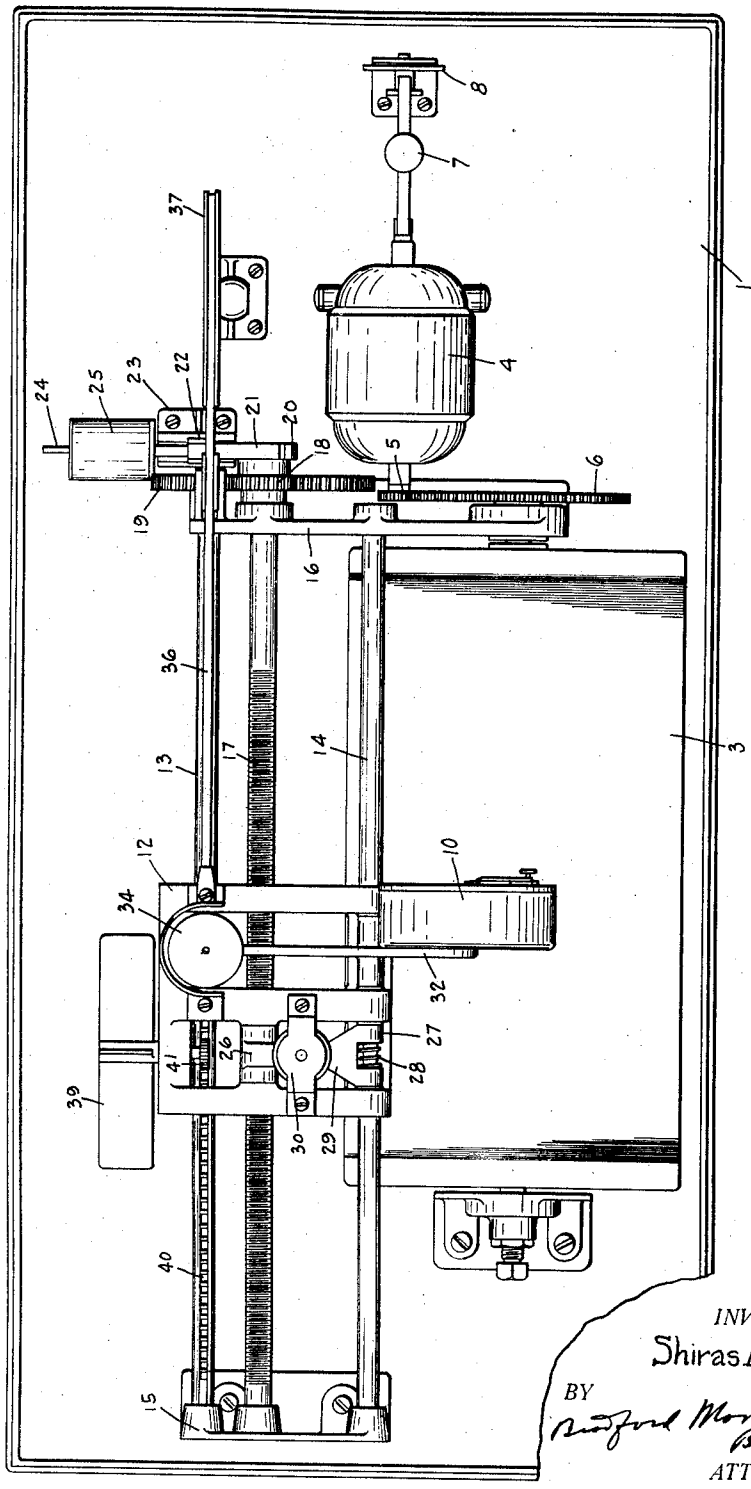
Oct. 30, 1923. 1,472,743

S. A. BLAIR

AUTOMATIC SOUND REPRODUCING INSTRUMENT

Original Filed Aug. 25, 1919 2 Sheets-Sheet 1

FIG. 1



INVENTOR.
Shiras A. Blair
BY
Redford Morrill & Bierce
ATTORNEYS.

Oct. 30, 1923. 1,472,743

S. A. BLAIR

AUTOMATIC SOUND REPRODUCING INSTRUMENT

Original Filed Aug. 25, 1919 2 Sheets-Sheet 2

FIG. 3

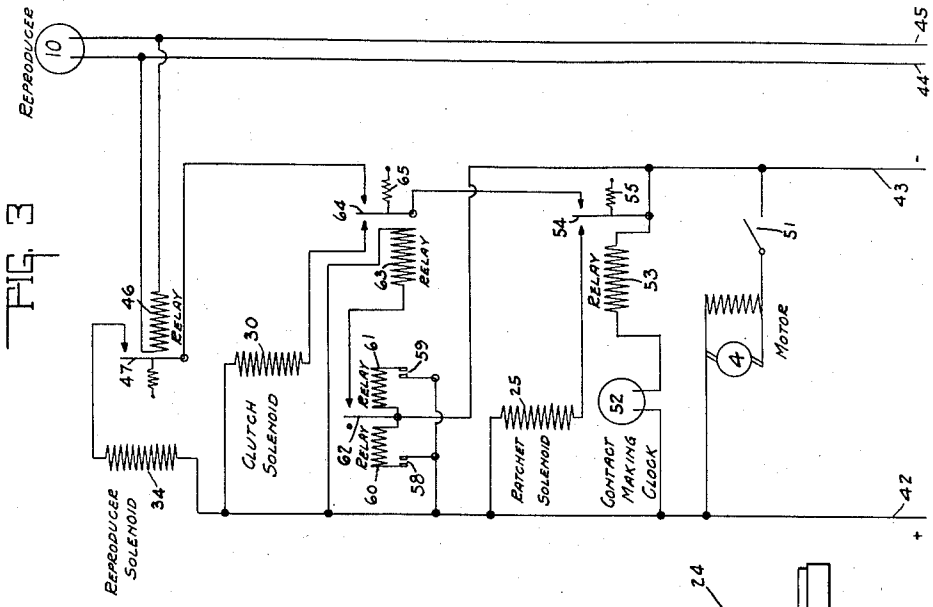


FIG. 2

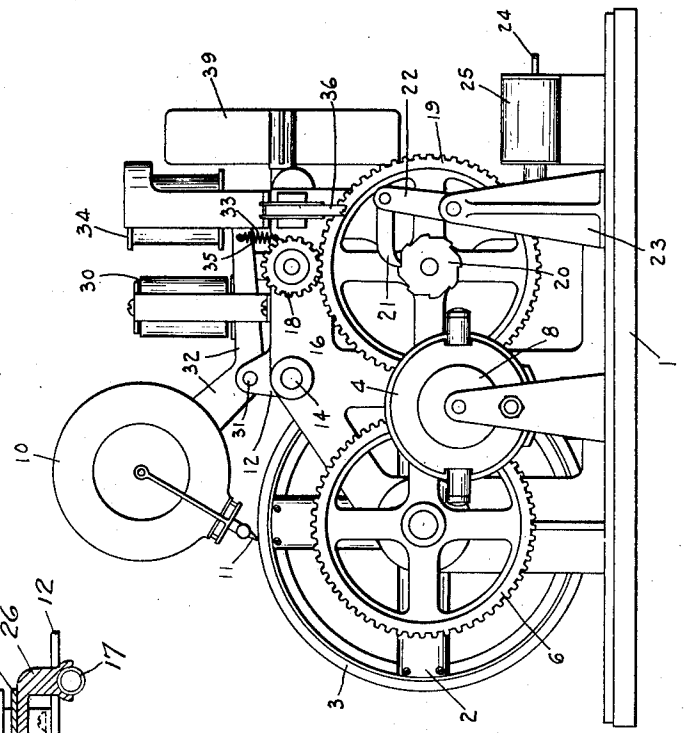
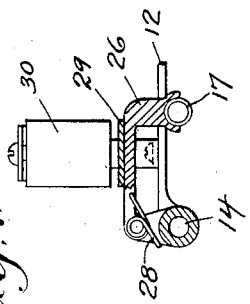


Fig. 4.



INVENTOR.
Shiras A. Blair.
BY
Bedford Morrill & Brown
ATTORNEYS.

Patented Oct. 30, 1923. 1,472,743

UNITED STATES PATENT OFFICE.

SHIRAS A. BLAIR, OF INDIANAPOLIS, INDIANA.

AUTOMATIC SOUND-REPRODUCING INSTRUMENT.

Application filed August 25, 1919, Serial No. 319,536. Renewed July 11, 1923.

To all whom it may concern:

Be it known that I, SHIRAS A. BLAIR, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Automatic Sound-Reproducing Instruments, of which the following is a specification.

This invention relates to an automatic sound reproducing instrument, more especially to a mechanical time operator adapted to be connected to a telephone system whereby upon the calling of a specified number on the dial of an automatic telephone or asking the operator for the time in the Bell system the correct time is given. The device is completely automatic with the automatic telephone system and semi-automatic with the old telephone system. My invention although particularly useful, and especially designed for application to telephones has various uses to which it is equally adapted with few minor changes in details, such as for the calling out of the arrival and departure of trains from a railroad station automatically at predetermined periods of time, for making announcements, for automatically repeating a sound record, etc.

Up to the present time when it was desired to obtain the time of day by means of a telephone it was necessary to call the operator who looked at a clock and then announced the time. Often the time given was inaccurate and it wasted much of the time of the operator, taking her attention from the work of connecting subscribers; and in automatic telephone systems an extra operator was necessarily employed to give the time. My invention obviates all these disadvantages, it being among the objects thereof to produce a device which is accurate, automatic, requires no attention, and expends but very little energy for its operation.

In carrying the objects of my invention into effect I provide a sound reproducing mechanism including a sound record which may be of the disk or cylinder type, but preferably being a cylindrical record for convenience. Co-operating with the record is a reproducing mechanism adapted to be operated by the closing of a circuit caused by the lifting of the telephone receiver from its hook and calling the operator who "plugs in" the device in the old system, or by calling a predetermined number on the dial of the automatic system. Automatic means are provided for returning the reproducing mechanism to its starting position on completion of its travel to the end of the record.

Specifically my invention comprises a cylindrical record driven at a constant speed by a motor or other suitable driving means, the record having preferably independent parallel grooves instead of continuous spiral as is ordinarily used in sound reproducing instruments. Each of the grooves bears a sound impression and as preferred the impressions in successive grooves represent intervals of time of one minute each. Thus, one groove has impressed upon it the time "twelve-0-one"; the next "twelve-0-two," etc. The reproducer is mounted on a positively actuated carriage so as to be moved from one groove to the next each minute by a suitable timing means, such as a contact making clock having contacts corresponding to one minute intervals. I provide a mechanism for automatically lifting the reproducer from the record in passing from one groove to the next, and for keeping the same out of contact with the record when no telephone receiver is up for the purpose of ascertaining the time. Means for automatically returning the reproducer and its carriage to the starting point, and electrically operated devices are included to make the action positive, certain and reliable.

Referring to the accompanying drawings forming a part hereof, and in which similar reference characters denote similar parts,

Figure 1, illustrates a plan view of my sound reproducing instrument,

Figure 2, an end view thereof,

Figure 3, shows diagrammatically the wiring diagram for the instrument, and Figure 4 a detail showing the clutch member.

The device consists of a frame 1 on which is mounted a cylinder 2 for rotation, the cylinder carrying a cylindrical sound record 3, although I may use a record of the disk type by a slight modification of the frame and the driving mechanism for the record. A motor 4 is geared to cylinder 2 by a set of reduction gears 5 and 6 and a friction governing device comprising a set of springs with weights 7 and a set of friction disks 8 adapted to be brought in contact by the outward movement of the governor weights 7 to equalize the speed of the

motor. A reproducer 10 of any type bearing a point 11 for contact with the sound record is provided, the reproducer being preferably of a type such as is described and claimed in my co-pending application for sound reproducing device, Serial No. 310,893, filed July 15, 1919, and preferably the point is of the jewel type in order that it may be more or less permanent.

A movable carriage 12 is mounted upon bars 13 and 14 fixed in brackets 15 and 16 carried by the frame 1 to allow of a sliding of said carriage upon said bars. Journaled between the brackets 15 and 16 is a rotatable, threaded member 17 carrying at one end a gear wheel 18 meshing with gear 19 which has fixed to it a ratchet 20 co-operating with the pawl 21 pivoted to lever 22 which is pivoted on bracket 23 fixed to the frame. To the end of lever 22 opposite pawl 21 is a bar 24, preferably of soft iron, which fits into solenoid 25 and is adapted to be drawn in upon the energizing of said solenoid.

Pivoted to the carriage 12 is a clutch member 26 comprising a semi-cylindrical, hollow, internally threaded head adapted to fit over and engage the threads on rotatable member 17. A spring 28 tends to hold or force the clutch member into engagement with said screw member. The intermediate portion 29 is adapted to be attracted by the energizing of a solenoid 30 mounted on the frame 12 at a point above said clutch for drawing the clutch out of engagement with the screw member. Also pivoted to the carriage at 31 is a bell lever 32 upon one end of which is fixed the reproducer 10 and is adapted to normally hold the reproducer in retracted position by its own weight or by a spring 33, as shown, or other suitable means. A solenoid 34 mounted on the carriage is so placed as to attract the end 35 of bell lever 32, upon being energized, to draw the reproducer into contact with the record. Fixed to the carriage is a tape 36 which winds over a spring-held drum 37 to retract the carriage upon the release of the clutch, the spring being tensioned by the forward movement of the carriage. A flutter wheel 39 geared at 41 to an internally toothed portion 40 sunk into the bar 13, serves as a means for preventing a too rapid return of the carriage to its starting point.

The electrical connections for the device, which, for the sake of clearness, were omitted from Figures 1 and 2, are shown diagrammatically in Figure 3. Leads 42 and 43 are connected to a source of electrical energy, preferably across a 50 volt line, and leads 44 and 45 are connected to a telephone system. Connected to the telephone leads is a relay 46 adapted to be energized upon the closing of the telephone circuit and thereby drawing a spring-held switch 47 into closing position to energize the solenoid 34 which forces the reproducer 10 down on the record. A motor 4 and its starting switch 51 are placed across the line. A contact making clock 52 is inserted across the line and has in series with it a relay 53 which draws a switch 54, held in one contact making position by spring 55, into closing position to energize the solenoid 25 which operates the ratchet member for moving the reproducer forward.

Sets of contacts 58 and 59 carrying relays 60 and 61 between which is a free switch 62 adapted to be drawn by one of said relays into position to close the circuit and energize relay 63, and by the other relay to open position. The relay 63 is adapted to draw switch 64, which is normally held by spring 65 in one circuit closing position, into position to close solenoid 30 for throwing the clutch out of position and allowing the carriage to be brought back to its starting point.

The operation of the device is as follows:

The motor 50 is thrown into circuit to continuously and uniformly revolve the cylinder 2 carrying record 3. Reproducer 10 is normally out of contact with the record and switches 54 and 64 are spring-held tending to close the reproducer circuit which is open at 47. Upon the lifting of a telephone receiver or plugging in of a contact by the operator, the telephone circuit is closed, energizing relay 46 which draws spring retracted switch 47 into contact so as to close the circuit of the reproducer solenoid 34 across the leads 42 and 43; the solenoid draws upon the end 35 of the bell lever 32 pressing the reproducer 10 down on the record 3 which is moving thereby announcing the time which is impressed upon the particular groove with which the reproducer contacts. Upon the breaking of the telephone circuit the reproducer solenoid is de-energized and the reproducer brought back into inoperative position. In order to shift the reproducer at the specified one minute intervals the contact making clock 52, which is in the main circuit, is automatically closed at the expiration of a minute, energizing the relay 53 and drawing switch 54 from the contact, thus breaking the circuit through the reproducer solenoid which is de-energized, if it is being energized, by reason of the telephone circuit being closed. The switch 54 is drawn into its opposite closing position energizing ratchet solenoid 25 to actuate ratchet 20 and thus move the reproducer along to the next groove representing a one minute interval. By such an arrangement there is avoided any danger of breaking down the groove due to the shifting of the reproducer while the point is in the groove.

When the carriage 12 is at the end of its

position it closes contact 59 energizing relay 61 drawing switch 62 into closing position to energize relay 63 which draws upon switch 64 closing the circuit for clutch solenoid 30 to throw out the clutch and simultaneously breaking the reproducer solenoid circuit de-energizing it, assuming that the telephone circuit is closed, thus raising the reproducer out of contact with the record and the spring tensioned tape 36 draws the carriage to its starting position, the movement of the carriage being uniform due to the flutter wheel 39. When the carriage has reached its starting position it closes contact 58 which energizes relay 60 drawing switch 62 into open position, thus de-energizing relay 63 and allowing the switch 64 to be drawn to its spring-held closing position, so as to again energize the reproducer solenoid 34 if the telephone circuit is closed, to drop reproducer 10 upon the first groove and announce the time thereon.

The word "solenoid" as used throughout the specification and claims is intended to include an electro-magnet, coil, or other equivalent device having a similar function.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:

1. An automatic sound reproducing instrument comprising a sound record, a sound reproducing device and electrically operated means for automatically lowering and holding said sound reproducing device in operative position at any predetermined point on said record.

2. An automatic sound reproducing instrument comprising a sound record, a sound reproducing device, and means comprising an electro-magnetically operated device actuated by the closing of a circuit for lowering and holding said sound reproducing device in operative position at any predetermined point on said record.

3. An automatic sound reproducing instrument comprising a sound record, an intermittently operated sound reproducing device, a carriage carrying said sound reproducing device, electrically operated means for releasing said carriage at the completion of its movement, and electrically operated means for lowering and holding said sound reproducing device in operative position at any predetermined point on said record.

4. An automatic sound reproducing instrument comprising a sound record, means for continuously rotating the same, a sound reproducing device, means for intermittently shifting the same and electrically controlled means for automatically lowering said reproducing device into engagement with the record.

5. An automatic sound reproducing instrument comprising a sound record, means for continuously rotating the same, a sound reproducing device, electrically operated means for lowering the sound reproducing device into engagement with said record, a timing mechanism, a pawl actuated by a solenoid energized by said timing mechanism for intermittently moving said sound reproducing device.

6. An automatic sound reproducing instrument comprising a sound record, means for continuously rotating the same, a sound reproducing device, electrically operated means for lowering and holding the sound reproducing device in engagement with the record, and gravity operated means for elevating and holding the sound reproducing device out of engagement with the record.

7. An automatic sound reproducing instrument comprising a sound record having parallel grooves, means for rotating the same, a sound reproducing device adapted to be shifted to engage said grooves successively, electrically operated means for lowering said sound reproducing device into engagement with said record, means comprising a contact making timing instrument for shifting said reproducing device, and means co-operating therewith for avoiding contact of the reproducing device and record during the shifting.

8. An automatic sound reproducing instrument comprising a sound record having parallel grooves, means for rotating the same, a sound reproducing device adapted to be shifted to engage said grooves successively, means comprising a timing instrument for shifting said reproducing device, a relay for breaking a circuit causing the reproducing device to be drawn out of contact with said record and simultaneously closing a circuit causing shifting of said reproducing device to the next groove.

9. An automatic sound reproducing instrument comprising a sound record having parallel grooves, means for rotating the same, a sound reproducing device adapted to be shifted to engage said grooves successively, means comprising a contact making timing instrument for shifting said reproducing device, a relay for breaking a circuit causing the reproducing device to be drawn out of contact with said record and simultaneously closing a circuit causing shifting of said reproducing device to the next groove, a plurality of sets of contacts, relays carried thereby, a free switch interposed between said relays, means connected to said sound reproducing device for closing one set of contacts thereby energizing a relay breaking the circuit of said reproducing device and simultaneously closing a circuit for throwing out a clutch, means for bringing said reproducing device back to its starting position, means for closing a second

set of contacts thereby throwing out said free switch, thus closing said reproducer circuit and throwing in said clutch.

10. In an automatic sound reproducing instrument a sound reproducing device, a plurality of sets of contacts, relays carried thereby, a free switch interposed between said relays, means connected to said sound reproducing device for closing one set of contacts thereby energizing a relay breaking the circuit of said reproducing device and simultaneously closing the circuit for throwing out a clutch, means for bringing said reproducing device back to its starting position, means for closing a second set of contacts thereby throwing out said free switch, thus closing said reproducing circuit and throwing in said clutch.

In witness whereof, I have hereunto set my hand and seal at Indianapolis, Indiana this 22nd day of August, A. D. nineteen hundred and nineteen.

SHILAS A. BLAIR. [L. S.]

Witnesses:

H. C. BIERMAN,

M. L. SHULER.