Sept. 21, 1937. F. D. HENDERSON 2,093,675

AUTOMATIC TELEPHONE SECRETARY

Filed Aug. 19, 1936 4 Sheets-Sheet 1

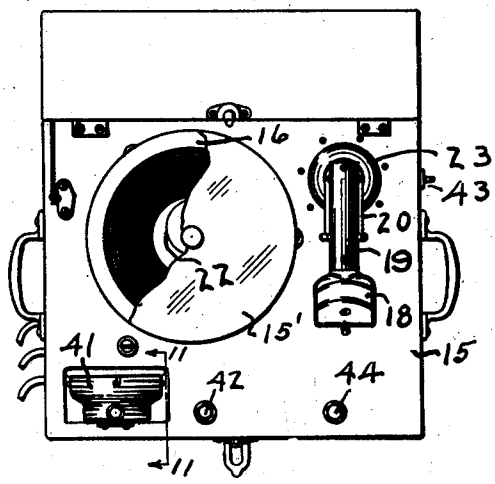

Fig. 1

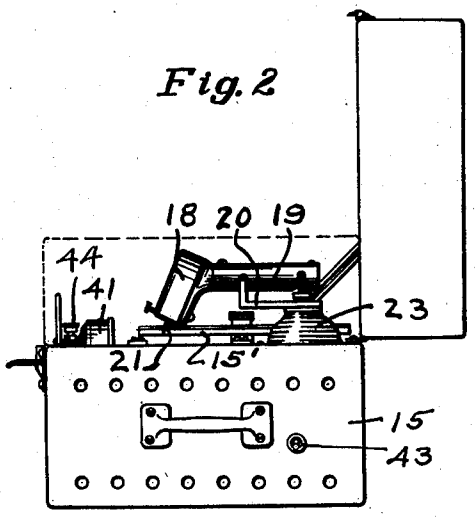

Fig. 2

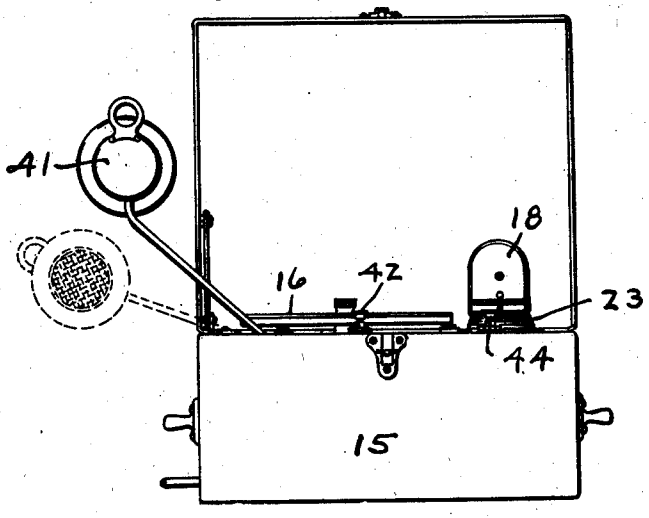

Fig. 3

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AUTOMATIC TELEPHONE SECRETARY

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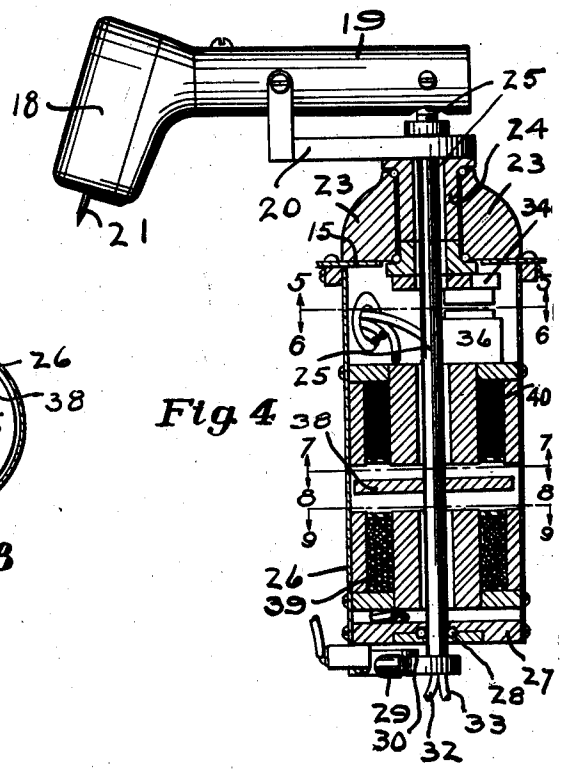

Fig. 4

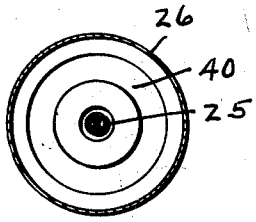

Fig. 7

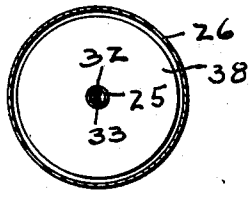

Fig. 8

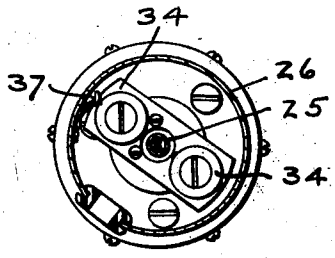

Fig. 5

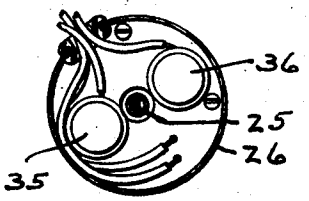

Fig. 6

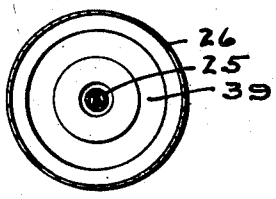

Fig. 9

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AUTOMATIC TELEPHONE SECRETARY

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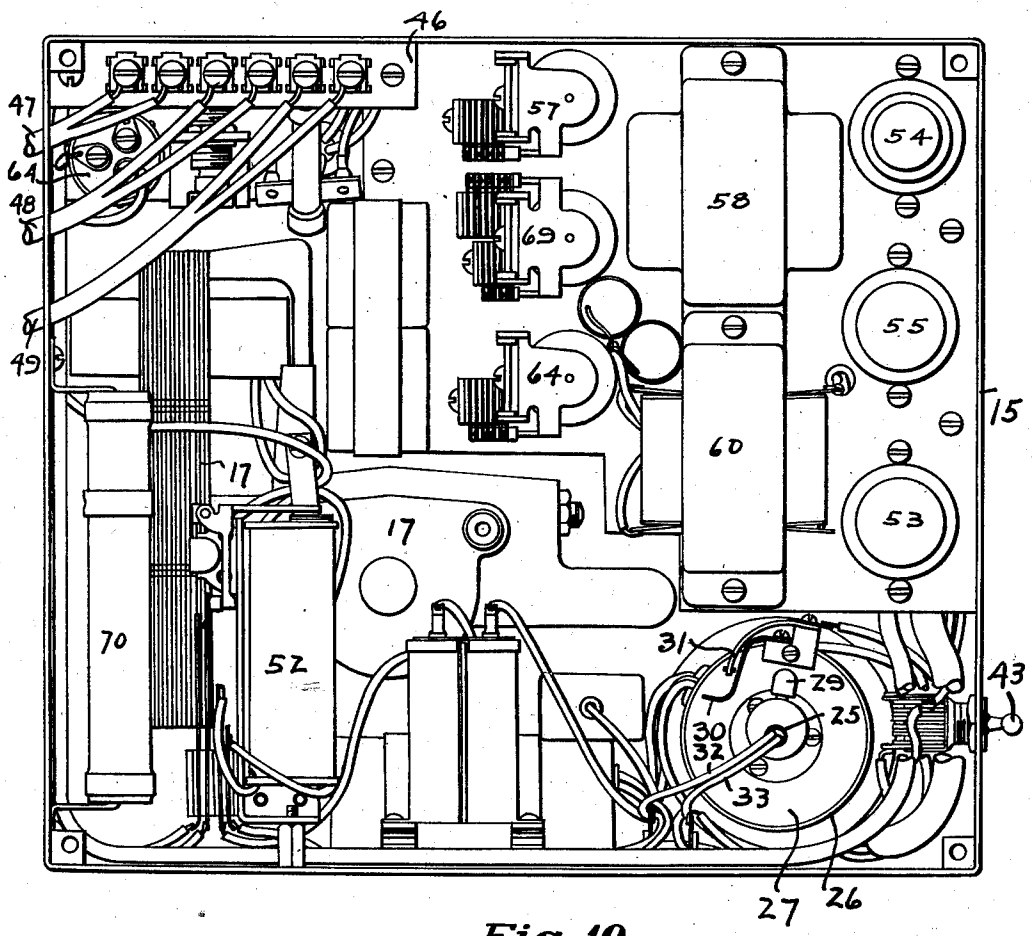

Fig. 10

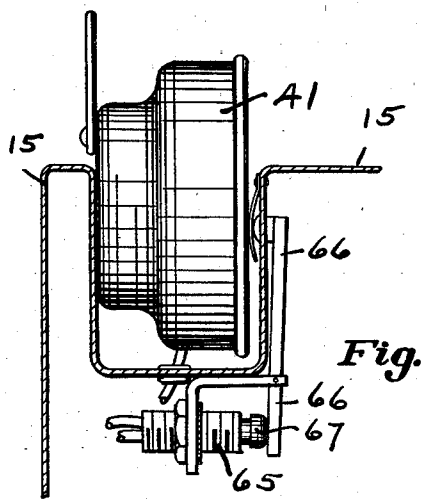

Fig. 11

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AUTOMATIC TELEPHONE SECRETARY

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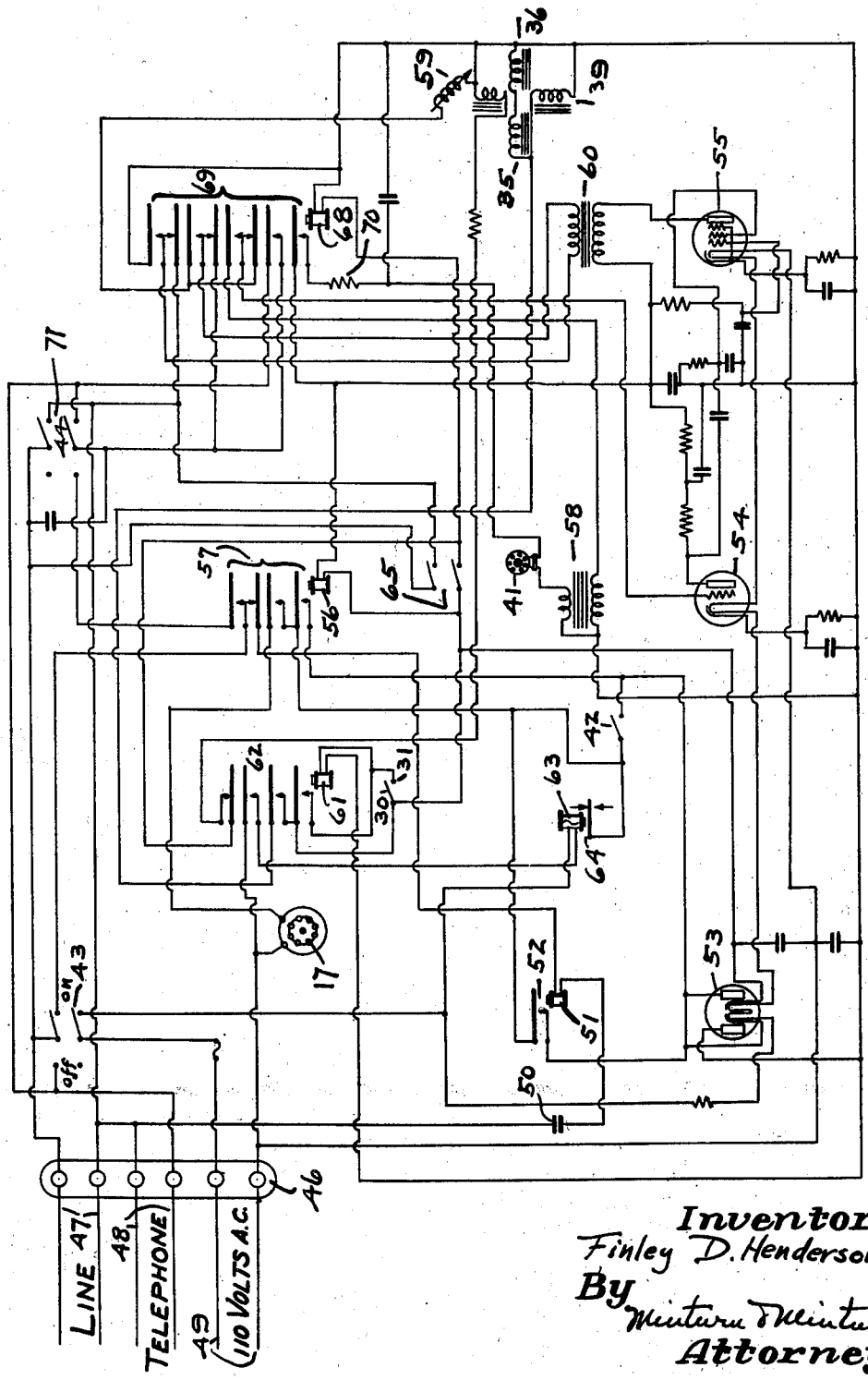

Fig. 12

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UNITED STATES PATENT OFFICE

2,093,675

AUTOMATIC TELEPHONE SECRETARY

Finley D. Henderson, Indianapolis, Ind.

Application August 19, 1936, Serial No. 96,724

9 Claims. (Cl. 179—6)

This invention relates to a device which will automatically answer a telephone call with a predetermined statement whereby incoming calls on the telephone may be answered and the person calling may be given a message as may be desired by the person being called.

An important object of the invention is to provide such a means as will be fully automatic in the absence of the person being called and which may be so constructed as will permit the recording in advance of the message to be delivered each time the telephone is placed in the calling operation. A still further important advantage of the invention is that a record may be made and repeated back to the person making it as a check.

Another important feature of the invention resides in the mechanism for lifting and lowering as well as revolving the record pick-up mechanism and also in the means for applying an increased pressure on the pick-up needle during recording operations.

Further objects and advantages of the invention such as the unique arrangement and of the various elements entering into the invention, the simplicity of construction, and general reliability as well as simplicity, will become apparent to those versed in the art in the following description of a preferred embodiment of the invention, it being understood of course that changes and variations may be employed without departing from the spirit of the invention. In describing the invention, reference is made to the accompanying drawings in which

Fig. 1 is a top plan view of the device embodying the invention with the cover lifted;

Fig. 2, a side elevation;

Fig. 3, a front elevation;

Fig. 4, a central vertical section through the pick up lifting, revolving and pressure applying means;

Fig. 5, a transverse section on the line 5—5 in Fig. 4;

Fig. 6, a transverse section on the line 6—6 in Fig. 4;

Fig. 7, a transverse section on the line 7—7 in Fig. 4;

Fig. 8, a transverse section on the line 8—8 in Fig. 4;

Fig. 9, a transverse section on the line 9—9 in Fig. 4;

Fig. 10, a bottom plan elevation of an enlarged scale with the lower cover plate removed;

Fig. 11, a detail in vertical elevation of an enlarged scale on the line 11—11 in Fig. 1; and

Fig. 12, a wiring diagram.

Like characters of reference indicate like parts throughout the several views in the drawings.

The various elements entering into the invention are mounted on and within a metallic box 15. A phonograph is mounted on the box to have the record table 15' revolubly carried thereabove to receive a record 16 thereon to revolve in horizontal plane. The actuating motor 17 is mounted on the under side of the box and the pick-up head 18 is carried by an arm 19 rockably pivoted on a supporting arm 20 above the box top.

The movement of the head 18 in reproducing will of course be from the outer to the inner portion of the record following the grooves thereon as controlled by the bearing of the needle 21 in the record grooves. In the usual manner, upon reaching the end of the record, the needle 21 will be guided inwardly quickly in the spiral groove 22 so as to give the head a quick inward movement.

A special mechanism is supplied to return the head to its original position for again traversing the record. This mechanism will now be described. A head 23 is fixed to the upper side of the box 15 and carries a sleeve 24 revolubly therethrough, Fig. 4, the arm 20 being fixed to this sleeve. The sleeve 24 is so formed as to be retained against upward and downward movement in the head 23. The end of the arm 19 is rockably connected to a vertically disposed shaft 25 which extends freely down through the sleeve 24 centrally through a cylinder 26 secured to the under side of the top of the box 15. A head 27 is provided in the lower end of the cylinder 26 to carry a bearing 28 to centrally align and support the shaft 25. The lower end of the shaft 25 carries an arm 29 in the path of a spring arm 30 so that upon sufficient rotation of the shaft 25, the arm 29 may carry the spring arm 30 into electrical contact with the fixed contact arm 31 to close a circuit. Preferably the shaft 25 is tubular so that the wires 32 and 33 may be carried therethrough and across to the arm 19 to the pick-up head 18.

The shaft 25 may be lifted and lowered so as to rock the arm 19 and thereby lower and raise the head 18. On the under side of the sleeve 24 is mounted a bar type armature 34 and immediately thereunder is mounted a pair of electro-magnets 35 and 36. These magnets 35 and 36 are of the spool wound type with their cores vertically disposed and having slight air gaps normally between their upper ends and the

armature 34. The armature is mounted on the under side of the sleeve 24 in reference to the magnets 35 and 36 so that when the head 18 is revolved outwardly to be clear of the record 16 the armature 34 would be directly across the upper sides of the two magnets and in that position will be stopped by any suitable stop such as the spring 37, Fig. 5. These two magnets 35 and 36 are energized upon the closing of the contact arms 30 and 31 and this closure is occasioned when the head 18 is carried inwardly of the record toward its center by the spiral 22.

However upon the energizing of these two magnets 35 and 36, the needle 21 must be lifted to prevent dragging across the face of the record and in order to accomplish this, a circular disk of iron 38 is mounted in a fixed position on the shaft 25 and thereunder in fixed relation is mounted an electro-magnet generally designated by the numeral 39 which is simultaneously energized with the magnets 35 and 36. Therefore the pull of the magnet 39 will lower the shaft 25 and thereby rock the head 18 upwardly as the armature 34 pulls it around above the face of the record.

Since it is desirable to apply an increased pressure on the needle 21 against the face of the record upon recording, means are provided to do so. Such means comprise the placing of an electro-magnet 40 above the iron disk 38 so that when the winding of the magnet 40 is energized, the shaft 25 will be lifted and thereby cause the head 18 to be pushed downwardly. The various circuits for producing flows of current through the different windings of magnets above indicated will be hereinafter indicated. In any event it will be seen in the foregoing description, that a complete electrical control is provided for returning the pick-up head 18 to an original starting position after traversing the record; lifting the head 18 to remove the needle 21 from contact with the record during that returned movement; and lowering the head 18 to apply additional pressure of the needle against the record during recording.

In order that the remainder of the structure entering into the invention may be better understood, a general picture of the operation of the invention will now be given. Assuming the owner of the device intends to leave his office, for example, and wants to make a response to all incoming telephone calls, he will first pick up the microphone 41 which is normally carried within a pocket in the top side of the box 15 and will push down on the button 42 which will set the phonograph motor 17 into operation and lower the head 18 to cause the needle 21 to drop against the record 16. The operator may then talk into the microphone 41 to have his message recorded directly on the record 16. He may then return the microphone back to its original position in the pocket, turn the main "off-on" switch 43 to the "on" position before leaving his office with the assurance that the message he has already dictated has been recorded on the record 16 and will be given and placed on the telephone line in response to each and every call coming in over that line. Furthermore in order to check his message before leaving, the operator may press down on the second button 44 and remove the telephone receiver from its hook and listen to the message being given.

Further explanation of the invention will now be made in reference to the wiring diagram, Fig. 12, so that the operations may be more easily understood. Within the box 15 viewed from its under side, Fig. 10, is placed a terminal block 46 to which all external connections are made. The external terminal line 47, line 48 from the box to the telephone and a source of current energy line 49, 110 volts A. C. being normally used, are brought into the box 15 to connect on this block 46. No changes are made whatsoever in the internal wiring of the telephone. When the device is not in use, the "on and off" switch 43 is turned to the "off" position. In this position as will be noted from the diagram, the telephone line 47 is in direct connection with the telephone the same as though the device did not exist. When the device is to be used, this switch 43 is turned over to the "on" position. In this position, the telephone line 48 is disconnected from the incoming line 47 and the line 47 is connected through a condenser 50 to the coil 51 of a relay 52. Simultaneously the switch 43 interconnects the 110 volt line 49 with the heater of the rectifier tube 53 and amplifier tubes 54 and 55.

Now if a ringing voltage were applied to the line 47, instead of normally ringing the telephone, this applied voltage would energize the coil 51 and trip the relay 52 to close the relay contacts and apply the 110 voltage current to the rectifier—voltage doubler tube 53. The D. C. output of this tube 53 passes through the energizing coil 56 of the relay 57. The application of this direct current trips the relay to shift the movable contacts therein. The coil 56 of this relay also acts as a filter for the rectifier output. The relay 57, it will be noted, has a pair of contacts (lowermost) in parallel with the contacts in the relay 52 whereby the circuit is maintained after the relay 52 opens after the end of a ringing impulse.

The closing of the relay 57 through the respective contacts completes the circuit of the phonograph motor 17 and switches the telephone line 47 from the coil 51 to the secondary winding of the output transformer 58 and the condenser 50 is switched out of the circuit so that in case of automatic telephone exchanges the calling telephone will be connected and the called telephone will not be rung another time.

The phonograph pick-up winding 59 is connected to the input of the first amplifier tube 54. The output of this tube is resistance coupled to the output tube 55. In turn the output of the tube 55 is coupled through the transformer 60 to the telephone line 47.

When the pick-up needle 21 reaches the spiral or eccentric grooves 22 at the completion of the record 16 the contact members 30 and 31 momentarily close. This closure causes the current to excite the coil 61 of a relay 62 which is a high resistance winding operated directly from the rectified output of the tube 53. This relay 62 has three pairs of make and one pair of break contacts. The first pair (lowermost) is in parallel with the switch formed by the members 30 and 31 and the contacts of this pair when closed maintain the relay 62 in the operated position after the members 30 and 31 are opened. The next above pair of contacts in this relay 62 apply the rectified high voltage current to the lifting magnet 29 and to the rotation magnets 35 and 36, these magnets being the ones which motivate the return movement of the pick-up head 18 as above indicated. The third pair of make contacts in this relay 62 applies the 110 A. C. to the high resistance coil 63 of the thermal time delay relay 64.

This relay 64 operates about two seconds after excitation, thereby providing sufficient time for the pick-up head 18 to be lifted from the center of the record and rotated to the start of the record 16. The relay 64 has a single pair of contacts which when opened turn off the supply of 110 A. C. to the entire device. When these contacts open, the motor 17 stops and the pick-up 18 drops to the record to its initial starting point and all of the other relays return to their initial unoperated positions. In an additional two seconds, the relay 64 automatically drops and the entire system is in the original condition and ready to answer another call.

Now when it is desired to make a new record 16, the "on-off" switch 43 is turned to the "on" position. The microphone 41 is lifted from its compartment and in being removed, permits a switch 65 to close. This switch 65 is normally held in an open position when the microphone 41 is in its compartment, Fig. 11, by reason of the pressure of the microphone 41 against an arm 66 which is rockable to have its lower end bear against the plunger 67 of the switch. Removal of the microphone permits the arm 66 to rock under pressure of the arm 66 outwardly.

Closure of the switch 65 with the switch 43 in the "on" position, allows current to flow through the coil 68 of the relay 69 when the starting button 42 is pressed to close that switch. The contacts of the switch operated by the button 42 are in parallel with the contacts on the relay 52 and the momentary closing of this button 42 does exactly the same thing which happens were the relay 52 to close as above indicated. The relay 69 may be designated as the recording relay and it is supplied with two pairs of make contacts (lowermost) and three sets of break-make contacts. One pair of these contacts (lowermost) applies D. C. to the microphone 41 through the dropping resistor 70. The next above pair of contacts connects the telephone line 48 directly with the incoming line 47 even with the "on-off" switch 43 in the "on" position. This arrangement makes the telephone usable during the recording process. It is necessary however upon the conclusion of the making of the record to immediately turn the switch 43 to its "off" position. On the other hand, in installations where it is desired not to be interrupted by phone calls while making a record, a second pole is provided in the switch 65 to be wired as shown so as to give the busy signal while recording. One set of the break-make contacts of the relay 69 switches the grid of the tube 54 from the pick up 59 to the secondary winding of the input transformer 58. The other two sets of the break-make contacts of this relay 69 as indicated, switch the secondary winding of the output transformer 60 from the line 47 to the pick up 59 which now acts as the recording head.

In parallel with the recording relay 69 is the recording pressure magnet 40. This magnet 40 as above indicated is the one which applies the additional needle pressure as required during the recording process. In series with the winding of this magnet 40 is the pair of break contacts of the relay 62 which interrupt the circuit through the coil of this magnet so as to relieve the pressure at the end of the record and permit the lifting magnet 39 to raise the pick up head 18.

Now if a person desired to listen to a record on his own telephone, he may do so by initially pressing down the starting button 42 and then holding down the monitor button 44 which operates the switch 71. This switch 71 has a pair of contacts which as indicated give the busy signal for incoming calls on the line 47 while the person is using his telephone as a monitor. It is to be noted however that the busy signal feature on the switches 65 and 71 should be omitted and not connected in instruments or devices of use in P. B. X. installations or non-automatic exchanges.

While the invention has herein been described in one particular arrangement of circuits, it is obvious that variations may be employed without departing from the spirit of the invention, and it is therefore intended that the scope of the invention not be limited by said arrangement, nor any more than may be required by the following claims.

I claim;

1. In a phonograph having a record, means for revolving the record, a recording and pick up head, and a head carrying arm horizontally and vertically rockably mounted, the combination of an arm shifting shaft, electro-magnet means for revolving the shaft to turn the arm horizontally, electro-magnet means for shifting the shaft in one direction, electro-magnet means for shifting the shaft in another direction, an electric circuit including said revolving means and one of said shifting means, switch means in said circuit actuated upon travel of said head on said record toward the end thereof to close said circuit and energize both said magnet means to lift and return said head to a starting position, a microphone selectively connected in circuit with said pick up for recording purposes, and means placing said other magnet means in an energizing circuit upon use of said microphone, whereby said other magnet means will apply a pressure on said head toward said record during the recording operation.

2. In a phonograph having a record, means for revolving the record, a recording and pick up head, and a head carrying arm horizontally and vertically rockably mounted, the combination of an arm shifting shaft, electro-magnet means for revolving the shaft to turn the arm horizontally, electro-magnet means for shifting the shaft in one direction, electro-magnet means for shifting the shaft in another direction, an electric circuit including said revolving means and one of said shifting means, switch means in said circuit actuated upon travel of said head on said record toward the end thereof to close said circuit and energize both said magnet means to lift and return said head to a starting position, a microphone selectively connected in circuit with said pick up for recording purposes, and means placing said other magnet means in an energizing circuit upon use of said microphone, whereby said other magnet means will apply a pressure on said head toward said record during the recording operation, and means de-energizing said other magnet upon completion of said record.

3. In a device of the character specified having available a telephone line, a telephone, a source of electrical energy, a phonograph having an operating motor, a record, a recording and pick up head vertically and horizontally shiftable over the record, the combination of an initial circuit selectively switched initially into said telephone line; a relay in said initial circuit operative upon a signalling impulse being applied to said line; a second circuit; a second relay in said second circuit; contacts in said first relay closeable upon its energization to interconnect said current source with the second circuit, the out-

put of which is applied to the energizing coil of the second relay; contacts in said second relay maintaining the initial circuit closed after cessation of said impulse; a third circuit including said motor; contacts in said second relay interconnecting said third circuit with said energy source; a fourth circuit including said pick up head; and contacts in said second relay transferring connection of said line from said first relay to the output of said fourth circuit.

4. In a device of the character specified having available a telephone line, a telephone, a source of electrical energy, a phonograph having an operating motor, a record, a recording and pick up head vertically and horizontally shiftable over the record, the combination of an initial circuit selectively switched initially into said telephone line; a relay in said initial circuit operative upon a signalling impulse being applied to said line; a second circuit; a second relay in said second circuit; contacts in said first relay closeable upon its energization to interconnect said current source with the second circuit, the output of which is applied to the energizing coil of the second relay; contacts in said second relay maintaining the initial circuit closed after cessation of said impulse; a third circuit including said motor; contacts in said second relay interconnecting said third circuit with said energy source; a fourth circuit including said pick up head; and contacts in said second relay transferring connection of said line from said first relay to the output of said fourth circuit, a fifth circuit including a closing switch for interconnection with a source of electrical energy, means operated by travel of said head toward the end of said record for closing said switch, a time delay switch in said fifth circuit, electro-magnet means included in said fifth circuit for lifting and revolving said head back to a starting position, and a pair of contacts in said delay switch for interrupting connection of said initial source of electrical energy with the other said circuits whereby all of said relays and contacts may be restored to their original unoperated positions preparatory to additional impulses in said telephone line.

5. In a device of the character specified having available a telephone line, a telephone, a source of electrical energy, a phonograph having an operating motor, a record, a recording and pick up head vertically and horizontally shiftable over the record, the combination of an initial circuit selectively switched initially into said telephone line; a relay in said initial circuit operative upon a signalling impulse being applied to said line; a second circuit; a second relay in said second circuit; contacts in said first relay closeable upon its energization to interconnect said current source with the second circuit, the output of which is applied to the energizing coil of the second relay; contacts in said second relay maintaining the initial circuit closed after cessation of said impulse; a third circuit including said motor; contacts in said second relay interconnecting said third circuit with said energy source; a fourth circuit including said pick up head; and contacts in said second relay transferring connection of said line from said first relay to the output of said fourth circuit, a fifth circuit including a closing switch for interconnection with a source of electrical energy, means operated by travel of said head toward the end of said record for closing said switch, a time delay switch in said fifth circuit, electro-magnet means included in said fifth circuit for lifting and revolving said head back to a starting position, and a pair of contacts in said delay switch for interrupting connection of said initial source of electrical energy with the other said circuits whereby all of said relays and contacts may be restored to their original unoperated positions preparatory to additional impulses in said telephone line, a sixth circuit paralleling said initial circuit relay contacts, and a closing switch in said sixth circuit for operation to initiate movement of said motor independently of telephone line impulses, and a microphone circuit having its output connected to said pick up head, and a relay in said microphone circuit operated from connecting the output of said second circuit therewith.

6. In a device of the character specified having available a telephone line, a telephone, a source of electrical energy, a phonograph having an operating motor, a record, a recording and pick up head vertically and horizontally shiftable over the record, the combination of an initial circuit selectively switched initially into said telephone line; a relay in said initial circuit operative upon a signalling impulse being applied to said line; a second circuit; a second relay in said second circuit; contacts in said first relay closeable upon its energization to interconnect said current source with the second circuit, the output of which is applied to the energizing coil of the second relay; contacts in said second relay maintaining the initial circuit closed after cessation of said impulse; a third circuit including said motor; contacts in said second relay interconnecting said third circuit with said energy source; a fourth circuit including said pick up head; and contacts in said second relay transferring connection of said line from said first relay to the output of said fourth circuit, a fifth circuit including a closing switch for interconnection with a source of electrical energy, means operated by travel of said head toward the end of said record for closing said switch, a time delay switch in said fifth circuit, electro-magnet means included in said fifth circuit for lifting and revolving said head back to a starting position, and a pair of contacts in said delay switch for interrupting connection of said initial source of electrical energy with the other said circuits whereby all of said relays and contacts may be restored to their original unoperated positions preparatory to additional impulses in said telephone line, a sixth circuit paralleling said initial circuit relay contacts, and a closing switch in said sixth circuit for operation to initiate movement of said motor independently of telephone line impulses, and a microphone circuit having its output connected to said pick up head, and a relay in said microphone circuit operated from connecting the output of said second circuit therewith, and a pair of contacts in said microphone circuit relay interconnecting said telephone and said line.

7. In a device of the character specified having available a telephone line, a telephone, a source of electrical energy, a phonograph having an operating motor, a record, a recording and pick up head vertically and horizontally shiftable over the record, the combination of an initial circuit selectively switched initially into said telephone line; a relay in said initial circuit operative upon a signalling impulse being applied to said line; a second circuit; a second relay in said second circuit; contacts in said first relay

closeable upon its energization to interconnect said current source with the second circuit, the output of which is applied to the energizing coil of the second relay; contacts in said second relay maintaining the initial circuit closed after cessation of said impulse; a third circuit including said motor; contacts in said second relay interconnecting said third circuit with said energy source; a fourth circuit including said pick up head; and contacts in said second relay transferring connection of said line from said first relay to the output of said fourth circuit, a fifth circuit including a closing switch for interconnection with a source of electrical energy, means operated by travel of said head toward the end of said record for closing said switch, a time delay switch in said fifth circuit, electro-magnet means included in said fifth circuit for lifting and revolving said head back to a starting position, and a pair of contacts in said delay switch for interrupting connection of said initial source of electrical energy with the other said circuits whereby all of said relays and contacts may be restored to their original unoperated positions preparatory to additional impulses in said telephone line, a sixth circuit paralleling said initial circuit relay contacts, and a closing switch in said sixth circuit for operation to initiate movement of said motor independently of telephone line impulses, and a microphone circuit having its output connected to said pick up head, and a relay in said microphone circuit operated from connecting the output of said second circuit therewith, and means for connecting said telephone to said pick up head for monitoring purposes without connection of the telephone with the line.

8. In a device of the character specified having available a telephone line, a telephone, a source of electrical energy, a phonograph having an operating motor, a record, a recording and pick up head vertically and horizontally shiftable over the record, the combination of an initial circuit selectively switched initially into said telephone line; a relay in said initial circuit operative upon a signalling impulse being applied to said line; a second circuit; a second relay in said second circuit; contacts in said first relay closeable upon its energization to interconnect said current source with the second circuit, the output of which is applied to the energizing coil of the second relay; contacts in said second relay maintaining the initial circuit closed after cessation of said impulse; a third circuit including said motor; contacts in said second relay interconnecting said third circuit with said energy source; a fourth circuit including said pick up head; and contacts in said second relay transferring connection of said line from said first relay to the output of said fourth circuit, a fifth circuit including a closing switch for interconnection with a source of electrical energy, means operated by travel of said head toward the end of said record for closing said switch, a time delay switch in said fifth circuit, electro-magnet means included in said fifth circuit for lifting and revolving said head back to a starting position, and a pair of contacts in said delay switch for interrupting connection of said initial source of electrical energy with the other said circuits whereby all of said relays and contacts may be restored to their original unoperated positions preparatory to additional impulses in said telephone line, and means for interconnecting said pick up head, said line and said telephone for recording incoming messages on said record.

9. In a device of the character specified having available a telephone line, a telephone, a source of electrical energy, a phonograph having an operating motor, a record, a recording and pick up head vertically and horizontally shiftable over the record, the combination of an initial circuit selectively switched initially into said telephone line; a relay in said initial circuit operative upon a signalling impulse being applied to said line; a second circuit; a second relay in said second circuit; contacts in said first relay closeable upon its energization to interconnect said current source with the second circuit, the output of which is applied to the energizing coil of the second relay; contacts in said second relay maintaining the initial circuit closed after cessation of said impulse; a third circuit including said motor; contacts in said second relay interconnecting said third circuit with said energy source; a fourth circuit including said pick up head; and contacts in said second relay transferring connection of said line from said first relay to the output of said fourth circuit, a fifth circuit including a closing switch for interconnection with a source of electrical energy, means operated by travel of said head toward the end of said record for closing said switch, a time delay switch in said fifth circuit, electro-magnet means included in said fifth circuit for lifting and revolving said head back to a starting position, and a pair of contacts in said delay switch for interrupting connection of said initial source of electrical energy with the other said circuits whereby all of said relays and contacts may be restored to their original unoperated positions preparatory to additional impulses in said telephone line, a sixth circuit paralleling said initial circuit relay contacts, and a closing switch in said sixth circuit for operation to initiate movement of said motor independently of telephone line impulses, and a microphone circuit having its output connected to said pick up head, and a relay in said microphone circuit operated from connecting the output of said second circuit therewith, and electro-magnet means in parallel circuit with said microphone circuit relay arranged to be energized upon closure of the microphone circuit to apply greater pressure on said pick up head during recording on said record.

FINLEY D. HENDERSON.