

C. E. CHINNOCK.
Time-Lock.

No. 213,809.

Patented April 1, 1879.

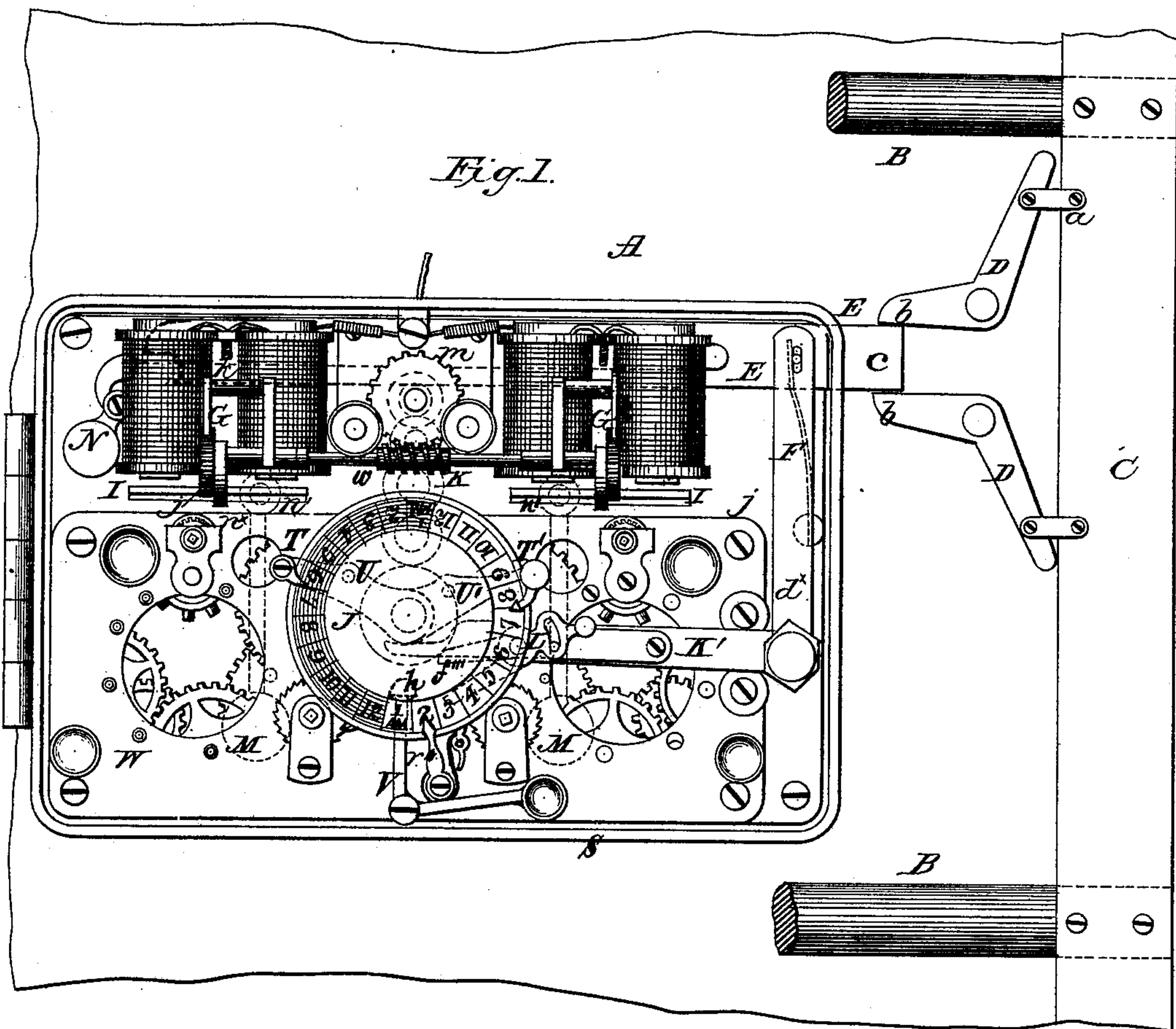


Fig. 2.

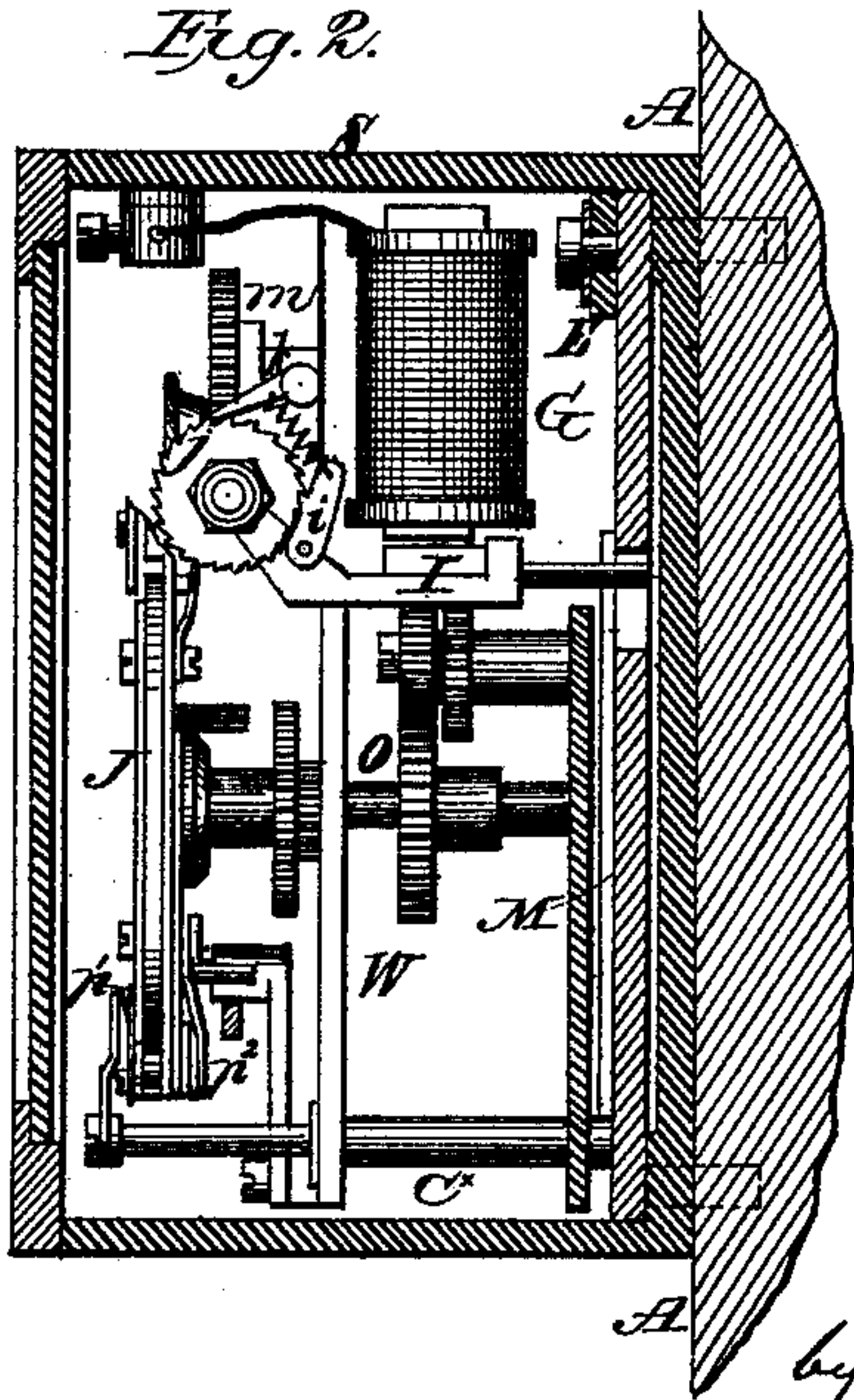
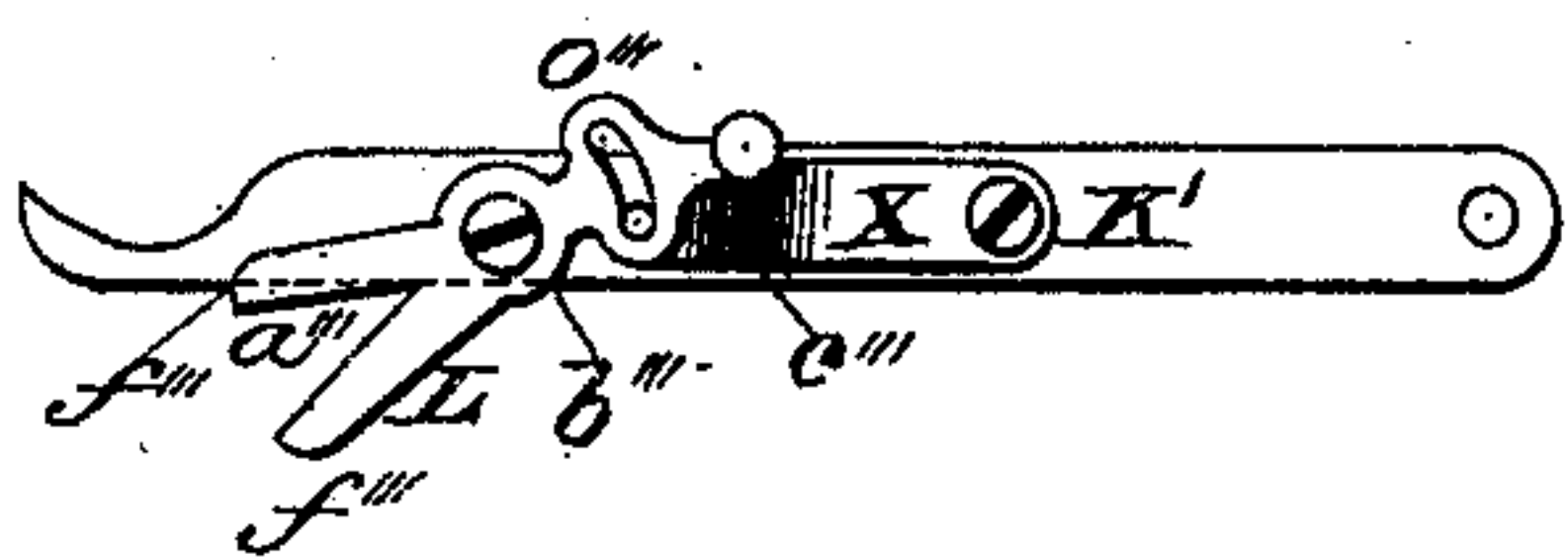


Fig. 3.



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Inventor:

Charles E. Chincock,
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Fig. 4.

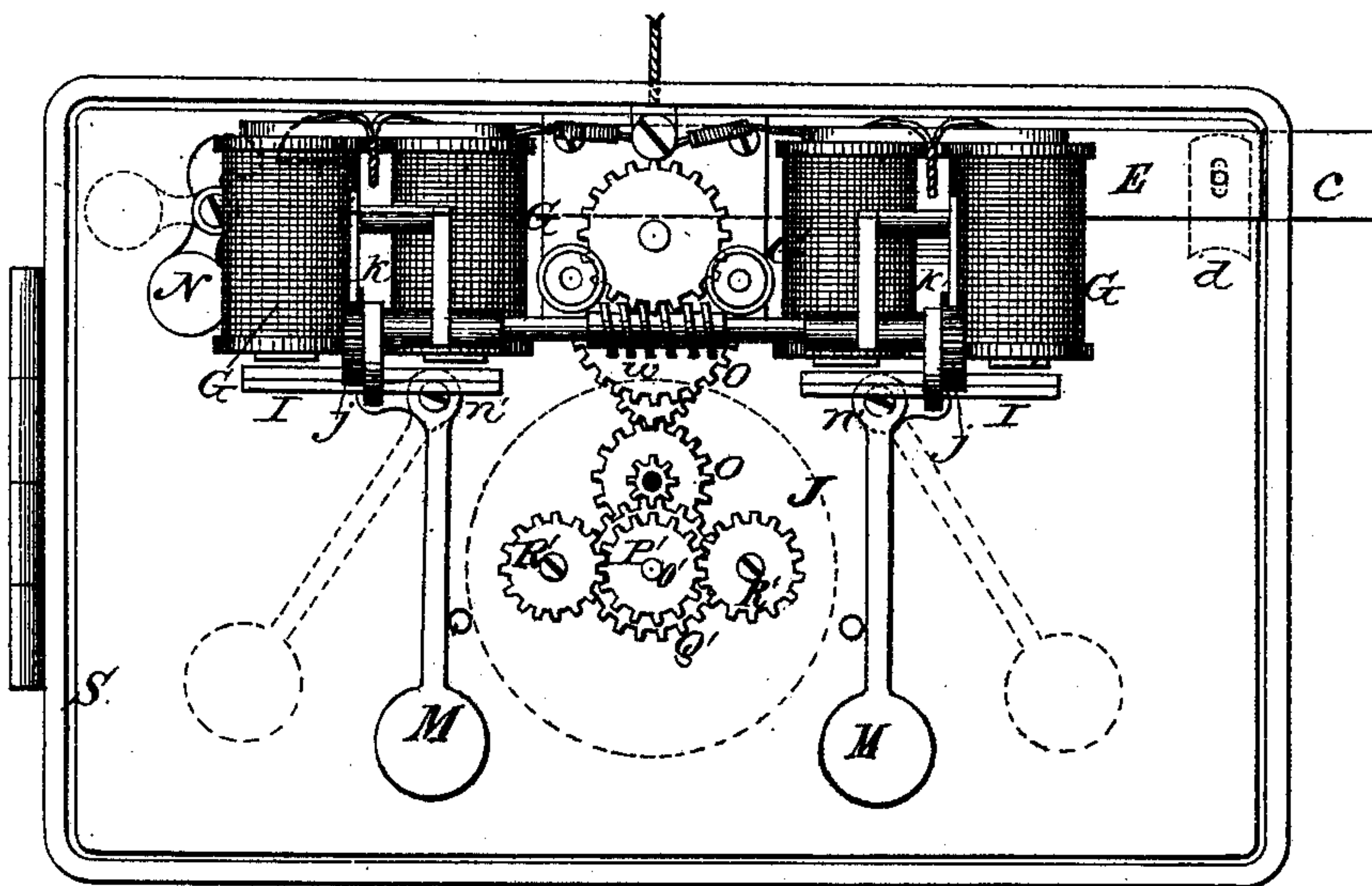


Fig. 6.

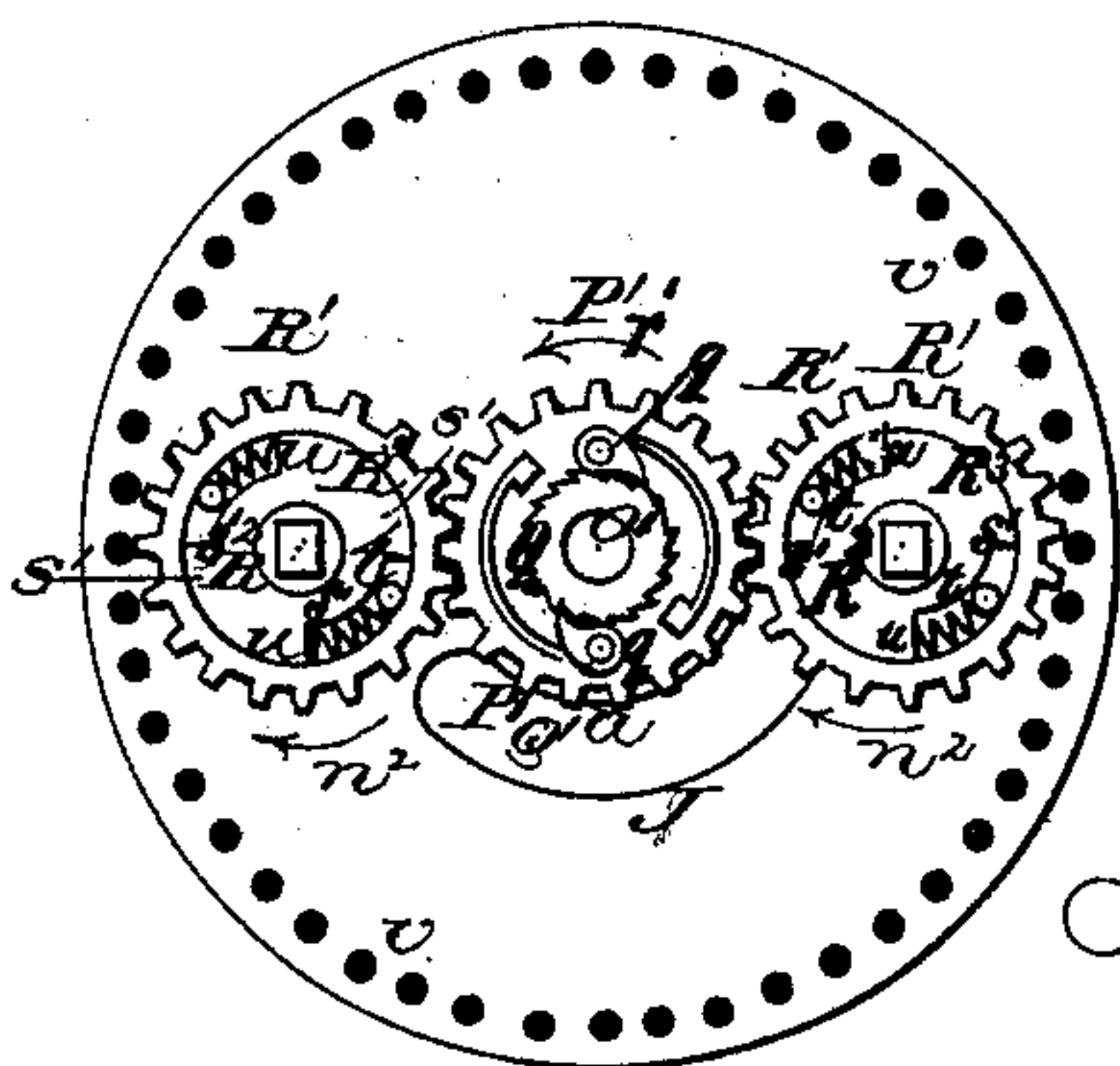


Fig. 7.

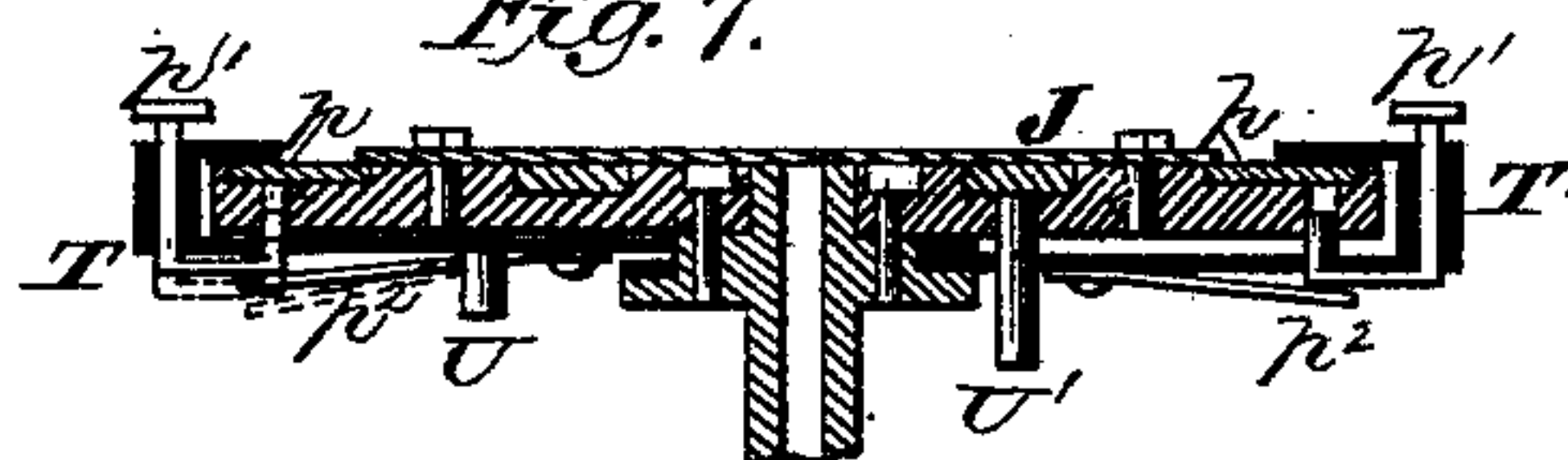
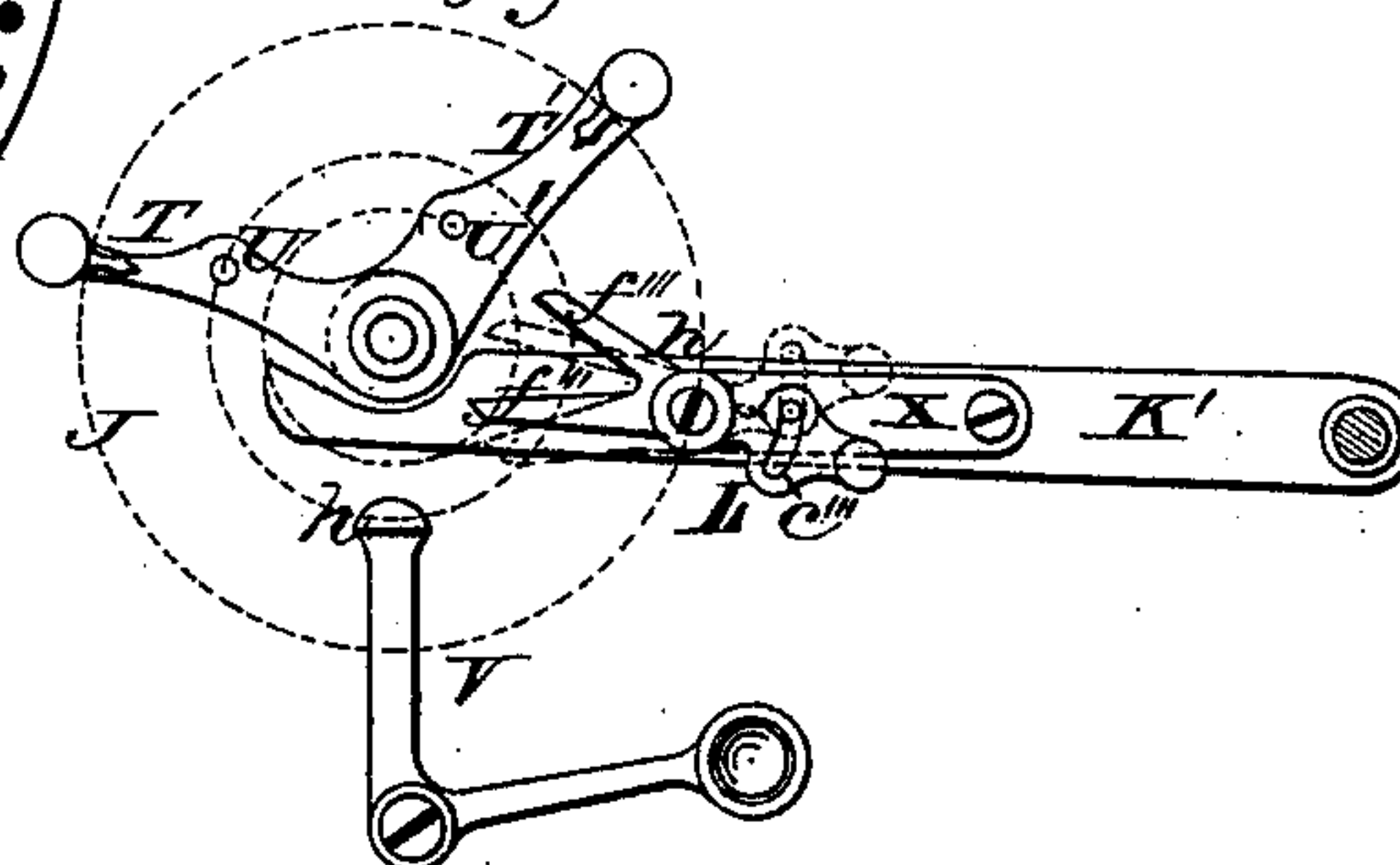


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES E. CHINNOCK, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN TIME-LOCKS.

Specification forming part of Letters Patent No. **213,809**, dated April 1, 1879; application filed May 10, 1876.

To all whom it may concern:

Be it known that I, CHARLES E. CHINNOCK, of the city of Brooklyn, Kings county, and State of New York, have invented certain new and useful Improvements in Locks, of which the following is a specification:

My improvements relate to the kind of locks known as "time-locks," wherein time-measuring mechanism is employed to automatically secure and release bolt-work or other devices from the inside of a safe, vault, or other article.

Ordinarily the time-measuring mechanism consists of clock-work operated by mechanical force produced by a spring or weight, and termed by me herein a "mechanical time-piece;" and in the event of the breakage or stoppage of such mechanical time-piece while the safe is closed, it has sometimes been necessary, in order to obtain access to the safe, to force the door open. Several days would then be required to repair the damage, and during that time the safe or other article would be useless.

The object of one of my improvements is to provide for a time-lock a simple time-measuring mechanism, which may be operated by electricity generated from outside the safe, but cannot otherwise be controlled in its operation outside the safe, and such a mechanism as may be used alone or in connection with a mechanical time-piece.

This improvement consists in the combination of a block or dog, an electro-magnetic engine, means for transmitting therefrom motion to a train of wheel-work, by which it is imparted to devices controlling the block or dog, many successive movements of the electro-magnetic engine being requisite to affect the block or dog, and a considerable amount of time being occupied in so doing.

Another improvement consists in the combination, in a time-lock, of a block or dog, an electro-magnetic engine, and a governor for regulating the speed of the electro-magnetic engine, so that the latter will not run too rapidly.

When combined with the ordinary mechanical time-piece the electro-magnetic engine need only be put in operation on the stoppage of such time-piece, and to complete the duty thereof; and inasmuch as it will not release

the bolt-work more rapidly than the time-piece would have done, it will not prove of assistance to any one desiring to surreptitiously open the safe.

A lock embodying an electro-magnetic engine and governor may be employed to secure the bolt-work of a safe for any length of time, such as a number of consecutive days, if desirable.

Another of my improvements consists in the combination, in a time-lock, of a block or dog, a mechanical time-piece, an electro-magnetic engine, (preferably a governor of the kind above referred to,) a dial, and a connection between the dial and the mechanical time-piece, and the electro-magnetic engine, whereby either such time-piece or engine may operate the dial without interfering with the other, and the dog or block may be operated either by mechanical force stored up within the safe or other article or by a current of electricity generated outside it.

Another of my improvements consists in the combination, in a time-lock, of a dial and a wheel transmitting motion thereto, and connected with its driving-shaft by a friction-clutch, providing for a circumferential or rotary adjustment of said gear-wheel relatively to the driving-shaft in one direction, but locking it positively thereto against movement in the other direction, whereby they may be made to engage in any relation and the dial connected with said gear-wheel may be set at any desirable point without lost motion.

The object of another of my improvements is to provide an improved means, for precluding the release of the bolt-work during any day when access to the safe will not be desired.

Another of my improvements consists in the combination, in a time-lock, with a lever for controlling the operation of its block or dog, and an unlocking-finger for operating on said lever to withdraw the block or dog and release the bolt-work, of a device actuated by the unlocking-finger in operating the said lever, and capable of being set so that the first passage of the unlocking-finger past it will serve only to set it, and so that a subsequent passage will serve to operate the lever.

The object of another of my improvements is to effectually preclude the release of the bolt-work on the tilting of a safe by the shifting of the dog of a time-lock for controlling the bolt-work. This improvement consists in the combination, with the slider-bar carrying the block or dog of a time-lock, of a pendulous bob or stop pivoted to the case of said lock, and weighted at one end, so that on the tilting of the safe to which the lock may be applied to release the block or dog it will obtrude itself behind the slider-bar and preclude the block or dog from movement.

Another improvement consists in the combination, in a time-lock, of a block or dog, a rotary dial, a finger for controlling the movement of said block or dog, an arm carrying said finger supported on the dial-shaft, or a sleeve or collar thereon, and capable of adjustment relative to the dial, and a pin for locking said arm to the dial, provided with a push-piece at the front of the dial, and a spring for actuating it to engage with the dial.

Another of my improvements consists in the combination, in a time-lock, of a block or dog, a lever connected thereto for drawing it inward with a positive action to release the bolt-work, an unlocking-finger for operating said lever so as to draw the block or dog inward, and a catch or detent for engaging with said lever after the block or dog is drawn inward, so as to hold said block or dog during the time it is desired that the bolt-work should remain unlocked.

Another of my improvements consists in the combination, in a time-lock, of a block or dog, a lever connected thereto for drawing it inward, a detent for engaging with said lever, a dial, a finger carried by the dial and adapted to release the detent from said lever, and a spring for actuating said lever, so as to throw the block or dog forward to operate on the bolt-work.

My other improvements consist in details of construction, which will be hereinafter explained.

In the accompanying drawings, Figure 1 is a front view of a time-lock embodying my improvements, with the cover removed, and including a view of a portion of the inside of a door and bolt-work thereof. Fig. 2 is a transverse section of such lock. Fig. 3 is a face view of a portion of the lever for releasing the dog of the lock from the bolt-work, including a secondary lever for precluding the lock from releasing the bolt-work during a holiday. Fig. 4 is a front view of a lock, with the mechanical time-piece removed, a dotted outline of the wheel to which motion from the electro-magnetic engine is imparted being included. Fig. 5 is a face view of the dog-releasing lever, a secondary lever applied thereto for precluding the releasing of the bolt-work during a holiday, a catch or detent for holding said dog-releasing lever while the bolt-work is to be left free of the lock, fingers for operating said le-

ver and detent, and a dotted outline of the dial of the lock. Fig. 6 is a back view, on a larger scale, of the dial and the means for transmitting motion thereto from the mechanical time-piece and from the electro-magnetic engine; and Fig. 7 is a transverse section of said dial, including side views of the locking and unlocking fingers and their appurtenances.

Similar letters of reference designate corresponding parts in all the figures.

A designates the door of a safe or vault of any suitable construction. B B C designate the bolt-work of the door, consisting of bolts B B and a carrying-bar, C, connected thereto, so as to insure their being simultaneously moved in order to secure or release the door. D D designate a pair of elbow-levers, pivoted at about the middle to the door A. Their outer arms are connected to the carrying-bar C, so as to control the movements thereof; but their inner arms, *b b*, project toward the case S of the time-lock. *c* is a dog or block, mounted on a slider-bar, E, in the time-lock, and extending through the case, so that it may fit between the inner arms, *b b*, of the elbow-levers D D. It will be seen that if, after the bolt-work B C is moved forward to secure the door A and the dog *c* is shot or impelled between the arms *b b* of the elbow-levers D D, it will preclude the inward movement of the said arms, and hence the rearward movement of the bolt-work, so as to release the door A.

One of the levers D may be sufficient. It is through this dog *c* that the time-lock controls the movement of the bolt-work.

Referring now to the time-lock, W designates a mechanical time-piece, consisting of any suitable train of wheels for measuring time, and effecting once in twenty-four hours a complete rotation of a movable dial, J, bearing numerals indicative of the twenty-four hours of a day. This dial carries with it two arms, T T', which extend from the dial-shaft, and are capable of being severally adjusted independently and connected in different positions to the dial J, to provide for adjusting the locking and unlocking fingers U U', which they respectively actuate, so that they will operate at different hours. These arms (see particularly Figs. 5 and 7) are shown as mounted loosely on the collar forming part of the dial J, and as provided with pins *p p*, capable of being fitted with different holes *v* in the back of the dial, these pins being attached to push-pieces *p' p'*, accessible from the front of the dial, and held in the holes by springs *p² p²* when not actuated by the push-pieces.

The locking-finger U is affixed to and carried by the arm T, whereby it is actuated; but the unlocking-finger U', for the purpose of giving it the requisite rigidity, is shown as affixed to a ring fitted in a recess in the dial, so as to be free to turn relatively to said dial, and as extending through an arc-shaped slot in said dial communicating with said recess, so as to admit of its movement relatively to the dial,

its connection with the arm T' , by which it is operated, being effected by the passage of the said finger through a hole in said arm.

By pressing back the push-pieces $p^1 p^1$ the pins may be disengaged from the dial, and then the arms may be adjusted at pleasure, and on releasing the push-pieces the pins will engage with the dial and the arms will be locked thereto.

The locking and unlocking fingers, combined with the above-described mechanism, can be easily adjusted relatively to the dial without detachment from their supports, and can be locked to the dial positively, and not merely secured thereto by friction. If they become accidentally loosened or freed from the dial they will slip only as far as the next hole, whereas if secured by friction merely they would, on becoming loosened, slip continuously around the dial, and fail to fulfill their functions at all.

One object of the numbers on the dial is to facilitate the adjustment of the arms to cause the locking and unlocking fingers to effect the movement of the dog c , and secure or release the bolt-work $B C$.

Preferably I provide the said arms with indices or pointers extending over the face of the dial, so as to facilitate their accurate adjustment relatively thereto.

F designates a spring, which acts on the slider-bar E , so as to impel the dog c outward between the arms $b b$ of the levers $D D$, when not otherwise actuated.

$K' d^x$ designate a lever, the arm d^x of which is connected to the slider-bar E , and the arm K' of which projects in the path or line of travel of the unlocking-finger U' , so as to be depressed on the contact of the latter with a secondary lever, L , arranged on it, and thus, through the arm d^x , cause the inward movement of the dog c with a positive movement derived from the dial. V designates a catch or detent, for engaging with the arm K' of the lever $K' d^x$, and retaining it in a depressed position and the dog c in its rearmost position for the number of hours during which the safe or vault is desired to be kept open. This catch or detent is shown as consisting of a bell-crank lever, weighted at one end and provided at the other with a convex head, h , and the end of the arm K' of the lever $K' d^x$ is shown as being rounded on the under side; hence, on the depression of the lever, it comes in contact with the head h of the said catch or detent, moves it aside, and passes below it, whereupon the detent moves forward and its head h slips over the end of the said arm K' , and holds the said lever stationary.

At the time the lock is set to secure the bolt-work, the locking-finger U comes in contact with the catch or detent V , swings it aside, and releases the arm K' of the lever $K' d^x$ from it, whereupon the spring F forces the slider-bar E forward, and obtrudes the dog c between the arms $b b$ of the elbow-levers $D D$, and secures the bolt-work against movement.

The secondary lever L , arranged on the arm K' of the lever $K' d^x$, is pivoted in place between the ends, so that it may be adjusted to different positions as far as permitted by its slot c'' and stop-piece, and is held in different positions by a friction-spring, X . It may be provided with a handle to facilitate its adjustment, and it is provided at the end nearest the dial J with diverging arms $f''' f'''$, the upper of which is shorter than the lower. The object of this secondary lever is to provide for the working of the mechanical time-piece W for twenty-four hours or more without effecting the dog c and releasing the bolt-work.

It will be seen by reference to Fig. 5 that, if the secondary lever L has the arms $f''' f'''$ thrown upward, the unlocking-finger U' in its transit comes in contact with the lower arm f''' of said lever and throws the lever into the reverse position, as indicated by the dotted outline, and passes onward without affecting the lever $K' d^x$ and dog c . It will not again come in contact with the secondary lever L until twenty-four hours afterward; hence a day is passed without releasing the bolt-work. In its succeeding transit the unlocking-finger comes in contact with the upper arm f''' of the secondary lever L , and, as the said arm cannot then yield, depresses the lever $K' d^x$ and draws the dog c inward. The advantage of this secondary lever is that it enables a time-lock to be set so as not to release the bolt-work on any holiday, whether it is a Sunday or an irregularly-occurring holiday, such as Thanksgiving Day or Christmas.

N designates a pendulous stop or bob, weighted at one end, and pivoted to the case S of the lock, so that upon tilting the safe to which said lock is applied its unweighted end will obtrude itself behind the slider-bar E , so as to preclude the latter from movement and hold the block or dog c between the levers $D D$, controlling the bolt-work.

$G I$ designate an electro-magnetic engine capable of being operated within the case S of the lock through electricity generated outside the safe or vault, and shown as consisting of electro-magnets G and armatures I , the former of which are to be made to communicate by wires or through metallic portions of the safe with an electric circuit, through which currents of electricity may be passed from a battery or other generator outside the safe or vault, under control of any means or devices for breaking the circuit, so that the armatures may be alternately attracted to and released from the magnets. In order that this engine may not operate too rapidly, I have shown as combined with it a governor to regulate its action to correspond with the operation of the mechanical time-piece W . This is an important feature of my invention, because, unless the action of the electro-magnetic engine were retarded or governed in some way, it might prove an aid to any one seeking to surreptitiously open the safe or vault. The governor which I have shown consists of pendulums M ,

pivoted at n' to the case of the lock, and connected by arms with the armatures, so that they will be set in motion by the movements of the armatures, and will impede a too rapid movement thereof. The armatures carry pawls i , by which they transmit motion through ratchet-wheels j to a worm, w , and train of wheel-work O to the dial J , and devices for controlling the block or dog, stop-pawls k being employed to preclude the backward movement of the ratchet-wheels.

The mechanical time-piece W , electro-magnetic engine G I , and dial J are connected so that either the time-piece or engine may operate the dial without interference from the other, and so that the dial may be adjusted independently of both for the purpose of setting it.

I will proceed to describe such connection with a special reference to Figs. 4 and 6. O' designates a shaft driven by the electro-magnetic engine G I through the train of wheels O . The dial J and a gear-wheel, P' , rigidly connected with it, are mounted loosely on this shaft, and through this gear-wheel motion is imparted to the dial. The connection which I have shown between this gear-wheel P' and the engine-shaft O' consists of a ratchet-wheel, Q , rigidly affixed to said shaft, and pawls q q , carried by the gear-wheel P' , so that the ratchet-wheel will engage with them when in motion, and so that the gear-wheel and dial may rotate independently of the ratchet-wheel whenever it and the engine are inactive, or for the purpose of setting the dial. The direction in which the shaft O' , ratchet-wheel Q , and dial J rotate is indicated by the arrow r' in Fig. 6.

R^1 R^1 designate two gear-wheels, supported on shafts R^2 R^2 , driven by the time piece W , and engaging with the gear-wheel P' . They are provided in the back with circular cavities, and fitted on hubs R^3 R^3 , which are rigidly affixed to the shafts R^2 R^2 . These hubs R^3 R^3 are provided with peripheral recesses s' s' , tapering from end to end, wherein are arranged rollers t t and springs u u , tending to force the rollers toward the narrower ends of the recesses s' s' . Thus I form a friction-clutch, whereby provision is afforded for circumferential adjustment of the gear-wheels relative to their driving-shafts in one direction, and for effecting their positive engagement with said shafts at any point against movement in the opposite direction, and not only at regular points, such as may be done with ratchet-wheels and pawls. When the time-piece is in operation the hubs R^3 R^3 are rotated in the direction indicated by the arrows n^2 n^2 , and they then wedge the rollers t t toward the narrow ends of the recesses s' s' , and against the inner side of the rims of the gear-wheels, and thereby lock the gear-wheels to them to carry the gear-wheels around. Thus motion will be transmitted to the gear-wheel P' and dial J , and the pawls q q will play over the teeth of the ratchet-wheel Q .

When the electro-magnetic engine G I op-

erates the gear-wheels P' and dial J the rims of the gear-wheels R^1 R^1 will draw the rollers t t toward the wide ends of the recesses s' s' , and they will no longer lock the said wheels to the hubs R^3 R^3 ; hence the said wheels may run free of the time-piece. The moment the said wheels cease revolving, however, the springs u u force the rollers t t toward the narrow ends of the recesses s' s' in position to lock the wheels to the hubs, so that on the starting of the time-piece there will be no lost motion between it and the dial. It will be understood, also, that as the dial may run free of either the mechanical time-piece or the electro-magnetic engine it may also be turned in the direction of the arrow r' to set it, as the pawls will then play over the ratchet-wheel Q and the wheels R^1 R^1 run free from the hubs R^3 R^3 .

A very important advantage results from connecting the dial with its operating mechanism by clutches which are in condition to engage with the means for transmitting motion to the dial instantaneously and without lost motion, as compared with a pawl or pawls and a ratchet-wheel, because in the latter case, even with the finest ratchet-teeth that can be reliably used, there will be considerable lost motion at the dial. Such lost motion occasions considerable trouble in setting the dial, as with a ratchet-wheel oftentimes the dial has to be set ahead of the real time at which it is desired to set it in order to allow of the operating mechanism catching up and engaging with it at the desired point, thereby entailing the loss of much time in setting the dial.

Both the mechanical time-piece and the electro-magnetic engine may advantageously be made in duplicate, to afford additional security against a lock becoming inoperative through breakage of parts comprised in them.

It will be seen that by my invention I provide a time-lock operated by a positive action in unlocking, and which, in case of a stoppage of the time-piece, may be operated through electricity outside the safe or vault to which the lock is applied, and at only the same speed as the time-piece would have operated had it continued active; that I provide a time-lock which may be entirely operated by electricity supplied from outside, and yet one that is incapable of being controlled in its movements from outside, save as regards the supplying of the electricity thereto; that I provide a time-lock which may be operated by the motive power of a mechanical time-piece arranged in it, or by electricity supplied from outside, and hence may be safely locked for a long time, provided the source through which the electricity is conducted to it be protected and concealed; that I provide a time-lock which may be very conveniently set not to unlock on any day whatsoever during which it is desirable to have it secure the bolt-work; and that I provide a lock whose dog is, in a very simple manner, precluded from releasing the bolt-work on the tilting of the safe to which it is applied.

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

1. In a time-lock, the combination of a block or dog, an electro-magnetic engine, means for transmitting motion therefrom to a train of wheel-work, by which it is imparted to devices controlling the block or dog, many successive movements of the electro-magnetic engine being requisite to affect the block or dog, and a long period of time being occupied in accomplishing this result.

2. In a time-lock, the combination of a block or dog, an electro-magnetic engine for operating the same, and a governor for regulating the speed of said electro-magnetic engine.

3. In a time-lock, the combination of a block or dog, an electro-magnetic engine for operating the same, and a governor for regulating the speed of said electro-magnetic engine, and consisting of a pendulum.

4. In a time-lock, the combination of a block or dog, an electro-magnetic engine, and a governor for regulating the speed of said electro-magnetic engine, consisting of a pendulum pivoted to a suitable support, and provided with an arm connected to the armature of said electro-magnetic engine.

5. In a time-lock, a block or dog, a mechanical time-piece, and an electro-magnetic engine, said mechanical time-piece and electro-magnetic engine being so combined with the dog or block that either may operate the same independently of the other.

6. In a time-lock, the combination of a block or dog, a mechanical time-piece, and an electro-magnetic engine, provided with a governor for regulating its speed, for the purpose specified.

7. In a time-lock, the combination of a block or dog and mechanism for operating the same, actuated either by mechanical force stored up inside the safe or vault to which the lock is applied, or by a current of electricity generated outside said safe or vault.

8. In a time-lock, the combination of a block or dog, a mechanical time-piece for operating said block or dog, an electro-magnetic engine for operating said block or dog, a dial, and means for connecting said mechanical time-piece and said electro-magnetic engine with said dial, so that either may operate the dial independently of the other.

9. In a time-lock, the combination, with a block or dog, a mechanical time-piece, an electro-magnetic engine, and a dial, of means for connecting said dial with said mechanical time-piece and said electro-magnetic engine, so that it may be adjusted independently of both.

10. In a time-lock, the combination of a dial and a gear-wheel transmitting motion thereto, and connected with its driving-shaft by a friction-clutch, providing for a circumferential or rotary adjustment of it in one direction relatively to its driving-shaft, but locking it positively thereto against movement in the other direction, whereby the two may be

made to engage in any desirable relation without lost motion.

11. In a time-lock, the combination, with a dial and means for operating it, of gear-wheels adapted to communicate motion to the dial, hubs for supporting said gear-wheels, tapering recesses between said hubs and gear-wheels, rollers or dogs fitting in said tapering recesses, and springs tending to force said rollers toward the narrow end of the said tapering recesses, substantially as and for the purpose specified.

12. In a time-lock, the combination of a dial, a mechanical time-piece adapted to operate said dial, an electro-magnetic engine capable of being supplied with a current of electricity from outside the lock for the purpose of operating said dial, and a gear-wheel connected with said dial mounted loosely on a shaft connected with said electro-magnetic engine, a ratchet-wheel on the said shaft, pawls on said gear-wheels with which said ratchet-wheel engages, gear-wheels meshing into the former supported on independent hubs driven by the mechanical time-piece, tapering recesses between the latter gear-wheels and their hubs, rollers, or dogs, and springs in said recesses, substantially as and for the purpose specified.

13. In a time-lock, the combination, with a lever for controlling the operation of its block or dog, and an unlocking-finger for operating on said lever to withdraw the block or dog and release the bolt-work, of a device actuated by the unlocking-finger in operating the said lever, and capable of being set so that the first passage of the unlocking-finger past it will serve only to set it, and so that a subsequent passage will serve to operate the lever, substantially as and for the purpose specified.

14. In a time-lock, the combination, with a lever for controlling its block or dog, and an unlocking-finger for operating on said lever, of a secondary lever pivoted to the former and provided with arms, either of which may be adjusted to project within the line of travel of the unlocking-finger, substantially as and for the purpose specified.

15. The combination, with the slider-bar carrying the block or dog in a time-lock, of a pendulous stop or bob pivoted to the case of said lock, and weighted at one end, so that its unweighted end can obtrude itself behind the slider-bar, substantially as specified.

16. In a time-lock, the combination of a block or dog, a rotary dial, a finger for controlling the movement of said block or dog, an arm carrying said finger supported on the dial-shaft or a sleeve or collar thereon, and capable of adjustment relatively to the dial, and a pin for locking said arm to the dial, provided with a push-piece at the front of the dial and a spring for actuating it to engage with the dial.

17. In a time-lock, the combination of a block or dog, a lever connected thereto for drawing it inward with a positive action to release the bolt-work, an unlocking-finger for

operating said lever so as to draw the block or dog inward, and a detent for engaging with said lever after the block or dog is drawn inward, so as to hold said block or dog during the time it is desired that the bolt-work should remain unlocked.

18. In a time-lock, the combination of a block or dog, a lever connected thereto for drawing it inward, a detent for engaging with

said lever, a dial, a finger carried by the dial and adapted to release the detent from said lever, and a spring for actuating said lever so as to throw the block or dog forward.

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