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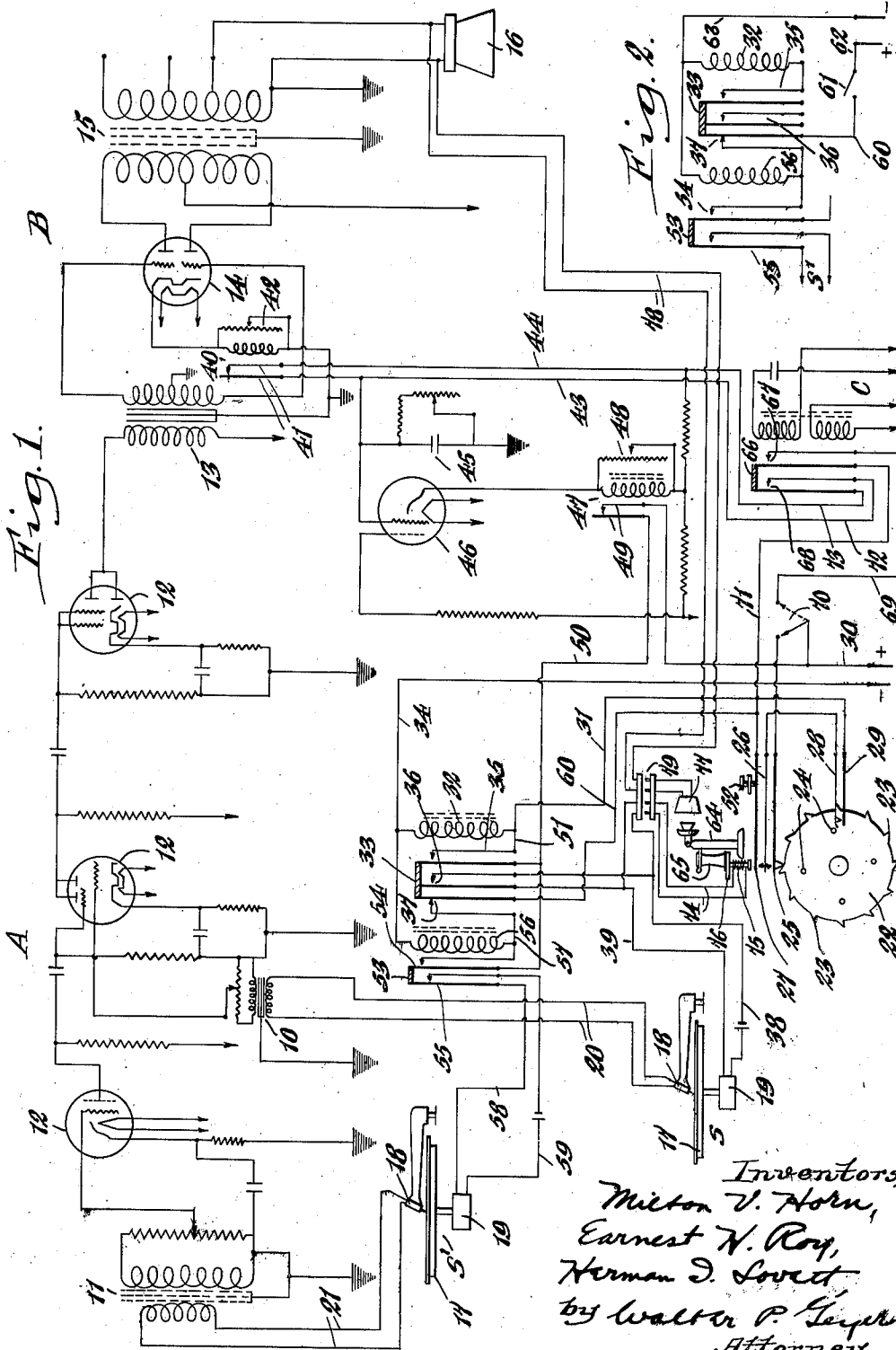
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2,252,327

SOUND EMITTING APPARATUS

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2 Sheets-Sheet 1



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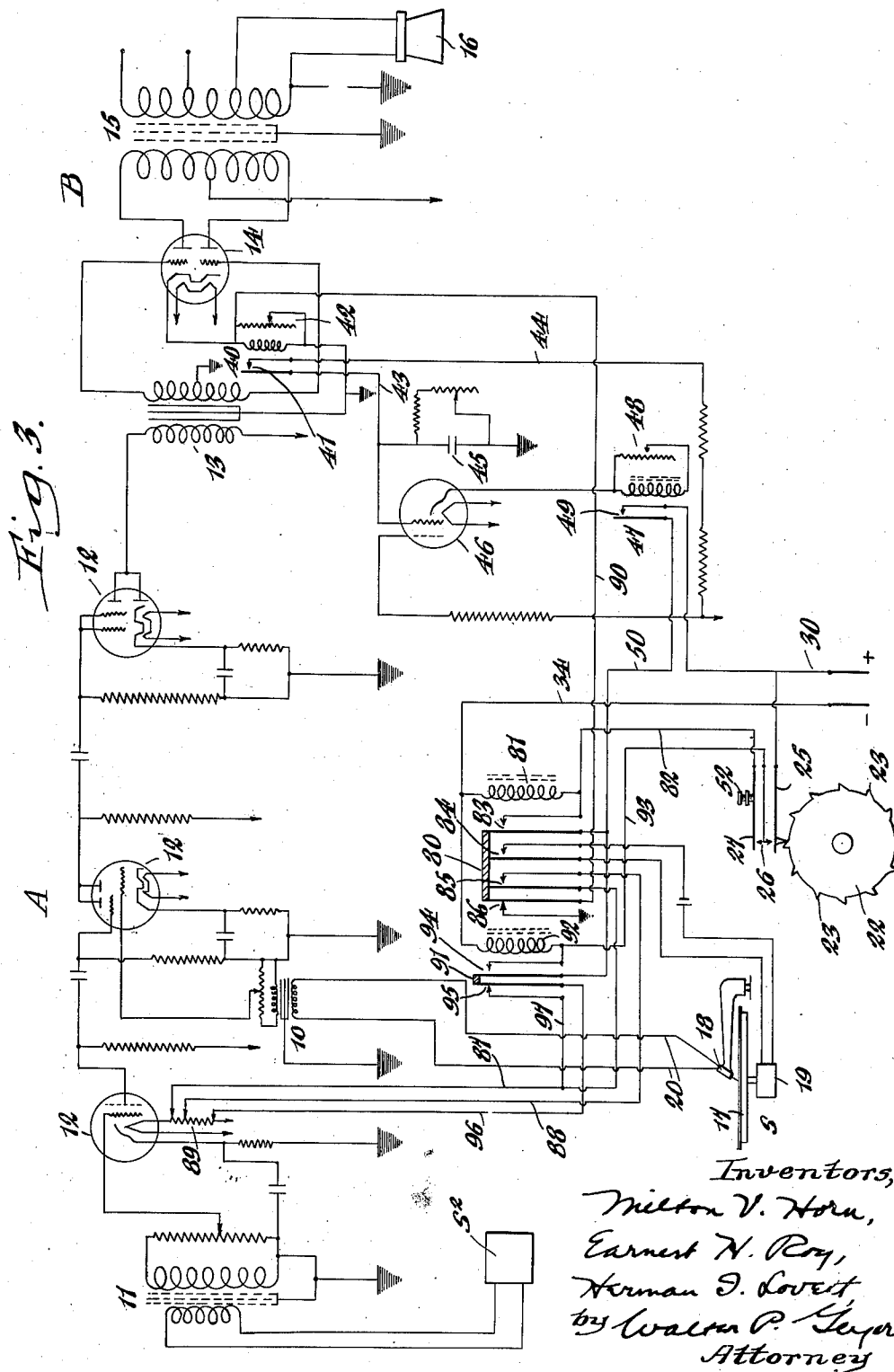
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UNITED STATES PATENT OFFICE

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SOUND EMITTING APPARATUS

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8 Claims. (Cl. 179—100.11)

This invention relates to certain new and useful improvements in sound emitting apparatus and more particularly to the selective reproduction at predetermined times of programs from recorded or other sound sources for advertising and like purposes in mercantile establishments and other public places or wherever it is desired to give an audible message.

It has for one of its objects to provide a sound emitting apparatus of this character which is electrically controlled and fully automatic in operation, and wherein the voice or audio frequency impulses of the sound source governs and maintains the sound-emitting circuit of the apparatus operative.

Another object of the invention is to provide time-controlled means for initiating the operation of the respective sound sources and thereafter automatically maintaining the apparatus operative by the audible frequency emanating from the sound sources.

A further object of our invention is to provide an automatically-controlled sound emitting apparatus which is so designed as to effect the operation of an auxiliary electrical device, such for example, as to complete a telephone circuit and transmit the message of the sound source over the telephone.

Other features of the invention reside in the construction and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a diagrammatic view of the sound emitting apparatus embodying our invention. Figure 2 is a detail diagrammatic view of a modification thereof embodying initial manual controls of a sound source. Figure 3 is a diagrammatic view of another modification of our invention wherein a continuous sound source, such as radio, is employed.

Similar characters of reference indicate corresponding parts throughout the several views.

In its general organization, our apparatus comprises a plurality of sound sources, such for example as phonographs, equipped with means for translating the sound record into electrical impulses, an electric circuit for initiating the operation of the sound sources at desired or predetermined time intervals, an amplifying circuit operatively connected with the output impulses or sound emanating from the respective sound sources and means in said amplifying circuit and governed by the voice or audio frequency impulses of the sound sources for auto-

matically maintaining such circuit operative to reproduce the signals or electrical impulses generated at the sound source.

Referring now to the drawings wherein our invention is diagrammatically illustrated, the letter A indicates the class A stage of amplification including the in-put transformers 10, 11 connected with the respective sound sources S, S¹ and the customary vacuum tubes 12, and the letter B indicates the class B stage of amplification including the in-put transformer 13, vacuum tube 14, out-put transformer 15 and loud speaker 16. For the purpose of this application, suffice it to say that the class A amplification is that type where the plate current remains the same with excitation and the class B amplification is that stage where the plate current rises and falls when excitation is applied to the grid circuit, this latter characteristic being preferably utilized in the automatic control of our apparatus. The amplifying circuit may be closed by a suitable switch (not shown) either manually or time-controlled.

While the sound sources S, S¹ may be of any appropriate form, those shown, by way of example, are phonographs having the usual record turntable 17, tone arm or pick-up head 18 and an electric motor 19 for rotating the turntable during the playing of a record. The pick-up head of the phonograph S is connected by wires 20 with the in-put transformer 10 while the pick-up head of the phonograph S¹ is connected by wires 21 with the in-put transformer 11, so that when one or the other of the phonographs is rendered operative the record-selections are transmitted to the amplifying circuits A and B and thence to the speaker 16. The initial or starting operation of the phonographs at predetermined time intervals is preferably effected through the medium of a time-controlled switch mechanism which also functions to temporarily close the sound-emitting or amplifying circuit, the latter being thereafter maintained closed automatically by the transmission of the sound from the record through the class B amplification stage. When the selection rendered by the record is terminated, the circuit is automatically opened and the parts controlled thereby are restored to their initial position.

The time-controlled switch mechanism preferably consists of a revolving disk or wheel 22 operatively connected to the minute shaft of a clock mechanism (not shown) and provided with two annular rows of switch-contacts in the form of teeth and projections 23, 24, respectively, the

inclined or ratchet-shaped teeth 23 being on the periphery of the wheel at say five minute intervals and the pin-like projections 24 being arranged inwardly of the periphery at say fifteen minute intervals. Disposed in operative relation to the wheel-periphery for actuation by the tooth-like contacts 23 are superposed switch elements 25, 26 and 27 and in operative relation with the inner pin-contacts 24 are switch elements 28, 29. The switch element 25 is connected to a power or feed wire 30 and the switch element 26 is connected to the switch element 29, while the companion switch element 29 is connected by a wire 31 to the coil 32 of a relay 33, the other end of such coil being connected to the return or companion power wire 34. This relay controls three sets of contacts 35, 36 and 37 and when the relay-coil 32 is energized contacts 35 and 36 make while contacts 37 break, the latter being closed when the relay is de-energized and the others being then opened. Whenever there is a simultaneous contact of the switch element 25 with a companion five-minute wheel-tooth 23 and a closing of the switch elements 28, 29 by a companion fifteen minute pin 24, a circuit is established to energize the relay-coil 32, the circuit including the feed wire 30, switch element 25, across to switch element 26 to switch element 28, and from the latter to switch element 29, then through wire 31 to the coil 32 and thence to the other feed wire 34. The closing of the switch elements 28, 29 is only momentary, say five seconds, or such time as may be required to emit sound from the sound source S, after which the contact-making pin moves out of reach of the switch element 28 and permits it to seek its open position relative to the element 29. Upon the closing of the relay-contacts 36 the sound source or phonograph S is rendered operative, this particular pair of contacts being connected by lead wires 38, 39 to the motor 19 of such phonograph. The other closed pair of relay-contacts 35 function to close another circuit including the class B amplifying circuit which is rendered operative by the voice frequency emanating from the operating sound source S, so that the moment the voice frequency enters the amplifying circuit the relay-coil 32 is maintained energized through said contacts 35 which function to hold the relay in its so-called locked position during the duration of play of the phonograph record. Were it not for some such auxiliary means automatically maintaining and continuing the relay circuit closed, after the momentary closing and opening of the time-controlled switch elements 28, 29, the phonograph would be shut off immediately after it was started.

The voice or audio frequency impulses control for maintaining the relay 33 in its locked position to continue the operation of the sound source is effected by a voice control relay 40 or like element arranged in the amplifying circuit B. While this relay may be inserted at any suitable point in the circuit to divide any portion of the voice current or create a voltage change by voice frequency, we have shown it in the cathode circuit of the tube 14. When sound enters this circuit from the sound source, the relay is energized and its contacts 41 make and break in response to the energizing and de-energizing of the relay-coil by the varying current set-up by the sound frequencies. A variable resistor 42 is placed across the relay 40 for governing its sensitivity. Interposed between the voice control relay and the relay 33 is a time delay circuit which is closed

whenever the voice control relay 40 is rendered operative to in turn close the circuit of relay 33 to maintain such relay locked through its contacts 35. This time delay circuit includes the wires 43, 44 leading from the relay-contacts 41, a condenser 45 including a variable resistor, vacuum tube 46, a relay 47 having a resistor 48 across it to govern its sensitivity and contacts 49 connected respectively to the feed wire 30 and by a wire 50 leading to the relay 33 to complete the circuit therethrough, one of the pair of contacts 25 thereof being connected by a branch wire 51 with the wire 31 leading to the relay-coil 32 with the switch element 29. By this arrangement, when the voice control relay contacts 41 close, a voltage is applied across the condenser 45 and this voltage then gradually discharges into the vacuum tube 46 of the time delay circuit, the time interval of discharge being governed by the variable resistor across the condenser 45. The discharge of voltage from the condenser into the vacuum tube causes current to flow in the circuit and the relay 47 is energized, closing its contacts 49 and causing the circuit of the relay 33, to be completed through feed wire 30, contacts 49, wire 50, relay-contacts 35, branch wire 51, relay-coil 32 and return wire 34, thereby holding the relay 33 closed across its contacts 35, 36 and open across its contacts 37 when the time-controlled switch elements 28, 29 open after a closing period of approximately five seconds or until voice frequencies from the sound source take over the control of the circuit. Thus the sound energy or voice frequency transmitted through the apparatus controls the circuit, and the time interval elapsed between the time-closing of the circuit to start the sound source in operation and the continued, automatic maintenance of that circuit by the voice frequency set up consumes, as previously stated, about five seconds.

Instead of using a voice control relay for controlling the locking of the relay 33 during a given program, the condenser 45 may be charged through an auxiliary speech amplifier and gaseous tube rectifier, the auxiliary amplifier being connected to any point of the audio frequency circuit.

After this lapse of five seconds or so, the switch element 25 continues to ride up the adjoining wheel-tooth 23 and maintains said switch element in contact with the next adjoining switch element 26 and in turn ultimately causes the latter to contact the uppermost switch element 27, which may have a screw adjustment 52 or the like for governing the time of closing the last-named switch element and which is connected to one of the pair of contacts 37 of the relay 33. This closing of these switch elements prepares to establish a circuit to automatically bring the second sound source S' into play the moment the selected announcement or program from the sound source S has been completed. The circuit to be ultimately closed to attain this result includes a relay 53 having pairs of contacts 54, 55 and a coil 56 connected at one end to one of the relay-contacts 54 and by a wire 57 to the companion one of the pair of contacts 37 of the relay 33, while its other end is connected to the feed wire 34. The other one of the pair of contacts 54 is connected to the wire 50 of the circuit including the relay 47. However, when the latter is closed, it only maintains the circuit through the relay 33, the other relay 53 at that time being opened because there is no current flowing through its coil 56. The other pair of contacts

55 of the relay 53 are connected by wires 58, 59 to the sound source S¹.

When the sound emanating from sound source S stops, the voice control relay 40 is accordingly automatically opened, causing the condenser 45 to discharge completely, the relay 47 to be de-energized, its contacts 49 to be opened and the relay 33 to be de-energized, thereby opening the relay-contacts 35, 36 to break the motor circuit of the sound source S and render it inoperative and closing the relay-contacts 37. Upon the closing of these contacts 37 when the relay 33 is restored to normal, the circuit of the second sound source S¹, which was in part previously prepared for establishment the moment the first sound source S was stopped, is now completed across the relay-contacts 37, thereby energizing the coil of the relay 53, closing its contacts 54, 55 and starting the operation of the second sound source. The circuit thus established includes the feed wire 30, switch elements 25, 26 and 27, wire 60 leading from the switch element 27 to one of the pair of relay-contacts 37, wire 57, relay coil 56 and thence to the return feed wire 34, the current also branching from wire 37 through the closed relay-contacts 54, 55 to the motor 19 of the sound source S¹. After the time-controlled switch elements 25, 26 and 27 are opened by riding off the wheel-tooth 23, the established circuit is then automatically continued closed, in the same manner as heretofore described, by the voice frequency transmitted from sound source S¹ through the amplifying circuit "B" and time delay circuit which, through its closed relay-contacts 49, maintains the circuit of the relay 53 closed, such circuit including feed wire 30, relay-contacts 49, wire 50, relay-contacts 54, relay coil 56 and return feed wire 34. When the message, announcement or the like has been completed and the voice frequency of the sound source S¹ is terminated or silenced, then the voice control relay 40, the relay 47 and the relay 53 become de-energized and the sound source is stopped.

With the time control arrangement heretofore described, the sound source S is rendered operative approximately every fifteen minutes while the sound source S¹ is rendered operative at approximately five minute intervals. When the five minute interval switch-control contacts 23 only are employed, then the operation is as follows:—

When one of the contact-teeth 23 of the time-controlled wheel 22 encounters the switch element 25 nothing happens until the remaining switch elements 26, 27 are jointly closed, at which time a circuit is established from the feed wire 30, across said switch elements to wire 60, contacts 37 of relay 33 and then through wire 57 to relay 53 and return feed wire 34, thereby energizing said relay 53 and starting sound source S¹, the latter thereupon automatically operating the voice control relay 40 to maintain the circuit closed after the breaking of the time-controlled circuit initiated by the switch elements 25, 26 and 27. Upon the completion of the reproduced program emanating from sound source S¹, the circuit is broken in the manner heretofore set forth and the various parts thereof are restored to their normal position until the next timed selection is called for and the closing of the circuit again initiated at the time control device.

In the event that the sound source is that of a phonograph, it may be of the automatic type and each record may have a plurality of independent announcements or messages thereon appropriate

for any given use with a gap or silent groove portion between messages. Further, if the sound source is that of sound on film, then the film may have a multi-sound track thereon for producing the desired announcement program at desired intervals.

Should it be desired in some cases and under certain condition of use of our apparatus to manually initiate the starting of the sound apparatus, then a suitable switch 61 may be substituted for the switch elements 25, 26, 27, 28 and 29 of the time control unit and the latter eliminated in the manner shown in Figure 2. In this case, the switch 61 is interposed in the circuit including the feed wire 62 contacts 37 of the normally closed relay 33, coil 56 of relay 53 and the return wire 63, whereby the circuit of the sound source S¹ is established and maintained in the manner heretofore set forth.

In Figure 1 we have also shown embodied therein another adaptation of our invention, wherein there is included in the circuit of a sound source operating unit, as for example, the motor 19 of the phonograph S or S¹, an auxiliary electrical device which is rendered operative whenever such sound source is brought into operation. By way of example, the auxiliary device is shown as a telephone 64 whose receiver 65 is adapted to be automatically lifted from its customary hook or hanger to complete the telephone circuit and transmit the message emitted from the sound source through the speaker 16 of the amplifying circuit to the party at the other end of the telephone line who has called the number to which such telephone responds. Such an arrangement may be used where the patron desires some universally-inquired-about information from a newspaper office, radio station or like office or establishment, as for example, the late news flashes now commonly broadcast over radio stations.

The ringing circuit of the telephone 64 is indicated generally at C and controlled thereby is a relay 66 having two sets of contacts 67, 68, one of the contacts 67 being connected by a wire 69 and interposed switch 70 with the feed wire 30 and the companion contact being connected by a wire 71 with the wire 31 leading to the coil 32 of relay 33, so that when this circuit is closed and said relay energized the sound source S is rendered operative. The other set of contacts 68 are connected by wires 72, 73 with the companion wires 43, 44 leading from the contacts 41 of the voice control relay 40 to the time delay circuit including the relay 47. Included in the circuit of the sound source operating motor 19 through wires 74 is a solenoid 75 or like device which has an abutment or support 76 on its movable plunger upon which the telephone-receiver 65 normally rests. Disposed opposite the transmitter of the telephone is an auxiliary speaker 77 which is connected by wires 78 with the circuit of the speaker 16 in the amplifying circuit. If desired, a plug and socket fixture 79 may be interposed in the circuits of the solenoid 75 and auxiliary speaker 77. By this arrangement, when the ringing circuit of the telephone is rendered operative, the sound source operating circuit is closed through the relay 33 and simultaneously therewith the circuit of the solenoid 75 is closed, thereby lifting the receiver 65 to complete the telephone circuit, and, in the manner heretofore described, the message from the sound source is transmitted through the amplifying circuit and thence to the

auxiliary speaker 77 into the transmitter of the telephone where it is conveyed by the land wires to the other end of the telephone line. When a message is completed over the telephone from the sound source S, the circuit is restored to normal in the manner heretofore described, at which time the solenoid 75 is de-energized and the receiver 65 drops back into its normal position.

Instead of employing an auxiliary speaker 77, the output transformer 15 may be connected directly to wire lines or electrically to the telephone circuit.

In the modified form of apparatus depicted in Figure 3, the sound source S² may be of any known form or type and there is embodied in the circuit, which otherwise is the same as that shown in Figure 1, a means for effecting the fading out of that sound source whenever the circuit of the sound source S is rendered operative either manually or by the time-controlled unit heretofore described. For this purpose there is a 4-contact relay 80 employed instead of the 3-contact relay 33 shown in Figure 1, the coil 81 of such relay being connected at one end to the time control switch element 27 by a wire 82 and at its other end to the return feed wire 34. The pairs of relay-contacts are indicated at 83, 84, 85 and 86, one of the contacts 83 being connected to the wire 82 and its companion contact being connected by the wire 50 with the relay 47. The contacts 84 are included in and control the circuit of the sound source operating unit S, while the contacts 85 are connected by wires 87, 88 to a resistance 89 in the filament circuit of one of the vacuum tubes 12 in the amplifying circuit A. One of the remaining set of contacts 86 is grounded while its companion one is connected by a wire 90 with the coil of the voice control relay 40. In the normal position of the relay 80 with the sound source S² operating, the relay-contacts 83, 84 and 85 are open and the contacts 86 are closed, shorting out the field coil of relay 40.

The numeral 91 indicates a relay whose coil 92 is connected at one end to a wire 93 leading to the time control switch element 26 and at its other end to the return feed wire 34. The relay 91 has two sets of contacts 94, 95, one of the contacts 94 being connected to the wire 93 and its companion contact being connected by the wire 50 with the relay 47. One of the other set of contacts 95 is connected by a wire 96 with one end of the resistance 89 while its companion contact is connected by a wire 97 with the wire 87 leading from one of the relay-contacts 85 and which is connected to the other end of such resistance, the wire 88 leading from the companion relay-contact 85 being connected to such resistance at a point intermediate its ends. Normally relay contacts 94 open while contacts 95 are closed.

By this arrangement, when switch elements 25, 26 are closed, the coil of relay 91 is energized, thereby closing its contacts 94 and opening its contacts 95 and opening up the short across the resistance 89 which effects the fading out of the sound source S². The relay-contacts 94 are the relay-locking contacts and after being initially closed by the time-controlled switch unit, they are ultimately maintained closed by the voice frequency in conjunction with relay 47, in the manner heretofore described. When the closing of the switch elements 26, 27 is effected through contact of element 25 with the wheel tooth 23, and which closing is so timed that the

sound source S² is faded out when said switch elements 26, 27 are closed, then relay 80 is energized to close its contacts 83, 84 and 85 to render sound source S operative and to short out a portion of the resistance 89 across the wires 87, 88 leading to the relay-contacts 85, allowing the emission to come to a point just below cut off or to a reduction from its original emission. The relay-contacts 86 are opened and the short through wire 90 is removed from the coil of the voice-control relay 40. At this time the sound frequency transmitted through the amplifying circuit from the sound source S maintains the circuit of relay 80 closed (the momentarily-closed, time-controlled switches having been again restored to open position) through the relay 47 in the time release circuit, as in the previous construction. When the sound source S is silenced, the circuit is restored to normal and the sound source S² is then faded in or restored to its normal operating level.

When using phonograph records as the sound source, the record may have a plurality of primary sound grooves or portions for reproducing given messages or announcements and these may be alternated with continuously connected secondary grooves or portions having no prescribed message but of a different and fixed sound characteristic, or no audible sound characteristic, which will have the effect of rendering the relay 40 inoperative and open the motor circuit of the sound source.

We claim as our invention:

1. In an apparatus of the character described, the combination with an amplifying circuit, of a plurality of electrically-operated sound sources connected to said circuit to transmit the sound impulses thereto, an electric circuit including said sound sources and having switch means therein for controlling the same, respectively, means in said circuit for governing at predetermined times the closing of said switch means to temporarily close the circuit of one or another of said sound sources, and means in the amplifying circuit and operatively connected with the sound source controlling circuit for automatically maintaining, by the audio frequency impulses transmitted through said amplifying circuit the continued closing of the switch means in said controlling circuit.

2. In an apparatus of the character described, the combination with an amplifying circuit, of a plurality of electrically-operated sound sources connected to said circuit to transmit the sound impulses thereto, an electric circuit including said sound sources, time-controlled switch means in said electric circuit for initiating the momentary closing thereof to render one or another of the sound sources operative at predetermined times, and means in the amplifying circuit and operatively connected with the sound source controlling circuit for maintaining, by the audio frequency impulses transmitted through said amplifying circuit, the continued closed condition of the sound source circuit after said time-controlled switch means has been restored to normal after a predetermined lapse of time.

3. In an apparatus of the character described, the combination with an amplifying circuit, of a plurality of electrically-operated sound sources connected to said circuit to transmit the sound impulses thereto, an electric circuit including said sound sources, time-controlled switch means in said electric circuit for initiating the momen-

tary closing thereof at predetermined times to render the sound sources operative in desired sequence, and means for automatically maintaining said electric circuit closed during the transmission of sound impulses from the respective sound source, said automatic means functioning to open such circuit upon stoppage of the sound impulses to render the respective sound source inoperative.

4. In an apparatus of the character described, the combination with an amplifying circuit, of a plurality of electrically-operated sound sources connected to said circuit to transmit the sound impulses thereto, an electric circuit including said sound sources, time-controlled switch means in said electric circuit for initiating the momentary closing thereof at predetermined times to render the sound sources operative in desired sequence, and means for automatically maintaining said electric circuit closed during the transmission of sound impulses from the respective sound source, said means consisting of a voice control relay disposed in the amplifying circuit, and an auxiliary switch means included in said electric circuit and governed by said voice control relay, the latter opening such circuit upon stoppage of the sound impulses to render the respective sound source inoperative.

5. In an apparatus of the character described, the combination with an amplifying circuit, of a plurality of electrically-operated sound sources connected to said circuit to transmit the sound impulses thereto, an electric circuit including said sound sources, relays interposed in said circuit for controlling the operation of said sound sources, time-controlled switch means in said electric circuit for initiating the momentary closing of the respective relays at predetermined times to render the sound sources operative in desired sequence, and means for automatically maintaining each of the relays closed after the time-controlled switch means has been restored to open position, whereby to continue the establishment of the circuit of the selected sound source until the sound impulses emitted therefrom into the amplifying circuit have stopped, said means including an auxiliary electric circuit including switch means connected with said sound source controlling relays, and a voice control relay in said amplifying circuit and operatively connected to said auxiliary circuit for controlling its switch means.

6. In an apparatus of the character described, the combination of a plurality of electrically-actuated sound sources adapted to transmit sound impulses therefrom, a sound reproducing device common to said sound sources and having connections therewith for receiving the impulses therefrom, respectively, said reproducing device including an amplifying circuit having class "B" amplification, an electric circuit including said sound sources and relays therein for controlling their selective actuation, time-controlled switch means in said relay circuit for momentarily closing the same to initiate the operation of one or another of said sound sources at predetermined times, and means controlled by the audio frequency impulses transmitted through said amplifying circuit for automati-

cally maintaining said relay circuit closed and said sound source operative after said time-controlled switch means has served to initiate such operation, said audio-frequency-controlled means operating to open said relay circuit and stop said sound source when the sound impulses transmitted by the sound source have been silenced.

7. In an apparatus of the character described, the combination of a plurality of electrically-actuated sound sources adapted to transmit sound impulses therefrom, a sound reproducing device common to said sound sources and having connections therewith for receiving the impulses therefrom, respectively, said reproducing device including an amplifying circuit having class "B" amplification, an electric circuit including said sound sources and relays therein for controlling their selective actuation, time-controlled switch means in said relay circuit for momentarily closing the same to initiate the operation of one or another of said sound sources at predetermined times, and means controlled by the voice frequency transmitted through said amplifying circuit for automatically maintaining said relay circuit closed and said sound source operative after said time-controlled switch means has served to initiate such operation, said means including a voice relay and a time delay relay governed thereby, the latter being included in the relay circuit of the sound sources for maintaining them closed subsequent to the opening of the time-controlled switch means, said voice relay being de-energized upon the silencing of the sound impulses through the amplifying circuit to break the automatically maintained relay circuit and stop said sound source.

8. In an apparatus of the character described, the combination with an amplifying circuit and a plurality of electrically-operated sound sources connected to said circuit to transmit the sound impulses thereto, one of said sound sources being normally operative and adapted for interruption of its operation when the other sound source is selectively rendered operative, of an electric circuit having a portion thereof connected to that stage of the amplifying circuit associated with said normally operative sound source and another portion thereof including said selectively operative sound source, time-controlled switch means in the respective portions of said electric circuit for initiating, respectively, the momentary closing of that portion of the circuit associated with the normally operative sound source to interrupt its operation and thereafter, and while the aforesaid portion of the circuit is still closed, momentarily closing that portion of the circuit to render the selective sound source operative, and means in the electric circuit and governed by the sound impulses transmitted through said amplifying circuit from the selective sound source for continuously maintaining the respective portions of said electric circuit closed until said selective sound source is silenced.

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