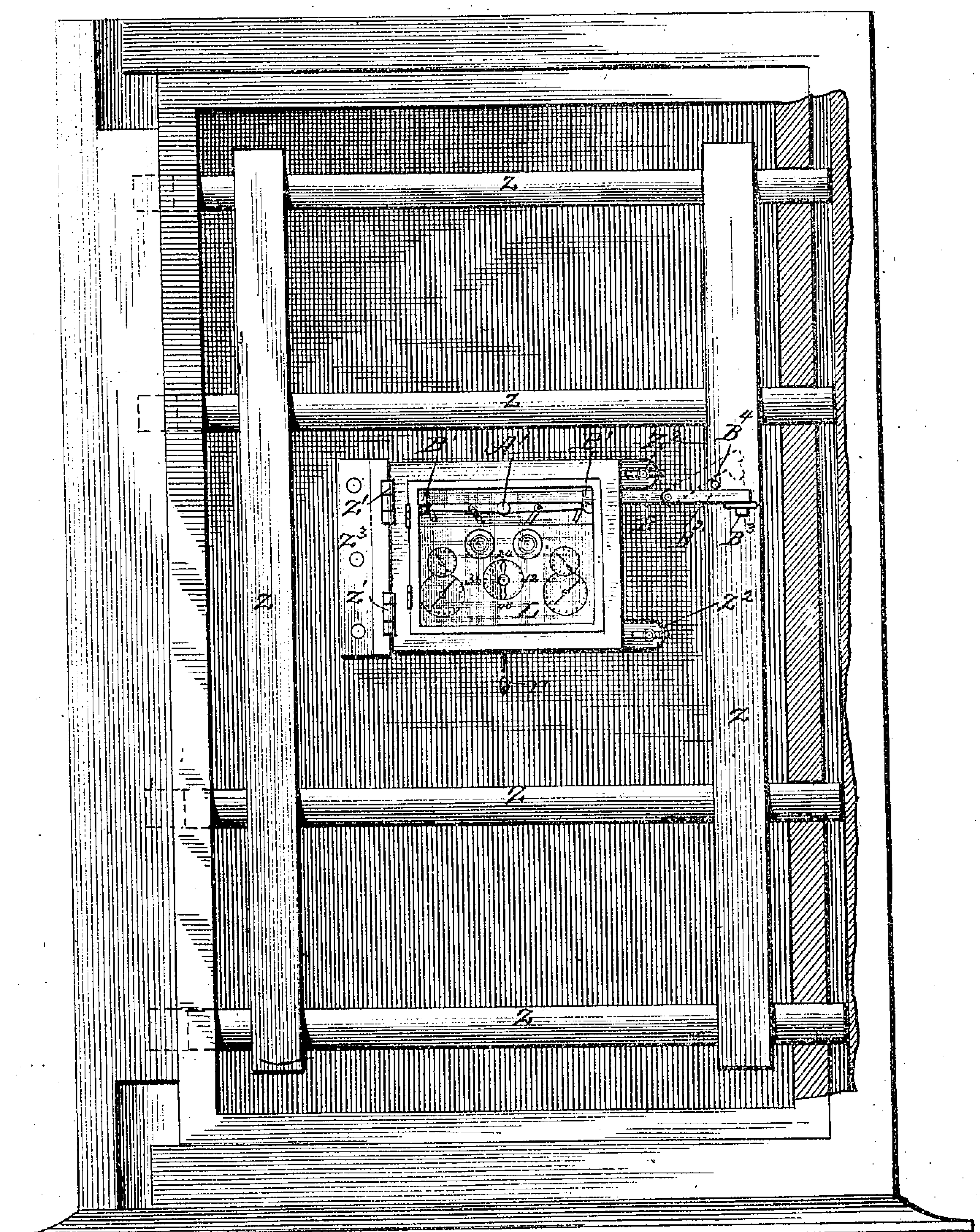
(Model.) 5 Sheets—Sheet 1.

C. F. MYERS.

TIME LOCK.

No. 428,852. Patented May 27, 1890.

Fig 1.



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Edw. W. Byrn.

INVENTOR:

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BY *Munn & Co*

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(Model.) 5 Sheets—Sheet 2.

C. F. MYERS.

TIME LOCK.

No. 428,852. Patented May 27, 1890.

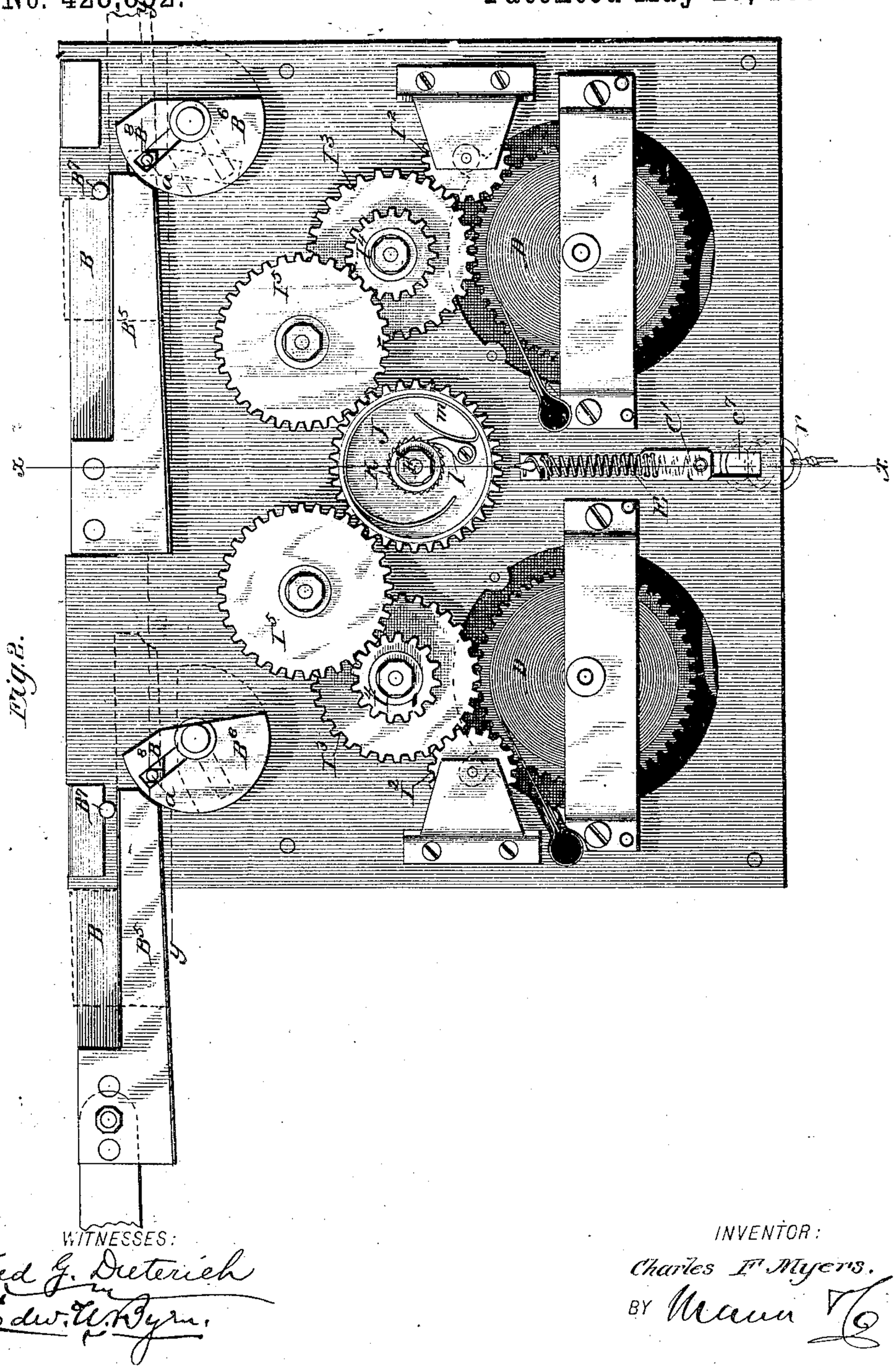

Fig. 2.

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TIME LOCK.

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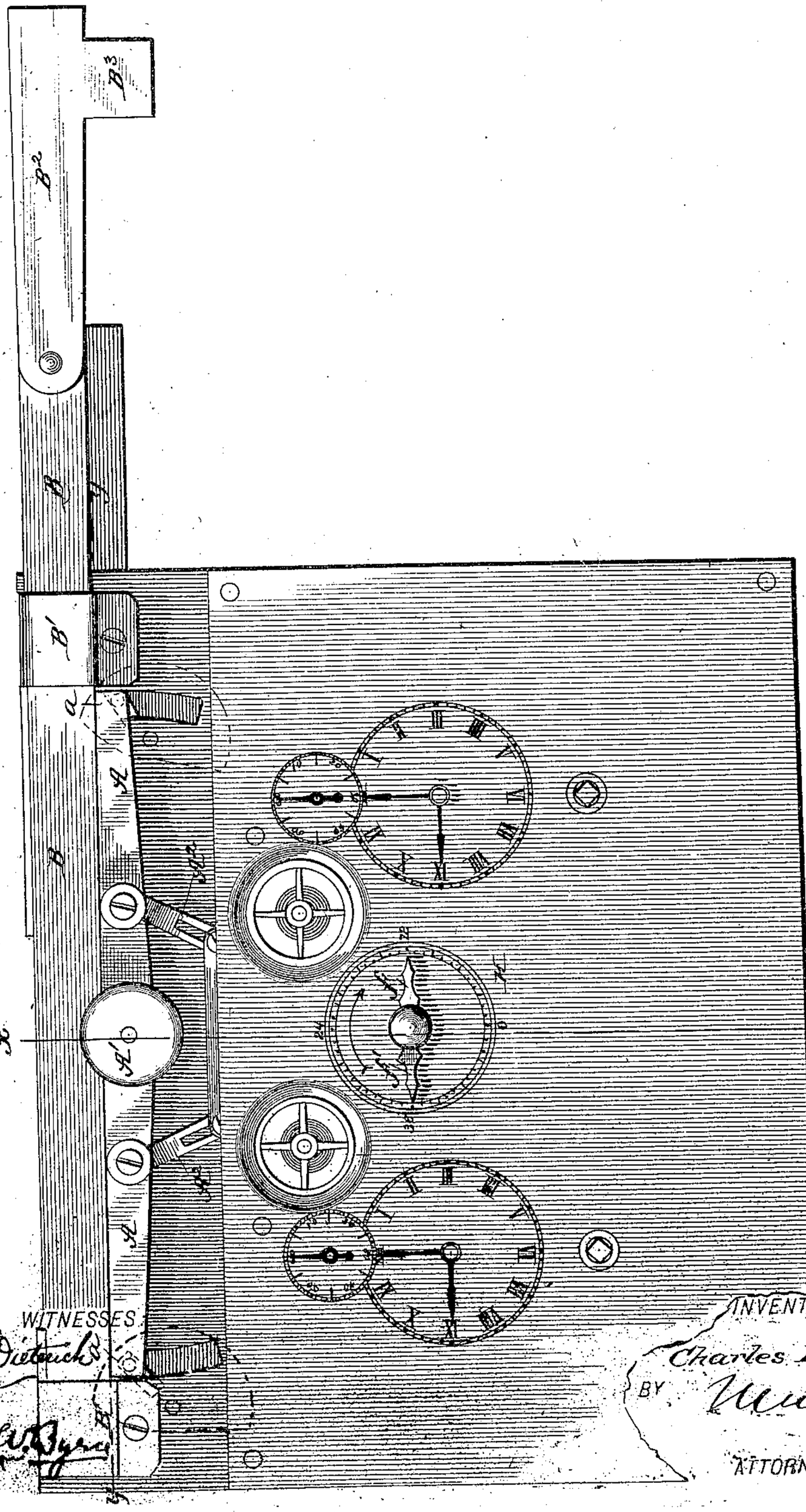

Fig. 3.

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(Model.)

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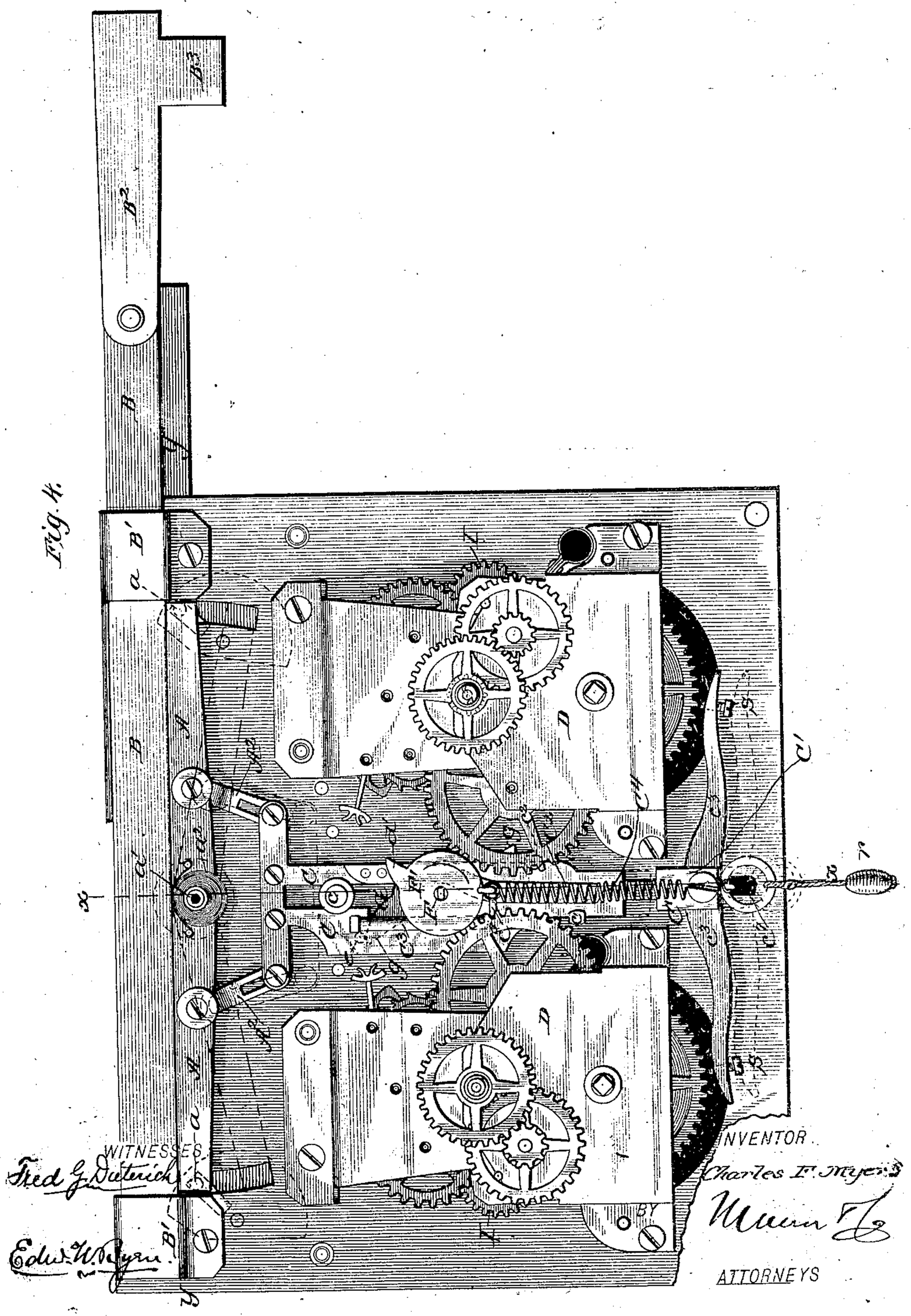
TIME LOCK.

No. 428,852. Patented May 27, 1890.

Fig. 4.



(Model.)

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C. F. MYERS.

TIME LOCK.

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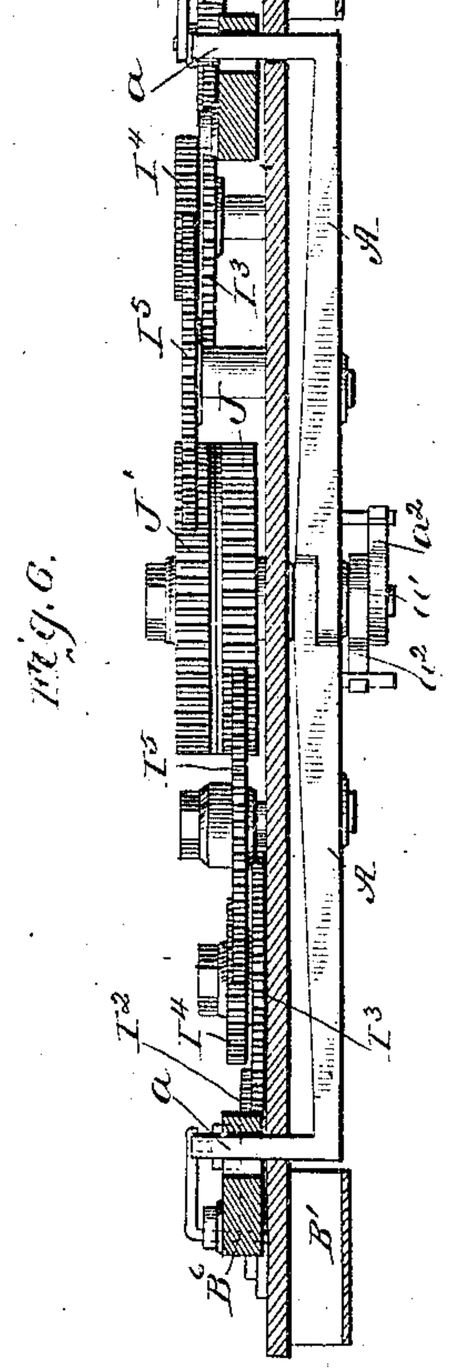

Fig. 6.

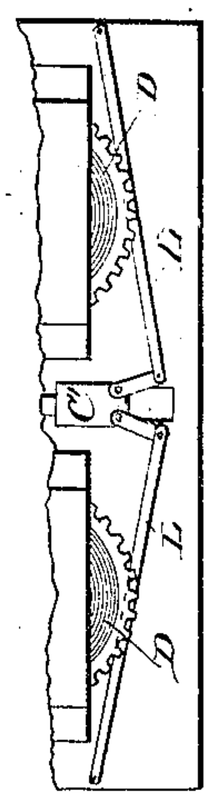

Fig. 7.

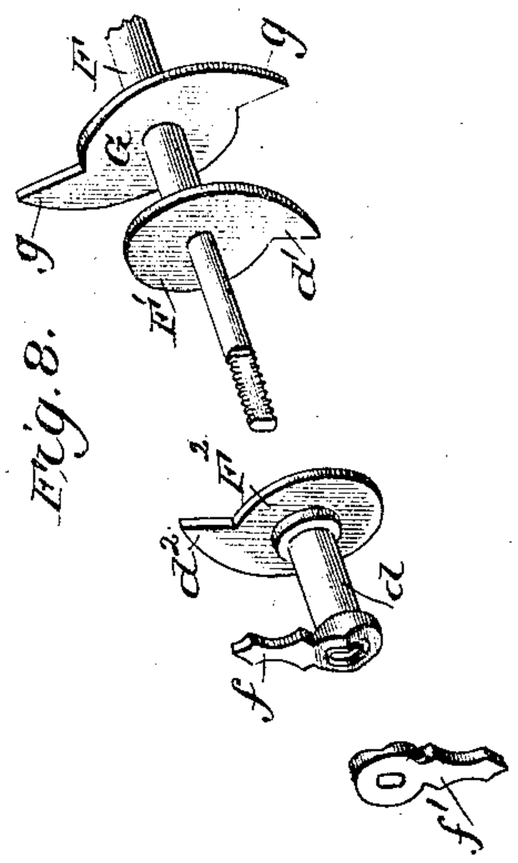

Fig. 8.

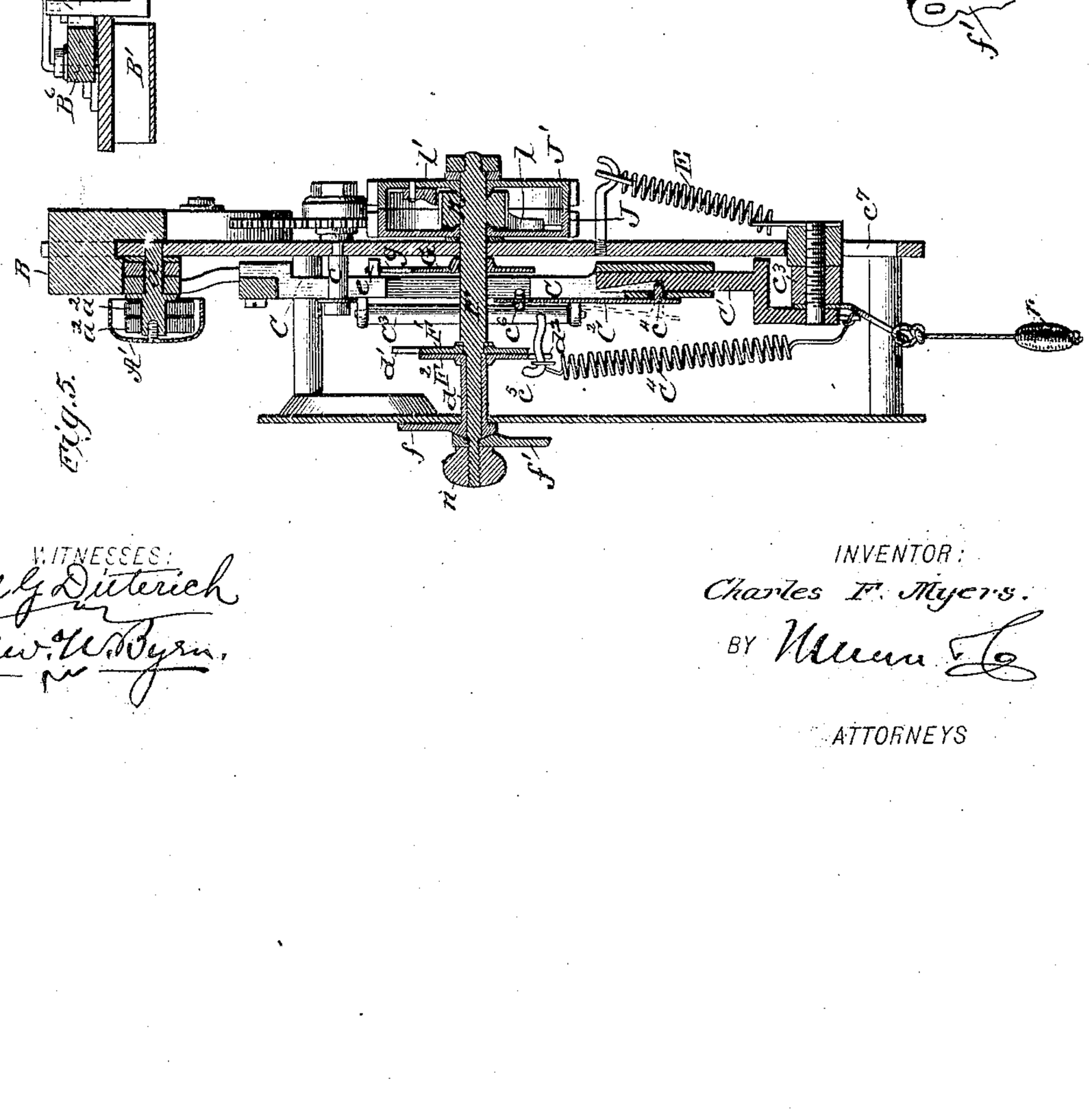

Fig. 5.

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UNITED STATES PATENT OFFICE.

CHARLES F. MYERS, OF McKINSTRY'S MILLS, MARYLAND.

TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 428,852, dated May 27, 1890.

Application filed September 16, 1889. Serial No. 324,157. (Model.)

To all whom it may concern:

Be it known that I, CHARLES F. MYERS, of McKinstry's Mills, in the county of Carroll and State of Maryland, have invented a new and useful Improvement in Time-Locks, of which the following is a specification.

The general objects of my invention are to provide a time-lock for the doors of safes, vaults, and strong rooms, which shall preclude the opening of the door at all times except during the intervals for which it may be set to open.

The specific objects are to provide for the accidental derangement of the time mechanism by providing two sets of mechanism operating in unison or independently of each other, to provide for the automatic unlocking of the time mechanism when from oversight or accident it may be allowed to run down, and to provide for the automatic unlocking of the time mechanism in the event of the breaking of the mainspring or other operative part of the time mechanism.

My invention consists in the peculiar construction and arrangement of the various parts of the time-lock, which I will now proceed to more particularly describe with reference to the drawings, in which—

Figure 1 is an inside view of a safe-door, showing my time-lock applied to the bolt-work. Fig. 2 is a rear view of my time-lock mechanism on an enlarged scale and in the locked position. Fig. 3 is a front view of the same. Fig. 4 is a front view of the same with the front frame-plate removed. Fig. 5 is a vertical section through lines *x x* of Figs. 2, 3, and 4. Fig. 6 is a horizontal section through lines *y y* of the same figures. Figs. 7 and 8 are details.

Referring to Fig. 1, Z represents the bolt-work, which is arranged in the door as usual, and is thrown forward to lock the door or drawn back to open it by means of a knob or handle, in the usual way.

L is my time-lock, which has at its upper end a horizontally-arranged locking-bar B, sliding in guides or keepers B′ B′ on the frame-plate. This locking-bar has at its outer end a pivoted or jointed locking-latch B^2, which is provided with a lug or right-angular extension B^3 near its end, which is arranged to drop through a staple or recess in the bolt-work. When this bolt-work is projected to the right to lock the safe-door, and the locking-bar is also projected to the right and locked by the time mechanism, and the pivoted locking-latch B^2 is in its horizontal position, with its lug dropped through the staple of the bolt-work, it will be seen that it is absolutely impossible to throw back the bolt-work until the bar B is released by the time mechanism.

The object of the pivoted latch B^2 is to permit the locking-bar to be disconnected from the bolt-work when it is desired to do so, and for which purpose the locking-latch is raised out of the staple of the bolt-work. A pin B^4 serves to hold the locking-latch against rising when the bolt-work and latch are connected, and when the parts are to be disconnected the pin is withdrawn and the latch raised and pin reinserted just beneath the latch, so as to hold the latch in elevated position, as in dotted lines, Fig. 1.

I will now proceed to describe how the locking-bar B is locked and unlocked by the time mechanism. On the rear side of the frame-plate and rigidly attached to the locking-bar B (see Fig. 2) there are arranged two horizontal abutment-arms B^5 B^5, which slide over or abut against the two segmental tumblers B^6 B^6, which are pivoted to the back side of the frame-plate. When these tumblers are in the position shown, the arms B^5 abut against these tumblers and the locking-bar B cannot be withdrawn, but when the tumblers are turned on their pivots, as shown in dotted lines, the abutment-arms pass freely over the tops of these tumblers and leave the bar B free to be withdrawn. Each abutment-arm moves beneath a stationary pin or lug B^7 on the frame-plate, which pin or lug serves to prevent the abutment-arm from springing up when locked by the tumbler in case an attempt should be made to force back the locking-bar. It is the office of the time mechanism to adjust these tumblers so as turn the tumblers out of range of the abutment-arms, and for this purpose each tumbler has a slot B^8, in which plays a pin *a*, which is attached to the end of a lever A on the front side of the back plate, and which pin extends at right angles through the same. (See Figs. 4 and 6.) Each lever A is fulcrumed upon a common

pin a' in the middle, and is held up into a parallel position against the locking-bar B by a separate coil-spring a^2 and a^2, one end of each of which springs is attached to the fulcrum-pin and the other end to a stud on the lever. The two levers A A are respectively connected to the cross-head of a vertical slide C C′ by means of independent link-bars A^2 A^2, which have a slotted connection with said cross-head, so that levers A can move up and down about their common fulcrum without reference to their connection to the cross-head of the slide, the object of which will be explained farther along.

A′, Figs. 3 and 5, is a protecting cap, which is screwed to the fulcrum-pin of the levers A for the purpose of covering and protecting the springs a^2.

The slide C C′ is made in two parts. The upper part C bears the cross-head connecting with the links, and is formed with a vertical slot, and is guided in its vertical movement by a stud c, projecting through the slot, and pins c' c^2 near its lower end projecting from the back plate. The lower part C′ of the slide fits in a groove at the lower end of C, (see Fig. 5,) and said lower part of the slide has at its lower end a T-shaped head, consisting of arms c^3 c^3, Fig. 4, projecting horizontally from opposite sides of the same into range of engagement with the mainspring of the clock-movements D D, disposed on opposite sides of the central slide C C′. These arms c^3 of the slide are designed to be struck by the expanded clock-spring when run down or broken, and furnish the means for automatically unlocking the time-lock mechanism whenever such contingency occurs. The upper section C of the slide bears a spring-bar C^2, Fig. 5, with a stud c^4 (see Fig. 5) on its inner side, which passes through a hole in the slide C, and is adapted to catch against the end of lower section C′ of the slide. The upper section C also carries a vertical rock-shaft C^3, which has (see Figs. 4 and 5) a horizontally-projecting arm c^5, extending outwardly, and also another horizontally-projecting arm c^6, which lies beneath the spring-bar C^2, and is adapted to pull out the spring-bar and take its stud c^4 away from the end of the lower section whenever the rock-shaft is turned from right to left. The arm c^5 of the rock-shaft is connected by a spiral spring C^4 with the T-headed section of the slide C′, whereby the two sections C and C′ of the slide are held together with an elastic tension. The T-head of this section C′ is guided in a vertical slot c^7, Figs. 2 and 5, in the back plate, and on the rear side of the back plate (see Figs. 2 and 5) is connected to a spiral spring E, which is anchored at its upper end to the back plate, and the tension of which spring serves to hold both the slide-sections C C′ and the arms A A up in the locked position. When either mainspring breaks and its coils expand, or when either or both coils expand from running down, said coils strike against the arm or arms c^3 and force both the lower slide-section C′ and the upper slide-section C down together (see dotted lines Fig. 4) against the tension of the spiral spring E on the back, and the links or pull-bars A^2 A^2 are made to pull down the levers A A and turn the tumblers out of the way of locking-bar, so that it can be withdrawn.

I will now proceed to describe how the time mechanism is made to effect the unlocking and resetting, and how it may be set to unlock at any stated time. F is a central shaft which passes through the slot of the upper slide-section C and has a bearing in the front and back frame-plates. This shaft is rotated by either or both of the time mechanisms once in forty-eight hours through gears on the rear of the back plate, which will be hereinafter described, and the revolution of this shaft is made to lock and unlock the time mechanism and also set it to unlock at any desired time in the following manner: On the shaft F (see Figs. 4 and 5) is rigidly attached a disk F′, bearing a tripping-tooth d', and also a disk F^2, bearing a tripping-tooth d^2. In the place of these disks with a single tooth tappet-arms may be used. The disk F^2 is rigidly connected to the shaft, but for purposes of adjustment is mounted upon the inner end of a sleeve d, which encompasses shaft F. These two disks are arranged in a plane to strike with their teeth the horizontal tripping-arm c^5 of the rock-shaft C^3, and the teeth of these disks are arranged at diametrically-opposite sides of the shaft, so that as the shaft revolves once in forty-eight hours the teeth of the two disks will successively strike the tripping-arm c^5 once every twenty-four hours, or once every day, to open the time-lock. The shaft F, with these disks, revolves in the direction of the arrow, and when either of the teeth of said disks strikes the tripping-arm c^5 it turns the rock-shaft C^3 about its axis, and the other arm of the rock-shaft (see Figs. 4 and 5) presses forward the spring-bar C^2 and pulls its pin c^4 away from the top end of lower section C′ of the slide, and the upper section C of the slide being now free to move down from tension of the spring C^4 and also from gravity it drops down and through the slotted links pulls down levers A A and opens the locking-bar, as before described.

For automatically resetting the time-lock, the shaft F has back of the slide-section C a disk G, rigidly attached thereto and provided at diametrically-opposite points with wiper-cams g g, which successively strike once in twenty-four hours a stud e on the rear side of the slide C, and again raises said slide to its set position—*i. e.*, to a position where the pin c^4 on spring-bar C^2 drops over the top end of lower slide-section C′.

To reduce friction, the stud e of the slide C should have an anti-friction roller on it where the wiper-cams bear against it. In this connection the function of the slots in the link-bars A^2 and the springs a^2 of the levers A A

may be understood. Their purpose is to permit the time mechanism to reset the tripping devices, even while the locking-bar is unlocked, for when the levers A A are down and the locking-bar is thrown back the slots in the link-bars permit the slide-section C to be raised by the resetting mechanism to its set position any time in the day. Afterward, when the locking-bar is thrown forward to lock the safe, just as soon as the tumblers are freed from the arms of the bar the springs a^2 of the levers A A throw up said levers and turn the tumblers into the locked position independently of the setting devices.

I will now describe the means for setting the time mechanism to open at any number of hours ahead. For this purpose the shaft F, sleeve *d*, and the two disks F′ F², with their diametrically-arranged teeth, may be regarded as one device moving together. On the front side of the front frame-plate is arranged a dial H, Fig. 3, consisting of forty-eight subdivisions, each representing an hour. The zero-point *o* corresponds exactly to the position of the rock-shaft arm c^5 in the rear. The shaft F has also on this dial (see Fig. 5) an index-hand *f*′, corresponding in its radial position to the radial position of the tooth d^2 of disk F², and the sleeve *d* has also an index-hand *f* on the dial, which index-hand *f* corresponds in its radial position to the radial position of the tooth *d*′ of disk F′. It will therefore be perceived that the relation of the two index-hands *f* and *f*′ to the zero-point of the dial is an exact counterpart of the relation of the tripping-teeth of the two disks to the tripping-arm of the rock-shaft. It being remembered that the index-hands and shaft revolve once in forty-eight hours and that there are forty-eight subdivisions on the dial, the index-hand approaching the zero-point will mark between it and the zero-point the number of hours in the future from the present time that will have to elapse before the disk-tooth representing that index-hand will trip the mechanism and open the lock. Thus, if the present time be nine o'clock at night, as indicated by the two time-clocks in Fig. 3, and it is desired to have the time-lock open at nine o'clock next morning, the following is the method of adjustment: The intervening hours being computed are found to be twelve. One of index-hands *f* or *f*′ (whichever is in rear of the twelfth mark, since the hands are not adapted to move backward) is turned forward until it rests upon the mark 12, which means that the tooth of the disk in the rear is just the same time distant from the tripping-arm of the rock-shaft, and when the twelve hours shall have elapsed the rock-shaft arm will be tripped and the time-lock opened.

The purpose in making the shaft F and dial represent forty-eight hours is to make the lock mechanism capable of being set for a longer period than one day, so as to cover Sunday or a holiday. When this extra long-time adjustment is to be made, the sleeve *d*, with its disk F² and index-hand *f*, is given an adjustment into perfect coincidence with the disk F′ and index-hand *f*′—*i. e.*, one index-hand is turned directly over the other, which causes the teeth of the two disks to also come into exact coincidence. Now, as the revolution of the shaft is once only in forty-eight hours, it will be seen that the time-lock will be tripped only once in forty-eight hours, and may be set for a forty-eight-hour interval before opening.

For connecting the sleeve *d* and shaft F together so as to revolve as one, the end of the shaft is flattened to receive a similar-shaped opening of the index-hand, (see Fig. 8,) and the hub of this hand has a clutch-face that is rigidly connected by nut *n* to the hub of the other hand and its attached sleeve and disk.

I will now proceed to describe how the two clock-movements D D are made to rotate (either independently or conjointly) the shaft F once in forty-eight hours. In each clock, movement I place a gear-wheel I, Fig. 4, which meshes with the main gear-wheel on the winding-shaft of the movement. This gear-wheel is rigid on a shaft that on the rear side of the back frame-plate carries a rigid gear-wheel I². (See Fig. 2.) This gear-wheel I² meshes with a larger gear-wheel I³, which is fast on a sleeve with a small gear-wheel I⁴. Gear-wheel I⁴ meshes with another larger gear-wheel I⁵. A similar train of gears extends from both clock-movements, and their final wheels I⁵ I⁵ connect with a compound differentiating-wheel J J′, which is hung loosely on the shaft F, and through which gears and compound wheel the shaft F is rotated once in forty-eight hours, and through which also the two clock-movements act in unison to rotate it in the same direction, or either movement serves to rotate it in case the other becomes inoperative. This compound differentiating-wheel is made of two parts J J′, hollowed out and facing each other with their hollow sides. One of these wheel-sections J rests in the plane of the last wheel I⁵ of the train from one clock-movement, and the other wheel-section J′ rests in the plane of the last wheel I⁵ of the train from the other clock-movement.

Within the chamber formed by the hollow wheel-sections there is arranged a ratchet-wheel K, Figs. 2 and 5, which is fast on the shaft F and has forty-eight teeth.

Each wheel-section has within its chamber a pawl *l* and *l*′, which are respectively forced by springs *m m*′ into engagement with the ratchet-wheel K. Now, when both wheel-sections of the compound wheel are turned in the same direction both pawls engage the ratchet-wheel and turn in unison the shaft F; but if one clock-movement becomes inoperative that does not lock or interfere with the rotation of shaft F, but the wheel-section of that inoperative side simply stands still and its

pawl drags over the ratchet-teeth, while the other active wheel-section, with its pawl, is acting upon and turning the shaft F. In this way a safeguard is provided for accident to one of the movements and assurance is rendered doubly sure.

In order to set the tripping devices of the slide C C′ by hand, a cord (or rod) with a loop or pull-knob *r* is connected to the lower slide-section C′ and extends through the inclosing-case into easy access. By pulling down this knob the lower section of the slide is brought down and is caught beneath the stud of the spring-bar on the upper slide-section to set the devices.

In adjusting the size of the gear-wheels of the clock-movements and the distance between the arms of the T-shaped slide and the mainsprings, this is so regulated that the clock-movement will strike the arms of the T-head at the expiration of seventy-two hours instead of the full time for which the movement is designed to run, and by this means the clock mechanism will always be actuated by the first part of the tension of the mainspring and will not be liable to lose time, as it might through the last part of the relaxed condition of the spring.

For inclosing the time mechanism any suitable case may be employed, as shown in Fig. 1, and this case is provided with bolts, nuts z^2, (with rubber washers,) and flanges for bolting it to a heavy cold-chilled plate that acts as a protection to the front of the time mechanism.

A suitable stay, shoulder, or abutment z^3 is provided at the end of the lock to resist a strain from a back-thrust of the bolt-work. The case is hinged at z' to this abutment and opens like a door.

In constructing the arms A A they are made heavy and drop from gravity to open the lock in case the coil-springs at their fulcrum give way. Furthermore, if the spring E should break, the lock will also open, as the slide-section would in that case drop from gravity.

Instead of using a T-head on the lower slide-section C′ for the mainsprings to strike against in opening the time-lock, levers L L (see Fig. 7) may be pivoted to the case and also to the slide-section C′, so as to be acted upon by the springs.

To provide for the tripping of the mechanism at an earlier or later period by the expansion of the mainsprings of the clock mechanism, a set-screw *s* may be placed in the ends of the arms of the T-head, (or the levers of Fig. 7,) by turning which set-screws up or down the spring is made to strike them at an earlier or later period.

Having thus described my invention, what I claim as new is—

1. The combination, with the bolt-work of a safe-door and a time-lock having a sliding locking-bar, of a pivoted latch jointed to the locking-bar and arranged to be connected to or disconnected from the bolt-work, substantially as shown and described.

2. The combination of the locking-bar B, having one or more locking-arms B^3, one or more segmental tumblers B^6, with slots B^5, one or more levers A, loosely connected to the tumblers, means for pulling down said lever to open the lock, and a time mechanism for operating the same, substantially as shown and described.

3. The combination of the locking-bar B, having one or more locking-arms B^3, one or more segmental tumblers B^6, with slots B^5, one or more levers A, with spring for holding it up, and a stud playing in the slot of the tumbler, means for pulling down said lever, and a time mechanism for operating the same, substantially as shown and described.

4. The combination of the locking-bar B, having two locking-arms B^3 B^3, two segmental tumblers B^6 B^6, with slots B^5, the two levers A A, pivoted upon a common fulcrum at their inner ends and having their outer ends provided with studs working in the slots of the tumblers, springs for holding up these levers, a slide for pulling down these levers, and a time mechanism arranged upon each side of said slide, substantially as shown and described.

5. The combination, with the locking-bar B and the means for locking it against withdrawal, of a time-lock tripping and setting mechanism having a loose connection with the locking mechanism for the locking-bar, whereby the tripping mechanism may be reset while the locking-bar is withdrawn or unlocked, substantially as described.

6. The combination, with the locking-bar, the locking devices for the same, and the time mechanism for operating them, of an arm or lever connected to the locking devices and arranged in relation to the mainspring of the time mechanism, to be struck by the expansion of the same to open the time-lock in case the spring becomes broken or run down, as described.

7. The combination of the locking-bar B, having one or more arms B^3, the segmental tumblers B^6, one or more levers A, loosely connected to said tumblers, and one or more link-bars connected to said lever, a slide connected to said link and made in two parts held together by a spring, and provided with a setting device and tripping device, substantially as shown and described.

8. The combination of slide-section C, having spring-bar C^2 with setting-stud c^4, and also rock-shaft C^3 with arms c^5 and c^6, the lower slide-section C′, and tripping devices for the two sections of the slide, a time mechanism for operating the tripping devices, and a locking-bar arranged to be released by the tripping of the slide, substantially as shown and described.

9. The combination of the locking-bar B,

tumblers for locking it, levers A, attached links A^2, and a compound slide for unlocking bar B, consisting of parts C and C′, held together by a spring, the upper slide-section being provided with a spring-set stud and a rock-shaft with tripping-arms, a time mechanism for operating the trip-arms, and a lift-spring E for the compound slide, substantially as shown and described.

10. The combination, with the locking mechanism, the set mechanism, and the time-movement, of a special dial H, and a trip mechanism for the set mechanism, consisting of a shaft F, operated by the time-movement and bearing a disk with a tripping-tooth, and also an index-hand sustaining the same radial position to the zero-point of the dial as the tripping-tooth does to the set mechanism, substantially as described.

11. The combination of a dial having forty-eight subdivisions, or subdivisions which are multiples of the hours of a day, a shaft F, having two disks with tripping teeth or arms and corresponding index-hands, one index-hand and toothed disk or arm being made adjustable with reference to the other toothed disk and index-hand, substantially as shown and described.

12. The combination, in a time-lock, with a dial graduated into multiples of twenty-four, of an independent index-hand with a corresponding tripping device for each multiple of twenty-four, substantially as and for the purpose described.

13. The combination, with the compound slide C C′, carrying a spring and a setting device, and means for connecting it to the locking-bolt, as described, of a shaft F, bearing both a tripping device and a lifting-cam for raising and resetting the upper section of the slide, substantially as shown and described.

14. In a time-lock having a double time-movement, the combination, with said time-movement and the tripping devices, of an independent train of gears from each time-movement to the tripping devices, and a compound gear-wheel connecting the time-movements with the tripping devices for conjoint or independent action, substantially as shown and described.

15. The compound wheel consisting of two hollow loose toothed gears J J′, a shaft F, bearing the tripping devices and also a rigid ratchet-wheel within the hollow gears, and spring-pawls connecting the sections of the compound wheel to the ratchet, in combination with the two independent time-movements and the tripping devices, substantially as shown and described.

CHARLES F. MYERS.

Witnesses:
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JOHN F. KERFARVER.