

(Model.)

T. N. VAIL.

STOP MECHANISM FOR SIGNAL APPARATUS.

No. 246,696.

Patented Sept. 6, 1881.

Fig. 1.

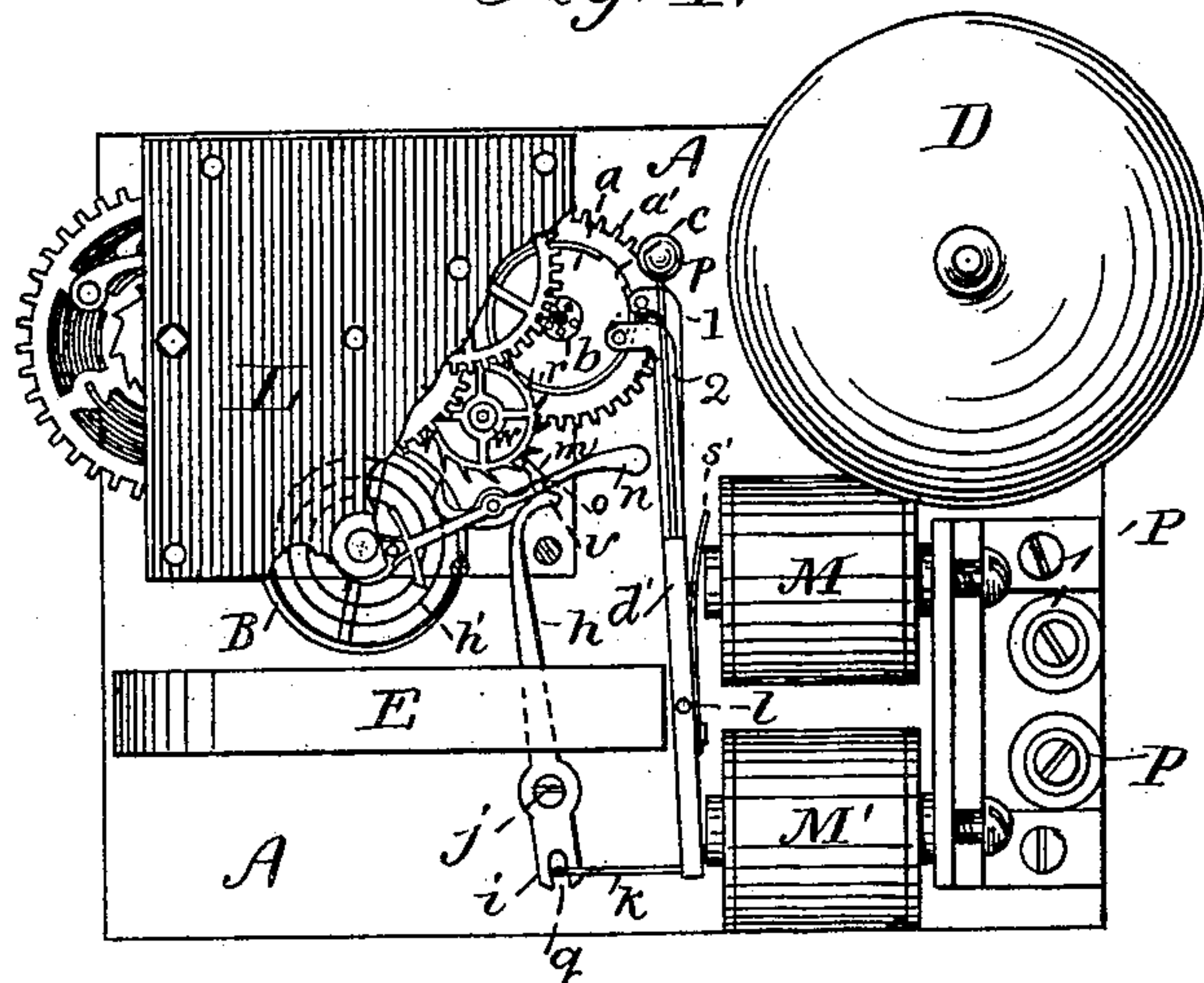


Fig. 2.

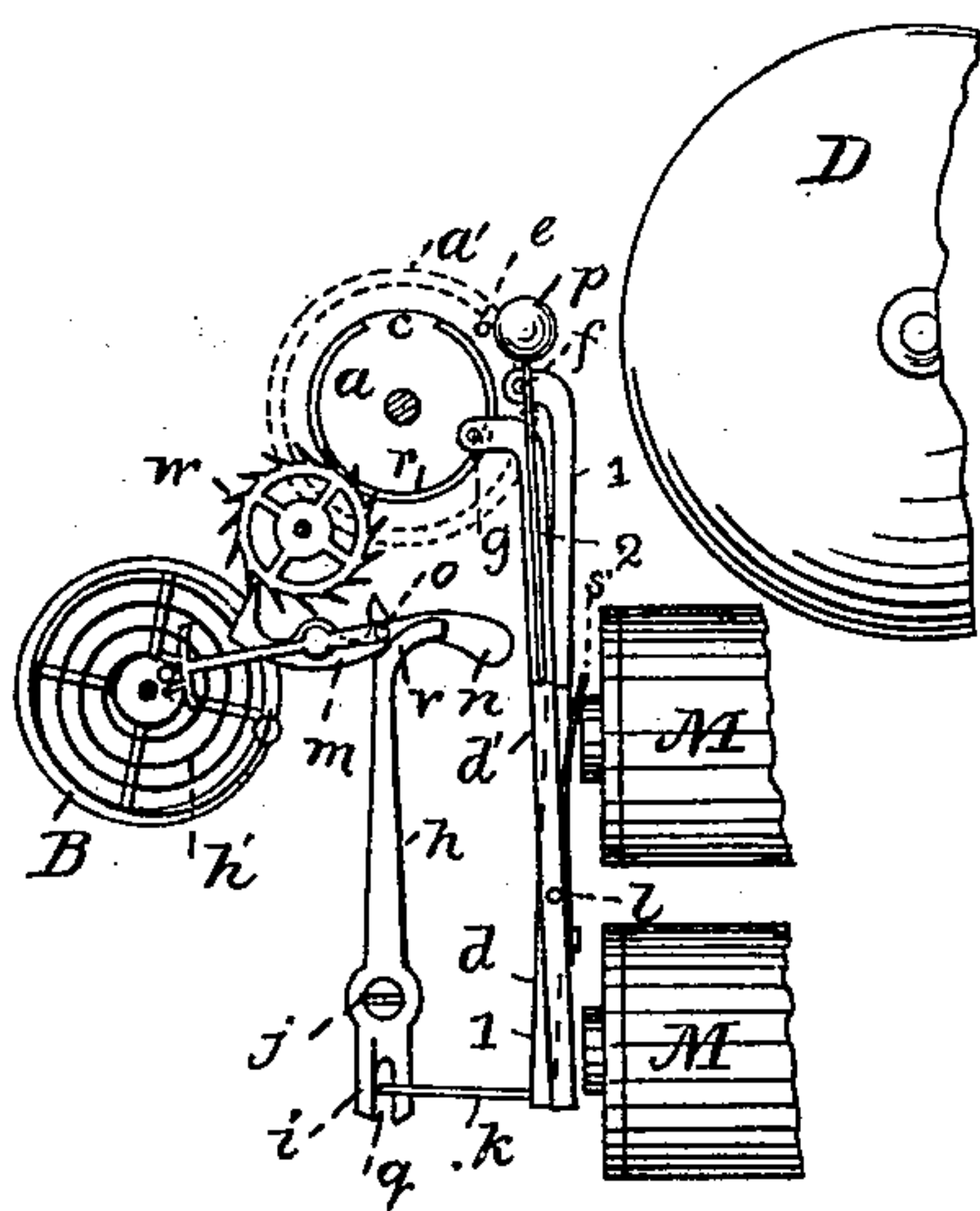
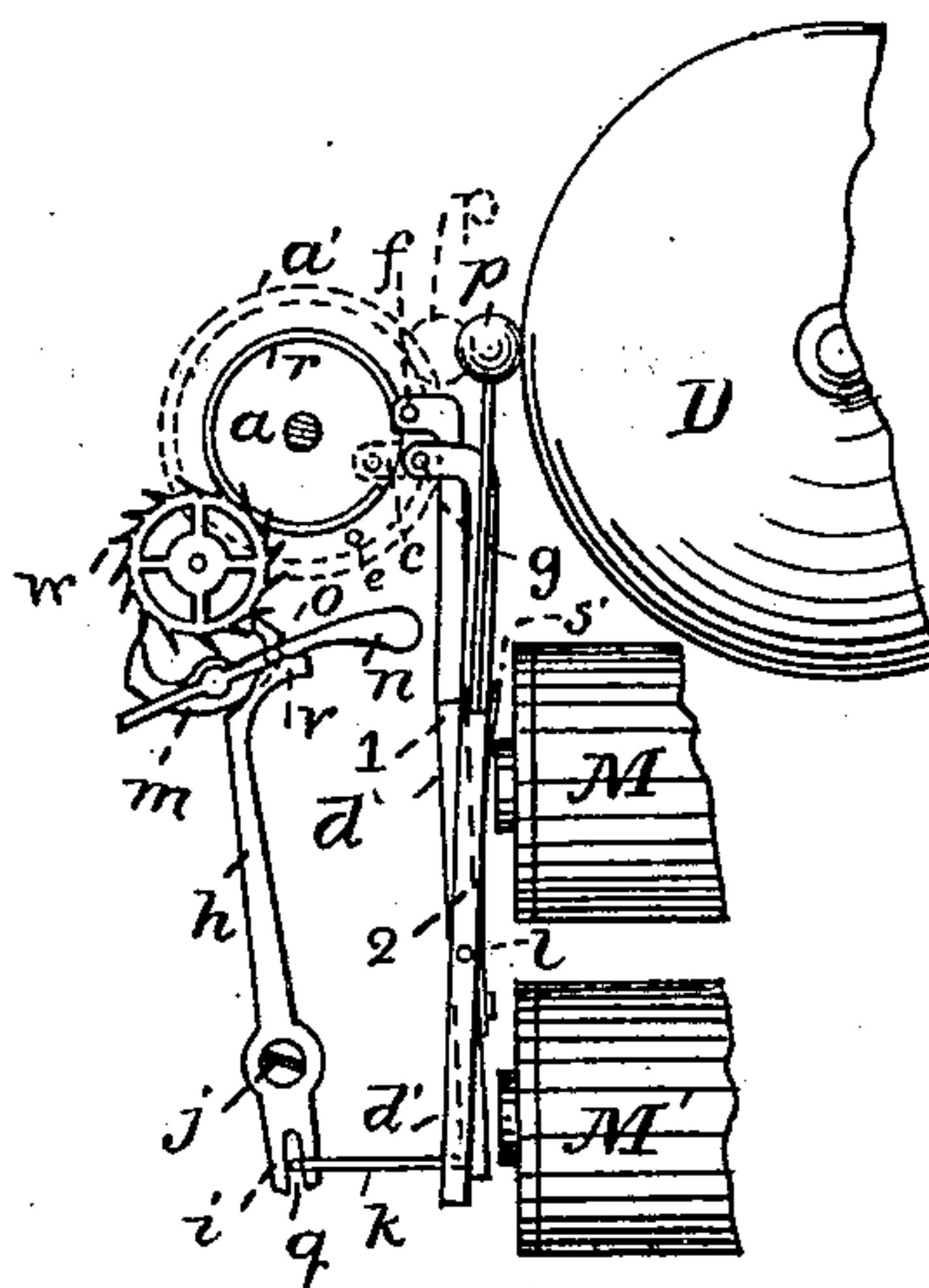


Fig. 3.



Witnesses.

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THEODORE N. VAIL, OF BOSTON, MASSACHUSETTS.

STOP MECHANISM FOR SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 246,696, dated September 6, 1881.

Application filed June 8, 1881. (Model.)

To all whom it may concern:

Be it known that I, THEODORE N. VAIL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improve-
5 ments in Stop Mechanism for Signaling Apparatus, of which the following is a specification.

My invention relates to an electro-magnetic stop mechanism for clock trains or movements, and is embodied, utilized, and clearly shown
10 in an electric signaling apparatus invented by me, for which I received Letters Patent June 7, 1881, No. 242,492. In the said patent an instrument is shown adapted to work in series and synchronously with other instruments of
15 the same character and construction, which are placed each at a separate station on the same line-circuit, and operate to bring the alarms at such stations consecutively into a position where they may be sounded, each in its own
20 time and at its own position, to the exclusion of the others. Each instrument consists of an ordinary clock train or movement controlled by a mechanical escapement, which may be of any suitable construction, and of a stopping
25 device by which, when the said clock-movement is in operation, it can be stopped at any point or at any time, for the purpose hereinbefore indicated.

The stopping device, which is the subject of
30 my present invention, operates in each instrument to stop the clock-work whenever currents of a definite character are transmitted over the line, traversing the electro-magnets of all the instruments included in the line-circuit.
35 All the instruments on the circuit are thus simultaneously stopped, and when at rest may also be simultaneously started by the transmission of a current or currents of an opposite character to those employed to operate the
40 stopping mechanism.

It is obvious, then, that the clock-trains, after having been set in motion, may, by my invention, be brought to a standstill at any point of their progress, and consequently at the point
45 on time at which the alarm at any particular or individual station is in position to be sounded.

My invention consists, first, of an electro-magnetic stopping device with polarized armature, combined with the mechanical escape-
50 ment of a clock-train, so as to act upon and

stop said escapement when a current of one polarity is sent, and release it by the operation of a current of opposite polarity; second, mechanism for bringing a clock or time train to a standstill and a controlling device for the same, 55 such mechanism being arranged to engage the escapement of the clock-trains at or near the end of its oscillating movement, thus leaving it ready to again oscillate when disengaged by the stopping device. 60

Figure 1 is a side elevation of a signaling apparatus containing my invention. Figs. 2 and 3 are details showing the stopping device, Fig. 2 representing the escapement disengaged from said stopping device, as when the clock- 65 work is in motion, and Fig. 3 represents it as locked and the clock-work at rest.

The clock-work L may be driven by any suitable motor—such as a weight or spring—and may be the same as that shown in my former 70 application. Its train terminates in an escapement-wheel, *w*, controlled by an escapement, *m*, the movement of which is regulated by a lever, *n*, fixed on the same arbor as the pallet, and which is governed by the balance-wheel 75 B, which is provided with a hair-spring, *h*'.

Attached in a suitable position in relation to the clock-work on the bed-plate or frame A is an electro-magnet, M M', furnished with two soft-iron armatures, *d d'*, pivoted at their 80 centers on the arbor *l*. These armatures are inductively polarized by the proximity of the permanent horseshoe-magnet E. The front armature, *d*', carries a bell-hammer, *p*, and a rod and pin, *g*, by which it is engaged by the 85 rim *r* of the permit-wheel *a*, and kept from vibrating, except when the said permit-wheel, which is fixed to the arbor of the spur-wheel *a'*, and is thus revolved by the clock-work, is in such a position that the opening *c* in the rim *r* 90 is opposite to the pin *g*. No longer controlled by the permit-wheel, the armature *d*' has then free movement. The rear armature, *d*, at its upper end, carries an upright rod, *l*, to which is attached a horizontal pin, *f*. This nor- 95 mally engages with a unison-pin, *e*, on the surface of the spur-wheel *a'*, and by such engagement maintains the clock-work at rest. This detention is irrespective and independent of the position of the stopping device, and in the 100

apparatus shown serves as a unison or zero point at which the clock-train may automatically come to rest at the completion of each revolution. Attached to the lower end of the armature *d* is a stiff metallic wire, *k*, placed at right angles to the armature itself. It terminates in a projection, *q*, engaging with the slot *i* of a lever, *h*, which is pivoted at *j*, and which is, at its upper end, provided with a curved extension, *v*. This extension *v*, by a movement of the armature *d* in a definite direction, is advanced into engagement with the pin *o* of the escapement-lever *n*, and thus arrests the motion of the clock-train. When the armature is moved in the opposite direction the curved extension is withdrawn and disengaged from the pin *o*, releasing the clock-work and allowing it to resume its motion.

The permanent horseshoe-magnet *E* is placed near the base of the instrument, with its poles opposite and near to the armatures *d d'*, giving to one of the armatures a permanent induced magnetism of north polarity, and to the other a permanent induced magnetism of south polarity, so that when a current of either direction is transmitted through the electro-magnet coils *M M'* both armatures are affected, but oppositely. When the upper arm of *d* is attracted to the core of the electro-magnet the lower arm of the armature *d'* is similarly attracted, and vice versa.

The electro-magnet is placed in the line-circuit and the clock-work is normally at rest, being so retained, as hereinbefore described, by the engagement of the pin *f*, carried by the armature, with the unison-pin *e* of the wheel *a'*.

The operation of my invention is as follows: The clock-trains are released from their unisons by sending from the transmitting-stations successive currents of alternating polarity or direction, which operate on the respective electro-magnets, causing the armature *d* to vibrate, releasing, by the first electrical impulse, each time-train in the circuit from its unison, and, by the second impulse, from the escapement-lock *v*. The clock-work, no longer held, will commence its movement.

It is proper here to state that the starting of the time-train from zero could be effected by a single impulse of any prearranged definite direction, followed by a single impulse of opposite direction, since the first impulse, which we will, for example, suppose to be of positive direction, releases the clock-work from its unison-pin, but locks the escapement, while the second, of opposite direction, unlocks the escapement, and as the unison-pin has now advanced beyond its point of engagement, the clock-trains continue to move, either until a complete revolution of the permit-wheel and unison-pin has been made or until a current or succession of currents of the first or positive direction is sent, which will again stop their movement by locking the escapements at any point of the revolution. It is preferred to use a series or suc-

cession of impulses, as being equally certain to cause the trains to start, while by using such successive currents I am enabled to use an ordinary magneto-generator as the transmitting-instrument.

When the clock-trains have advanced to the desired point, which may be known at the transmitting-station by the movements of a duplicate clock operating an index-finger over a graduated dial, a current or succession of currents is sent of the same character as that first transmitted, to release the clock-work from zero. This attracts the lower end of the armature *d*, and the pivoted lever *h* by such attraction brings the curved end *v* under the pin *o* of the escapement-lever *n*, locking the escapement or the oscillating governing portion of the escapement of each and every instrument in the circuit at or near the end of its oscillating movement, with the hair-spring in tension, thus leaving it ready and in position to oscillate again when disengaged by removal of the stopping device. The locking-armature *d* is not provided with a retracting-spring, and consequently remains drawn to that pole of the electro-magnet to which it was last attracted until released by a current of opposite polarity. When it is desired again to release the stopping device and permit the clock-work to resume its motion a current of opposite or negative direction is sent through the circuit, causing the electro-magnet to attract the upper end of the armature *d*, placing it in position to engage the unison-pin *e* on the completion of the revolution of the spur-wheel *a'*, and to repel the lever end of the armature, thereby rocking the lever *h* on its center *j*, and causing it to unlock the escapement. As soon as the projection *v* is withdrawn from under the pin *o* the movement of the clock-work will recommence, as the balance-wheel and hair-spring were stopped in tension and in position to oscillate on the removal of the locking device. The movement of the wheel-work will then continue until the unison-pin *e* engages with the pin *f* on the extension of the armature. The clock-work is then at its original point of rest on said unison-pin.

Having now fully described my said invention and the manner of carrying the same into effect, I would observe, in conclusion, that I do not claim herein the combination, with the mechanical escapement of a clock-train, of an electro-magnetic stopping device with polarized armature arranged to stop said escapement when a current of one polarity is sent and to release it by the action of a current of opposite polarity, said matter being reserved for separate application for Letters Patent; but

What I do claim herein is—

In a clock-train having an escapement, the hereinbefore-described stop mechanism, consisting of a stopping device and a controlling device to operate the same, the said stopping

device being arranged to stop the escapement-lever or oscillating governing portion of the escapement at or near the end of its oscillating movement with the hair-spring of the balance-wheel in tension, thereby leaving it ready to again oscillate when released by the said stopping device, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 2d day of June, 1881. 10
THEO. N. VAIL.

Witnesses:

JNO. M. WHEELER,
WM. B. ROSS.