June 13, 1944. L. H. CHASE ET AL 2,351,319

STYLUS OPERATING MEANS

Filed Dec. 26, 1941 3 Sheets-Sheet 1

FIG. 2

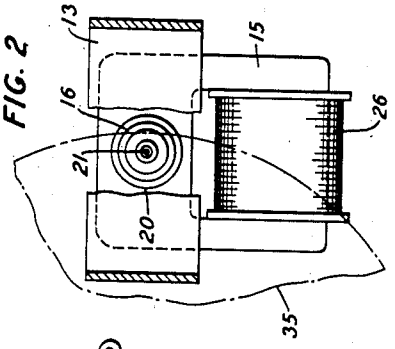
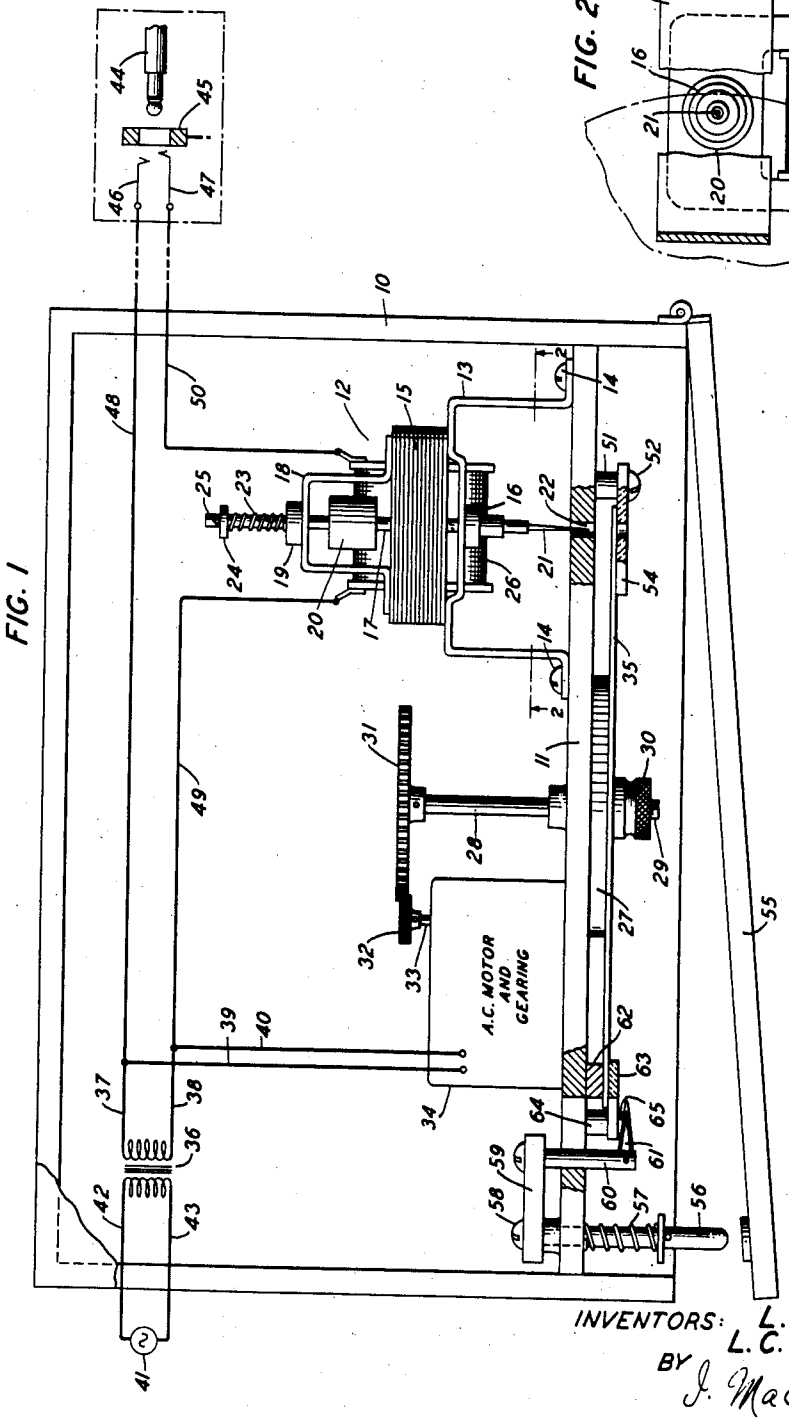


FIG. 1



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FIG. 4

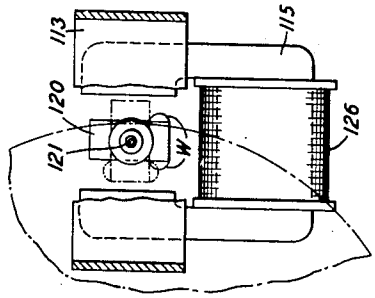


FIG. 3

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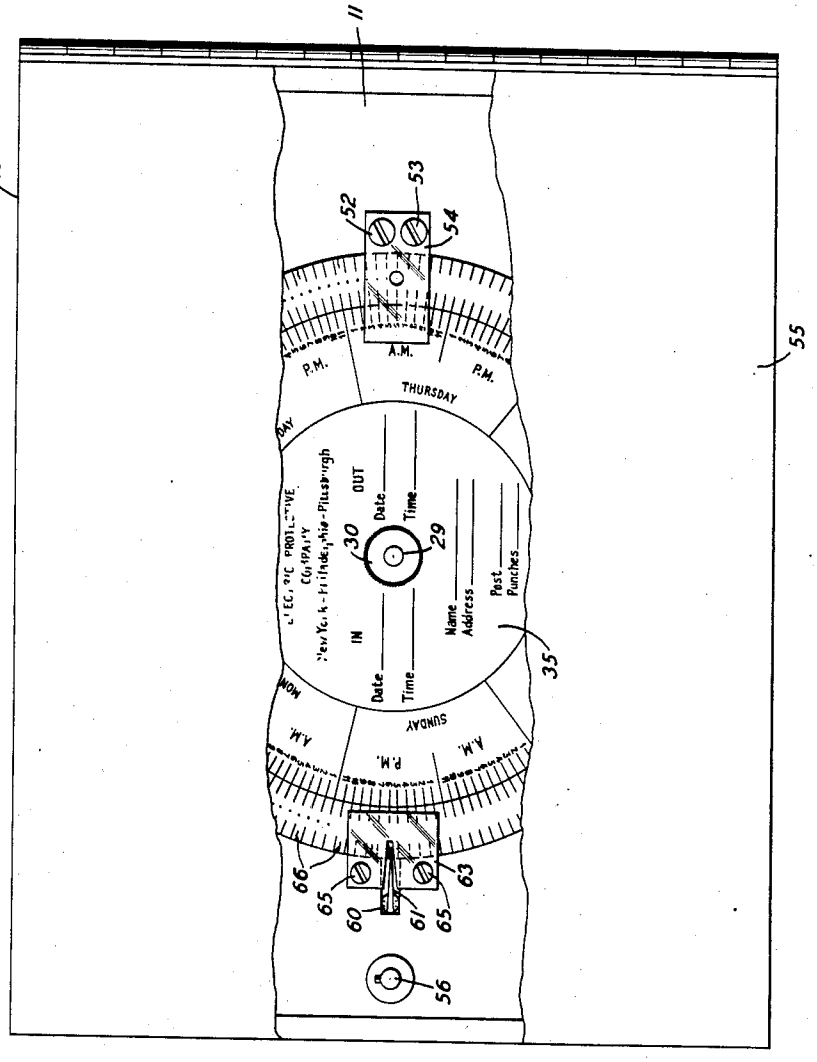


FIG. 5

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2,351,319

UNITED STATES PATENT OFFICE

2,351,319

STYLUS OPERATING MEANS

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Application December 26, 1941, Serial No. 424,448

1 Claim. (Cl. 234—63)

This invention relates to watchman's time recorders and more particularly to that class of recorders which are used to record the time at which a watchman visits certain fixed points or stations in factories, offices, buildings, hotels, etc. This record is permanently made on a clockwork driven rotatable paper disc by perforating the disc by means of a stylus which is operated by the closing of electrical circuits at the remote points or stations.

An object of this invention is to provide a recorder of the rotatable paper disc type, with a stylus operating mechanism which will cause the stylus to perforate the paper disc with a minimum amount of effort and make a clear-cut perforation.

Another object of the invention is to provide a stylus operating mechanism which will prevent the stylus from sticking either as it enters the paper disc or is removed therefrom.

A further object of this invention is the provision of a stylus operating mechanism which will permit the paper disc to be perforated in such a manner that the paper between the adjacent perforations will remain intact.

A still further object of the invention is the provision of a stylus operating mechanism which will permit the perforation of the paper disc without affecting the operation of the clockwork mechanism which drives the clock.

Our invention is an improvement over the type of watchman's time recorders in which a paper disc rotated by a suitable clockwork mechanism is perforated by means of a stylus or needle which is caused to perforate the disc by the closure of a circuit through an electromagnet, the armature of which, when attracted to the poles of the magnet, causes the stylus to perforate the paper disc.

Heretofore in this closs of apparatus, that is, the type wherein the stylus is electromagnetically operated, it has been found that after a short period of operation the stylus, due to the abrasive action of the paper disc, becomes roughened and not only mutilates the paper disc when it is perofrated but has a tendency to stick, thereby causing the clockwork mechanism to slow up and in some instances to stop altogether, thereby causing a false record and, in other cases, no record at all.

In our invention we have eliminated the possibility of the needle sticking by reducing the abrasion action of the paper thereon and have eliminated the tendency to break the paper wall between the adjacent perforations.

In the preferred form of our invention the stylus or needle, which perforates the paper disc, is caused to rotate previous to and while being forced through the paper disc thereby permitting a smooth and clean perforation to be made in the disc.

The features of our invention will be more readily understood from the following detailed description when read in connection with the accompanying drawings, in which:

Fig. 1 is a top plan view partly schematic of the preferred form of our invention;

Fig. 2 is a front elevation partly in section of a fragmentary portion of the stylus operating mechanism taken on line 2—2 of Fig. 1;

Fig. 3 is a top plan view, partly schematic, of a modified form of our invention in which the clockwork mechanism is spring wound;

Fig. 4 is a fragmentary front elevation partly in section taken on line 4—4 of Fig. 3 showing the stylus operating mechanism; and

Fig. 5 is a front elevation of the device as shown in Figs. 1 and 3 with a portion of the cover broken away.

As shown in Figs. 1 and 2 a housing or cabinet 10 is provided on its interior with an apparatus supporting panel 11 which extends the full width of the housing, and is so positioned therein that rear and front compartments are formed on either side of the panel. Mounted on the rear of the panel 11, at one end thereof, is the low voltage alternating current motor 12. This motor is secured to the panel 11 by means of a U-shaped bracket 13 and the screws 14—14. The bracket 13 is secured to the front face of the pole-pieces 15 of the motor 12 and supports the front bearing 16 for the armature shaft 17. Secured to the rear face of the pole-pieces 15 is a U-shaped bracket 18 which extends outward from the pole-pieces 15 some distance and supports the rear bearing 19 for the armature shaft 17.

The armature shaft 17 is rotatably and slidably mounted in the bearings 16 and 19 and has positioned thereon, between said bearings, the armature 20. Located on the front end of the armature shaft 17, is a needle or stylus 21 the point of which extends into and is positioned in the aperture 22 in the panel 11. The rear portion of the armature shaft 17 extends beyond the bearing 19 and has positioned thereon an expansible spring 23 one end of which bears against the outer face of the bearing 19 and the other end against a washer 24 which is held in position by means of the pin 25 on the shaft 17, which is held in its retracted position by means

of the spring 23 and any forward movement of the shaft 17 must be made against the tension of this spring. When the coil 26, on the motor 12, is energized, in a manner which will hereinafter be described, the armature 20 will be drawn into the direct magnetic path between the pole-pieces 15, against the tension of the spring 23 and rotated as long as the circuit to the coil 26 remains closed.

Mounted on the front of the panel 11 and centrally located with respect thereto, is the metallic disc 27. This disc is fixedly secured to the shaft 28 which is rotatably mounted in the panel 11 and has portions thereof extending both to the rear and front thereof. The front portion of the shaft 28 terminates in the threaded portion 29 which has a knurled nut 30 positioned thereon and the rear portion has secured thereon the gear member 31 which meshes with the pinion 32 fixed to the shaft 33 of the alternating current synchronous clock motor 34 which is secured to the rear side of the panel 11 and is driven from the low voltage source 36 over the conductors 37, 38, 39 and 40.

Removably secured to the front face of the metal disc 27, by means of the knurled nut 30, as shown in Figs. 1 and 5, is the paper disc or record sheet 35 which is rotated by means of the clock motor 34 through the gears 32 and 31 and the shaft 28.

The synchronous clock motor 34 and the stylus operating motor 12 are both low voltage motors and are operated by the current supplied by the step-down transformer 36 which derives its energy from the high voltage alternating current source 41 over conductors 42 and 43. As shown in Fig. 1 the clock motor 34 is in continuous operation and causes the paper disc 35 to make one complete revolution every seven days, while the stylus motor 12 is only intended for momentary operation when the plug 44 is inserted in the jack 45 and closes a circuit to the motor coil 26 through the contacts 46 and 47 of the jack 45 and over the conductors 48, 37, 38, 49 and 50.

As shown in Figs. 1 and 5, there is mounted on the front of the panel 11, by means of the spacing member 51 and the screws 52 and 53, in alignment with the aperture 22, an apertured strip of transparent material 54. This strip of material is spaced away from the face of the panel a sufficient distance to permit it to overlie the paper disc 35 and act as a reinforcement or backing for the paper disc when the stylus 21 is forced therethrough by means of the action of the stylus motor 15.

In order to discourage the unauthorized opening of the door 55 of the housing 10 and to make a permanent record of each opening and closing, there has been provided, as shown in Figs. 1 and 5 means for cutting a slot in the edge of the disc 35. This means comprises a door operated plunger 56 mounted on the panel 11 adjacent the edge of the door 55 and adapted to be moved inwardly when the door is closed. The plunger 56 is slidably mounted in the panel 11 and extends a short distance on either side thereof. The front portion of the plunger 56 is arranged to come in contact with the door 55 when the door is closed and has a coil spring 57 mounted thereon to maintain in its extended position. Secured to the rear portion of the plunger 56, by means of the screw 58, is an arm 59 which has secured thereto a shaft 60 which extends through an aperture in the panel 11 and is in parallel relation with the plunger 56. Mounted on the front end of the shaft 60 is the double-edged knife blade 61 which, when the plunger 56 is moved inwardly by the action of the door 55, and outwardly under the influence of the spring 57, will be caused to travel back and forth and cut a slot in the edge of the paper disc 35 on each stroke, thus indicating each time the door 55 has been opened or closed.

In order to provide a backing or reinforcement for the paper disc 35 as the knife blade 61 passes back and forth, spaced apart members 62 and 63 are provided at the periphery of the paper disc 35 adjacent the knife blade 61. The member 62 is preferably metal and is secured to the front of the panel in back of the paper disc a short distance from the periphery thereof and has its front face in contact with the back of the paper disc 35. Mounted in spaced relation directly in front of the member 62 by means of the spacer member 64 and the screws 65—65 is the transparent slotted member 63. This member overlies the edge of the disc 35 and serves to confine the disc between it and the member 62. Thus when the door 55 is being shut and the plunger 56 is pushed inwardly against the tension of the spring 57, the knife blade 61 will cut a slot therein as shown at 66 in Fig. 5. The plunger 56 and its associated knife blade 61 will remain in its retracted position until the door 55 is opened at which time the plunger 56, under the influence of the spring 57 will travel outwardly, carry with it the knife blade 61 and cut another notch or slot in the edge of the disc as shown at 66 in Fig. 5.

In the operation of the improved recorder of this invention a high voltage alternating current source 41 supplies current to a step-down transformer 36 over the conductor paths 42 and 43. Connected to the low voltage side of the transformer 36 is a pair of conductors 37 and 38 to which are connected the leads 39 and 40 from the clock motor 34. Thus, the clock motor 34 is continuously driven over the normally closed circuit just described. As the motor 34 operates, it causes the gears 32 and 31 and the shaft 28 and the associated metal disc 27 to rotate and thereby cause the rotation of the paper disc 35 which is secured thereto by means of the knurled nut 30. The motor 34 is so geared to the shaft 28 that one complete revolution of the paper disc 35 is made every seven days. It will be noted by reference to Fig. 5 that the paper disc 35 is divided into seven segments one for each day of the week and that each segment is provided with twenty-four graduations indicating twenty-four hours, twelve for a. m. and twelve for p. m.

Located on the panel 11 and also connected to the conductors 37 and 38 by a normally open circuit which comprises the jack contacts 46 and 47 and the conductors 48, 49 and 50, is the stylus motor 12. Thus the motor normally will be unoperated with the stylus 21 in its retracted position under the influence of the spring 23 as shown in Fig. 1. When the plug 44 is inserted in the jack 45 the circuit to the motor, as heretofore described, is closed thereby causing the armature 20 to be drawn into the direct magnetic path between the pole-pieces 15 and rotated. This action causes the stylus 21 to project through the aperture 22 and perforate the paper disc with a rotating or boring action and indicates by means of the puncture or perforation therein the time at which the plug 44 was inserted in the jack 45. The withdrawal

of the plug 44 opens the circuit which causes the motor 12 to stop and permits the stylus 21 to be retracted under the influence of the spring 23.

In a modified form of our invention, as shown in Figs. 3 and 4, we have provided our recorder with a spring driven clock motor and a battery operated stylus mechanism.

As shown in Figs. 3 and 4, the housing or cabinet 110 has mounted on the panel 111, by means of the bracket 113 and screws 114, a direct current operated stylus mechanism 112. This mechanism is somewhat similar to the alternating current stylus operating motor heretofore described in that it comprises a set of pole-pieces 115, an armature shaft 117, an armature 120 and suitable bearings 116 and 119 for the armature shaft 117 in the brackets 113 and 118. Positioned on the shaft 117, which is rotatably and slidably mounted in the bearings 116 and 119 is the armature 120 which is provided with counterweights W—W on each side thereof adjacent its lower edges, to unbalance the armature and maintain it in an upright position when no current is flowing through the coil 126.

Located on the front end of the armature shaft 117 is the stylus 121 which is positioned in the aperture 122 in the panel 111, in a manner similar to that described with regard to the stylus in the alternating current operated recorder as shown in Fig. 1. The rear portion of the armature shaft 117 is provided with a spring 123 for maintaining the shaft 117 in its retracted position as shown in Fig. 3 and as described with respect to the recorder in Fig. 1.

When the coil 126 of the mechanism 112 is energized by the closing of the normally open circuit, which comprises the battery 124, the coil 126, the conductors 125 and 127, by bridging the contacts 128 and 129 by means of the plug 130, the armature 120 will be drawn into the direct magnetic path between the pole-pieces 115 and rotated 90 degrees as shown in dot and dash lines in Fig. 4 thereby causing the stylus 121 to project through the aperture 122 and puncture the paper disc as heretofore explained with regard to Fig. 1. As long as the plug 130 remains in the jack 136 the circuit to the mechanism 112 will remain closed and the stylus 121 will remain extended. However, upon the withdrawal of the plug 130 the circuit will be opened and the stylus 121 will return to its normal position under the influence of the spring 123. Due to the counterweights W—W located on the armature 120, the armature will assume a vertical position as shown by the full line in Fig. 4.

The rest of the mechanism in the modified form of our invention shown in Figs. 3 and 4 is substantially the same as that employed for the alternating current operated recorder shown in Figs. 1, 2 and 5 with the exception that the clock motor 131 is spring driven. The description and reference characters applied to this portion of the mechanism are the same in both instances and refer to like parts and operate in the same manner as heretofore described with reference to Figs. 1, 2 and 5 except that the armature 120 does not continuously rotate but rotates 90 degrees and then comes to rest. However, a direct current operated motor may be substituted for the motor 112 without affecting the operation of the recorder.

While there is shown and described herein the preferred form of our invention, it is to be understood that it is not limited or confined to the precise details of construction herein described and various modifications may be made therein without departing from the spirit of the invention and we are only limited by the scope of the appended claim.

What is claimed is:

In a recorder having supporting means for a movable record-receiving chart, a stylus for perforating said chart, actuating means for said stylus comprising an electromagnetic device having an armature shaft rotatably mounted between a set of pole-pieces on said device and to the front end of which said stylus is connected in operative relation to said chart, an armature secured on said shaft and normally positioned outside of the direct magnetic field of said pole-pieces, a normally open electrical circuit including said electromagnetic device and a source of electrical energy, and means for closing said circuit to energize said device whereupon said armature will be drawn into the direct magnetic path between said pole-pieces and rotated, thereby imparting a rotary and reciprocating motion to said shaft and said stylus to cause said stylus to perforate said record receiving chart.

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