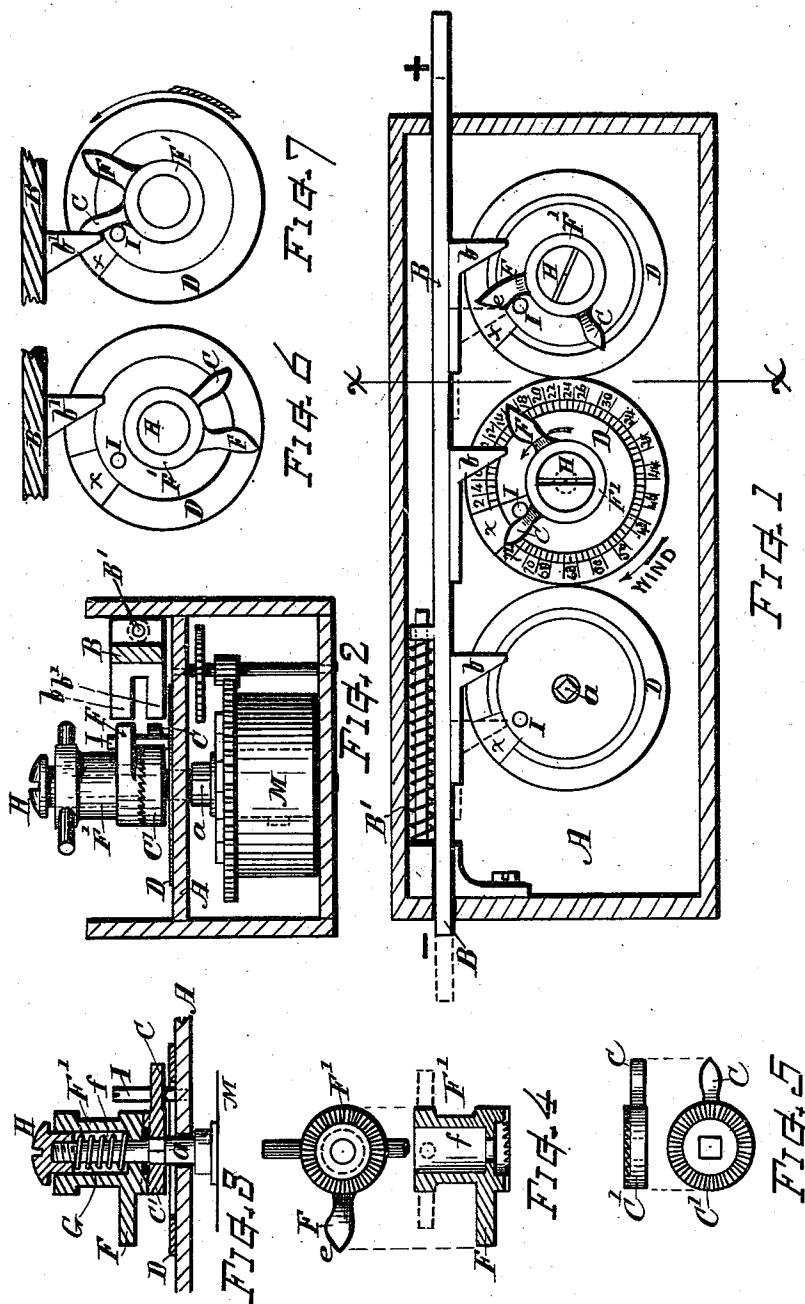


(No Model.)

I. G. BLAKE.
TIME LOCK.

No. 504,427.

Patented Sept. 5, 1893.



Witnesses.

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UNITED STATES PATENT OFFICE.

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TIME-LOCK.

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To all whom it may concern:

Be it known that I, IRA G. BLAKE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Time-Lock Mechanism, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

My present invention relates to improvements in that part of the time-lock mechanism designed and adapted to facilitate the adjusting or setting of the chronometric action to accord with given periods of time; and in the means by which the release of the lock or throwing of the guards at the end of such time is effected; the objects of my invention being to afford a more desirable, convenient and efficient means for effecting, in a practically successful manner, certain desirable results in the use of a watch movement in connection with the mechanism for locking and unlocking the doors of safes, bank vaults, &c. as will be more fully hereinafter explained; second, to combine the improved setting, winding and lock-controlling devices with the watch movement or chronometric mechanism in a manner that shall enable the main spring of said watch movement to perform the labor of actuating the unlocking devices when the strength of said spring is at its greatest, or at the maximum tension thereof, less only the number of hours it has run the watch train to cover the predetermined time for opening; third, to arrest the action of the watch movement by the unlocking action and to cause the same to remain non-active during the day, or while not controlling or guarding the lock, and without exhausting the spring tension; fourth, to render the winding and setting mechanism simple for operation and permanently connected, so that the winding and adjusting, for change of hours that the watch movement shall hold guard on the lock, can be quickly and easily performed by the attendant and without requiring particular attention to give the proper extent of winding, or obliging him to take notice on each of the

dials the exact hour to which he winds every night, nor to apply and remove a key at each operation; fifth, to provide a positive stop for the wind-up, so that the motor spring shall be wound fully and to uniform extent; and an attached key for each watch movement for winding and setting the mechanism; sixth, to afford a mechanism that operates without re-adjustment of the time setting devices for repeated intervals, so that ordinarily change of setting is required only on Saturdays and Mondays, and for holidays; seventh, to provide a simple means for guarding against "lock-outs" should the attendant fail to wind the spring, or in the event of the dent breaking or failing to properly act; eighth, to provide a simple means for arresting the time movement when the lock is released, and for holding the strain of the spring motor without strain on the draw-bar or guard devices.

I attain these objects by the mechanism constructed and organized for operation in the peculiar manner illustrated and explained, the particular subject matter claimed being hereinafter definitely specified.

In the drawings, Figure 1 is a front view of such parts of a time lock as will show the nature of my invention. Fig. 2 is a sectional view at line *x x* Fig. 1. Fig. 3 is a section through the winding key, the plate and dial. Fig. 4 shows the bottom and section of the winding key separate from other parts. Fig. 5 shows side and top views of the clutch hub, and Figs. 6 and 7 are diagrams illustrating the operation.

In Fig. 1 I have indicated the positions of three timing mechanisms, since it is in practice customary to employ a plurality of time keepers; but I have fully delineated only one set of said mechanisms and time dials. It will, however, be understood that each of the several indicated dials would in practice be suitably graduated the same as illustrated at the middle position; and that the several timing mechanisms and the winding and adjusting devices thereof would be, substantially, duplicates of the one fully illustrated and described.

Referring to parts, A denotes the stationary

front plate of the chronometer or time-keeping mechanism, and *a* its operative shaft or arbor, the end thereof projecting through and above said plate, as indicated. The chronometric mechanism consists of motor spring within the barrel *M* (see Fig. 2) for rotating the arbor, and regulated by any well known or suitable watch movement or train of gearing operated by the motor spring. The watch movement can be arranged substantially as heretofore employed in time-lock mechanisms, and being common and well known such time mechanism is not herein shown in detail. The arbor *a* is preferably the main winding arbor, but if in any instance desired the arbor *a* can be any convenient arbor in the clock train and the main spring arbor connected therewith by the operating gearing whereby equivalent rotative action is given to said operating arbor.

B indicates the draw-bar or guard-actuating slide, by means of which the locking and unlocking of the safe door are controlled directly or through suitable connections combined therewith. The connections, engaging dogs and door-bolts are not herein shown, as such parts can be of any suitable well known kind. For the purpose of this description it will be understood that when the bar *B* is advanced in the direction marked + the locking is effected; and when said bar is retracted in the direction marked - the unlocking is effected. A spring *B'* is provided for maintaining said lock-bar normally at advanced position.

C' indicates a clutch or hub rigidly fixed upon the arbor *a* and carrying a radial tooth, lug or pointer *C* that moves positively with the rotation of the arbor and serves as a wind-up stop.

D denotes the chronometrically graduated dial fixed upon the front plate *A* and over which said pointer travels. The dial has an ungraduated segment *x* as indicated; and its graduated part is in the present instance and preferably, divided into seventy two hours that being the extreme time limit for modern bank lock practice. The main spring of the time keeper is made to have a running tension somewhat in excess of seventy two hours.

F' indicates a permanently attached key for winding and setting. Said key is mounted loose upon the projecting end of the arbor *a* outside of and adjacent to the hub *C'*, and having at its inner end clutch devices or teeth that match into or engage with those on said hub and thereby normally clutching the parts together for simultaneous rotation. The winder-key has on its exterior a rigid projecting arm or detent *F* that constitutes the throw-off for the draw-bar; it being furnished with a lug or surface *e* that engages with the trip or shoulder *b* of the draw-bar *B* when said detent is moved to the position thereof by rotation of the arbor. The interior of the winding-key is chambered, as at *f*, and a coiled

wire spring *G* is arranged within said chamber about the arbor *a*. Said spring is confined in the chamber *f* by a cap nut *H* screwed onto the threaded outer end of the arbor. The exterior of the nut forms a bearing for the outer end of the key; one end of the spring *G* bears against the nut, the other end against a shoulder at the interior of the chamber and by its expansive force retains the key normally in clutch with the fixed hub *C*, while permitting disengagement by an outward pull on the key *F'* sufficient to overcome the power of the spring so that said winder-key can be quickly and conveniently adjusted or turned in either direction, forward or backward, and the throw-off detent re-set at any desired position in relation to the dial *D* and wind-up stop tooth *C*. The winding key *F'* is best provided with a cross handle or formed so that it can be readily grasped and moved by the hand of the operator. A stop-pin *I* is fixed in the plate *A* at the ungraduated segment *x* adjacent to the hub *C'*. Said stop-pin projects outward sufficiently far to engage both the tooth projection *C* and the throw-off detent *F*; the latter when it has retracted the draw-bar or lock-guarding dogs, said stop-pin being located substantially in line with the back position of the draw-bar trip *b*, as shown. The reciprocating draw-bar *B* is best disposed tangential to the circle of movement of the throw-off and tooth. Said bar is best provided with two shoulders or lugs *b b'*, or their equivalent for each timer; one, *b*, located in line with the throw-off, and the other, *b'*, in line with the tooth *C*, so that either the throw-off or the tooth can retract the draw-bar if swung around to engaging position. The stop-pin *I* can engage the tooth and also the throw-off arm or detent, and performs the triple function of stopping the winding up at the full tension of the main spring; of stopping the time movement when the draw-bar is thrown back by contact with the throw-off detent and holding the same during the day while the safe is unlocked, and of a stop for the tooth should the attendant fail to wind the main spring; but set the throw-off arm as usual, thus causing it to occupy a position back of the tooth. The detent *F* has the triple function of a throw-off for retracting the draw-bar; of pointing out the number of hours for which the mechanism is adjusted to guard the lock, and of a stop and holder for the timing mechanism while in contact with pin *I*. The tooth or projecting point *C* performs the triple function of indicating the extent to which the main spring is run down; of a positive stop for the wind-up in conjunction with the pin *I*, and of retracting the guard-bar and preventing lock outs in case of failure of the attendant to wind the spring.

The operation of my improved mechanism is as follows:—For winding the spring the operator takes hold of the key *F'*, turns it in

the direction of the arrow marked "wind" in Fig. 1, until the tooth C strikes the stop-pin I; the tooth then being at the graduation 72 on the dial. At this position the main-spring in the barrel M is fully wound up with a tension sufficient to run the timing movement for more than seventy two hours. (In practice a spring tension equal to about one hundred hours, more or less, is employed to afford an excess of reserved power, but only seventy two hours, commencing from the strong position of the spring, is utilized for the full operation of my mechanism.) The operator then draws forward the winding-key, thereby disengaging its clutch from the fixed hub C' of the arbor and then rotates said key about the arbor carrying the detent F to a position, or number on the dial, that corresponds to the number of hours hence at which it is desired the mechanism should unlock or relieve the bolts which hold the safe door; the key is then re-clutched in the hub at such position. The safe door then being closed and locked the draw-bar occupies the position shown in Fig. 1; the tooth and the throw-off detent also occupy the respective positions shown at the central dial on Fig. 1. The spring G holds the parts in mesh so that the key F' and detent F rotate with the arbor a of the time movement. (This at all times except when drawn out for resetting.) As the watch movement operates, the tooth and detent gradually move around the circle of the dial in the direction indicated by the arrow on the detent, or on Fig. 7, and the detent coming in contact with the shoulder b on the draw-bar at the predetermined time moves said draw-bar toward the sign — until the detent strikes the stop-pin I, at which position the draw-bar has relieved the bolts, or thrown off the guards or dogs which obstruct their unlocking. The further action of the time mechanism is arrested and held by the detent resting against the stop-pin, the parts then occupying the positions similar to that indicated at the right hand dial in Fig. 1, and by dotted line of the draw-bar. The parts remain in this position while the safe doors are unlocked or during the day. Then at the time for locking up, if the safe is to be opened at the same hour of the next day, the operator simply turns back the winding key bringing the tooth against the stop-pin without any attention to re-setting the throw-off detent. But if the safe is to be unlocked on the second day, then the throw-off detent is re-set at the position of the forty fourth hour, or such other hour as may be desired, by drawing outward the winding key and partially rotating the same on the arbor as above described. If by reason of inadvertence or carelessness the attendant should set the detent F without winding the spring, and the spring should become sufficiently run down so that the detent occupies a position relatively back of the tooth for instance, as shown in Fig. 6, then

before the motor-spring became fully exhausted the tooth C would travel round to the position indicated in Fig. 7; and said tooth coming in contact with the second lug or shoulder b' on the draw-bar would thereby force back the draw-bar and release the lock, (see Fig. 7) thus acting as a safety relief to prevent "lock-outs" by the running down of the chronometric mechanism; at the same time preventing entire running down of the spring by coming in contact with the stop-pin.

It may be noted that the tooth C never serves as a throw-off except under the abnormal conditions last above described; the principal functions of said tooth being the positive stop, the winding up movement, and as an indicating mark to show at what position the main spring has run down. It will also be noted that the winding up operation brings the tooth against the stop-pin. Consequently no attention has to be paid as to the extent to which the main spring is wound other than to bring up against the stop. As the spring runs down said tooth moves away from the stop-pin and not toward it.

I claim—

1. In a time-lock mechanism, the winding-key having the throw-off detent thereon, the internal chamber and the clutch devices on its end, in combination with the chronometric arbor having a clutch-hub fixed thereon, said winding-key being permanently mounted on said arbor and engaging said clutch, an expandible coiled spring disposed within said chamber and retained by a nut at the end of said arbor, and the lock-controlling bar with which said throw-off detent makes contact, substantially as set forth.

2. In a time-lock mechanism, the combination, substantially as described, of the lock-controlling bar, the chronometrically operated arbor having the clutch hub carrying a projecting tooth rigidly fixed thereon, the stationary dial concentric therewith, the stop-pin fixed in the front plate, the winding-key mounted loose on said arbor and normally clutched with said hub, and carrying a projection or detent that engages and moves said lock-controlling bar, and a yielding connection that permits the unclutching and re-adjustment of said winding-key relatively to the arbor and dial, for the purposes set forth.

3. The reciprocating lock-controlling draw-bar having the upper and lower lugs or shoulders b and b', in combination with the chronometric arbor, its motor spring, the clutch hub fixed on said arbor and carrying the tooth or projecting point in line with said shoulder b', the winding-key mounted on said arbor normally in clutch with said fixed hub and carrying the throw-off detent in line with the shoulder b, and the stop-pin fixed in the front plate or dial at a position corresponding to the back limit of the unlocking movement, substantially as and for the purpose set forth.

4. The combination of the chronometrically
actuated arbor *a*, the clutch hub fixed there-
on and carrying the projecting tooth, the
winding-key carrying the throw-off detent,
5 the coil spring within the winding-key, the
cap-nut threaded to the end of the arbor and
sustaining said spring, the fixed stop-pin and
the draw-bar having two shoulders thereon,

all substantially as and for the purposes set
forth.

Witness my hand this 14th day of April, 10
A. D. 1893.

IRA G. BLAKE.

Witnesses:

CHAS. H. BURLEIGH,
ELLA P. BLENUS.