2 Sheets—Sheet 1.

P. A. DOWD.
Electric Recorder.

No. 220,752. **Patented Oct. 21, 1879.**

Fig. 1.

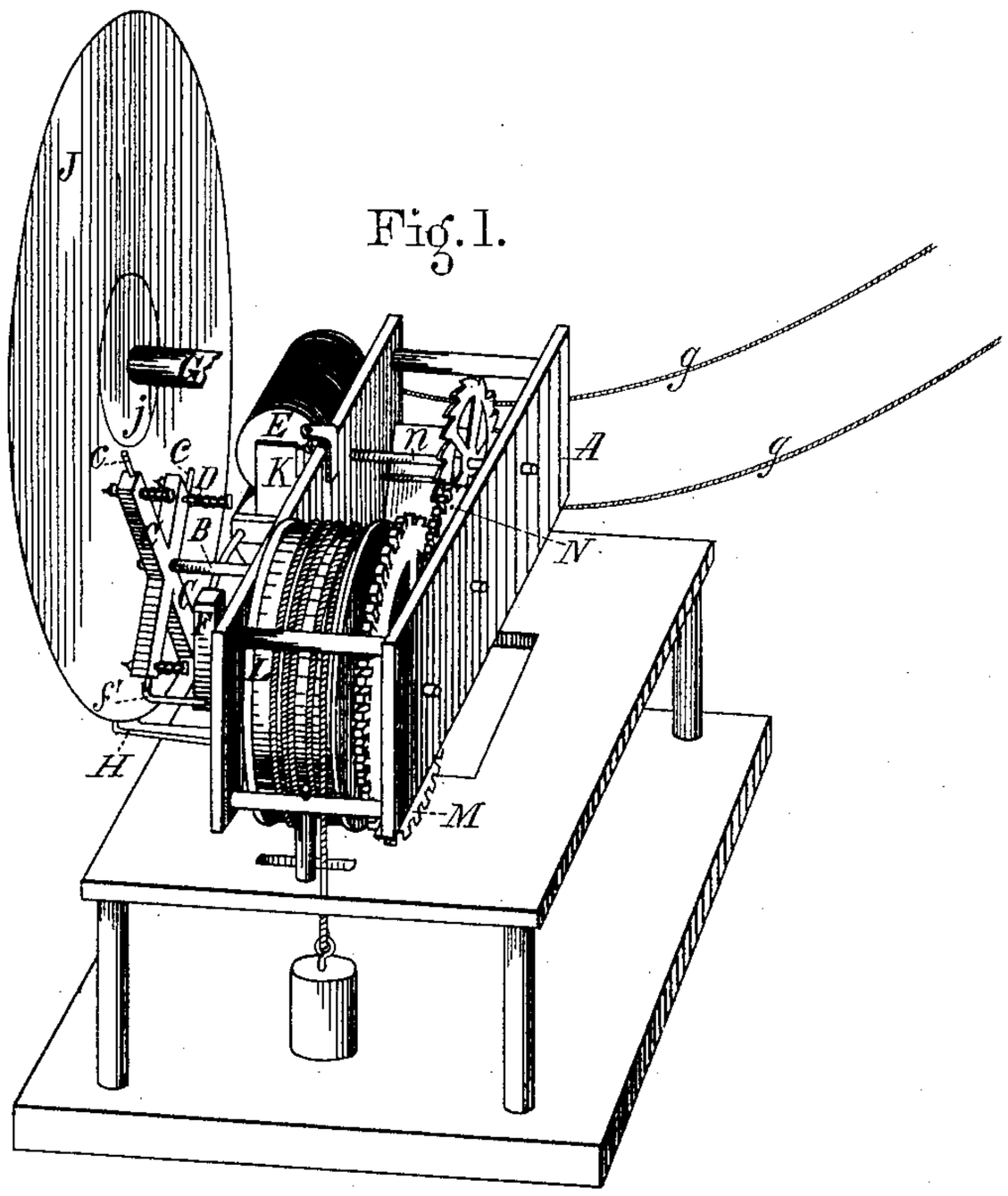
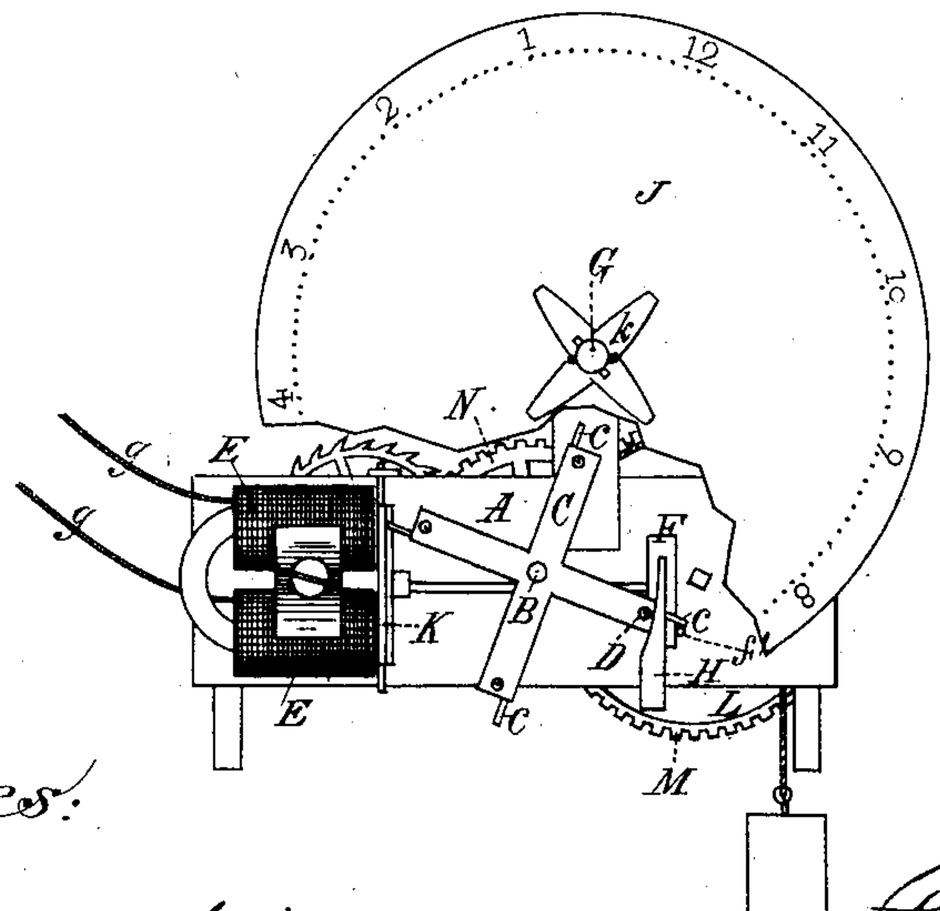


Fig. 3.

Fig. 2.



Witnesses:

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2 Sheets—Sheet 2.

P. A. DOWD.
Electric Recorder.

No. 220,752. Patented Oct. 21, 1879.

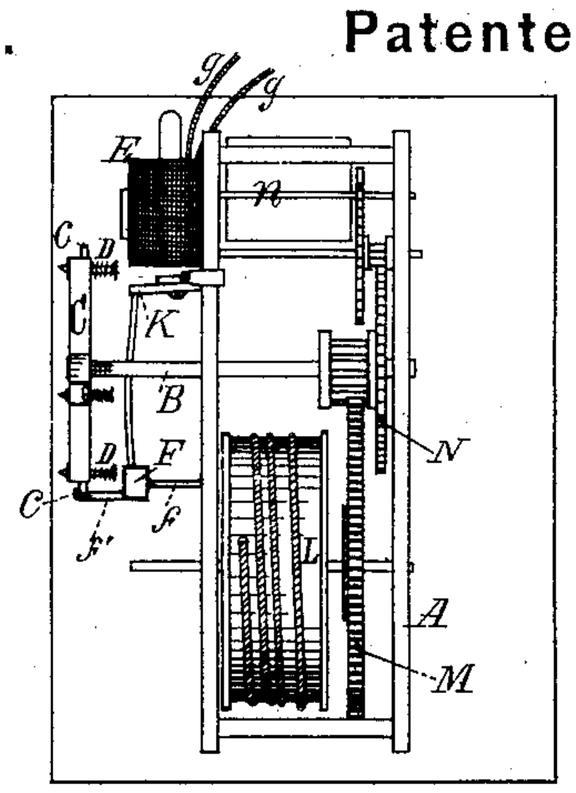

Fig. 4.

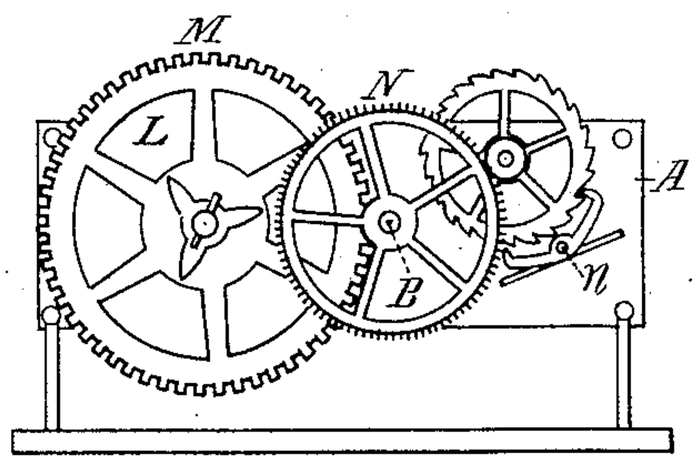

Fig. 5.

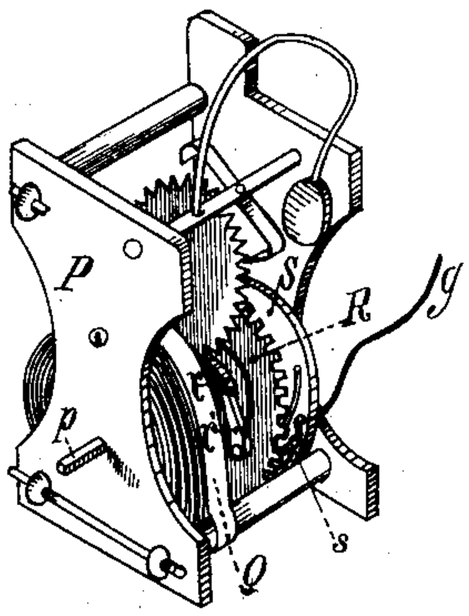

Fig. 7.

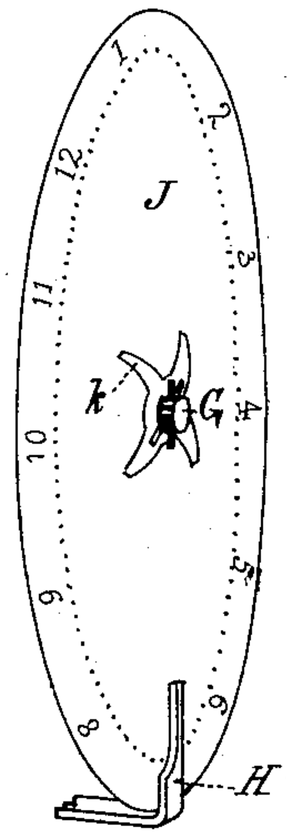

Fig. 6.

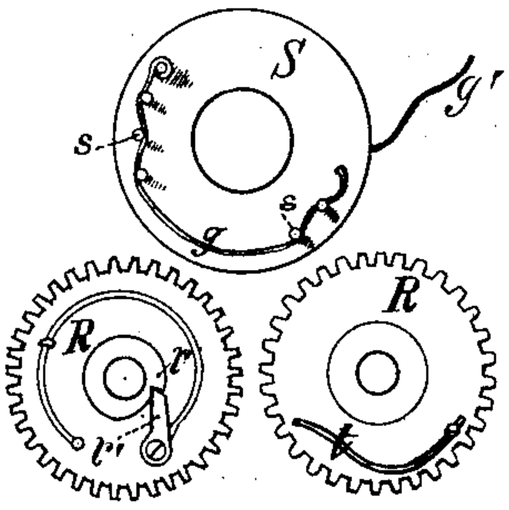

Fig. 8.

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UNITED STATES PATENT OFFICE.

PETER A. DOWD, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ELECTRIC RECORDERS.

Specification forming part of Letters Patent No. **220,752**, dated October 21, 1879; application filed August 11, 1877.

To all whom it may concern:

Be it known that I, PETER A. DOWD, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Electric Registers, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings, making a part hereof.

My invention consists, mainly, in the combination of an electro-magnet having upon its armature a suitable hammer and a shaft suitably rotated, and having one or more cross-arms carrying a stylus adapted to be struck by the hammer, the whole being so arranged in connection with a stop to keep the shaft from revolving that the motion of the armature will not only release the stop and set the arm free, and thus allow the shaft to revolve, but will also actuate the stylus while the shaft is revolving.

In the drawings, A represents a frame in which the necessary shafts are journaled. B is a shaft, from the end of which project one or more cross-arms, C, each of which has near its end and passing through it a stylus, D. Each arm also has a stop, *c*, projecting from its extremity, which, with the stop on the hammer F, stops the revolution of the shaft B, as will be shown hereinafter.

E represents an ordinary horseshoe electro-magnet, the armature K of which is hinged by one edge to the frame A. A spring is, of course, used to keep the armature from remaining in contact with the electro-magnet when the circuit is broken. Attached to this armature, and forming with it a bell-crank lever, is a rod, upon the end of which is a hammer, F, for striking the stylus. From each side of this hammer projects a rod, the one *f* acting with the frame A to prevent the spring from forcing the armature too far from the electro-magnet, (made adjustable in practice,) the other, *f'*, being of convenient shape to act with the stop *c* on the arm C, to prevent motion of the shaft B when the bent part of the rod *f'* lies in the path of the stop *c*.

Figure 3 shows an enlarged view of the stylus which I prefer to use in my register. This is a piece of wire sharpened at one end, and having near this end a collar, *a*, to prevent its being forced out of the hole in the arm C by the spring *b*. This spring *b* is to retract the stylus.

The disk J (made of paper or other suitable material) is fastened to the hour-arbor G of a clock, and is generally made so that it may be easily detached when necessary. I usually clamp it between a disk, *j*, fastened permanently to the hour-arbor, and a spring, *k*, fastened to the hour-arbor by a bayonet-joint.

I generally divide its circumference into a number of parts to represent hours and fractions of an hour, so that the time when a registration is made will be known from the place upon the disk where the perforations are.

It will be seen that when the disk is placed upon and moved by the hour-arbor of a clock the figures must either be arranged in the opposite order to that in which they are arranged on an ordinary clock-dial, or else the directions of the revolutions of the arbor must be reversed.

When the disk is not stiff enough to enable the stylus to indent it or otherwise mark it, a piece, H, of proper shape is so placed near the edge of the disk which lies between it and the stylus that the stylus will, when it strikes the disk, force it against the edge of the piece H, and as it pierces the disk will graze the edge of the piece H.

For this reason I prefer to make the edge of the piece H which the stylus grazes concave, the radius of concavity being a very little longer than the distance from the center of the shaft B to the farther side of the stylus.

The shaft B in the apparatus shown in the drawings is actuated by an ordinary weight and cord, with drum L, properly connected by a click cog-wheel, M, and a pinion with the shaft B. The shaft B also has a cog-wheel, N, gearing into an escapement, by which a regular movement may be given to the shaft B. I prefer the escapement shown in the drawings, its peculiarity consisting in the winged shaft *n*, by which the motion of the shaft B is rendered slower.

It will be obvious that any driving mechanism may be substituted for the cord and weight spoken of above.

When the register is to be used the wires *g g'* are properly connected with a battery and a system of circuit-closers, in a manner too well known to need description further than to say that the first closing releases the shaft B, and may also cause the stylus to indent the paper, while the other closings make each its indentation.

Although various circuit-closers will answer, I prefer to use the one shown in Figs. 7 and 8 of the drawings, in which P represents a frame, in which is journaled the shaft *p*. This shaft carries a spring, or its equivalent, for imparting a return motion to it after it has been turned in one direction by the operator; and there is also upon it a cog-wheel, R, and a ratchet, *r*, the cog R and ratchet *r* being so arranged with the pawl *r'* that the motion of the shaft in winding up the spring will not cause any motion of the cog R; but the motion of the shaft caused by the unwinding of the spring will revolve the cog, the whole arrangement being very common in clock-work. The cog-wheel R is connected with an ordinary escapement, by which its speed is regulated.

A piece, S, of ebonite or some other non-conductor of electricity is fastened to the frame P in some convenient position, preferably round the shaft *p*, as shown in the drawings, and from this piece S project one or more pins, *s*, the pins being arranged at proper distances from each other, and each pin being insulated from the frame P by the piece S.

The cog-wheel R carries a spring-finger, *t*, which is arranged in such relation to the pins *s* that when the cog-wheel revolves, the finger *t* will be pressed against these pins, one after the other; and as each pin is in electrical connection with the wire *g'*, but otherwise insulated, and the finger *t* in electrical connection with the other pole of the battery, (or with the earth,) the circuit is made when the finger touches either of the pins, and broken when the contact ceases. The number of these pins, therefore, determines the number of makes and breaks of the circuit, and when the circuit is first made the armature K is attracted by the magnet E, the hammer F thereby thrown forward, the stylus thereby caused to make one mark upon the disk, and the stops *c* and *f'* separated, the arm C being thereby set in motion. All the rest of the makes and breaks occur while the arm C is in motion, and each make throws forward the hammer F and produces a mark upon the disk J.

The circuit-closer shown is designed to register six marks upon the disk, so arranged as to show that they were registered from station No. 24, the pins being arranged in two groups, one containing two pins and the other four.

When the mechanism in the register is wound up the stop *c* will be in contact with the stop *f'* on the hammer. On closing the circuit the armature will be attracted to the electro-magnet, and will move the hammer a sufficient distance with sufficient force to cause it to strike the stylus in front of it, driving it through or against the disk, making a hole or indent in the disk, at the same time separating the stops *c* and *f'*, thus allowing the shaft B to rotate until the hook *f'* comes in contact with the stop *c* again. Of course, if the circuit is made and broken with sufficient rapidity, the same stylus may be struck several times before it passes out of reach of the hammer, and in this way a series of signals may be registered, showing by their position upon the disk the time at which they were registered, and by the number or arrangement of perforations in each signal the circuit-closer from which such signal was sent.

It will be clear that varying the arrangement or number of the pins *s* on the insulating-plate S will vary the number or arrangement of the perforations on the disk J, and that a great number of circuit-closers may be used with one register, each closer having its own arrangement of the pins *s*, and consequently making a peculiar register.

Thus, suppose a watchman was required to register from, say, ten stations. In that case ten circuit-closers would be used, one at each station, each the same, except in the number or arrangement of the pins *s*. For example, circuit-closer for station No. 1 need have but one pin, No. 2 two pins, and so on, as many pins as numbers up to ten. Station No. 11 would be provided with a circuit-closer with two pins, but separated considerably more than the two pins of station No. 2, on the same principle as above explained for station No. 24.

The watchman has only to turn the shaft *p* (which, in practice, is suitably protected to prevent any unauthorized person turning it) against the spring Q a little more than one whole revolution, and then release it, when it is revolved by the spring in the other direction, and when revolving in this direction the pawl *r'* engages with the ratchet *r*, and thus causes the cog R to revolve until its further motion is prevented by a suitable stop.

In the circuit-closer shown the wheel R is designed to make but one revolution, and, by means of the escapement, is so timed that its revolution will take place in the same time or a little less than the time during which the arm C is moving, so that all the makes and breaks shall occur while the hammer and stylus are in their proper relations to record them.

If the disk be properly placed upon the hour-arbor of the clock, the concave edge of the piece H will be a pointer, showing the time in hours and minutes. Thus this disk and pointer H show the time, this instrument being not only a register, but also serving the purpose of an ordinary clock.

Having now described the best form of apparatus known to me for putting into use my invention, what I claim as my invention is—

1. The improved registering apparatus above described, consisting of the shaft B and its actuating mechanism, provided with one or more arms, C, each carrying a stylus, in combina-

tion with the magnet, its armature, hammer, and stop, all substantially as and for the purpose set forth.

2. In an electrical circuit-closer, the combination of the shaft *p*, spring Q, pawl and ratchet *r r'*, cog R, its finger *t*, and the escapement with a series of pins, *s*, and conductor *g'*, the conductor *g'* connecting the pins with each other and with the battery, and the finger *t* adapted to make an electric connection with each of the pins *s* in turn.

P. A. DOWD.

Witnesses:
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