

(No Model.)

2 Sheets—Sheet 1.

G. W. ADAMS.
TIME LOCK.

No. 454,897.

Patented June 30, 1891.

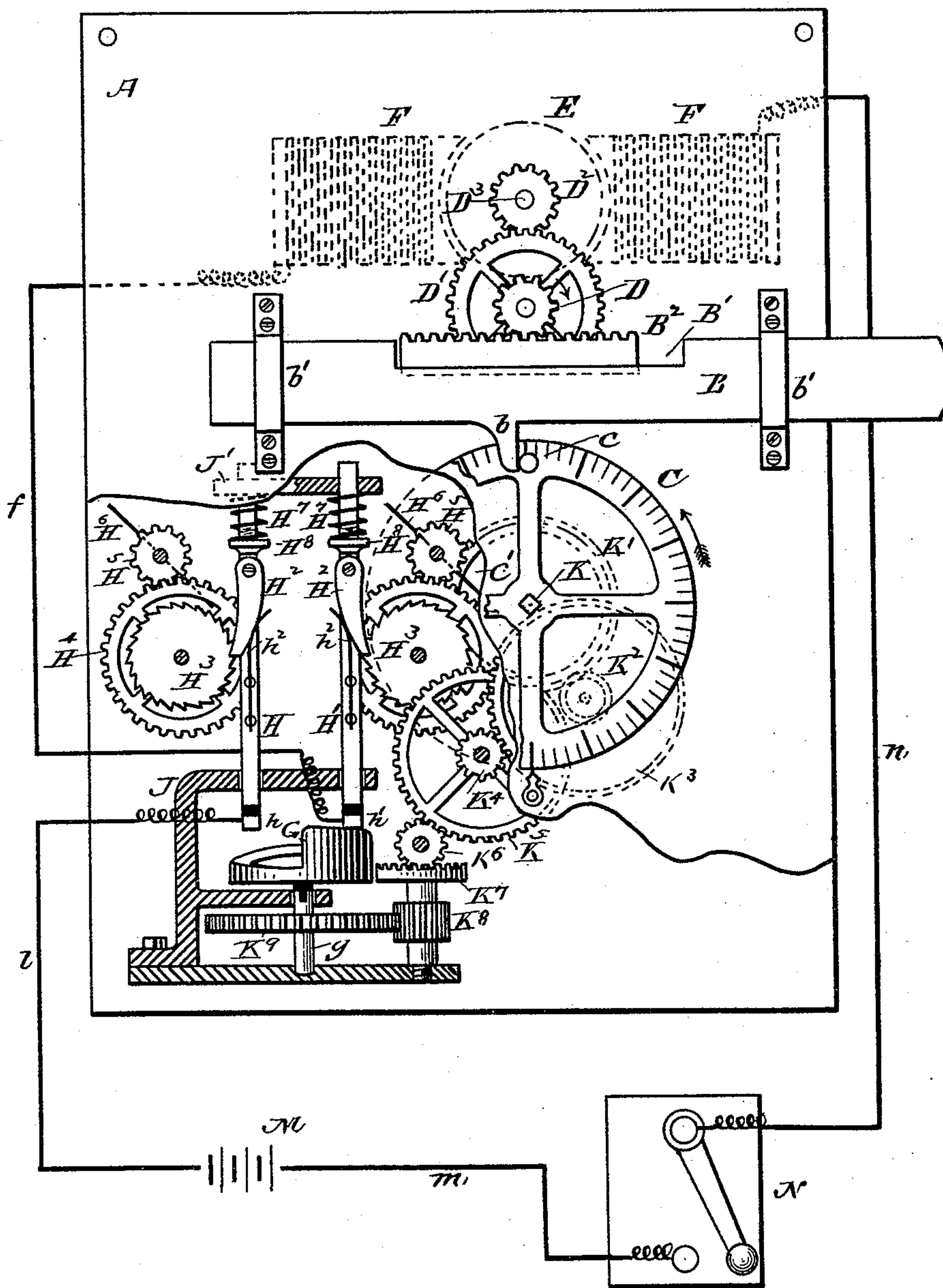


Fig. 1.

WITNESSES
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George D. E. Brown

INVENTOR
George W. Adams

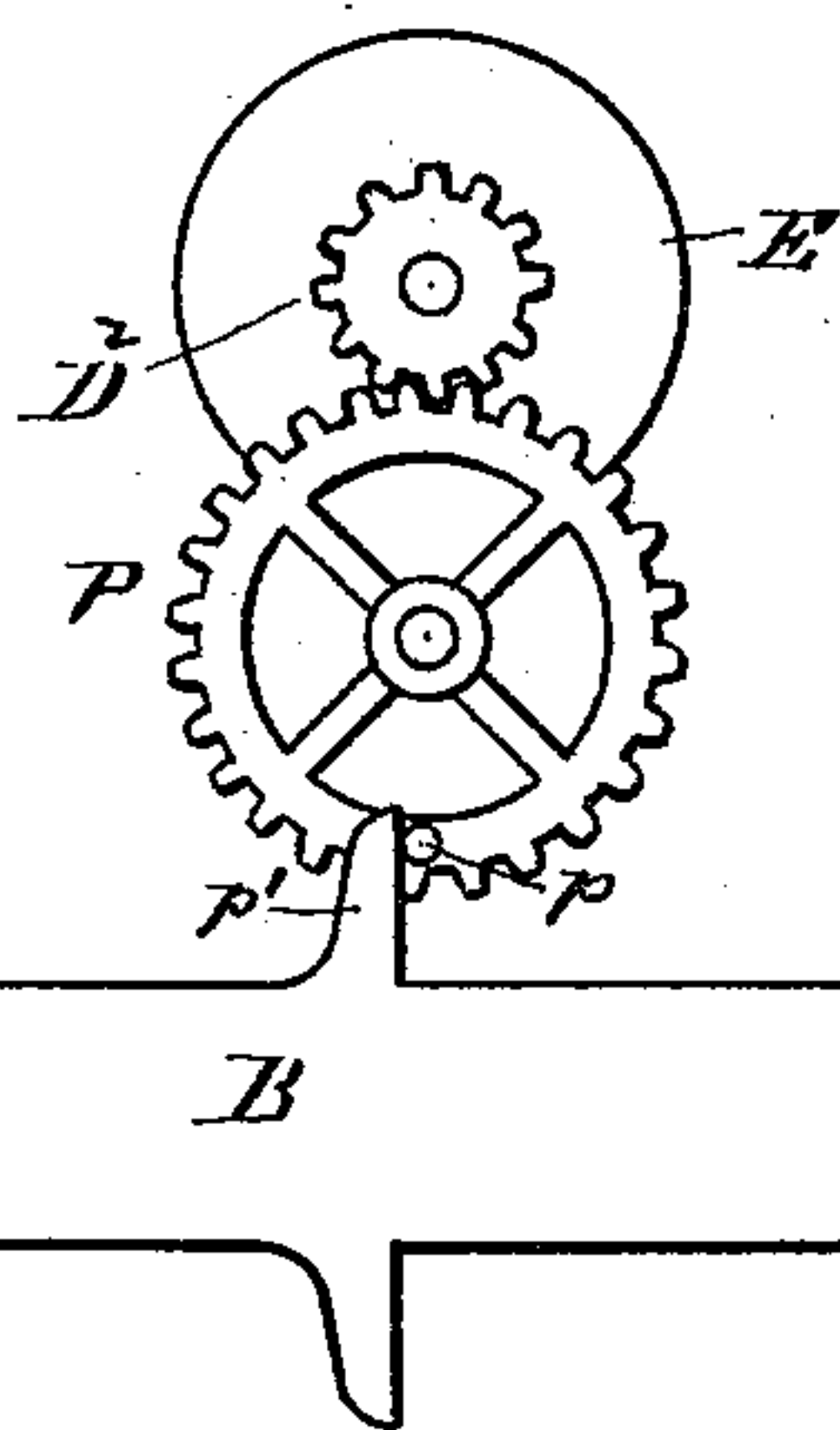
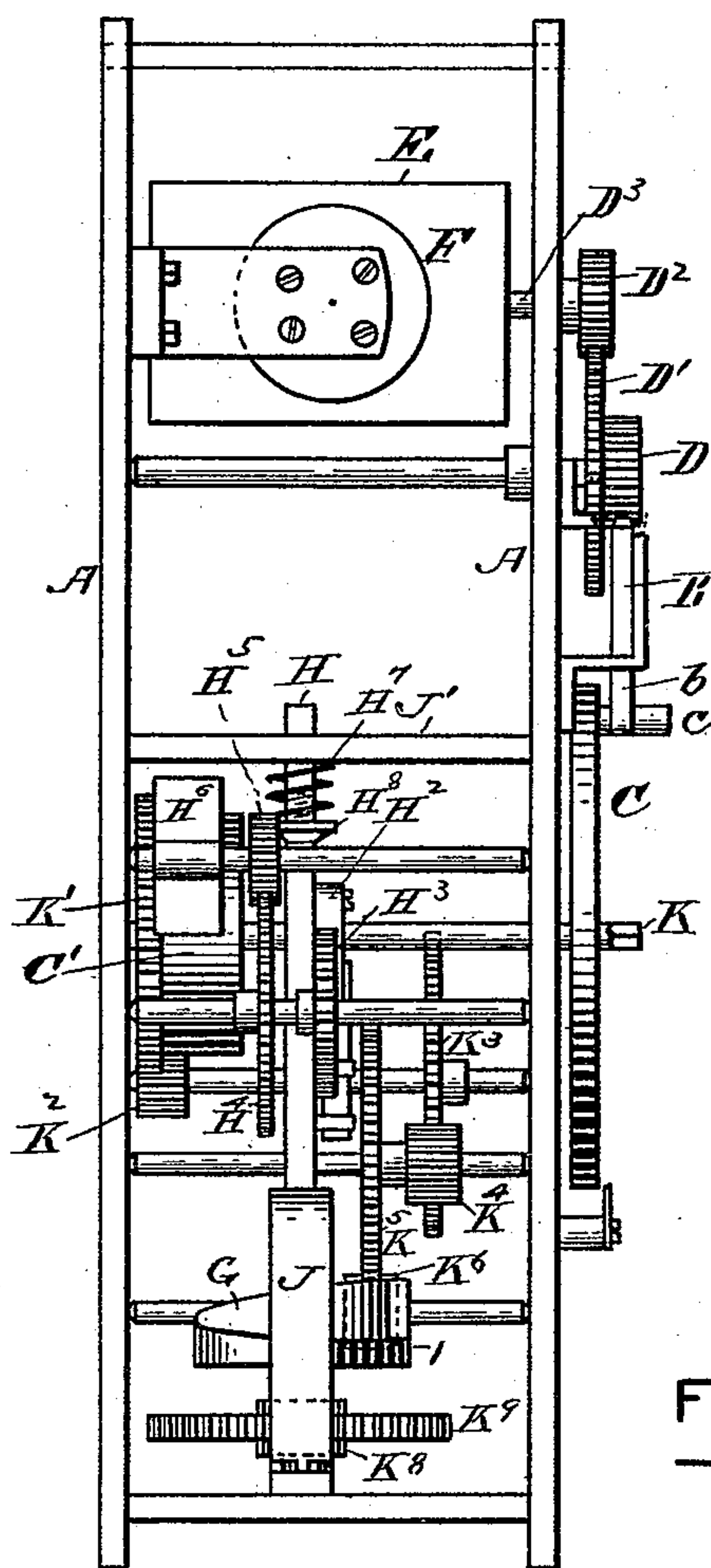
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2 Sheets—Sheet 2.

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No. 454,897.

Patented June 30, 1891.



WITNESSES

Exa. & Guild }
George O. G. Loane

INVENTOR

George W. Adams.

UNITED STATES PATENT OFFICE.

GEORGE W. ADAMS, OF MALDEN, MASSACHUSETTS.

TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 454,897, dated June 30, 1891.

Application filed February 9, 1891. Serial No. 380,711. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. ADAMS, of Malden, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Time-Locks, of which the following is a specification.

The main objection to the ordinary time-lock is that should the time mechanism stop accidentally before the hour arrives for opening the safe it is impossible to open the safe without drilling into or forcing the lock in some way. Various electric appliances have been devised for the purpose of opening a safe under such circumstances; but, so far as I am aware, in all these prior devices the electric mechanism has been connected with the dial or some other part which must be rotated or otherwise moved a given distance before the bolt can be moved and the lock can be opened. This dial or other part, however, can only be moved as fast as will be allowed by the escapement or some other controlling part whose motions are correspondingly timed with the time mechanism. It is evident, therefore, that if, for example, the time mechanism stopped five hours before the time at which the safe was to have been opened it would take the electric appliances of such lock about five hours to bring the part into such relation to each other that the safe could be opened, because in these prior devices the dial or other part upon the position of which the possibility of unlocking the safe depends can only be moved at a regular rate of speed, whether its motion be imparted to it by the spring or by the electric motor, which regular speed corresponds with the regular speed of the dial, this being regarded as an important feature in all prior locks of the kind referred to of which I have knowledge. In certain locks there is also an electric mechanism to operate a withdrawing mechanism which withdraws the bolt in case, owing to an explosion, for example, the dial has been disabled. In these locks the withdrawing mechanism is adjusted to be run by an electric motor some considerable time before the bolt is seized by it to be withdrawn, and in these locks there is also an escapement which controls the motion of the electric motor, so that a long time will be necessarily occupied in making the connection with and retracting the bolt.

In my device the bolt is free to move independently of either the time mechanism or the electric appliance, and hence may be acted upon at any time by either. It is so connected with the dial that while the dial will move it normally it may be moved by any suitable electric device adapted for the purpose immediately, by which I mean without the intervention of any form of escapement or speed-controlling mechanism, it being so connected with such electric device that it will take its motion directly from it and withdraw the bolt in a time depending not upon the amount of time the time mechanism still has to move or upon any other time-controlling apparatus, but upon the possible speed of the electric device. It is evident, therefore, that the motion of the electric motor need only be for a very limited time, depending solely upon the space through which it is to move the bolt or dog. The only danger with such a device is that a current sufficient to operate the motor may be started through it and the safe opened by some unauthorized person. To guard against this I propose to use an automatic circuit-breaker operated by the time mechanism and of such construction that an electric current of sufficient duration to operate the motor cannot be established so long as the time mechanism is running at its normal speed. It will be seen, therefore, that a necessary element of my invention is a bolt or dog of some kind which shall control the safe-bolts and which, while it will be ordinarily operated by the time mechanism, is so far independent of it that it may be thrown instantly by a suitable electric motor, which need move only for a sufficient distance and during a sufficient length of time to withdraw the bolt without reference to any other factor. It is also evident that the kind of electric motor is immaterial and that some form of circuit-breaker which can prevent an operative current from reaching the motor while the time mechanism is moving at its normal speed, but which shall act as a circuit-closer when the time mechanism is stopped or runs abnormally slow, is a desirable addition. A convenient form of device embodying all these requirements is shown in the drawings.

Figure 1 is an elevation showing the dial of

an ordinary time-lock, together with the bolt or dog controlled thereby, the rest of the ordinary time mechanism being also indicated and the front plate of the lock being broken away so as to disclose a mechanism embodying my improvement. Fig. 2 is an end elevation, and Fig. 3 shows a modification.

A is the usual casing containing the time-lock mechanism.

B is the time-lock bolt. This bolt may be operated either by the dial C, which is connected with the ordinary time-lock mechanism C' and is provided with a pin *c*, shown in contact with a lug *b*, forming part of the bolt B, or by means of the pinion D, suitably geared by gear-wheel D' and pinion D² to the shaft D³ of the rotating armature E of an electric motor F. This pinion D acts upon a rack B², sliding in an elongated slot B' in the bolt B, the rack being located in the slot, as shown, so that a motion of the pinion D in the direction of the arrow will draw the bolt, while a motion of the dial C in the direction of the arrow will also operate the bolt, these two movements of the bolt being entirely independent of each other for the purposes described. The bolt B is held in place by straps *b'*.

The motor is electrically connected with a circuit-breaker of peculiar construction located within the safe, and which will now be described.

G is a crown spiral cam mounted on a vertical shaft *g*, from which it is insulated. Above this cam and resting upon it are two rods H H', provided with contact-points *h h'*, each of which is insulated from the rest of its rod. These rods are exactly alike, being mounted in a frame J J'. Each is provided with a pawl H², held in contact by means of a spring H², with a ratchet H³, mounted on the same shaft with a gear H⁴, in mesh with a pinion H⁵, carrying a fan H⁶. Each rod is provided with a spring H⁷, mounted between the under side of frame J', in which the upper ends of these rods slide, and an adjustable collar H⁸, as shown, each spring being arranged to give its rod a downward throw. This crown-cam G is operated by means of a train of gears connected with the clock mechanism as follows: Upon the main arbor K is mounted a gear K', which is in mesh with the pinion K² on the same shaft with gear K³, which is in mesh with pinion K⁴. On the shaft with pinion K⁴ is mounted a gear with K⁵ in mesh with the pinion K⁶. The crown-gear K⁷ is in mesh with pinion K⁶ and carries in its shaft a pinion K⁸, which meshes with gear K⁹ on shaft *g*.

To one of the contact-points *h* of the circuit-breaker is connected the wire *l*, which runs to a generator M. From thence a wire *m* runs to the switch N, as shown, and from the key or switch the wire *n* runs to the motor F, and from the motor F the wire *f* runs to the contact-point *h'*. It will be seen that the crown-cam G is constantly in motion, given

to it by means of the time mechanism of the lock, and that when this time mechanism becomes inoperative from any cause this crown-cam will stop. While it is in operation it will raise each of the rods H H' in turn, its cam-surface lifting each rod in turn until it reaches the highest point, when the rod will drop toward the lowest point, its drop being caused by its spring H⁷. When it drops, however, by means of the pawl H² and connections it will cause the fan-wheel H⁶ to rotate, this fan being so proportioned in size and shape with reference to the rod and the spring H⁷, which actuates it, and is so geared to the ratchet H³, that the rod can only drop at a given rate of speed. Hence it will be seen that before one of the rods—say H—having passed over the top of the cam and being in the air, has touched the bottom of the cam, the second rod H' will have started on its downward throw. As these two rods never touch the cam at the same time while the cam is in motion, it is evident that an electric circuit which can only be made through the cam and these two rods can never be made so long as the time mechanism is normally operative. When the time mechanism has become inoperative, however, the two rods settle down upon the cam, thereby making an electric contact, so that when the switch N is thrown a circuit will be established and the motor F charged so that it will operate the armature E, and by means of the train of gears throw the bolt. In Fig. 3 I show a modification in which the pinion D² of the armature E is geared to a wheel P, carrying a pin *p*, which engages with a lug *p'* on the bolt.

It is obvious that with some motors a prolonged and comparatively heavy current being necessary to operate them the rods H H' may both be allowed to come in contact with the cam G at the same instant, provided that contact is not prolonged until the motor has been started. Under such circumstances the purpose of my invention will be carried out, my invention requiring the use of such an automatic circuit-breaker as will prevent the bolt from being thrown by the use of an electric current, while the time mechanism is normally operative and will allow the electric current to be utilized to open the lock as soon as the time mechanism has stopped; but my invention also relates, as has been stated above, to such an immediate connection of the motor with the bolt that when the time mechanism stops or runs abnormally slow the bolt may be thrown rapidly by the motor without the intervention of the time-dial or any other intermediate speed-reducing mechanism, and as the only work of this motor is to withdraw the bolt it is evident that its motion is predetermined and limited both as to time and extent.

In place of the motor herein shown, if desired, there can be used any other well-known electrical device for imparting motion to the bolt of the time-lock, such as various forms

of motors or other electrical engines, electrical combination-locks, &c.

What I claim as my invention is—

1. In a time-lock, in combination, a lock
5 bolt or dog, a time-movement connected there-
with to withdraw said bolt, and an electric
motor having a restricted and predetermined
movement and also located to withdraw said
bolt, but independent of said time-movement,
10 all arranged together substantially as de-
scribed, and adapted for the purpose set forth.

2. In a time-lock, a bolt and two bolt-mov-
ing mechanisms of the kind described, one
mechanical and the other electrical, all con-
15 nected in the manner described, said mechan-
ical mechanism being capable of operation ir-
respective of the electrical mechanism, but
said electric mechanism being inoperative
while said mechanical mechanism is in opera-
20 tion, all as set forth.

3. In combination with the bolt or dog of a
time-lock, an electric motor and an automatic
circuit-breaker in electrical connection there-
with arranged together, substantially as de-
25 scribed, whereby when the time-lock mechan-

ism is in operation the part of the circuit
within the safe or other receptacle will be
broken, and when the time-lock stops or runs
abnormally slow the circuit-breaker will close
said circuit, as set forth.

4. The circuit-breaker above described, con-
30 sisting of the rotating spiral cam G and spring-
controlled rods H H', in combination with
means, substantially as described, whereby
the fall of said rod is delayed, all as set forth. 35

5. In a time-lock, in combination, a lock-
bolt or dog, a time-movement connected there-
with to withdraw said bolt, and an electric
motor also immediately connected with said
bolt, but independent of said time-movement, 40
all arranged together substantially as de-
scribed, and adapted for the purposes set forth.

In testimony whereof I have hereunto sub-
scribed my name this 7th day of February,
A. D. 1891.

GEORGE W. ADAMS.

Witnesses:

EVA A. GUILD,
GEORGE O. G. COALE.