June 9, 1942. J. L. FRANKLIN 2,285,425

ANNOUNCING MACHINE AND SYSTEM

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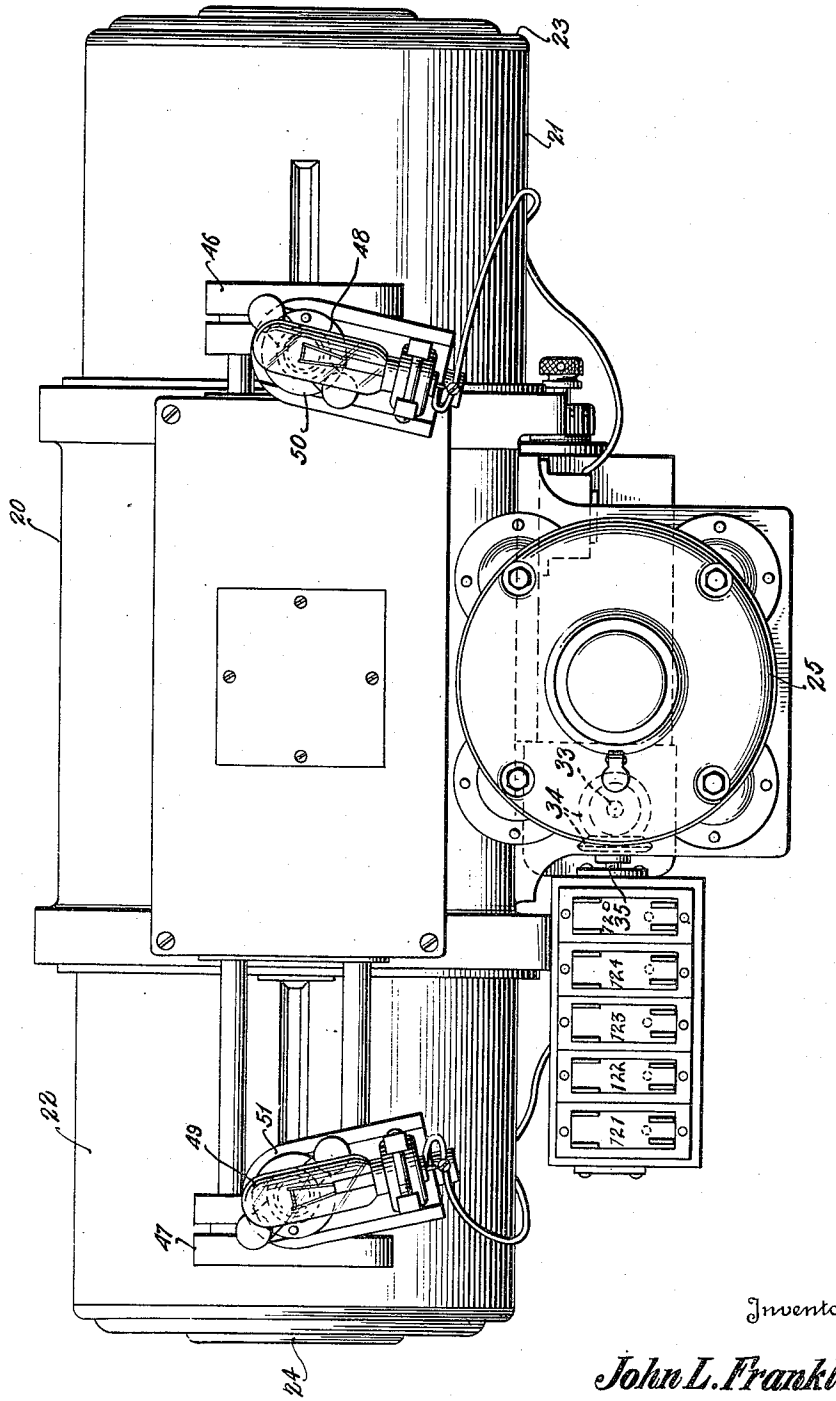


Fig. 1.

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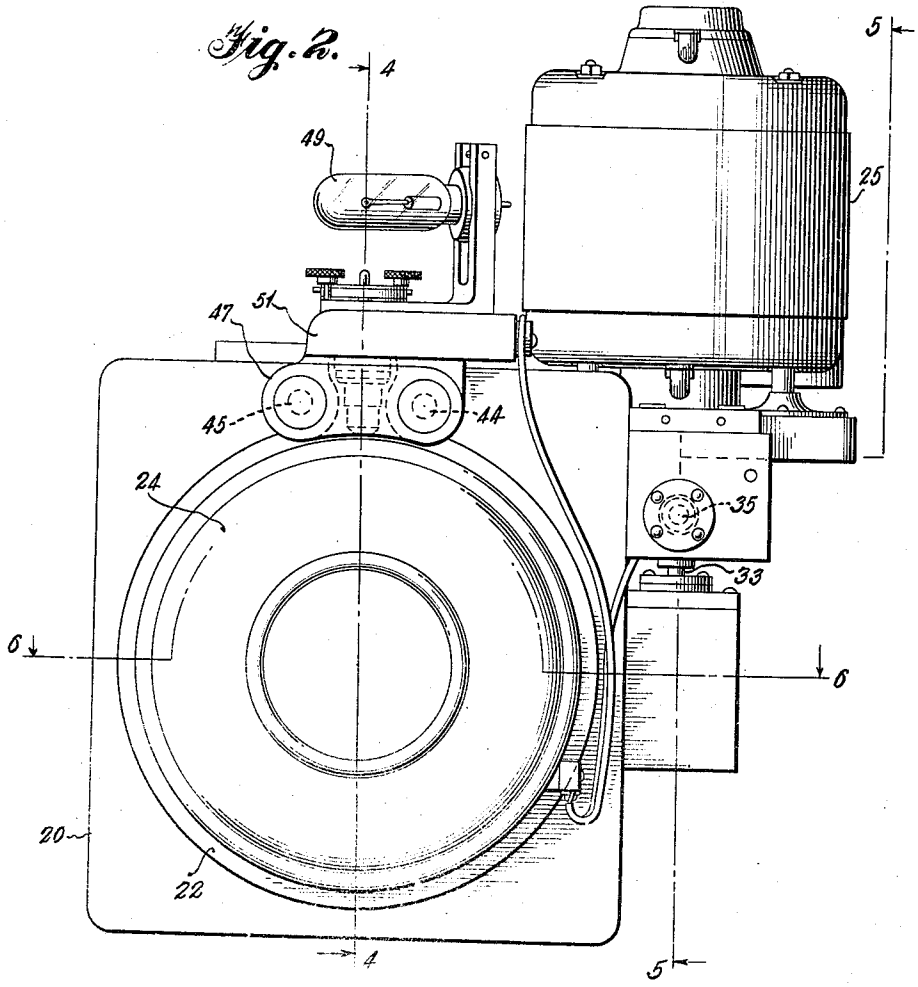
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ANNOUNCING MACHINE AND SYSTEM

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Fig. 2.



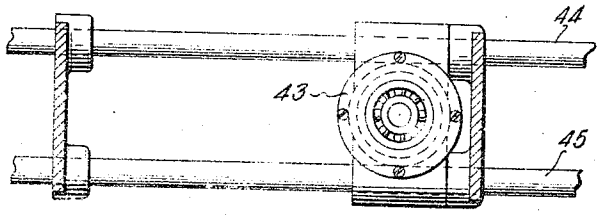


Fig. 3.

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ANNOUNCING MACHINE AND SYSTEM

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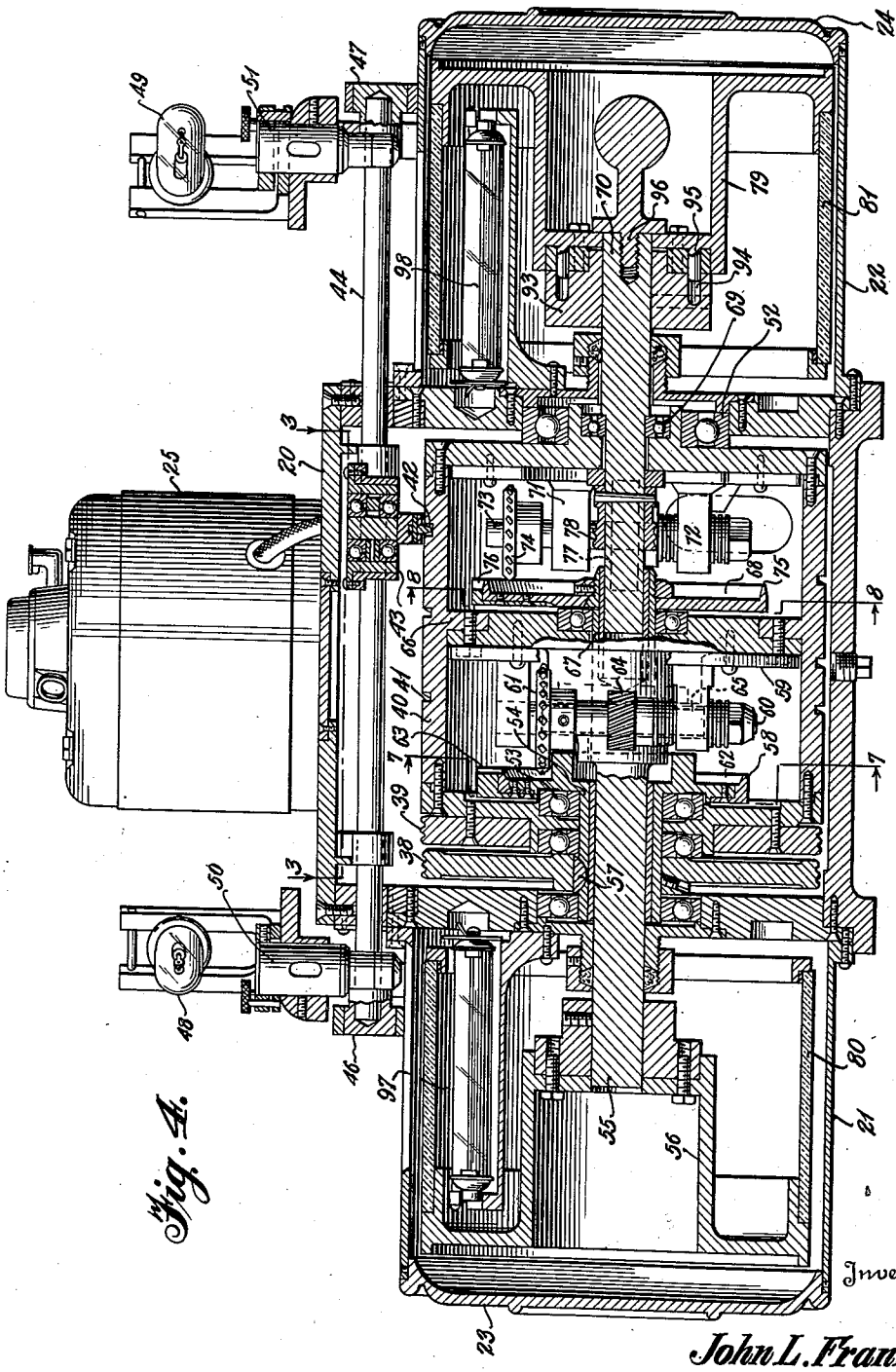


Fig. 4.

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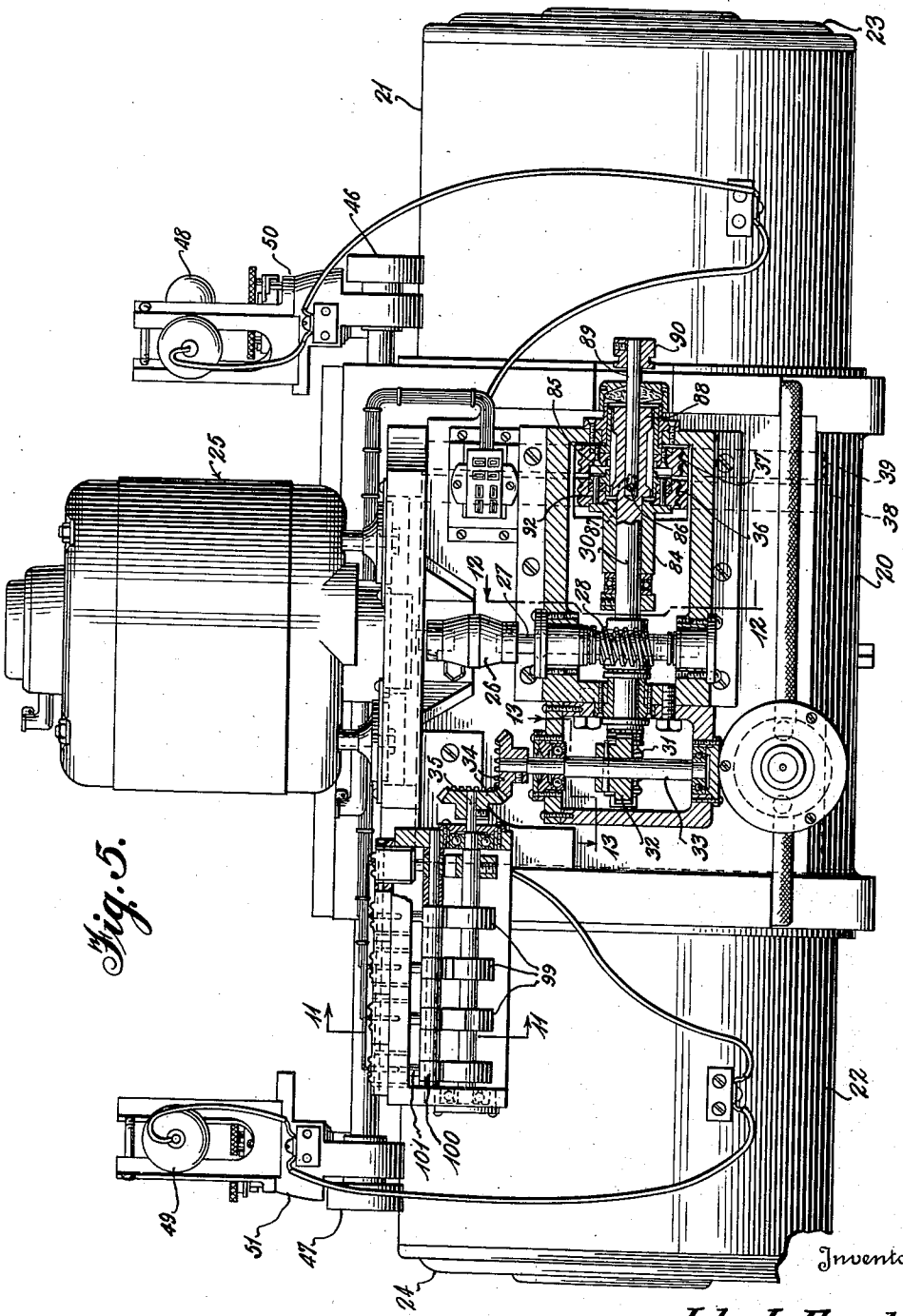


Fig. 5.

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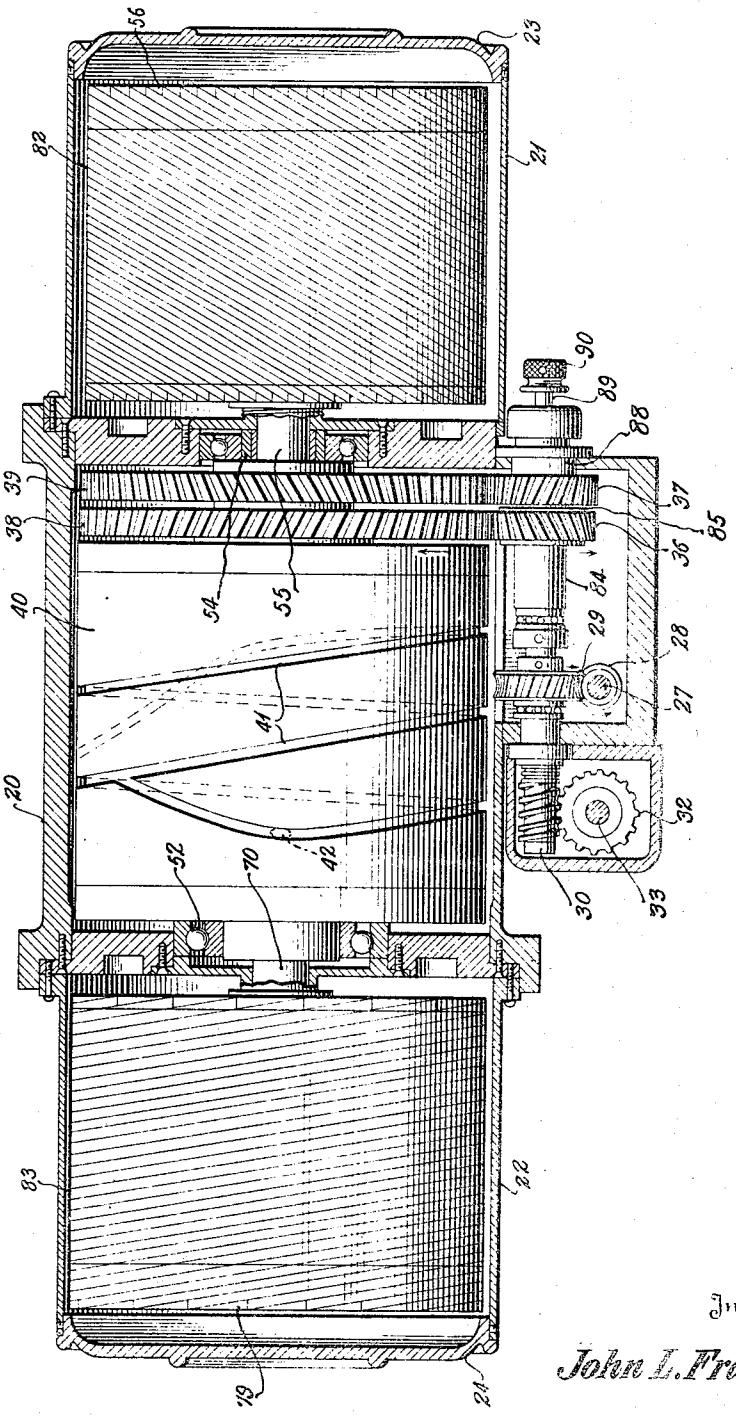
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ANNOUNCING MACHINE AND SYSTEM

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Fig. 6.



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Fig. 7.

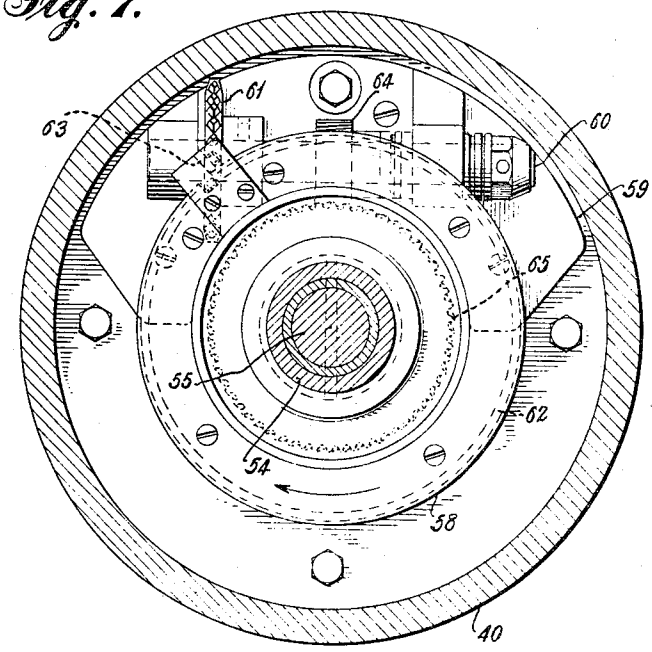
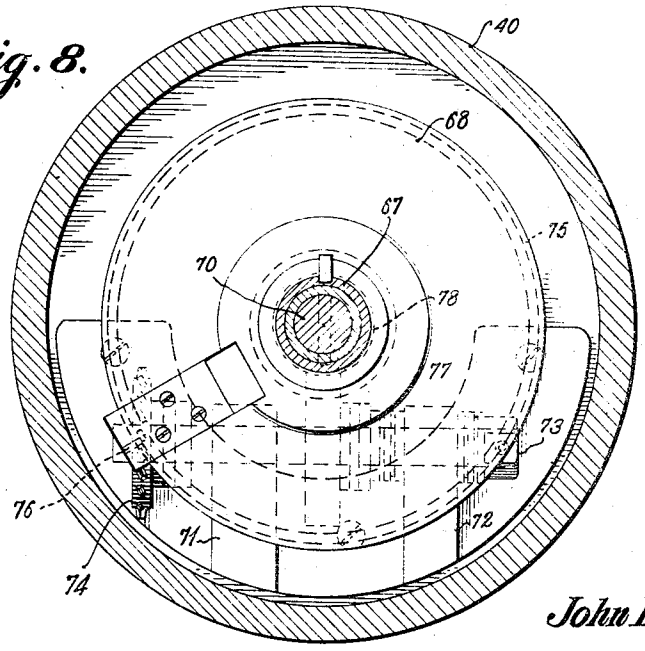


Fig. 8.



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Fig. 9.

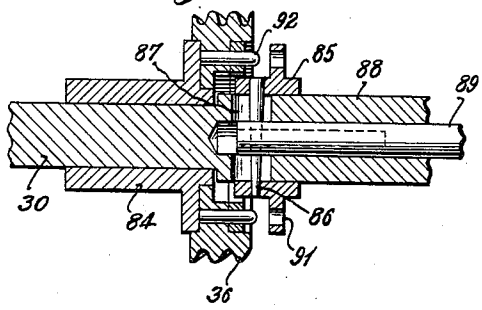


Fig. 10.

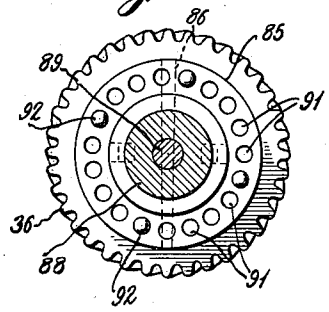


Fig. 11.

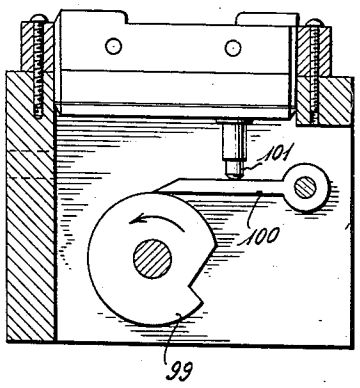


Fig. 12.

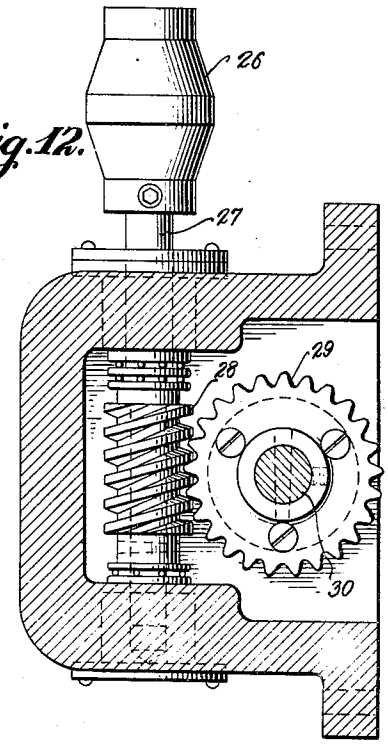
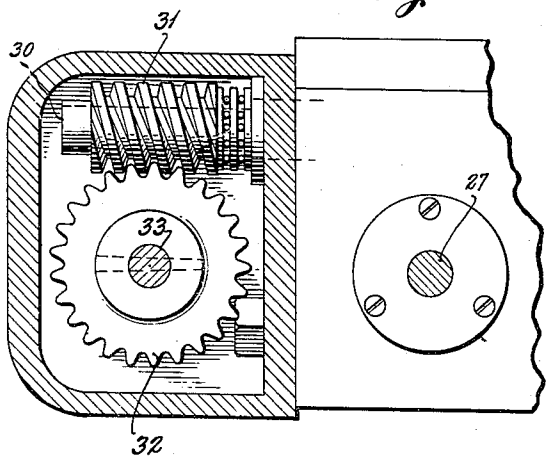


Fig. 13.



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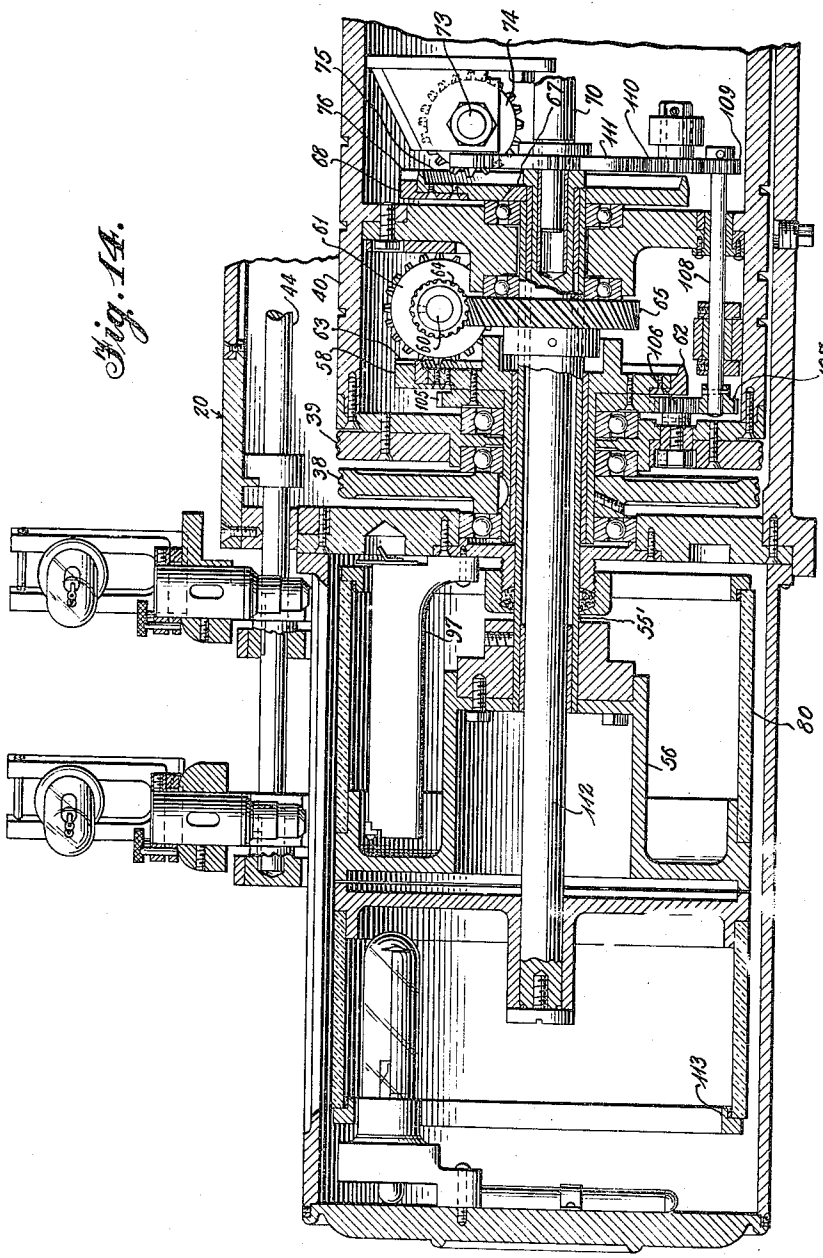
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ANNOUNCING MACHINE AND SYSTEM

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Fig. 14.



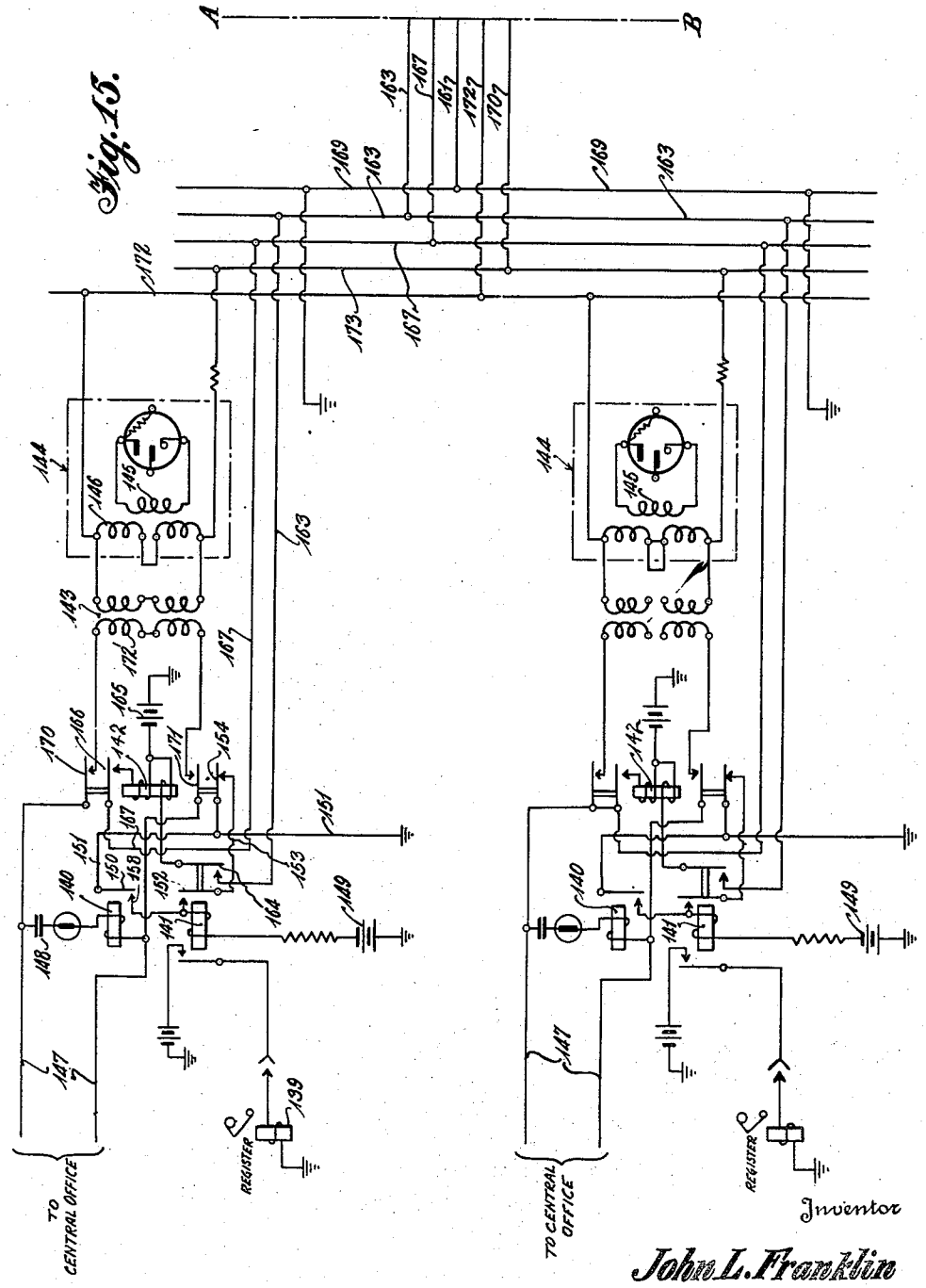
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June 9, 1942. J. L. FRANKLIN 2,285,425

ANNOUNCING MACHINE AND SYSTEM

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Fig. 15.



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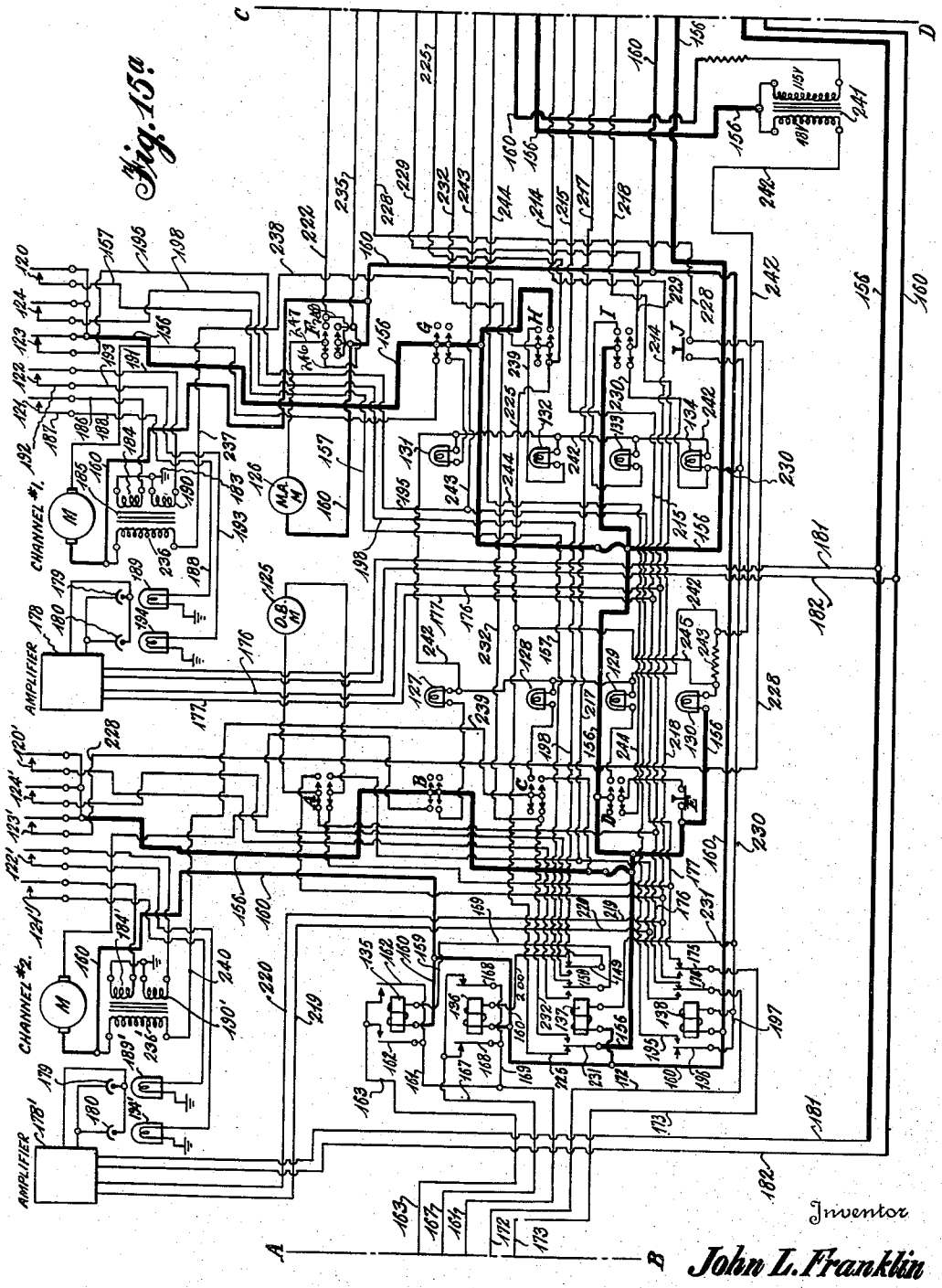
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June 9, 1942. J. L. FRANKLIN 2,285,425

ANNOUNCING MACHINE AND SYSTEM

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Fig. 15a.



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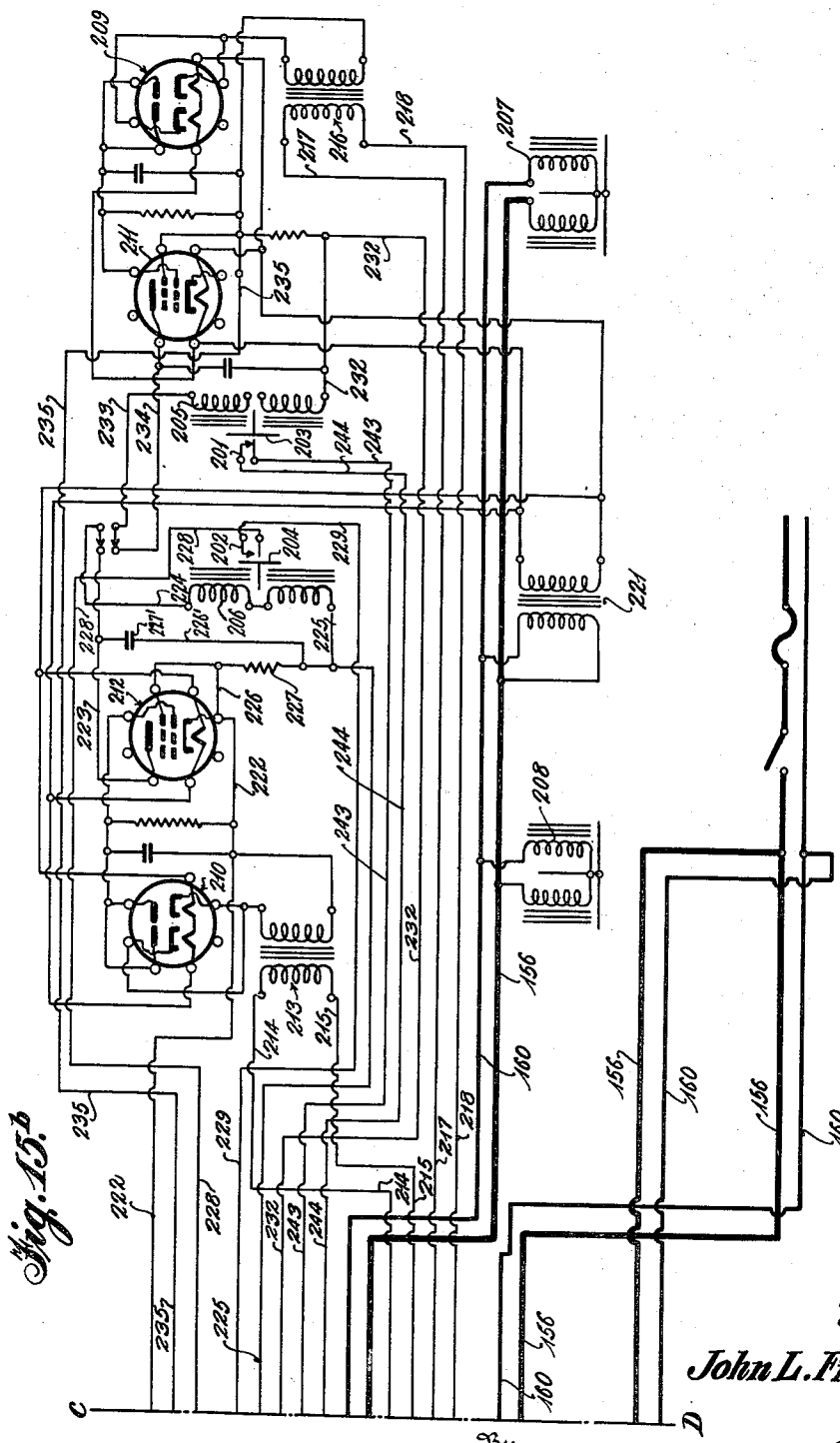


Fig. 15b.

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Patented June 9, 1942 2,285,425

UNITED STATES PATENT OFFICE

2,285,425

ANNOUNCING MACHINE AND SYSTEM

John L. Franklin, Atlanta, Ga.

Application February 28, 1941, Serial No. 381,203

34 Claims. (Cl. 179—6)

The invention relates to announcing machines and systems and has as an object the provision of a machine for making announcements particularly adapted for use in connection with a telephone system, and has as an additional object the provision of a system of electrical circuits for control of the machine.

It is a further object of the invention to improve in important particulars upon the machines and systems shown in my Patents No. 2,011,216, August 13, 1935 (Reissue No. 21,111, June 13, 1939), and No. 2,207,855, July 16, 1940.

Further objects of the invention are to provide a machine in which the cylinders bearing the announcement records are axially stationary and the activating lights are movable.

It is a further object of the invention to provide a machine of this character which will run continuously as distinguished from running only when started by a telephone call, where the system is used in combination with a telephone system, and in which the exciter lamps are energized only when announcement is to be made.

It is a further object of the invention to provide a machine and system of this character embodying a combination between a delayed action cut off device of a novel character for the purpose of shifting circuits if the operation of the device is imperfect.

Further objects of the invention will appear from the following description when read in connection with the accompanying drawings showing an illustrative embodiment of the invention, and wherein:

Figure 1 is a plan view of the machine of the invention;

Fig. 2 is an end elevation as seen from the left of Figure 1;

Fig. 3 is a detail section on line 3—3 of Figure 4;

Fig. 4 is a vertical section on line 4—4 of Figure 2;

Fig. 5 is a vertical section on broken line 5—5 of Figure 2;

Fig. 6 is a horizontal section on line 6—6 of Figure 2;

Figs. 7 and 8 are detail vertical sections on lines 7—7 and 8—8 respectively of Figure 4;

Fig. 9 is a detail section upon an enlarged scale corresponding to a portion of Figure 5;

Fig. 10 is an end view of the structure shown in Figure 9;

Figs. 11, 12, and 13 are detail sections upon an enlarged scale taken on corresponding section lines of Figure 5;

Fig. 14 is a vertical section corresponding to a portion of the left hand end of Figure 4 showing a modified form of the device for use with an additional announcing cylinder; and

Figs. 15, 15*a*, and 15*b* combined show a wiring diagram for the system of the invention, Figure 15 showing the circuits at two of the telephone sets to be utilized to answer calls, Figure 15*a* being an extension to the right of the circuits of Figure 15, and showing the electrical equipment of the invention and control circuits, and Figure 15*b* being an extension to the right of the circuits of Figure 15*a* and showing the circuits of the supervisory mechanism.

As shown the machine of the invention comprises a casing 20 shown as rectangular in outline and with cylindrical housing elements 21 and 22 extending from opposite ends thereof, which cylindrical elements are shown as closed by disk-like closures 23, 24 removably secured thereto in any desired manner.

For drive of the device there is shown a motor 25 of the synchronous type whereby when connected with a system of alternating current power supply, the generator of which is corrected to an accurate number of alternations per second, as is now the practice, the motor will operate the machine continuously with the regularity of the usual electric clock. The motor 25 drives the device through a coupling 26 preferably of material such as resilient rubber so as to serve the function of a universal joint. The coupling through a shaft 27 drives a worm 28 in mesh with a worm wheel 29 operating shaft 30 and through worm 31 and worm wheel 32 actuates shaft 33 which through bevel gears 34 actuates a switch shaft 35 for operation of control switches to be described.

Shaft 30, also through gears 36, 37 in mesh with gears 38, 39 respectively, drives the announcing cylinders, causes movement of the exciter lamps, and controls the shifting of the records.

To this end, as more clearly disclosed in Figure 4, the gear 39 is rigidly connected to a cylinder 40 formed with cam groove 41 in which groove is engaged a dog 42 connected with a member 43 fixed upon and between a pair of parallel rods 44, 45, the dog 42 being oscillatively mounted therein upon anti-friction bearings as clearly disclosed in Figure 4. The rods 44 are mounted to slide in bearings in the casing 20 and at their ends carry cross heads 46, 47 upon which are mounted the exciter lamps 48, 49 and the optical system housings 50, 51. The drum 40 with

the gear 39 is shown as mounted at one end in an anti-friction bearing 52 housed in a recess in the end member of the casing 20. The other end of the drum is shown as mounted in anti-friction bearings 53 upon a sleeve 54, which sleeve in turn is revoluble upon a shaft 55 having secured thereto a cylinder 56 bearing one of the announcement records to be described, which record in the case of a time announcing system is shown as the minute announcing record. Gear 38 is secured to the sleeve 54 as shown by means of a key 57 and the sleeve 54 also carries a circular cam 58 shown in rear elevation in Figure 7.

Mounted upon the disk 59 internally of the cylinder 40 is a shaft 60 carrying a spur or Geneva gear 61 between the teeth of which the cam edge 62 of cam 58 projects.

The number of teeth in the gears 36, 37, and 38, 39, are so related that gear 38 will revolve either one revolution more or one revolution less per minute, in the case of a time announcing system, than will gear 39.

In the embodiment shown, gear 38 is formed to revolve one revolution more each minute, which fact will appear from the relative diameters of the gears 38, 39 as shown in Figures 4 and 6. The result of this relation will be that the cam edge 62 will make a complete revolution relative to the gear 61 each minute.

A break in the cam edge 62 carries a dog 63 placed at an angle to the cam edge such that when brought into contact with the next spur in the gear 61 at the end of each revolution of the cam 58 the spur gear 61 will be advanced one spur so as to cause the cam edge 62 to perform its next revolution in the succeeding space in the gear. This movement of revolution of the spur gear 61, through shaft 60, actuates a worm wheel 64 in mesh with a worm wheel 65 fixed upon shaft 55 to cause a partial revolution of the cylinder 56 relative to the cylinder 40.

The number of teeth in the spur gear 61 and the number of teeth in worm 64 and worm wheel 65 are so related when the invention is used in time announcing systems that each actuation of the spur or Geneva gear 61 will cause a movement of cylinder 56 1/60 of a revolution for a purpose to be described. Between actuations of the gear 61 by the dog 63, the spur gear is locked with cam 62 and being fast upon shaft 60 which must revolve with drum 40, the cylinders 56 and 40 must revolve together under drive of the motor 25.

Mounted in bearings in diaphragm 66 internally of cylinder 40 is sleeve 67, carrying cam 68, in all respects similar to cam 58, mounted to revolve within the sleeve 67, and in bearings 69 mounted in a recess in the end of the cylinder 40 is shaft 70.

Mounted in brackets 71, 72 carried by the cylinder 40 is a shaft 73 carrying a spur or Geneva gear 74 between the teeth of which the cam edge 75 of cam 68 revolves, which cam edge 75 is provided with a dog 76. The sleeve 67 is a continuation of the shaft 55 and therefore each partial revolution of the shaft 55 caused by the dog 63 will provide a like portion of revolution of the cam 75 and the dog 76. Therefore cylinder 56 and shaft 55 which turn 1/60 of a revolution each minute, in the case of a time announcing system, will cause cam 75 to revolve once each hour and thereby actuate spur gear 74 through a distance of one spur each hour. The resultant movement of shaft 73 through worm wheel 77 and worm 78 will cause a partial revolution of the shaft 70 which bears a cylinder 79 shown as the hour record bearing cylinder when the device is utilized as a time announcing system. The cylinder 79 in like manner as cylinder 56 is locked for revolution with cylinder 40 except as modified by the action of the Geneva gear 74.

Spirally mounted upon the cylinders 56 and 79 and upon transparent portions 80 and 81 thereof are photo sound records 82, 83, there being sixty record strips 82 and twelve record strips 83 terminating at the ends of the cylinders at appropriately spaced distances 1/60 and 1/12 of the circumference of the cylinders respectively. It results from this arrangement that the revolution of these cylinders will bring new records directly under the optical systems 50, 51 respectively at each shift of the cylinders 56 and 79 relative to the cylinder 40.

The cam groove 41 which actuates the rods 44, 45 carrying the exciter lamps and optical systems is so timed by the grooves 41 as to move longitudinally in regisury with the lead of the spirals of the records 83, 82 so that during the travel from the position of Figure 4 to the left a certain hour record will be scanned, the exciter lamp 49 being energized and the lamp 48 being dark. After the stroke to the left the excitation of the lamps 49, 48 is reversed and upon the return movement the optical system 50 will scan the appropriate minute record to the return end of its stroke and the gearing is so arranged that the shift of the minute record or of the minute and hour record will occur only at the starting end of the carriage for an announcement and this said shift cannot interfere with the continuous giving of the announcement.

To set the mechanism correctly as to time there is shown a releasable clutch more clearly shown in Figures 9 and 10 wherein the gear 36 is mounted loosely upon shaft 30 through the medium of a sleeve 84 and is connected to the shaft 30 by means of a disk 85 driven by a pin 86 slidable in a slot 87 formed in the enlargement 88 of the shaft 30. The pin 86 passes through a rod 89 carrying a head 90 shown in Figure 5, and the disk 85 has a series of holes 91 as clearly shown in Figure 10. By moving the disk 85 to the position shown in Figure 9 the holes are free of drive pin 92, shown as four in number, and by revolution of the head 90 the shaft 30 may be revolved relative to the gear 36 so as to cause a relative rotation between gears 36 and 37 whereby to time the device.

To time the hour record relative to the minute record, there is shown a sleeve 93 having a series of openings 94 receiving pins 95 carried by the cylinder 79, the parts being retained in relative position by means of a screw 96. The cover 24 may be removed, the screw 96 taken out and the cylinder 79 may be adjusted relative to the shaft 70.

The light from exciter lamps 49, 48 through optical systems 51, 50 respectively, passing through the photo sound records falls upon photo electric cells 98, 97 respectively shown as mounted in brackets carried by the ends of the rectangular portion of the casing 20 and projecting to the interior of the cylinders directly beneath the transparent portions 81, 80 thereof.

To control the exciter lamps and other circuit connections to be described, the shaft 35 is shown as carrying a plurality of switch cams 99 a detail of which is illustrated in Figure 11, the cams through pivoted arms 100 actuating

suitable switch plungers 101 to close and open circuits to be described.

In the form of the invention shown in Figure 14 there is provision for announcement of fractions of a minute as well as of a minute and an hour—in other words, three announcements to take place consecutively instead of two as in the form already described. As shown in this figure the gears 38, 39 operate the cam drum 40 and the cam wheel 58 precisely as in the form already described. The only difference in structure is the addition of certain elements and the modification of the form of the end of shaft 70.

As shown there is a gear 105 secured upon cam wheel 58 which meshes with an idle gear 106 operating pinion 107 fast upon the shaft 108 which through pinion 109 actuates a Geneva gear 110 which in turn intermittently actuates a mutilated gear 111 fast upon the hollow end of shaft 112 to which is secured the record cylinder 113 bearing the fractional minute announcement records. The record cylinder 113 rotates continuously with record cylinder 56 and cam drum 40 in precisely the same manner as in the first form of the invention, with which also rotates the record cylinder 79, not shown in Figure 14 but fast upon shaft 70.

The relative rotation of cam disk 58 caused by gear 38 relative to gear 39 will cause a continuous rotation of Geneva gear 110 relative to the system of cylinders, which Geneva gear will thus cause an intermittent relative rotation of record cylinder 113, that is, relative to the remainder of the rotating system. The gearing for actuation of the shaft 112 may be designed to cause the relative rotation of cylinder 113 to be at any fractional portion of the rotation of record cylinder 56 but this rotation must be so related to the system as to cause the indexing of the cylinder 113 to occur during the stroke of the optical system and therefore the speaking of the seconds of a minute by cylinder 113 would require a reciprocation of shafts 44 once each second. For this reason fractions of a minute are more practicable to be utilized than seconds, as for instance ten or fifteen second intervals.

In accordance with the invention two of the machines above described will be used for an installation, one of these machines will be at all times in service and the remaining machine serving as a standby to be automatically switched into service in the event of any failure of the first-referred to machine. Both machines will be constantly running.

There is provided a control panel carrying the relays, switches, and connections shown in Figure 15*a*, and a plurality of telephone subscriber sets connected in parallel to the circuits of Figure 15*a*, and thereby to the machines, two only of which are shown in Figure 15. In a usual installation from twelve to fifteen telephone sets will be connected in the manner shown in Figure 15.

The supervisory mechanism shown in Figure 15*b* in addition to the vacuum tubes, to be described, comprise two delayed action switches actuated by continuously running synchronous motors. The switches shown at the top of Figure 15*a* are operated by a cam shaft upon the machine above described and comprise switches 120, 120' (cut-through switches); 121, 121' (hour switches); 122, 122' (minute switches); 124, 124' (cut-out switches); and 123, 123' (supervisory switches); which switches are actuated by the machine in the order recited.

Each of these switches is normally open except supervisory switch 123, which is normally closed. Momentary actuation of switch 120 makes a connection through the relay contacts to the telephone sets and in so doing places a hold-up circuit upon a relay therein. Actuation of switches 121 and 122 which remain closed, each for short periods of time, will give the hour record announcement and the minute record announcement, the hour record usually combining with the time announcement an advertising or other announcement phrase. The fourth switch to be actuated by the machine is 124 which is closed momentarily to restore the circuits to the telephone sets to normal condition, and lastly switch 123 is actuated to control transfer of circuits from one machine to the other in case of failure of signals from any cause.

The apparatus upon the control panel of Figure 15*a* combines a switch A, which may be utilized to place a decibel meter 125 into circuit with the amplifying circuits of either machine; a switch B for control of the machine of channel #2 in order to cut out the motor for servicing of the machine; a switch C for control of the exciter lamps of the machine 2, switches B and C being used when servicing the machine, changing the records, etc.; a switch D to disconnect the supervisory circuit from channel #2; a switch E which may be used to transfer the circuits from the machine of channel #2 to the machine of channel #1; a switch F for applying a milliameter 126 to test the condition of the vacuum tubes of the supervisory mechanism; two switches G and H for control of the motor and the exciter lamps respectively of the machine of channel #1; a switch I to release the supervisory circuits from the machine of channel #1; and a switch J for transfer of the circuits from the machine of channel #1 to the machine of channel #2.

Indicator lamps 127, 128, 129, 131, 132, 133, are shown associated respectively with switches B–D inclusive and G–I inclusive.

The relays shown on Figure 15*a* are a cut-through relay 135, a cut-out relay 136, and two transfer relays 137 and 138.

The mechanism at each telephone set comprises in addition to the usual telephone circuits of a subscriber set, a register 139, a ringing relay 140, a line relay 141, and a cut-through relay 142, with a transformer 143 and a protective unit 144 comprising a vacuum tube in series with a coil 145 in inductive relation to the transformer coil 146 in parallel with the voice current circuits to the announcing mechanism.

When a call is received over any or all of the telephone sets, circuits will be set up which will be described only for the upper of the sets shown in Figure 15, the remaining being in parallel therewith. Ringing current over the line wires 147 will, through condenser 148, actuate relay 140 closing a circuit from grounded battery 149 through relay 141, armature 150 of operated relay 140 and wire 151 to ground, causing relay 141 to draw up.

Actuation of relay 141 will close the circuit through the coil of the relay, armature 152, wire 153, armature 154 of relay 155 and wire 151 to ground providing a hold-up circuit for relay 141 after the ringing current ceases. This will hold the call over the calling circuit until switch 120 of the operating channel mechanism is closed, the closure of which switch will provide a circuit from line wire 156 through the armature of

switch G to switch 120, wire 157, back contact of armature 158 of relay 137, wire 159, coil of relay 135 to line wire 160 operating relay 135.

Relay 135 operated closes a circuit from ground, Figure 15, over wire 161, armature 162 of relay 135, wire 163, armature 164 of operated relay 141, lower coil of relay 142 to battery 165 and ground, operating relay 142 and providing a hold-up circuit through the upper coil thereof through grounded battery 165, armature 166, wire 167, back contacts of armatures 168 of relay 136, wires 169, 161 to ground. The thus provided hold-up circuit for relay 142 will thus depend upon the back contacts of relay 136 and will be opened by energization of relay 136.

The operation of relay 142 will connect the line wires 147 through the armatures 170, 171 of the relay, with primary coil 172' of transformer 143, the secondary of which transformers is connected by wires 172, 173 through armatures 174 and 175, back contacts of relay 138, and wires 176, and 177 with amplifier 178 provided in the circuits of the photoelectric cells 179, 180 respectively.

The amplifiers 178, 178' of the two channel mechanisms are shown as connected by wires 181 and 182 with line wires 156, 160 respectively.

Following the actuation of switch 120, the switch 121 will be actuated by the machine closing a circuit from ground 183, upper coil 184 of transformer 185, wire 186, switch arm 187, wire 188, thus illuminating exciter lamp 189, the light from which passes through a photographic sound record to photoelectric cell 179 and the thus modulated current will be apparent in the line wires of the calling telephone sets.

After the announcement of the hour, switch 121 will be opened and switch 122 will be closed, closing a circuit through the lower coil 190 of transformer 185, wire 191, switch arm 192, wire 193, through lamp 194, to ground, thus energizing photoelectric cell 180 resulting in an announcement of the minute from the photographic sound records. Switch 122 having been again opened, switch 124 is then operated momentarily, closing a circuit from wire 156, switch 124, wire 198, back contact of armature 149 of relay 137, wire 200, coil of relay 136 to line wire 160, energizing relay 136 and thereby breaking the circuit from ground through wire 167 and upper coil of relay 142 causing said relay to be de-energized, restoring the telephone sets over which an announcement has just been completed to normal position.

The transfer of circuits from channel #1 to channel #2—when channel #1 is providing the announcements—is controlled by switch 123' of channel #2 mechanism, through delayed action switch 202. If through failure of a signal in transformer 213, switch 202 closes, then closure of switch 123' will perfect a circuit from wire 156, switch 123', wire 228, switch 202, wire 229, switch I, wire 230, coil of relay 138 also wire 231, coil of relay 137, thus shifting all circuits to channel #2 mechanism.

The supervisory mechanism shown diagrammatically in Figure 15*b* is shown dually, each portion comprising switches 201, 202, the first of which is normally closed and the second of which is normally open. These switches desirably being mercury switches are carried by face plates 203, 204 in magnetic relation to magnet coils 205, 206 respectively, which are caused to revolve continuously by means of synchronous motors indicated diagrammatically at 207, 208. The motors 207, 208 being in continuous revolution will cause the face plates 203, 204 to revolve at all times when the coils 205, 206 are energized. The face plates are weighted in such a manner that if the magnetic clutches are de-energized at any time before they have rotated far enough to operate their switches, the face plate will drop back to normal position with switches as shown on Figure 15*b*.

To control the activities of coils 205 and 206 there are shown for each coil a rectifying and biasing tube 209, 210 and a biased current control tube 211, 212, (the former being of a type now known as 6H6 and the latter as 2051), and transformers 213, 216 one for each control switch and set of tubes.

The primary of bridging transformer 213 is connected by wires 214, 215 with wires 176, 177 respectively connected with amplifier 178 associated with channel #1 mechanism. The primary of bridging transformer 216 is connected by wires 217, 218 with wires 219, 220 respectively connected with amplifier 178' associated with channel #2 mechanism.

The circuits of tubes 209, 210 are self-rectifying, making it possible to operate directly on low voltage alternating current from step down transformer 221 connected with line wires 156, 160. Tubes 211, 212 are of the character which allows the current drain therethrough to be at a maximum when the control grid is biased positive with respect to the cathode. When no signal is apparent from the amplifier through the primary of transformer 213, the control grid will be biased positive allowing current to flow through the tube providing a circuit from wire 160, at switch F, Fig. 15*a*, wire 222, tube 212, wires 223, 224, coils 206, wires 225, back contact of 231, armature of relay 137 to wire 156.

To prevent chattering of the magnetic clutch coil 206 between words, by way of a shunt in this circuit, wire 225 is connected by wire 226 and resistance 227 to wire 222 and by wire 226' and condenser 227' with wire 223, energizing the magnetic clutch and causing its face plate to carry switch 202 toward closing position. The motors 207 and 208 being synchronous motors, will cause the face plates 203 and 204 to move at a definite rate when their magnetic clutches are energized and this rate together with the adjustment of the angle of the mercury switches 201, 202 is such as to introduce a definite delay between their starting to move when no signal is apparent in transformers 213, 216, and their operation by movement of the face plates. This time lag is a little in excess of the time, during each cycle, when there is normally no such signal apparent. Any substantial excess of such time with no signal apparent, due to failure of the apparatus to function normally for any reason, will cause the functioning switch to operate.

It has been shown that transformer 216 is connected with amplifier 178, and 213 with amplifier 178', therefore the operating switches 201 or 202 will drop back by reason of a signal apparent in its bridging transformer 216 or 213 once each cycle.

With the circuits as shown, any calling telephones will receive signals over wires 172 and 173 through back contacts of armatures 174, 175 respectively of relay 138 from amplifier 178 over wires 176, 177, hence from the mechanism of channel #1. Should such signals fail, with consequent closure of switch 202, a circuit will be provided as described above depending on switch

123'. The switch 123' is normally open and is closed momentarily after the C. O. switch 124' is operated. Such closure of switch 123' will operate relays 137 and 138.

Relay 138 operated will close a circuit from line wire 156, supervisory switch 123 of channel mechanism #1, wire 195, front contact of armature 196 of relay 138, wire 230, coil of the relay to line wire 160 providing a hold-up circuit for such relay at all times while switch 123 is closed as it is normally. Also, a circuit from wire 230, over wire 231 to the coil of relay 137 holding up that relay.

Since the C. O. relay 136 is actuated by switch 124' before supervisory switch 123', any subscribers who may be listening in at the time of a failure will be held in the telephone equipment relays, due to the fact that switch 124 has not had time to operate, and relay 137 being "make before break", the continuity of this circuit is held intact while being switched to switch 124' of channel #2 mechanism. Therefore, with channel #2 mechanism operating, the necessary sequence of operation begins with closure of switch 120'. Operation of switch 120' energizes relay 135, cutting through any calls waiting to be answered during this transfer.

The circuit involving clutch coil 206 and back contact of armature 231 of relay 137 has been described. A like circuit is provided from wire 156, front contact of armature 231, wire 232, clutch coil 205, wires 233, 234, to tube 211, wire 235, switch F, MA meter 126, wire 160. The meter 126 is such that coil 205 will operate the clutch with the meter in its circuit or not, due to switch F wire.

Switch 201 is normally closed and is opened upon failure of signals to appear in transformer 216. Normally this switch, when channel #2 mechanism is operating will maintain a circuit from wire 160, coils of relays 137 and 138, wires 231 and 197 to armature 196, wires 195, 243, switch 201, wire 244, switch D, switch E to wire 156. This circuit is in parallel with a circuit through supervisory switch 123 of channel mechanism #1. Should mechanism #2 fail with consequent opening of switch 201, the relays 137 and 138 will be held until switch 123 opens at the end of a cycle when the circuits will be transferred to channel #1 mechanism.

The energy for lamps 189, 194 of channel mechanism #1 is from the transformer as described, the primary coil 236 derives power from wire 160 over wires 237, 238, switch 8, wire 225, etc. in parallel with the circuit of clutch coil 206 and therefore these lamps will be de-energized at all times when armature 231 is separated from its back contact. At such times the lamps of channel #2 mechanism will be energized over wire 232, switch C, wires 239, 240 to wire 160.

Transformer 241 supplies low voltage current for indicator lamps 130 and 134. The circuit for lamp 130 is over wire 156, low voltage side of the transformer, wire 242, dropping resistance 243, lamp 130 to wire 156. The lamp in this circuit is normally shunted over wires 245, 225, and back contact of armature 231. When armature 231 leaves its back contact the shunt will be broken allowing the lamp to be energized.

When channel #1 mechanism is repaired, switch E will be manually opened, breaking the circuit wire 156, open switch E, switch D, wire 244, operated switch 201, wire 243, wire 195, armature 196, coil of relay 138, wire 160, releasing relay 138 when switch 123 of channel #1 mechanism is ready to reproduce, transferring all circuits back to channel #1 mechanism.

Operation

Any number of telephone answering sets are provided connected in parallel as shown of the two on Figure 15.

Ringing current operates relay 141 of one of these sets providing a hold-up circuit for itself pending the time of cycle of the mechanism for connection thereto.

Assuming channel #1 mechanism in service (the motors of both machines are continuously running), operation of switch 124 closes a circuit through a back contact of relay 137 to actuate relay 136 which energizes relay 142 to close signal circuits to the telephone line and to provide a hold-up circuit through back contacts of relay 136.

Exciter lamps 189, 194 are successively energized by switches 121, 122 after which closure of switch 124 energizes relay 136 to break the hold-up circuit completing a cycle.

During this time the circuit for energy to exciter lamps 189', 194' is broken at a front contact of relay 137 and current for the active lamps is supplied through the corresponding back contact. Also energizing current for coil 205 of a supervisory switch is broken at the same contact.

While channel #1 mechanism is functioning supervisory switch 202 is starting to operate at all times when there is no signal apparent in coil 213 but drops back each time such signal shows. In the event that such signals fail, switch 202 will close in a few seconds energizing relays 137, 138 to shift the signal circuits to channel #2 mechanism, to energize coil 236' in order to energize exciter lamps 189', 134', to shift control of relays 135, 136 from channel #1 mechanism to channel #2 mechanism and to de-energize coils 236 and 206, thus putting channel #2 mechanism into full service.

The control of shift mechanism while channel #1 mechanism is operating lies in supervisory switch 123' of channel #2 mechanism and while channel #2 is functioning it lies with switch 123 of channel #1 mechanism.

The motor of either machine may be stopped by manual operation of switch G or B and circuits may be manually shifted by actuation of switch E or J.

Minor changes may be made in the physical embodiment of the invention within the scope of the appended claims without departing from the spirit thereof.

I claim:

1. An announcing machine comprising, in combination: a revoluble record carrying cylinder; a plurality of sound records carried by said cylinder, the initial extremities of said records in circumferentially spaced relation at one end of said cylinder; means to drive said cylinder; and automatic means operated at each completion of a predetermined number of revolutions of said cylinder to cause a partial revolution thereof in amount equal to the distance of the spacing of said record extremities.

2. The combination of claim 1 with the drive means such as to cause the cylinder to revolve a definite number of revolutions in a unit of time.

3. An announcing machine comprising, in combination: a plurality of revoluble, record-carrying cylinders; a plurality of sound records carried by each cylinder; the initial extremities of said

records in circumferentially spaced relation on the respective cylinders; means to drive said cylinders; automatic means actuated after completion of a predetermined number of revolutions of one of said cylinders to cause a partial revolution thereof in amount equal to the distance of the spacing of said record extremities; and means acting at the completion of a predetermined number of partial revolutions of said one cylinder to cause a partial revolution of a second of said cylinders a distance equal to the spacing between the extremities of the records carried thereby.

4. An announcing machine comprising, in combination: a plurality of coaxial cylinders each mounted for movement of revolution in a fixed axial position; cam means carried by one of said cylinders; sound records carried by certain of said cylinders, the initial extremities thereof terminating in circumferentially spaced relation thereon; a reciprocable carriage actuated by said cam means; sound reproducing means, at least a portion thereof carried by said carriage to coact with said records during reciprocation of the carriage; and automatic means actuated at completion of a predetermined number of cam cycles to cause partial revolution of a sound record carrying cylinder a distance equal to the spacing of said record extremities.

5. An announcing machine comprising, in combination: a cam cylinder; a record cylinder; means to cause said cylinders to revolve in unison; said means comprising a gear wheel secured to said cam cylinder; a second gear wheel revoluble independently thereof; means to cause revolution of said gear wheels at differing rates; a plurality of sound records carried by said record cylinder, the initial extremities of each thereof terminating in circumferentially spaced relation at an end of said cylinder; means actuated as a result of the gaining of a revolution of one of said gears relative to the other thereof to cause said record cylinder to be given a partial revolution a distance equal to the spacing of said record extremities; and means actuated by said cam cylinder to reproduce sound from the records thereon.

6. The combination of claim 5 with a synchronous motor and means to drive the mechanism at a definite rate of speed.

7. An announcing machine comprising, in combination: a record cylinder having a plurality of sound records arranged spirally thereon terminating at circumferentially spaced divisions at an end thereof; means to revolve said cylinder at a fixed position upon its axis; means to reciprocate pick-up light apparatus to scan said records successively; means to reciprocate said light apparatus comprising a cylinder provided with a cam groove; a pair of gears for drive of said cam cylinder, one of said gears fixed to the cylinder and the other thereof free to revolve at a different rate of speed therefrom; a star wheel revoluble with said cam cylinder; a cam means actuated by completion of a gain of one revolution of one of said gears over the other thereof to revolve said star wheel; and means actuated by the latter to cause said record cylinder to be stepped a partial revolution to bring a successive record into alignment with said light pick-up device.

8. An announcing machine comprising, in combination: a cylinder having a cam groove in the surface thereof; a pair of record cylinders coaxial with said cam cylinder each carrying a plurality of sound records spirally thereon terminating at an end of each at uniform circumferentially spaced positions; a gear wheel fixed to said cam cylinder for drive thereof; a jack shaft mounted in bearings fixed to said cam cylinder; a gear drive for one of said record cylinders from said jack shaft; a star wheel carried by said jack shaft having separated pins; a cam ridge revoluble between said pins; a second gear wheel revoluble with said first named gear wheel at a different rate of speed; said last named gear wheel fixed with said cam ridge; means whereby completion of a revolution of said cam ridge relative to the cam cylinder actuates said star wheel a distance of one pin whereby to move said record cylinder a distance equal to the circumferential spacing of the records thereon; means actuated by said cam cylinder to reciprocate light-pick-up mechanisms over said cylinders and means to step the second cylinder a partial revolution after completion of a certain number of steps of said first-named record cylinder to present a successive record from the second-named record cylinder to announcing position.

9. Means to adjust a record cylinder through a partial revolution to present successive records thereon to reproducing apparatus comprising, in combination with a continuously revolving cylinder: a jack shaft revolving with the cylinder; a star wheel carried by said jack shaft; a disk presenting a cam ridge revoluble between the teeth of said star wheel; a gear revoluble with said cam cylinder at a different rate of speed therefrom; means engaging the teeth of said star wheel consecutively at completion of each relative rotation of said cam disk relative to the cam cylinder to step forward the star wheel one tooth thereof and gear means to transmit the step movement of said jack shaft to the record cylinder.

10. An announcing machine comprising, in combination: a cam cylinder mounted to revolve in hollow bearings; a pair of record cylinders coaxial with said cam cylinder mounted upon shafts revoluble relative to said bearings, a pair of gears one thereof fixed to said cam cylinder; means to revolve said gears continuously at different rates of speed whereby to cause one thereof to gain a revolution relative to the other thereof at each definite number of revolutions of the cam shaft; means actuated at each completion of a relative revolution between said gears to actuate one of said record cylinders a portion of a revolution and means actuated by said first named actuating means to actuate the second record cylinder a portion of a revolution upon completion of a definite movement of partial revolutions of the first named record cylinder; and means reciprocated by said cam cylinder to scan records mounted upon said record cylinders.

11. An announcing machine comprising, in combination: a cam cylinder, a pair of record cylinders mounted coaxially therewith; means to cause said cylinders to revolve normally in unison; 60 and 12 records carried by said cylinders respectively in spiral relation thereon terminating at uniform circumferentially spaced positions at the end of each; scanning means for said records reciprocated by said cam cylinder; means actuated upon completion of a definite number of revolutions of said cam cylinder to cause a partial revolution of said 60-record cylinder and means actuated upon completion of 60 actuations of said first named record cylinder to cause a partial revolution of said 12 record cylinder.

12. An announcing machine comprising, in combination: a casing; a drive cylinder mounted therein on a horizontal axis; a supplemental casing secured to each end of the first named casing; a record cylinder in each supplemental casing mounted coaxially with said drive cylinder; a synchronous motor mounted on an axis perpendicular with the cylinder axis and offset therefrom; a horizontal shaft driven from said motor; a pair of gears coaxial with said cylinders, one thereof secured to said drive cylinder and one free thereof; means to drive said gears from said horizontal shaft at differing gear ratios; means housed in said drive cylinder driven from said free gear, acting to give one of said record cylinders a partial revolution at each relative revolution between said gears; and means to cause normal revolution of said drive and record cylinders in unison.

13. The combination of claim 12 with means also housed in said drive cylinder to cause a partial relative revolution of the second record cylinder at the each of each full relative revolution between the first record cylinder and the drive cylinder.

14. An announcing machine comprising, in combination: a record cylinder carrying a plurality of sound records; means to reproduce sound therefrom; a gear means to cause revolution of said cylinder during such reproduction; record shifting means gear driven at a speed ratio differing from that of said cylinder drive; and means acting at the end of each predetermined difference of revolution of the gear drive to cause a partial revolution of the record cylinder to bring a successive record to active position.

15. A time announcing machine comprising, in combination: a hollow drive cylinder mounted in hollow bearings; a minute record cylinder mounted on a shaft revolving in one of said bearings; an hour record cylinder mounted on a shaft revolving in a second one of said bearings; a gear secured to said drive cylinder; a gear secured on a sleeve revolving on said minute record cylinder shaft; means to cause said cylinders to revolve full turns in unison; means to drive said gears at different speeds, and means acting at the end of a full revolution of relative revolution between said gears to cause partial revolution of the minute cylinder.

16. A time announcing machine comprising, in combination: a drive cylinder mounted in hollow bearings; a minute-record cylinder mounted on a sleeve concentric with said bearings; a fractional-minute-record cylinder mounted on a shaft concentric with said sleeve; an hour-record cylinder mounted on a shaft concentric with a second hollow bearing of said drive cylinder; a drive gear secured to said drive cylinder; a second drive gear secured on a second sleeve external to and concentric with the minute record carrying sleeve; a jack shaft journalled in brackets secured in said drive cylinder, a star wheel and a pinion secured on said jack shaft; a disk secured on said second sleeve and presenting an annular ridge projecting between teeth of said star wheel; means to cause said star wheel to advance one tooth at each revolution of said ridge; means driven by said pinion to give the minute-record sleeve one-sixtieth revolution for each star wheel tooth advance; a gear secured to said disk; gear train means to cause partial revolution of said fractional-minute-record carrying shaft at definite portions of revolution of said disk; means to cause the hour record to revolve one-twelfth of a revolution at the completion of each revolution of the minute record drive sleeve; and means to drive said drive gears at speed ratios to cause a difference of one revolution therebetween each minute.

17. A time announcing machine comprising, in combination: a drive cylinder; a minute record cylinder; an hour record cylinder; means mounting said cylinders on a common axis; means to cause simultaneous full revolutions of said cylinders; means to cause partial relative revolutions of the record cylinders at definite intervals at the end of certain of the full revolutions thereof, to bring successive records into announcing positions.

18. A time announcing machine comprising, in combination: a drive cylinder, a fractional minute record cylinder; a minute record cylinder; and an hour record cylinder; said cylinders mounted for revolution on a common axis; means to cause said cylinders to undergo full revolution in unison for announcing operation; and means to cause partial relative revolution of said cylinders at the end of each of certain full revolutions thereof to cause shifting of records in announcing position.

19. An announcing system comprising, in combination: a continuously operating announcing mechanism; switches actuated thereby in definite cycles; telephone circuit connections; a relay responsive to ringing current over the telephone circuit; a relay energized by said ringing current relay to provide a hold-up circuit for itself and a preparatory circuit closure; a circuit actuated by one of said switches to close a circuit through said preparatory circuit closure, to establish a connection for announcing currents to said telephone circuits and a hold-up circuit for itself; and means actuated by another of said switches to break the last named hold-up circuit.

20. An announcing system comprising, in combination: a continuously operating announcing mechanism functioning in definite cycles; telephone connecting circuits; a switch actuated by said mechanism at the beginning of each cycle to connect a calling telephone through said circuits; and a second switch operating at the end of each cycle to restore said circuits to normal.

21. An announcing system comprising, in combination: a plurality of continuously operating announcing mechanisms functioning in synchronism and in definite cycles; telephone connecting circuits; means conditioning one of said mechanisms for announcing service; a switch actuated by said mechanism at the beginning of each cycle to connect a calling telephone through said circuits; a second switch operating at the end of each cycle to restore said circuits to normal and a switch operating between cycles by an inactive announcing mechanism to energize circuit shifting mechanisms to shift the circuits to the said inactive mechanism in case of failure of said first mechanism.

22. A time announcing system comprising, in combination: a continuously operating announcing mechanism; switches actuated thereby in definite cycles; telephone circuit connections comprising a relay responsive to ringing current, a relay controlled by the first named relay acting to insert a signal transformer into the telephone circuit; a relay actuated by one of said switches at the beginning of a cycle to close a circuit through said second named relay includ-

ing the holdup circuit therefor, said hold-up circuit controlled by a normally closed contact under control of a second relay; switches actuated by said mechanism in sequence to energize sound reproduction means and a switch operated at the end of a cycle to energize said last named relay whereby to restore the circuits to normal condition.

23. A time announcing system comprising, in combination: a pair of continuously operating announcing mechanisms operating in cycles and in synchronism; means to apply announcing sound reproduction to calling telephones; switches operated by each of said mechanisms; a relay having front and back contacts; circuits controlled by the back contacts of said relay placing the announcing circuits of one of said mechanisms in position to be connected to said telephone line; circuits controlled by the front contacts of said relay to place the remaining mechanism in circuit with the telephone line; a switch controlled by each mechanism to call the telephone connection at the beginning of each cycle; a switch to break said telephone connection at the end of each cycle; and a switch operated between cycles to cause said relay to operate upon failure of operation of the connected mechanism whereby to shift signal connections to the remaining mechanism.

24. The system recited in claim 23 in combination with a delayed action switch connected to energize said relay upon failure of signals to occur within a definite time after the beginning of a cycle.

25. A time announcing system comprising, in combination: a pair of announcing mechanisms operating continuously and in synchronism; shiftable connections for a chosen one of said mechanisms to telephone equipment; means under control of the remaining mechanism to shift said connections; and means actuated by a time delay switch to bring said shifting means into action upon failure of signals in excess of a definite time.

26. An announcing system comprising, in combination: continuously running mechanisms; a delayed action switch corresponding to each of said mechanisms; one of said mechanisms normally functioning to delay announcements; means actuated by said functioning mechanism to inhibit action of said switch; and means actuated by said switch when its action is not inhibited to cause the second mechanism to function.

27. A time announcing system comprising, in combination: continuously operating time announcing mechanisms; a delayed action switch associated with each mechanism; one of said mechanisms normally functioning; means actuated by said functioning mechanism to inhibit action of said delayed action switch; means controlled by the non-functioning mechanism acting upon the operation of said switch to cause the second mechanism to function and to interchange the relation of said switches in the system.

28. A time announcing system comprising, in combination: continuously acting time announcing mechanisms, one thereof normally functioning; a delayed-action switch associated with each of said mechanisms; sound reproducing means associated with each of said mechanisms; a relay controlling the circuits of said delayed action switches and of said sound reproducing means; means associated with a functioning mechanism to inhibit the action of the operating delayed action switch; means associated with the non-functioning mechanism to operate said relay when action of said switch is not inhibited within a predetermined time, whereby to shift the circuits of the sound signal-producing means and of the delayed-action switch control between said mechanisms upon failure of the functioning one thereof.

29. A time announcing system comprising, in combination, continuously operating announcing mechanisms; common circuits for connection of any of said mechanisms with telephone circuits; means conditioning one of said mechanisms for normal functioning; means to amplify voice current reproduction from the functioning mechanism; a delayed action switch associated with each of said mechanisms; a transformer responsive to signal currents; means for inhibiting action of said switch by presence of said signal currents in the transformer; means connecting said transformer and the telephone connections in parallel; and means under control of a non-functioning mechanism to shift the circuits of the telephone connection and of the delayed action switch to a second mechanism upon failure of a first mechanism to function.

30. A time announcing system comprising, in combination: a plurality of continuously operating instrumentalities each comprising time announcing means, signal amplifying means, and control switches; telephone circuit connections; supervisory apparatus; relay means controlling the production of signals by said instrumentalities, the impressing of said signals on the telephone connections and connection to said supervisory apparatus; means whereby said apparatus causes actuation of said relay means upon failure of signals.

31. The combination of claim 30 with manual means to cause actuation of said relay means to bring a different instrumentality into use for servicing of the normally functioning instrumentality.

32. The combination of claim 30 with signal means to indicate actuation of said relay means.

33. The combination of claim 30 with electric signal means to indicate actuation of said relay means and with a step-down transformer to furnish low voltage current supply for said signal means.

34. The combination of claim 30 wherein the announcement signals are produced by light actuated photographic sound records and wherein production of signals is controlled by said relay means by controlling energization of the exciting lamps of the reproducing means.

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