

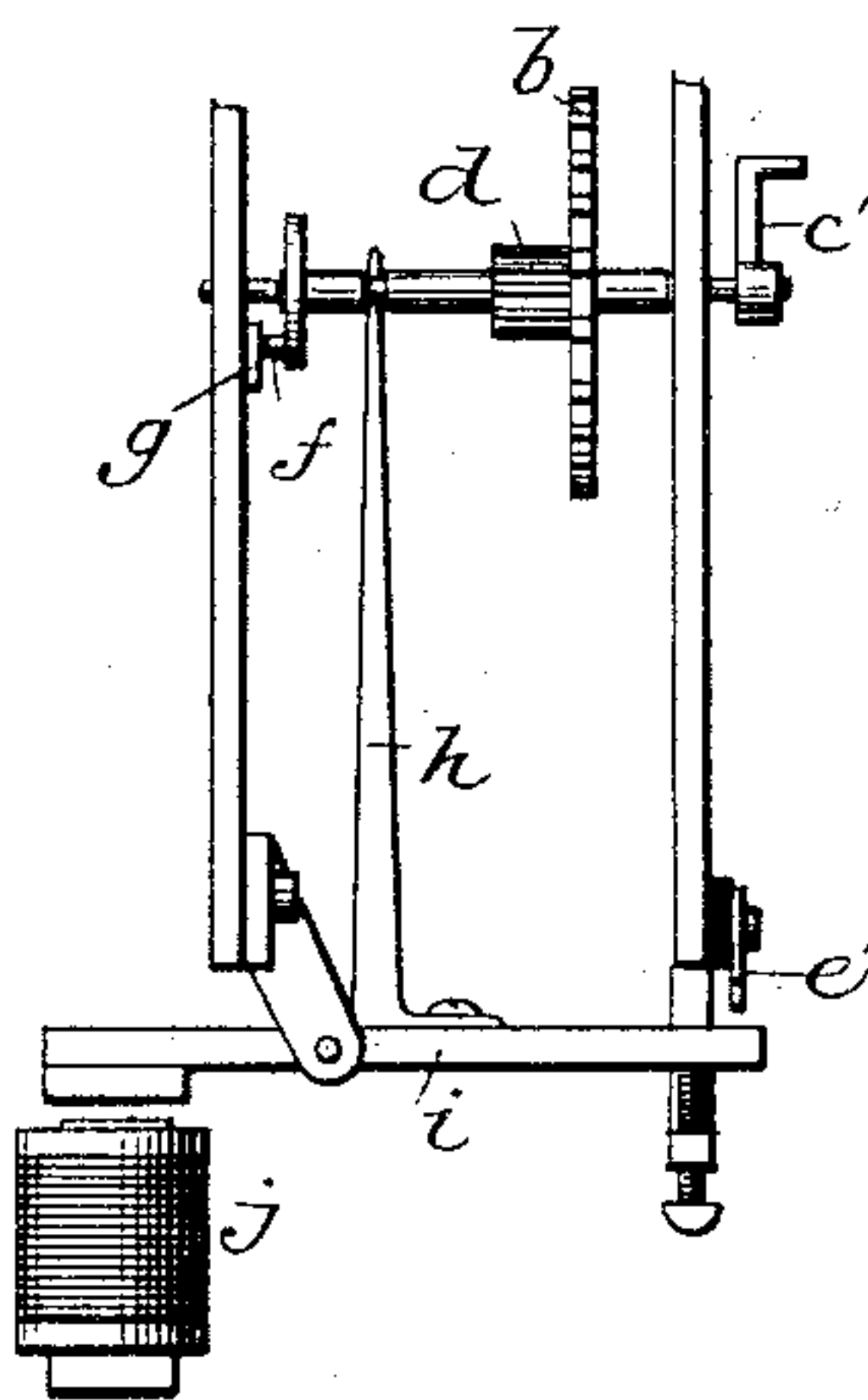
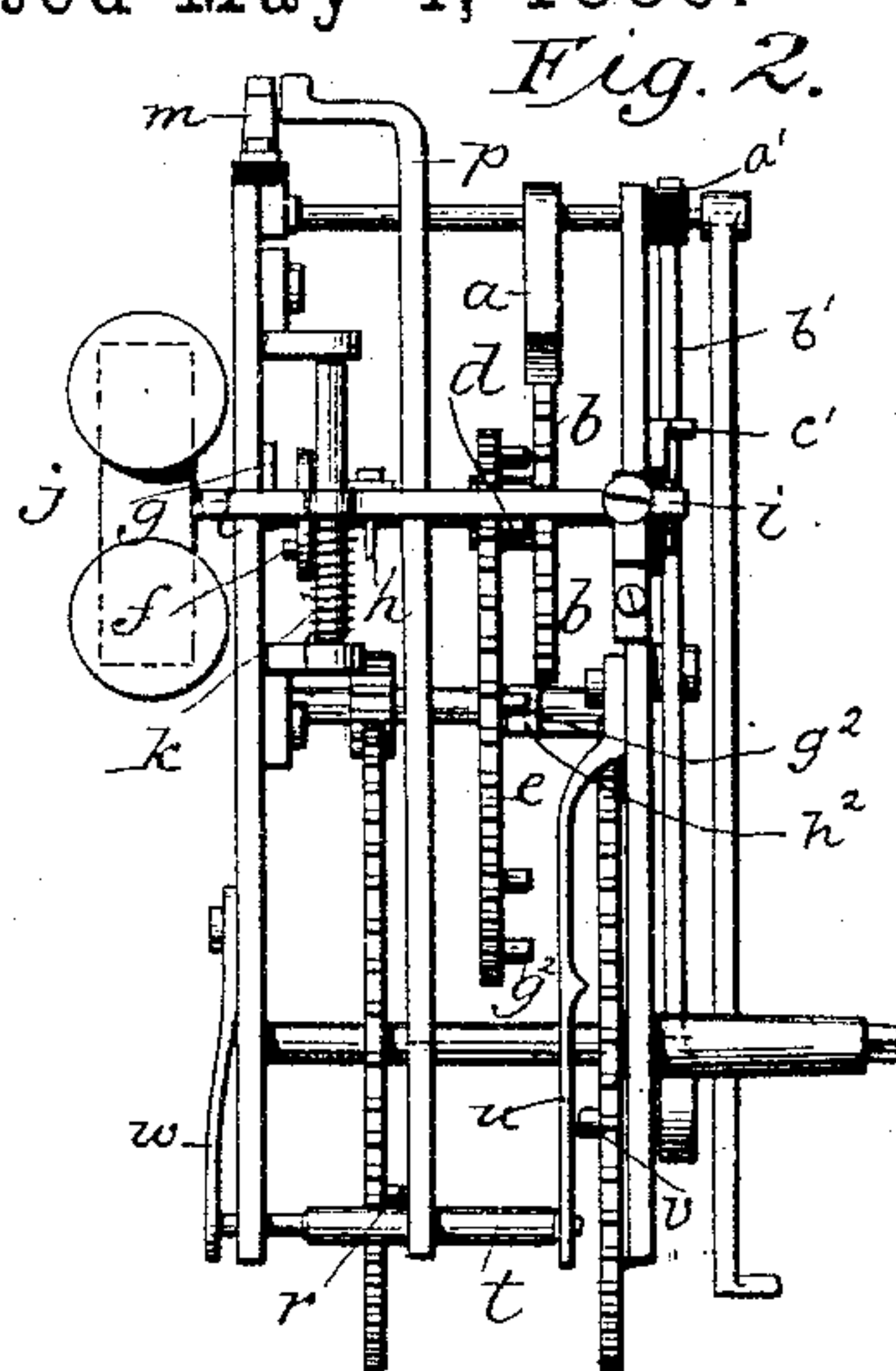
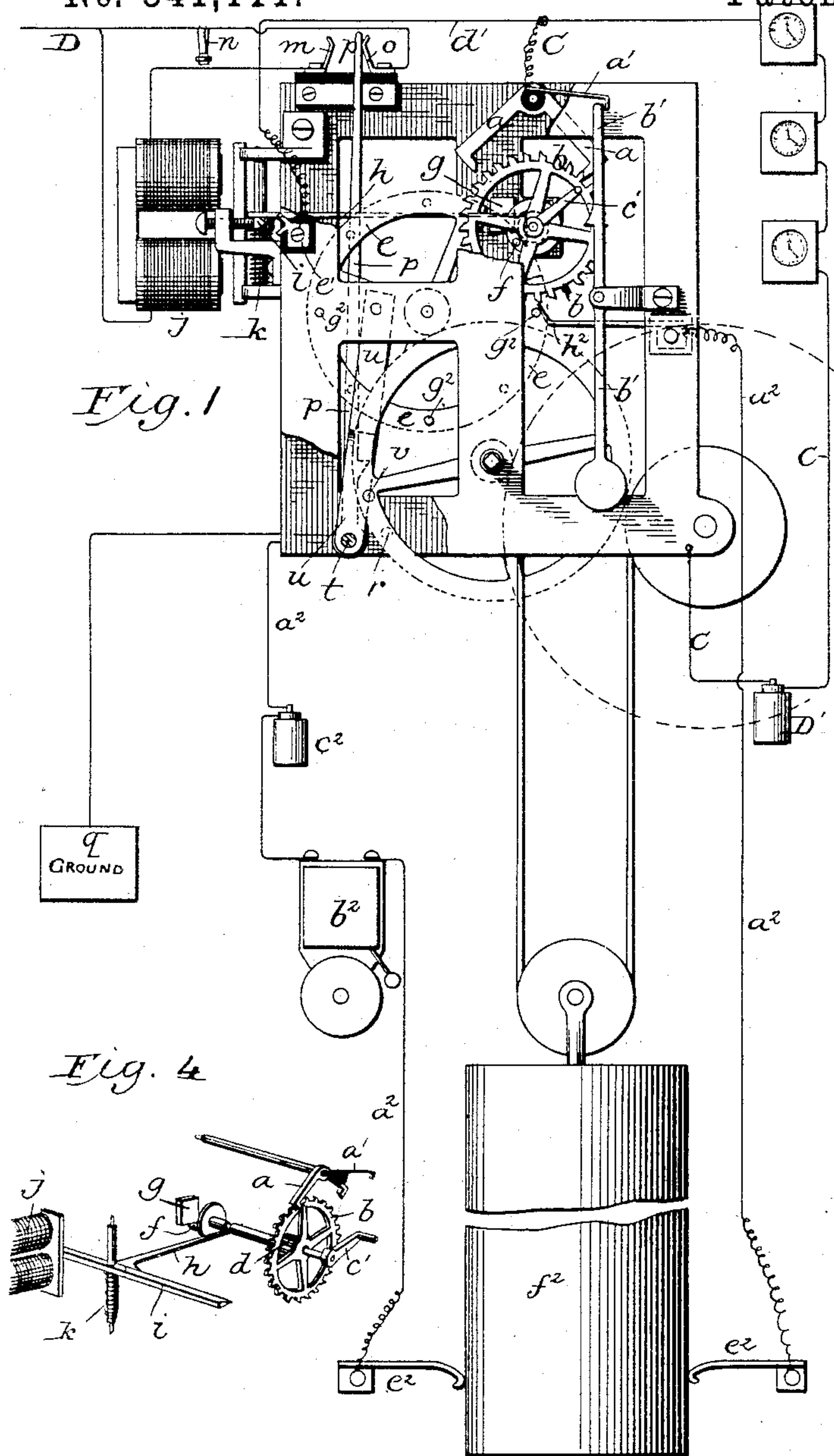
(No Model.)

J. S. ROSS.

ELECTRIC SYNCHRONIZING MECHANISM FOR CLOCKS.

No. 341,111.

Patented May 4, 1886.



Attest

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ELECTRIC SYNCHRONIZING MECHANISM FOR CLOCKS.

SPECIFICATION forming part of Letters Patent No. 341,111, dated May 4, 1886.

Application filed September 21, 1885. Serial No. 177,637. (No model.)

To all whom it may concern:

Be it known that I, JAMES S. ROSS, of Nashville, in the county of Davidson and State of Tennessee, have invented certain Improvements in Electric Synchronizing Mechanism for Clocks, of which the following is a specification.

The aim of my invention is to provide a time-keeper the hands of which may be adjusted or synchronized by a momentary electric impulse, and particularly to adapt the same for application to lines employed for telephonic or other telegraphic communication in such manner that the clock itself will produce the effect of momentarily cutting the telephone or other instrument out of the circuit and introducing the synchronizing devices therein.

Referring to the accompanying drawings, Figure 1 represents in front elevation my improved clock, which may be constructed in any ordinary manner and provided with a driving-train and time-indicating mechanism of any ordinary style, except as to the details hereinafter described. Fig. 2 is an elevation looking from one edge of the clock-train and synchronizing devices represented in Fig. 1. Fig. 3 is a top plan view of the escapement-wheel and the devices for disconnecting the same from the pallet. Fig. 4 is a perspective view showing an escapement-wheel, the pallet, and the disconnecting devices, the escapement-wheel being shown out of connection.

The clock-frame contains, as usual, the pallet *a* and escapement-wheel *b*, driven through its pinion *d* from the wheel *c*. The shaft or arbor of the escapement-wheel has its journals formed in such manner that it may play endwise sufficiently to throw the wheel out of engagement with the pallets for the purpose of permitting the entire train to turn ahead suddenly, in order to throw the second, minute, and hour hands forward to the synchronizing-point, which is usually the twelve-hour mark.

In order to limit the forward motion of the train, the escape-wheel is provided with a laterally-projecting pin, *f*, which, under the ordinary operation of the parts, revolves past the side of a stationary block or stop, *g*. When the escapement-wheel is thrown sidewise out of engagement, its pin *f* is carried into posi-

tion to encounter the stop *g* when the hands arrive at the predetermined point.

The movement of the shaft to disengage the train is effected by the arm *h*, attached to a pivoted armature, *i*, moved in one direction by the attraction of an electro-magnet, *j*, and in the opposite direction by a spring, *k*, applied as in the drawings, or in any other suitable manner. The magnet *j* is located in a circuit extending to a master-clock or regulator, or to other suitable means for closing the circuit when the clocks are to be synchronized. On the closing of the circuit the magnet *j* attracts the armature, causing the arm *h* to disengage the escape-wheel, whereupon the hands are immediately advanced to the proper point. The instant that the circuit is broken the spring *k* returns the parts to their original positions, disengaging the pin *f* from the stop *g* and throwing the escape-wheel again into engagement with the pallet, so that the various parts resume their original function.

The essence of my invention in this regard consists in the employment of the electro-magnet in a controlling-circuit to throw the clock-train into and out of gear with the pallet; and it will be manifest that the details may be modified and the construction of the minor parts altered without departing from the limits of the invention.

In making use of my invention in connection with a telegraphic or telephone line it is desirable that the telephone shall be for the time being cut out of the line and the magnet *j* substituted therefor. It is also desirable, on the other hand, that the magnet *j* shall be cut out of the circuit, except during the instant of time required for the controlling or adjusting current. To this end I divide the main line *D* into two branches, one of which is extended to the magnet *j*, and thence to an insulated conducting-finger, *m*. The other branch, which contains the telephone or other signal instrument, *n*, is connected to a second conducting-point, *o*, also insulated from the clock-frame. Pivoted to the frame, and in contact therewith, is a conducting or switch finger, *p*, which stands normally in engagement with the finger *o*, so that the circuit from the main line is completed through the telephone *n*, the finger *o*, and the clock-frame to the ground at *q*. When, however, the switch-finger *p* is moved

to the left out of contact with conductor *o* and into contact with finger *m*, the telephone branch is cut out of the circuit and the branch containing the magnet *j* thrown into the circuit, which is completed through said magnet, the conductor *m*, switch-finger *p*, and through the clock to the ground, as before. Thus it will be seen that during the action of magnet *j* to control the synchronizing-magnet the resistance of the telephone or other instrument is removed from the line.

For the purpose of automatically moving the switch *p* just before the time arrives for the clock to be acted upon by the synchronizing-impulse from the main line, in order to throw the magnet *J* into circuit, I provide the minute-wheel with a pin, *r*, which acts momentarily to force the switch *p* into contact with the conductor *m*.

As the minute-wheel revolves once in each hour, while the synchronizing effect is to occur but once in twelve hours, I provide means to prevent the wheel from moving the switch, except at the end of the twelfth hour. This is accomplished by attaching the switch-arm to a shaft, *t*, which is movable endwise in its bearings, and which is acted upon or carried at one end by an arm, *u*, having an inclined surface in the path of a pin, *v*, attached to the hour-wheel. This wheel revolves once in twelve hours, and at a proper time its pin *v* moves the arm *u* sidewise, thereby moving the shaft of the switch-finger, so that the switch is brought into the path of its pin on the minute-wheel. A spring, *w*, acts to throw the switch-finger out of the path of its operating-pin after it has performed this office.

From the foregoing it will be understood that once in twelve hours the clock switches itself into the circuit and the telephone out of the circuit, so that the synchronizing devices are in the condition to be operated by the impulse to be received over the main line.

When the clock is to be used as a means of controlling a series of secondary clocks or time-pieces on a local circuit, I make use of the additional parts, which will now be described. Local clocks are located on a circuit, *C*, containing a battery or other motor, *D'*, and extended to the controlling-clock above described, where one end is connected to the clock-frame and the opposite end connected to a conducting-finger, *a'*, attached to the shaft of the pallet. Below this finger *a'* there is pivoted to the clock-frame a conducting-finger, *b'*, weighted at its lower end, so that it may stand free in its upright position, with its upper end out of the path of the conductor *a'*. An arm, *c'*, on the shaft of the escapement-wheel, which carries the second-hand, acts at each revolution to force the upper end of the arm *b'* outward into the path of the conductor *a'*, which, acting thereon, closes the clock-circuit *C*, causing an impulse to be transmitted through the line to the various clocks thereon. This impulse continues but a brief time, for the reason that the arm *c'* quickly re-

leases the arm *b'*, and occurs at intervals of one minute. During the time that the escapement-wheel is out of action the conductor *a'* fails in the transmission of one of the impulses to the secondary clocks. To supply this missing impulse and to prevent the secondary clocks from the loss of time which would otherwise occur, I extend a conductor, *d'*, from the secondary-clock circuit to a contact-plate, *e'*, insulated to the clock-frame. When the armature-lever *i* is operated to throw the escapement out of action, its end forms a contact with the plate *e'*, so that the clock-circuit is completed for the instant through the armature and clock frame, instead of through the conductor *a'*. In this way it will be seen that the armature serves to supply the impulse which was lost by the arm *c* passing behind the arm *f* while the escapement-wheel was out of gear with the pallets.

For the purpose of giving notice of the near approach of the time for winding the clocks, I combine therewith a normally-open circuit containing a battery and a bell or other signal, and adapted to be closed by and through the weight, which in descending passes between and forms a contact with the two terminals of the circuit. This arrangement is plainly represented in Fig. 1, in which *a*² represents the alarm-circuit, *b*² the alarm, *c*² the battery, and *e*² the two spring-terminals or conducting-fingers between which the clock-driving weight *f*² descends.

To avoid the annoyance which would result from a continual operation of the alarm, I provide for closing the same at intervals, preferably intervals of one-eighth of an hour—that is to say, seven and one-half minutes—although the weight may remain in contact with the conducting-fingers. This is accomplished by connecting the circuit at one end with the clock-frame or other conductor and at the opposite end with a conducting-finger, *h*², arranged to form a contact at the end of each seven and one-half minutes with the conducting pins *g*², attached to the train-wheel located between the minute and the escape wheels.

I claim—

1. In combination, a clock or time-keeper, an electric synchronizing device embodied therein and acting thereon, and an automatic switch for placing said synchronizing device in and out of circuit operated by the concurrent action of two devices moved by the train, one acting with greater frequency than the other.

2. In combination with a clock or time-keeper, an electric synchronizing device embodied therein and acting thereon, an automatic switch to connect said device with an electric circuit, said switch operated, substantially as described, by the concurrent action of two devices carried, respectively, by wheels of the clock-train which revolve in different times.

3. In a clock or time-piece, the escapement-

wheel detachable by an axial movement from the pallet, in combination with the stop-pin on the wheel and the stationary stop *g*.

4. In combination with the regulator and the secondary circuit containing the secondary clocks B, the seconds contact connection with the escapement, the escapement - wheel detachable from the pallet to permit the advance of the hands to the synchronizing-point, the magnet to effect the disengagement, and connections whereby the magnet transmits impulses to the secondary circuit while the pallet is out of action for that purpose, whereby the motion of the secondary clocks is continued.

5. In combination with the clock-train and the switch *p*, the switch-operating pin on the minute-wheel, the arm *u*, to affect the lateral adjustment of the switch, and the arm-adjusting pin on the hour-wheel, whereby the switch is placed in position to be operated by the pin on the minute-wheel at the end of every twelfth hour.

6. As an improvement in clock-synchronizing mechanism, the escapement-wheel provided with the stop-pin and adapted for disengagement from the pallet.

7. As an improvement in synchronizing mechanism for clocks, an escape-wheel detachable from the pallet, that the train may advance the hands quickly to the synchronizing-point, in combination with a stop to arrest the motion at the proper point.

8. An open circuit connected with a winding-alarm, and spring-terminals in combination with a clock-operating weight arranged to pass between and form a conductor between the terminals, whereby the circuit is closed in a continuing manner.

9. A winding-alarm for clocks, embracing the battery and alarm mechanism, in combination with the weight adapted to open and close the circuit at one point, and the clock-train arranged to open and close the same at another point.

In testimony whereof I hereunto set my hand, this 22d day of July, 1885, in the presence of two attesting witnesses.

JAMES S. ROSS.

Witnesses:

PAUL JONES,
A. S. BENNET.