P. A. DOWD.

ELECTRO MAGNETIC WATCHMANS' TIME-REGISTER.

No. 182,179. Patented Sept. 12, 1876.

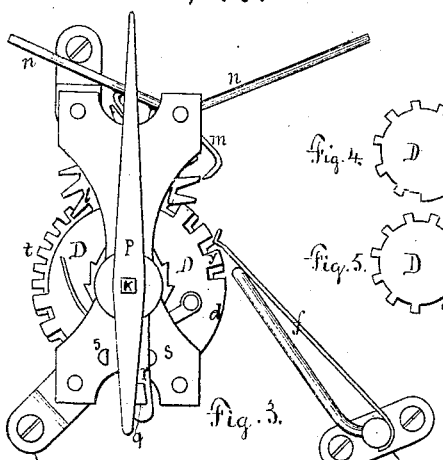

Fig. 3.

Fig. 4.

Fig. 5.

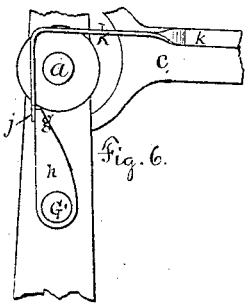

Fig. 6.

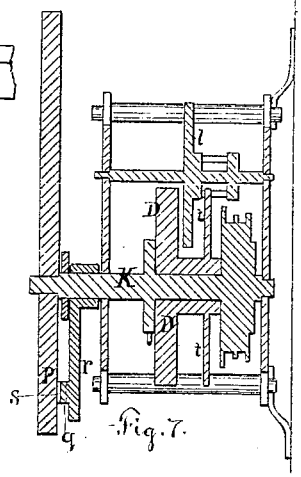

Fig. 7.

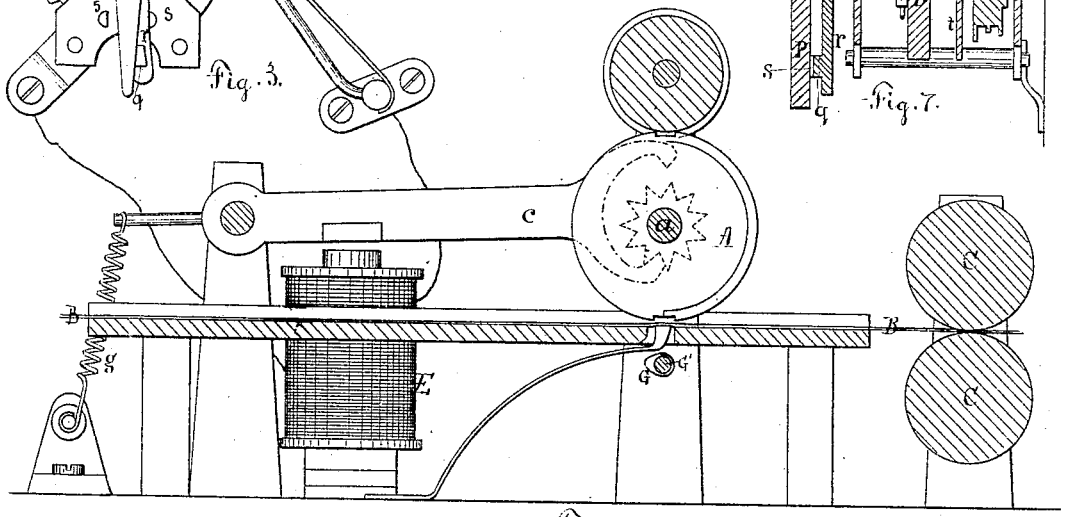

Fig. 1.

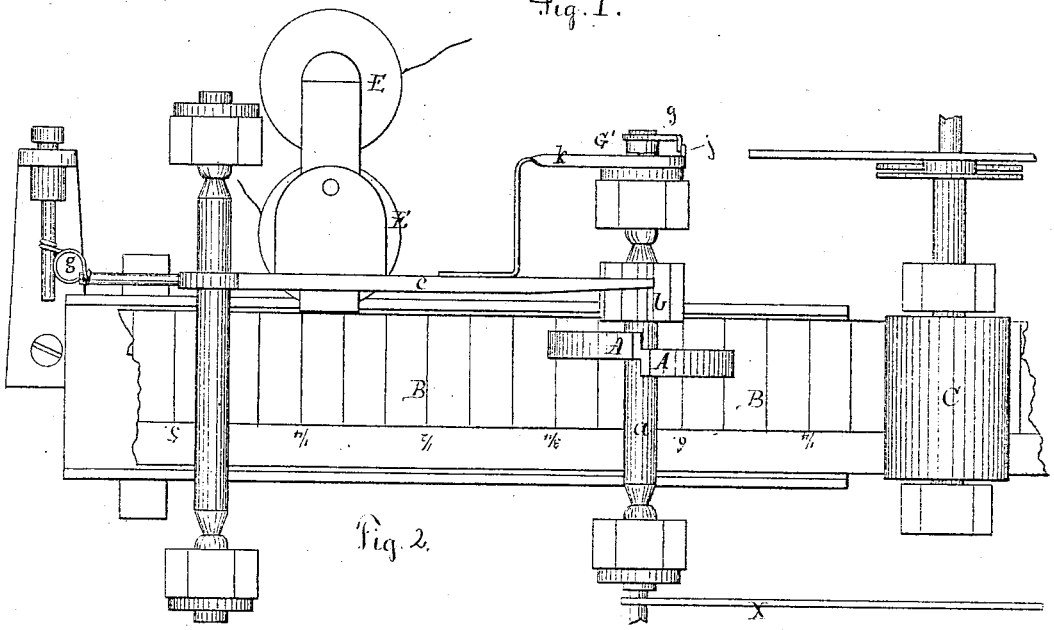

Fig. 2.

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PETER A. DOWD, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ELECTRO-MAGNETIC WATCHMEN'S TIME-REGISTERS.

Specification forming part of Letters Patent No. **182,179**, dated September 12, 1876; application filed February 21, 1876.

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 an Improved Time-Register for Watchmen, &c., of which the following is a specification, taken in connection with the accompanying drawings, making a part hereof.

Figure 1 is an elevation, partly in section, and Fig. 2 is a plan, of the main portion of my apparatus. Fig. 3 is an elevation of the circuit-closer and its attachments.

My invention consists, mainly, in the combination of a marking-wheel and a circuit-closer with mechanism operated by making and breaking the circuit, adapted to bring the marking-wheel into a given relation to the strip to be marked, hold it there long enough to allow the mark to be made, and then return it to the zero-point, in readiness for another operation; and its main purpose is to indicate permanently which one of a series of circuit-closers is operated, and also to show the time when such circuit-closer is operated.

In the drawings, A is the marking-wheel, and B the paper to receive the mark. This strip of paper is divided into spaces representing hours and parts of hours, and is moved forward, in accordance with these divisions, by the rollers C C, one of which is operated by a suitable time-piece. (Not shown.) The means for spacing and moving the strip are so well known as to need no description, the object being merely to move the strip along a given distance in a given time, so that the place of the mark upon the strip will indicate the time when the mark was made; and, as the character of the mark indicates the circuit-closer by which it was made, the record upon the paper will show both the time when, and the circuit-closer by which, the mark was made.

The marking-wheel A is upon the shaft *a*, and this shaft is revolved by the well-known mechanism consisting of a toothed wheel, *b*, and a forked lever, *c*, each motion of the lever downward moving the toothed wheel one tooth, and each motion upward moving it one tooth, as will be fully understood from the drawings.

The purpose of this mechanism is to insure the proper moving of the marking-wheel one division at a time, and thus enable a circuit-closer to be used, by which the electrical circuit shall be so made and broken as to insure the rapid motion of the marking-wheel from the zero-division until the numeral or other sign upon its periphery is brought into place, and its retention long enough in that position to enable the mark to be made and its return to a zero-point again.

When not more than, say, from fifteen to twenty-five stations are used, the marking-wheel may be a disk, with the same number of divisions as stations, plus one more for a zero-point. In this case the circuit-closer will be so formed that it will make and break the circuit often enough to revolve the wheel once—that is, from the zero-point back to the zero-point again—and there will be but one wide tooth or space upon it.

For example: Suppose there be fifteen stations. Then the marking-wheel would be a plain disk, having upon its periphery sixteen divisions—one for each station, and one for a zero-point—and the circuit-closer would have enough teeth for making the circuit and spaces for breaking it to give the marking-wheel one complete revolution. In this case, if the circuit-closer were at a station numbered one, then the wide tooth *d* would be so arranged in relation to the spring *f* (see Fig. 4) as to be the first tooth to engage with that spring when the wheel D of the circuit-closer commenced to revolve. This contact of the wheel D and spring *f* closes the circuit, and the electric current passes through the magnet E, which attracts its armature on the lever *c*, and thus causes the toothed wheel *b* to move on its axis the width of one of its teeth, which brings the first division from the zero-point of the marking-wheel A directly over the strip B, and holds it there so long as the current continues, which is so long as the spring *f* remains in contact with the wide tooth *d*. The other parts of the apparatus are so arranged that during this time, while this first division is held over the strip, the strip is pressed against the marking-wheel, so that the mark in this first division shall be reproduced upon the strip.

It is obvious that the wheel might be pressed upon the strip instead of pressing the strip

upon the wheel; but moving the strip is much simpler. After the strip is thus marked the continued revolution of the wheel D of the circuit-closer carries the wide tooth *d* from under the spring *f*, and that spring falls into the space between the wide tooth *d* and the small tooth next to it, which breaks the circuit, and as soon as the circuit is broken the spring *g* lifts the forked end of the lever *c*, and thus revolves the wheel *b*, its shaft *a*, and the marking-wheel A the distance of another tooth of the toothed wheel *b*, bringing the second division of the marking-wheel over the strip. The circuit is then closed by the passage of this first small tooth of the wheel D under the spring *f*, which brings the third division of the marking-wheel A over the strip, and so on, each breaking of the circuit allowing the spring *g* to lift the forked end of the lever *c*, and each making of the circuit depressing the forked end of that lever, the marking-wheel being moved one division for each tooth and each space in the wheel D of the circuit-closer. There are consequently seven small teeth and one wide tooth in the wheel D; and if it be set so that the wide tooth shall be the first to come under the spring *f*, then the mark in the first division, from the zero-point of the marking-wheel A, will be marked upon the strip; if it be so that only one small tooth comes in contact with the spring *f* before the wide tooth comes in contact with that spring, then the mark made upon the strip will be that in the third division from the zero-point; if two small teeth, then the fifth division from the zero-point, and so on, three small teeth giving the seventh division, four the ninth, five the eleventh, six the thirteenth, and seven the fifteenth. From this it will be clear that during the contact between the teeth of the wheel D and the spring *f* only one-half of the spaces on the marking-wheel A will be over the strip; and, consequently, that the other half of these spaces (the even numbers in this case) cannot be registered unless there be a wide space between two of the teeth of the wheel D.

Fig. 4 shows a wheel adapted for the first, third, fifth, seventh, ninth, eleventh, thirteenth, and fifteenth of fifteen stations, while Fig. 5 shows a wheel adapted for the remaining stations. Here the wide space *d'* performs the same function as the wide tooth *d* in Fig. 4.

When the number of stations is in excess of twenty, I prefer to use two semi-cylindrical marking-wheels, as in Figs. 1 and 2, rather than to enlarge the marking-wheel A and the circuit-closer wheel D so much as would be required if the number of stations were large, for there must, as is obvious, be sufficient space between the teeth on the wheel D to allow the spring *g* time to lift the forked end of the lever *c*, and, if there be a great many teeth, these spaces must be small, unless the wheel be unduly large; but when the marking-wheel A is made of two semi-cylinders, each of which bears the first ten Arabic numerals, it will be clear that as many as ninety-nine stations can be registered by one registering-instrument. Moreover, the circuit-closer wheel D will only require eleven teeth, one of them, *d*, being wide, and one of the spaces, *d'*, being also wide. For example, suppose the wheel D to commence its revolution from the position shown in Fig. 3, the small tooth *y* will make the circuit, and thus bring the first division from the zero-point of the marking-wheel A over the strip; the small space between this small tooth and the wide tooth *d* will break the circuit, and thus bring the second division of marking-wheel A over the strip. The wide tooth again makes the circuit, and brings the third division over the strip, and holds it there until the impression is made. The seven succeeding small teeth and the seven short spaces each make and break the circuit, and therefore move the marking-wheel until the sixth division of the second segment is over the strip—that is, the space next the wide tooth *d* carries the fourth division of the marking-wheel over the strip, the next tooth the fifth, the next space the sixth, the next tooth the seventh, the next space the eighth, the next tooth the ninth, the next space the tenth, the next tooth the intermediate division between the two segments diametrically opposite to the zero-point; the next space the first division of the second segment, the next tooth the second, the next space the third, the next tooth the fourth, the next space the fifth, the next tooth the sixth, and the wide space *d'* thus brings the seventh division of the second segment of the marking-wheel A over the strip, and keeps it there until the strip is marked; the other teeth and spaces bring the zero-division of the marking-wheel A over the strip, ready for the next operation.

It will be obvious from what has been said that the marking-wheel A may have more than two segments, and that three segments will answer for nine hundred and ninety-nine stations, and four nearly ten thousand.

It will be obvious that when the marking-wheel is but one segment the impression-cam G need revolve but once to give the impression, care being taken to so time that cam that it will lift the strip of paper while the wide tooth *d* of Fig. 4 is in contact with the spring *f*. This is readily done by securing the cam G to a shaft, G', which is actuated by a train of gearing, with a suitable escapement, and driven by a weight or a spring, and which is so timed that one revolution of the cam-shaft G' shall take place in a time only a little longer than that occupied by a complete revolution of the circuit-closer wheel of Figs. 4 or 5. The cam-shaft is stopped by the finger *g* upon the crank *h*, which crank is secured to the end of the cam-shaft, and this finger *g* comes in contact, as the cam-shaft G' revolves, with a stop, *j*, which is upon the projection *k* from the forked lever. Thus when the circuit

is closed, and the forked lever depressed by the magnet attracting its armature, the stop *j* is also depressed, so that it clears the finger *g*, and consequently the train of gearing puts the cam-shaft G′ in rotation, and it continues to rotate until the finger *g* strikes the stop *j*. The circuit-closer wheel of Figs. 4 or 5 completes its revolution before the cam-shaft G′ completes its revolution, and thus brings the stop *j* in place to arrest the motion of the finger *g*.

When two numbers are to be marked upon the paper, as happens when the circuit-closer wheel D of Fig. 3 is used, the cam-shaft must revolve nearly twice while the circuit-closer wheel is revolving once, so that the cam will lift the strip twice; or else there must be two cams, one so set as to operate at that portion of the circle corresponding with the wide tooth *d*, and the other at that portion of the circle corresponding with the wide space *d′*. The arrangement of these cams for three or four numbers will be clear without further description. The train of gearing and its escapement and driving weight or spring, by which the cam-shaft G′ is driven, is also too well known to require description. It is indicated at *x*, Fig. 1. The device for regulating the motion of the circuit-closer wheel D consists also of a train of gears and an escapement actuated by a spring or weight. The circuit-closer wheel D and the train of gears are so mounted upon the shaft K that the shaft can turn freely in one direction without moving them, but will carry them with it when it moves in the opposite direction, the pawl, which is fast to the wheel D, engaging with the ratchet-wheel, which is fast to the shaft K. This apparatus is so placed in a box that the watchman, when provided with a proper key, can turn the shaft K, and thus wind up the spring or weight, and when he releases the shaft K it is revolved in the opposite direction by the spring or weight, and carries with it the wheel D and the train of gearing. A single large gear, *k*, upon the shaft K, engaging with a pinion upon the shaft of the escapement-wheel *l*, and a pallet, *m*, whose motions are retarded by the arms *n n*, will answer.

In order that the circuit-closer wheel D shall always be arrested at the desired point, the shaft K is provided with an arm, *p*, which strikes against a stop, *q*, on the swinging pendant *r*, and this swinging pendant is itself stopped by the stop *s*. In winding up the weight or spring the other side of the arm *p* strikes against the stop *q*, and the swinging pendant *r* is stopped by the stop *s′*; but it is obvious that other devices can be used for accurately adjusting the extent of motion of the circuit-closer wheel D.

In Figs. 3 and 7 this mechanism is clearly shown.

The operation is as follows: The registering apparatus is kept at any desirable point, such as the counting-room of a mill, station-house of a city, &c., and a box containing the circuit-closer is secured at each place the watchmen or police officers, or the like, are directed to visit, and each circuit-closer is in electrical communication with the registering apparatus. The strip of graduated paper is put in place, so that it will be properly fed along by the rolls C C, actuated by the time-piece, and is constantly in motion (although its motion is very slow) all the time the apparatus is ready for use. The watchman has only to wind up the weight or spring by turning the shaft K with a key, (which may be formed like a clock-key, or may be so made that it will fit only his own boxes,) or otherwise, and as the apparatus connected with the circuit-closer wheel D runs down it will operate the marking-wheel, and set in motion the impression apparatus, as before described.

Where there is danger of two or more stations being used at the same time, with the same registering apparatus, suitable means should be adopted to prevent such use. Such means are well known, and therefore not shown or described.

It will be obvious that my apparatus can be used for other purposes than a watchman's register, as, for instance, to keep a record of the exact time when a fire-alarm is given, and also of the number of the box from which the alarm is given. In short, whenever the record of time when any one of a series of circuits is closed is desired, my apparatus is applicable, as by it there is permanently recorded on the strip which circuit of the series is closed, and when it is closed.

The marking-wheel A may be a type-wheel, and in that case a suitable inking-roller, Y, will be used with it.

What I claim as my invention is—

In combination the marking-wheel A, the paper B, the mechanism for actuating the marking-wheel by making and breaking the circuit, the mechanism for securing the impression after the marking-wheel is brought into its proper position, and a series of automatic circuit-closers, D *f*, constructed as described, so as to give the desired motions to the marking-wheel A, and hold it in its proper place while making the impression, the whole combination being substantially as set forth.

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