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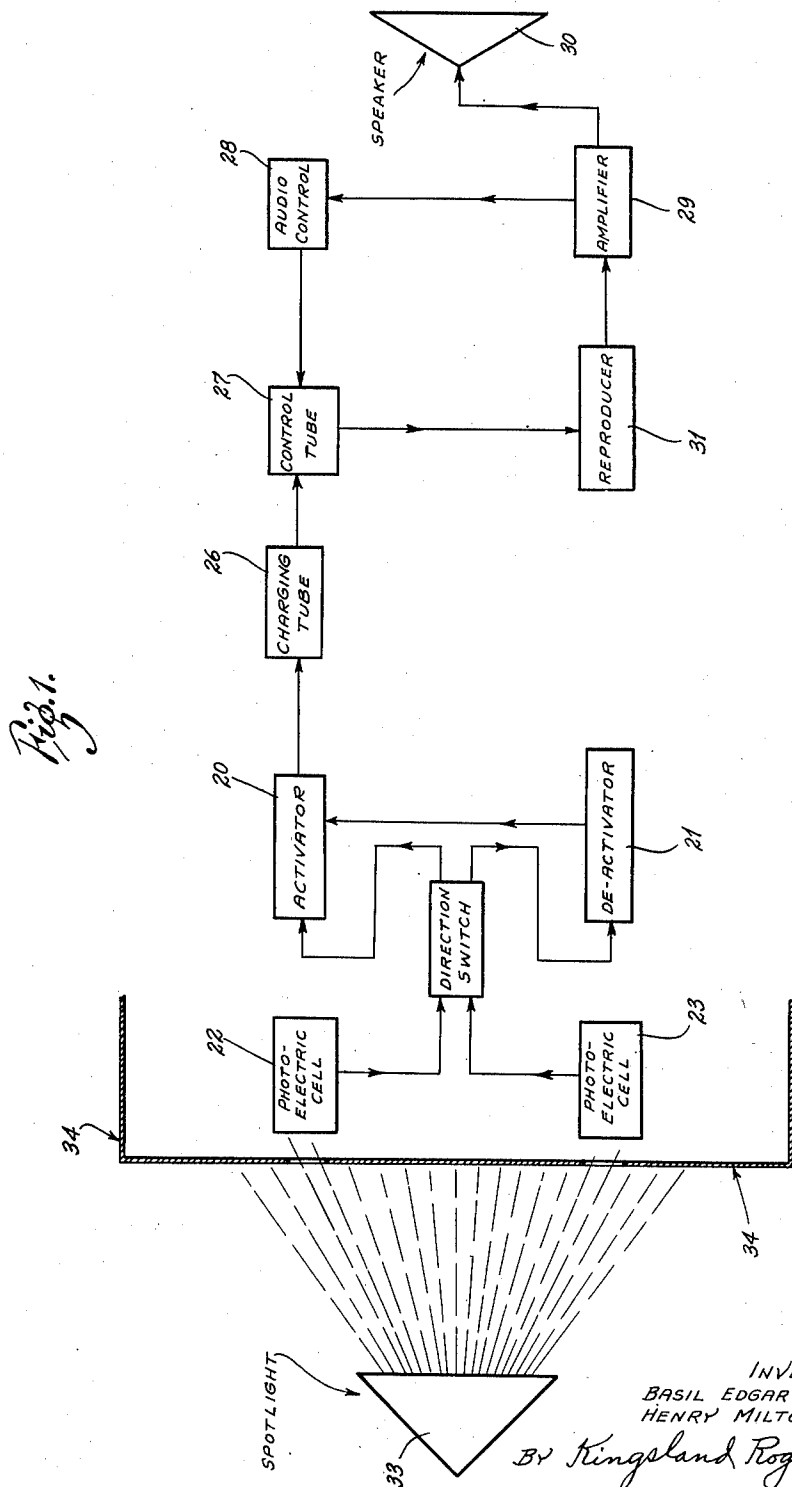
B. E. TEMPLEMAN ET AL

2,595,993

ELECTRONICALLY CONTROLLED ADVERTISING DEVICE

Filed Aug. 25, 1947

2 SHEETS—SHEET 1



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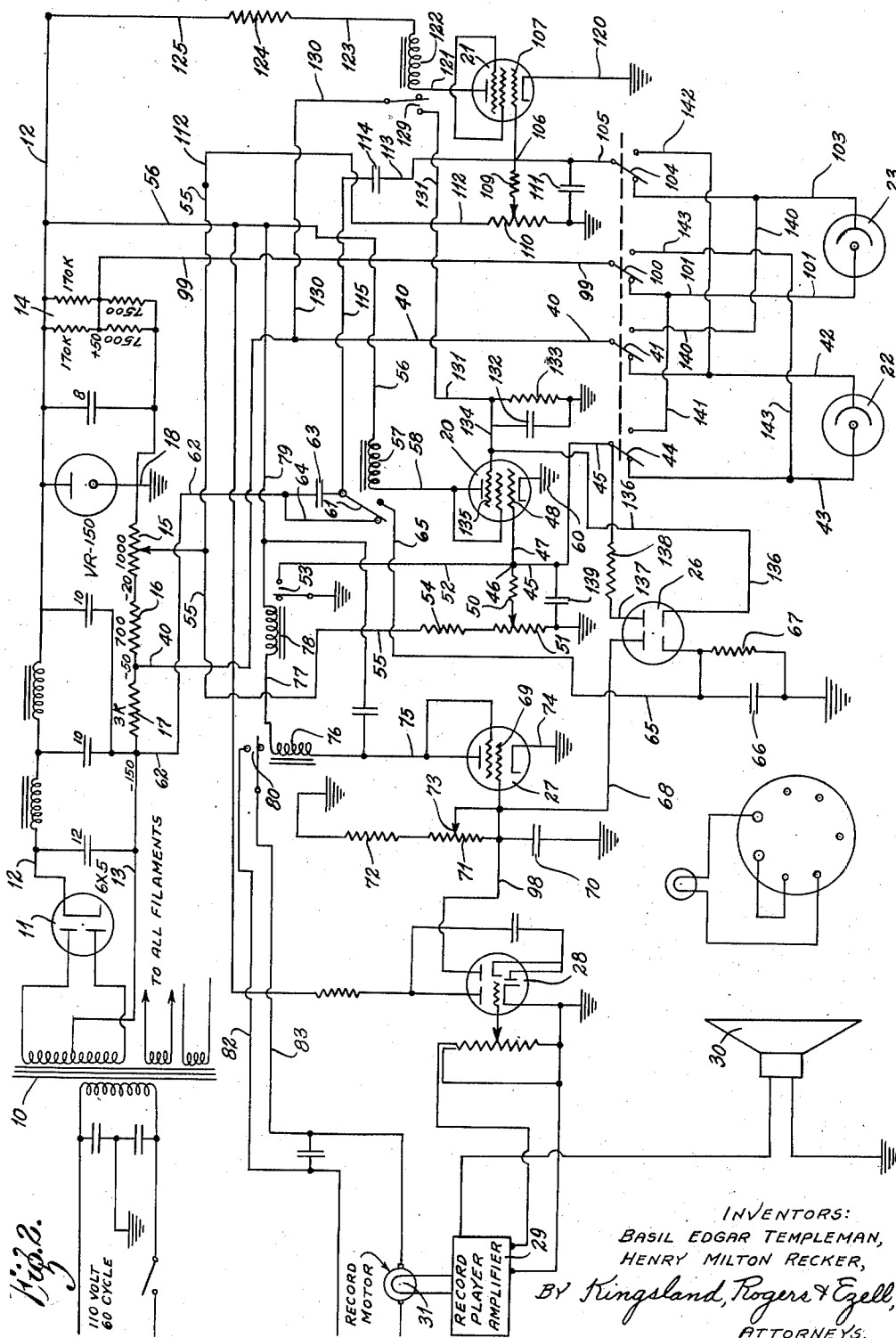
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2 SHEETS—SHEET 2



UNITED STATES PATENT OFFICE

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ELECTRONICALLY CONTROLLED
ADVERTISING DEVICEBasil Edgar Templeman and Henry Milton
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24 Claims. (Cl. 179—100.3)

1

The present invention relates to an electronically controlled advertising device.

It is an object of the invention to provide an apparatus that can be used, for example, in a store, and which is automatically operated by a person passing a given point in the store to cause a spoken message to be delivered to the customer. It is an object of the invention to provide a device of this kind that is completely automatic in operation and is set in operation by an act of a person in passing a given point, particularly where the person is not required to do any work to start the operation. In particular, it is an object of the invention to provide an apparatus of this kind that is operated by the action of light beams on photoelectric cells. A further object of the invention is to provide an advertising device of this kind that will automatically stop once a full message is delivered. A more specific object of the invention is to provide an advertising device of this kind that will operate through its given cycle regardless of variations in length of the audible message.

A further object of the invention is to provide a control of this kind which may be operated only when the customer travels in one direction, and which is prevented from operation when the customer moves in the opposite direction past the control.

Another object of the invention is to provide an advertising device of this kind that is cycled only once for any one given starting stage, that is to say, is operated only once for each given breaking of the light beam on the photoelectric cell. A further object of the invention is to maintain the device inactive for a predetermined period after it has cycled, before it can recycle, regardless of further functioning of the starting means, as by breaking of the light to the photoelectric cell.

A further object of the invention is to provide for illumination of the merchandise to be sold, especially where that illumination can be produced by light that acts upon the control photo-cells.

It is an additional object of the invention to provide a control of this kind that has an audio responsive apparatus that determines the length of time that a record player is operated, but which nevertheless provides for variation of the volume of the sound reproduced.

Further objects, and particularly objects derived from subcombinations of the mechanism will appear from the description to follow.

In the drawings:

2

Fig. 1 is a schematic over-all view of the various parts of the elements, showing their general interconnections and

Fig. 2 is a wiring diagram of the apparatus.

There is a power supply system that may be conventional, except that voltage regulation is improved by the tube VR, and that the control resistors are on the negative side. It is here shown as including a transformer 10, having a double diode 11 supplying current to two lines generally indicated at 12 and 13. These lines are connected through suitable resistors such as the resistor network 14 and resistors 15, 16 and 17, so as to supply points of potential take-off of the necessary values for the control system. There is a ground connection 18. Typically, the power system may have the values shown. Other equivalent sources of power could be used.

The system includes an activator tube 20, a deactivator tube 21, a first photoelectric cell 22, a second photoelectric cell 23, all of which are connected to provide response to existence or non-existence of light across a particular path. In addition, there is a double diode tube 26, a control tube 27, and an audio control rectifier-amplifier tube 28. There is a record player 29 including an amplifier having a loud speaker 30, these last elements delivering an audible message from a motor driven reproducer, such as a wire recorder operated by a motor 31. A spot light 33 is preferably employed to illuminate a spot to be featured, and to deliver, as by a slotted shield 34, enough light beams to activate the two photoelectric cells 22 and 23.

The two photoelectric cells 22 and 23 are located serially so that they may be successively activated when an object moves along a given path. In particular, these two cells may be actuated by the breaking of light beams as a person moves along this path. Normally, the activating beams to the two cells are close together.

Referring to the diagram of Fig. 2, there is a power line 40 that leads from the power network through a direction switch 41, and thence by way of a line 42 to the tube 22. The other side of this tube leads, by a line 43, to a second direction switch 44, from which a line 45 leads to a junction 46. As indicated, the junction 46 is connected by a line 47 to a control grid 48 of the tube 20. The junction 46 is also connected through a resistor 50 that is adjustably connected by a slide into a grounded resistor 51. The junction 46 is also connected by a line 52 to a terminal of a switch 53, the other side of which

is grounded. This switch will spring closed, but is normally held open, as will appear.

The resistor 51 is in series with a resistor 54 that is connected by a line 55 that is adjustably divided into the resistor 15.

Thus, when the cell 22 is conducting because light is activating it, and when the switch 53 is open, a relatively large negative bias is applied to the grid 48 that holds the tube 20 non-conducting, this being derived from the potential drop from the ground 18 to the line 40 across the resistors 15 and 16. When the cell 22 is non-conducting, and the switch 53 is open, the bias applied to the grid 48 is a small negative bias derived across part of the resistor 15 between the ground 18 and the line 55, which is sufficient to render the tube 20 conducting. When the switch 53 is closed, the grid is grounded, and the tube 20 also conducts.

When the tube 20 conducts, current flows through a circuit that may be considered as beginning at the power line 12, passing by way of a line 56 into a relay coil 57. From this coil, a line 58 extends to the tube 20 in the manner indicated. The cathode of the tube is grounded at 60. Thus, when the tube conducts, the coil 57 is energized and it draws its switch blade 61 over to the right in the drawing. When the coil is deenergized, this switch moves to the left.

There is a connection 62 from the power network that leads through a condenser 63 to the switch 61. A discharge connection 64 leads around the condenser to the released pole of the switch 61. From the other pole of the switch 61, a line 65 leads into a time-constant network consisting of a condenser 66 and a resistor 67 that are grounded as indicated. The line 65 is also connected to the one cathode of the double diode 26. The corresponding plate of the diode is connected by a line 68 that is connected to a grid element 69 in the tube 27, and is also connected to a time-constant network including a condenser 70 and a resistance system 71 and 72, this network being grounded as indicated. A divider 73 slidably connects the line 68 along the resistor 71.

The tube 27 is normally conducting. It has its cathode grounded at 74 and its plate connected by a line 75 through a coil 76. From this coil, a line 77 leads to a coil 78. The coil 78 is connected by a line 79 into the line 56 that extends to the power line 12. As the tube 27 is normally conducting, the two coils 76 and 78 are normally energized. When the coil 76 is energized, a normally closed switch 80 is kept open. This breaks the connection between two lines 82 and 83. These two lines connect the motor 31 into the power lines in the manner such as that indicated.

When the coil 78 is energized by the fact that the tube 27 is conducting, the switch 53 is held open, so that the line 52 is not connected to ground.

An audio signal is brought in from the audio amplifier when the recorder has begun to deliver audio signals. The recorder may be a wire recorder that is operated by the motor 31, although the record players, or the like, may be used, provided they produce a modulated signal. This signal is applied to the tube 28 through a suitable network, such as that indicated, which is shown as a 7 x 7 combined rectifier and amplifier. The tube 28 amplifies the audio signal, rectifies it and applies it, through a connection 98 to the time-constant network 70, 71, 72, and to the grid 69 of the tube 27. The operation of these various elements will appear hereafter.

The sequence photoelectric cell 23 is conducting

when the light is applied thereto. It will be seen that a connection to this cell is made from the power hookup by way of a line 99 connected into the resistance group 14, thence through a direction switch 100, from which a line 101 leads to the cell 23. From this cell, a connection 103 leads to a direction switch 104. From the switch 104, a line 105 leads to a junction 106. From this junction, a connection leads to the grid 107 of the tube 21. Another connection leads to a resistor 109 that is adjustably connected into a resistor 110 that is grounded. A condenser 111 connects the line 105 with ground. The resistor 110 is also connected by a line 112 that connects with the line 55 that is divided into the resistor 15. The junction 106 is also connected by a line 113 to a condenser 114 that is connected by a line 115 to the condenser 63.

The grid bias upon the tube 21, when the cell 23 is conducting, is slightly positive, as derived from the drop from the line 99 to the ground 18 across the resistors of the group 14. When the cell 23 is non-conducting, a small negative bias is applied from the ground 18 across part of the resistor 15 to the divider from the line 112, modified by the other resistances, as indicated. This negative bias can maintain the tube 21 non-conducting.

When the line 113 through the condensers 63 and 114 is conducting, it produces a larger negative bias that, during the period of conductivity through the condensers, holds the tube 21 non-conducting. This is a momentary action.

The circuit to the tube includes the grounded cathode line 120, a line 121 from the plate through a coil 122, a line 123 to a resistor 124, and a line 125 leads to the power line.

The coil 122 operates a relay switch 129, one side of which is connected by the line 130 that connects with the line 40. The other side of the switch 129 is adapted to close with a line 131 that leads to a time-constant network consisting of a condenser 132 and a resistor 133, grounded as indicated. The line 131 also leads by a line 134 to a suppressor grid 135 on the tube 20. Another line 136 leads from the line 134 to the other diode section of the tube 26. From this, a line 137 leads through a current-reducing resistor 138 that connects into the line 45. A condenser 139 connects the line 45 with ground.

The various direction switches 41, 44, 100 and 104 are operated together as indicated. It will be seen that the direction switch 41 may lead into the line 42 that leads to the tube 22. When it is shifted, it may connect with a line 140 that leads to the line 103, so that the connection from the line 40 may lead into the other photoelectric tube 23. Similarly, the switch 44 may connect with the line 141 that leads to the line 101 from the second tube 23, so that, when the switches 41 and 44 are shifted, they will connect through the tube 23 instead of through the tube 22.

The switch 104 may close with a line 142 that leads to the line 42 entering the first tube 22, and the switch 100 may connect with the line 143 that connects to the line 43.

Operation

Typically, the apparatus may be set up in a store, such as a grocery store of the self-service type, wherein it is desired to advertise a particular item automatically to a customer passing along an aisle of the store. The two photo tubes 22 and 23 will be disposed serially, preferably so that the tube 22 is in advance of the tube 23.

The light 33 will be turned on so that it casts adequate spaced beams (spaced automatically by slots in cabinet) upon the two tubes. Desirably, it also may spotlight the article to be advertised. The audio record player will be located at a convenient place.

At the start, the recorder mechanism will be inactive. The motor 31 will be stopped, the amplifier silent, and the light will be activating the two tubes 22 and 23, rendering them both conductive. There will be a wire or other record on which the given message will occupy a predetermined time, followed by a period of no audio signal before a subsequent message is begun.

With the light on the two cells 22 and 23, they will conduct. The cell 22 thereby establishes a heavily negative bias on the grid 48 by the connections from the ground 18, ground line 60, grid 48, line 47, junction 46, line 45, switch 44, line 43, cell 22, line 42, switch 41, and line 40. This negative potential holds the tube 20 non-conducting.

The cell 23, by conducting, applied a slightly positive bias to the grid 107 of the tube 21, through the connections from the resistance group 14, the line 99, the switch 100, the line 101, the cell 23, the line 103, the switch 104, the junction 106, the grid 107, the ground 120, and the ground 18. This renders the tube 21 conducting.

When the tube 21 conducts, current flows through it from the power line 12, through the line 125, the resistor 124, the line 123, the relay coil 122, the line 121, the ground 120, and the ground 18. Energizing of the coil 122 holds the switch 129 open. There will also be a potential applied from the junction 106 through the line 113, the condenser 114, the line 115, around the condenser 63 by the line 64 and the line 62, charging the condenser 114 in the direction indicated.

The tube 27 is conducting at the start, from the power line 12, the line 56, the line 79, the coil 78, the line 77, the coil 76, the line 75, the tube 27, and the ground 74. With the coil 78 energized, the switch 53 is held open. With the coil 76 energized, the switch 80 is held open. The last holds the recorder motor inactive. No audio signal is produced.

When a person breaks the light to the cells 22 and 23 in that order, they will become successively non-conducting.

When the cell 22 becomes non-conducting, the heavily negative bias upon the grid 48 of the tube 20 is cut off. Thereupon, the bias on this tube consists of that derived across the part of the resistor 51 and derived from the relatively small drop across part of the resistor 15 between the ground 18 and the line 55. This bias permits the tube 20 to conduct, whereupon a circuit is closed from the power line 12, through the line 56, the relay coil 57, the line 58, the tube 20 and the ground 60. The relay closes the switch 61.

When the switch 61 is closed, a circuit from the ground 18 charges the time-constant network 66, 67, from the ground 18, the time-constant network, the line 65, the switch 61, the condenser 63, the line 62 and the power line 13. The condenser 63 conducts for a predetermined time until it becomes charged.

Also, a circuit is closed through the second time-constant network, from its grounding, through the condenser 70 and through the chosen part of the resistor system 71, 72, via line 68, the left side of the diode 26, the line 65, the switch 61, and the condenser 63 to the power line 13. Both time-constant networks are thus charged.

Additionally, as the grid-cathode of the tube 27 is across the second time-constant network, the grid is biased to render the tube 27 non-conducting.

This tube becomes immediately non-conducting, after light break to the cell 22, and it thereupon deenergizes the coils 76 and 78, and releases the switches 80 and 53, which close.

When the switch 53 closes, the grid 48 of the first tube 20 is grounded, and that tube is held conducting so long as this switch 53 remains closed. By this means, the apparatus is held in operation for one cycle regardless of whether or not the light is again admitted to the cell 22. However, if the person remains in front of the cell 22, holding it non-conducting until the cycle is completed, this will continuously hold the relay switch 61 closed. But it cannot start a new cycle because the condenser 63 will remain charged and will not pass direct current until it is again discharged.

The cycle so far has started the recorder motor and has charged the time-constant networks. The recorder-amplifier begins the record, which should produce an audio signal after a brief interval, such as four seconds. The condenser 63 passes enough current to permit the networks to become charged to maintain a bias on the tube 27 long enough to assure operation for a period longer than the time to produce an audio signal, such as seven seconds.

When the recorder delivers an audio signal, a corresponding modulated potential is drawn off to the tube 28, and by it rectified and amplified. The rectified and amplified signal is then applied to the second time-constant network 70, 71, 72 and to the grid 69 to hold the tube 27 non-conducting for the duration of the audio signal, even though the condenser 63 has rendered the initial biasing circuit non-conducting and, hence, cut off by the diode 26.

By this audio signal bias, the recorder will continue operating until the audio signal stops at the end of the message. As this signal charges the second time-constant network 70, 71 and 72, but cannot charge the first because of the unidirectional conductivity of the diode 26, the bias on the tube 27 will survive the end of the audio signal only by the time fixed by the second time-constant network. This latter is shorter than that provided by both networks, so that the tube 27 can become conducting a relatively short interval after the end of the audio signal.

When the tube 27 again becomes conducting, the relays 76 and 78 are again energized to open the switches 80 and 53, stopping the recorder and restoring the bias on the tube 20 to render it non-conducting, and to break the circuit through the coil 57.

If the audio signal is not produced, such as at the end of a record, no audio bias will be supplied to hold the tube 27 non-conducting. The first time-constant network 66, 67 will be charged, and in discharging will charge the second and apply bias to the tube 27. When the first time-constant network has decayed, the second will then decay. By this means, a bias will be held on the tube 27 for a time greater than the normal requirement to produce an audio signal, and thereafter the apparatus will stop itself.

The sequence circuits through the second pentode 21 are operated by the breaking of light to the second photoelectric cell 23. A person passing the cell 23 after the cell 22 will break the light

thereto, and break the positive bias therethrough, applied to the grid 107. The tube 21 then becomes non-conducting, and the relay coil 122 is deenergized, permitting the switch 129 to close.

When the switch 129 closes, a circuit from the power line 13 is completed from the ground 18, the time-constant network 132, 133 of the tube 20, the line 131, the switch 129, the line 130, the line 40, and the resistor 17. This charges the network and the suppressor grid 135. Also, a negative bias will be applied to the main grid 43 to render the tube 20 non-conducting, this circuit extending from the ground 69 of the tube 20, the grid 43, the line 45, the resistor 138, the line 137, the right side of the tube 26, the line 136 to the lines 134 and 131, the switch 129, the lines 130 and 40, to the line 13. This aids the suppressor in rendering the tube 20 non-conducting.

Normally the switch 53 is closed before the foregoing suppressor circuits can be effective. After the switch 53 closes, the bias on the tube 20 remains sufficient to overcome the suppression. The negative bias to the grid 43 is short circuited, the resistor 138 making this safe.

If, however, the cell 23 is shaded first, the suppressor grid 135 will be given a suppressing bias for a period of time, such as seven seconds, determined by the network 132, 133. Likewise, the main grid 43 will be held adequately negative by the circuit from the line 136, even though the cell 22 is thereafter shaded and the negative bias derived from its circuit is removed. By this means, the shading of the cells 22 and 23 in reverse order cannot operate the recorder, and, indeed, renders the normal cycling inoperative for a definite period.

Any attempt to crowd the apparatus by rapidly making and breaking the light to the cells will not produce short-cycling of the recorder. If the cell 22 is shaded for even an instant, one cycle will be started and held until completed. At the instant the switch 61 releases, the condenser 114 can take a momentary charge to render the tube 21 non-conducting, as a result of which the time-constant network 132, 133 puts bias on the grid 135, and the grid 43 is charged negatively, to hold the tube 20 non-conductive for a predetermined interval. This avoids trouble as when a hand is waved back and forth across the light.

If the person stands in front of the cell 22, one cycle will result, as before, after which no repeat cycle can occur, because of the condenser 63. If the person stands in front of the cell 22 at the end of the cycle, then leaves and immediately returns, a new cycle can be started only after the delay produced by charging the condenser 114, as aforesaid. Any shading during a cycle, other than those described, has no effect.

If light fails, the system is inoperative, because the cells 22 and 23 are then non-conducting.

The direction switch, which is shown as being four-pole, double-throw and incorporating the switch elements 41, 44, 100 and 104, can be thrown to the position shown to provide the sequence shown. When it is thrown to its other position, the tube 23 is substituted for the tube 22, and vice versa. When this is done, the direction in which a person must travel to operate the apparatus is reversed, as is fairly evident without tracing the circuits.

The operation is independent of the length of

the message, since the audio signal controls the duration of operation.

The apparatus can be used with any kind of record player, but wire recording has advantages. An endless wire may be used in a wire recorder to eliminate periodical rewinding. The amplifier may be conventional, but the audio take-off should be ahead of the volume control to afford volume adjustment to suit the installation without affecting operation of the control unit.

The power supply system is generally conventional, except that a voltage regulator tube has been added, as indicated, and the control resistors are in the negative line.

In addition to the combination above, comprising a light operated advertising apparatus, there are subcombinations capable of other uses. For example, the motor holding circuit arrangement could be used as a record player cutoff means that eliminates trip grooves on the records, it responding to cessation of audio signals from the record. It is independent of the physical condition of the records.

Another of the valuable subcombinations is the sequence hookup that provides for an operation only in one order and prevents it in the reverse order. Additional subcombinations are apparent from the description.

What is claimed is:

1. A control for sound reproduction, including an electrically operable sound reproducing means, control mechanism to cause the sound reproducing means to operate, the said mechanism having starting means operable to actuate the control mechanism to start operation of the sound reproducing means, the starting means including an instantaneously operatable device, means responsive to instantaneous operation of that device to produce a starting potential of longer but limited duration to start the sound reproducing means and maintain the same in operation only for the duration of said potential, and means dependent upon production of an audio signal by the sound reproducing means to produce a potential to maintain the control mechanism and the reproducing means in operation beyond said period of time and for the duration of the audio signal.

2. An advertising device for use on traveled paths, including a sound reproducing means, control mechanism to cause the sound reproducing means to operate, the control mechanism having starting means positioned to be operated by an object traveling along the path in one direction to actuate the control mechanism to start operation of the sound reproducing means, means producing an electrical control potential from an audio signal derived from the reproducing means, and means applying said control potential to the electrical control means to maintain the control means and the reproducing means in operation for the duration of the audio signal, and means to prevent operation of the reproducing means when the object travels along the path in the opposite direction.

3. An advertising device for use on traveled paths, including a sound reproducing means adapted to operate and normally to produce sound when operating, control mechanism to cause the sound reproducing means to operate, the control mechanism having starting means positioned to be operated by an object traveling along the path and being connected to actuate the control mechanism to start operation of the

9

sound reproducing means, and means automatically to stop operation of the sound reproducing means if no sound is produced thereby within a predetermined time after the sound reproducing means is started.

4. In an advertising device; a sound reproducing means, a control mechanism comprising starting means positioned to be operated by an object traveling along a path, being connected to start operation of the sound reproducing means, and the control mechanism also comprising time-responsive means energized by the starting means when the starting means starts, to maintain the sound reproducing means in operation for a predetermined time after its start, and thereafter becoming incapable of maintaining the same in operation.

5. An advertising device for use on traveled paths, including a sound reproducing means adapted to operate and normally to produce sound when operating, control mechanism to cause the sound reproducing means to operate, the control mechanism having starting means positioned to be operated by an object traveling along the path and being connected to actuate the control mechanism to start the operation of the sound reproducing means, including time responsive means energized when the starting means starts to maintain the reproducing means in operation for a predetermined time after its start, and thereafter becoming incapable of maintaining the same in operation, and means responsive to production of an audio signal by the reproducing means, to maintain the last means in operation after said predetermined time.

6. An advertising device for use on traveled paths, including a sound reproducing means adapted to operate and normally to produce sound when operating, control mechanism to cause the sound reproducing means to operate, the control mechanism having starting means positioned to be operated by an object traveling along the path and being connected to actuate the control mechanism to start operation of the sound reproducing means, including time responsive means energized when the starting means starts to maintain the reproducing means in operation for a predetermined time after its start, and thereafter becoming incapable of maintaining the same in operation, means responsive to production of an audio signal by the reproducing means, to maintain the last means in operation after said predetermined time, and said last-named including means to render the reproducing means inoperative for a predetermined period after the end of the audio signal, said period being less than the aforementioned predetermined time.

7. An advertising device for use on traveled paths, including a sound reproducing means adapted to operate and normally to produce sound when operating, control mechanism to cause the sound reproducing means to operate, the control mechanism having starting means positioned to be operated by an object traveling along the path and being connected to actuate the control mechanism to start operation of the sound reproducing means, means dependent upon production of an audio signal by the sound reproducing means to maintain the control mechanism and the reproducing means in operation for the duration of the audio signal to produce a given audible message, and means to prevent production of more than one audible

10

message for each operation of the starting means.

8. An advertising device for use on traveled paths, including a sound reproducing means adapted to operate and to produce sound when operated, control mechanism to cause the sound reproducing means to operate, the control mechanism having starting means positioned to be operated by an object traveling along the path and being connected to actuate the control mechanism to start operation of the sound reproducing means, means dependent upon production of an audio signal by the sound reproducing means to maintain the control mechanism and the reproducing means in operation for the duration of the audio signal, the sound reproducing means including a motor and a record playing device operated by the motor, to produce the audio signal for an audible message, and time-controlled means to prevent operation of the motor for a predetermined period after the audible message is ended.

9. In an apparatus for producing a sensible message, a message reproducing means producing an electrical signal and converting the same into the message, control means to cause operation of the reproducing means, starting means for the control means, including a light-sensitive device subject to operation by an object passing a given point, the starting means including time-controlled means, and producing an electrical potential for a first time period to operate the control means, the control means becoming inoperative at the end of said period, and means responsive to operation of the message reproducing means to produce its electrical signal, to hold the control means and reproducing means in operation for the duration of said signal.

10. In an apparatus for producing a sensible message, a message reproducing means producing an electrical signal and converting the same into the message, control means to cause operation of the reproducing means, starting means for the control means, including a light-sensitive device subject to operation by an object passing a given point, the starting means producing an electrical potential for a first time period to operate the control means, the control means becoming inoperative at the end of said period, means responsive to operation of the message reproducing means to produce its electrical signal, to hold the control means and reproducing means in operation for the duration of said signal, and means to prevent producing more than one operation of the reproducing means for each operation of the light-sensitive device.

11. In an apparatus for producing a sensible message, a message reproducing means producing an electrical signal and converting the same into the message, control means to cause operation of the reproducing means, starting means for the control means, including a light-sensitive device subject to operation by an object passing a given point, the starting means producing an electrical potential for a first time period to operate the control means, the control means becoming inoperative at the end of said period, means responsive to operation of the message reproducing means to produce its electrical signal, to hold the control means and reproducing means in operation for the duration of said signal, and means to prevent rapid reoperations of the reproducing means by quickly reoperating the light-sensitive device at the end of an operation of the reproducing means.

12. In an apparatus for producing a sensible

11

message, a message reproducing means producing an electrical signal and converting the same into the message, control means to cause operation of the reproducing means, starting means for the control means, including a light-sensitive device subject to operation by an object passing a given point, the starting means producing an electrical potential for a first time period to operate the control means, the control means becoming inoperative at the end of said period, means responsive to operation of the message reproducing means to produce its electrical signal, to hold the control means and reproducing means in operation for the duration of said signal, the starting means including two time-constant network means, mechanism to produce the electrical potential for the said period from time-constant means, and means applying said message derived signal to time-constant network means to hold the reproducing means in operation for a different time interval after the end of the signal.

13. In an advertising device for producing a sensible message, a message reproducing device for producing an electrical signal and converting it into a sensible message, control means comprising an electronic valve, having a control grid, for controlling operation of the reproducing device, a first time-constant network, a unidirectional conductor, starting means producing a starting potential and applying it to the network and the conductor, a second time-constant network connected on the output side of the conductor and with the control grid, means to cause the reproducing device to start when said starting potential is so applied, means to produce a holding potential derived from the reproducing device when it produces an electrical signal, said means being connected to apply said holding potential to the control grid of the valve and to the second time-constant network, to cause the reproducing device to remain in operation after cessation of the starting potential and for a period after cessation of the electrical signal.

14. In a control mechanism, an electrical device that is operating produces a holding potential; means to produce a starting potential, a first time-constant network, a unidirectional electronic conductor, connections applying the starting potential to the first network and to one side of the electronic conductor to produce a starting potential on the output side of the electronic conductor, having a time-duration characteristic, a control valve having a grid, the control valve operating in response to potential on the grid means controlled by said valve to effect operation of the electrical device, a second time-constant network, connections between the output side of the electronic conductor to apply the starting potential to the grid and the second network, the control valve being rendered operative by such grid potential to operate the means to effect operation of the electrical device, whereby upon charging of the first network, the valve may effect operation of the electrical device for at least a predetermined starting time, means deriving a unidirectional holding potential from the electrical device during its operation, connections applying the holding potential to the grid and the second time network, whereby the valve may effect continuance of the operation of the device for the duration of the holding potential and for a period thereafter.

15. In a control mechanism, an electrical device that in operating produces a holding potential; means to produce a starting potential, a first

12

time-constant network, a unidirectional electronic conductor, connections applying the starting potential to the first network and to one side of the electronic conductor to produce a starting potential on the output side of the electronic conductor, having a time-duration characteristic, a control valve having a grid, means controlled by said valve to effect operation of the electrical device, a second time-constant network, connections between the output side of the electronic conductor to apply the starting potential to the grid and the second network, whereby upon charging of the first network, the valve may effect operation of the electrical device for at least a predetermined starting time, means deriving a unidirectional holding potential from the electrical device during its operation, connections applying the holding potential to the grid and the second time network, whereby the valve may effect continuance of the operation of the device for the duration of the holding potential and for a period thereafter, the means to produce the starting potential comprising a quickly operated and de-operated instituting means, and means operated by the output side of the electronic valve to hold the starting potential producing means in operation after the instituting means is de-operated.

16. In a control apparatus for producing and stopping a control potential for effecting operation of an electrically operable device, a first controlled activator including an electronic valve having a grid, object-controlled means including means regulating potential on said grid, causing said valve to have a conducting condition and a non-conducting condition, means operated from the output side of said tube to produce the control potential when the tube is in one condition, a second object-controlled means to produce a blocking potential, a time-constant network, connections from said second object-controlled means to apply said blocking potential to said time-constant network and to the grid to prevent the tube from having potential producing condition for a period of time, upon operation of the second object-controlled means and means to render the second object-controlled means ineffective upon the tube, said last-named means being connected with and operated from the output side of the tube when the first object-controlled means is operated before the second object-controlled means is operated, whereby when the first object-controlled means is operated first, the control potential may be produced and maintained regardless of subsequent operation of the second object-controlled means.

17. In a control apparatus for producing and stopping a control potential for effecting operation of an electrically operable device, a first controlled activator including an electronic valve having a grid, object-controlled means causing said valve to have a conducting condition and a non-conducting condition, means operated from the output side of said tube to produce the control potential when the tube is in one condition, a second object-controlled means to produce a blocking potential, a time-constant network, connections from said second object-controlled means to apply said blocking potential to said time-constant network and to the grid to prevent the tube from having potential producing condition for a period of time, upon operation of the second object-controlled means, and means to render the second object-controlled means ineffective upon the tube, said last-named means

13

being connected with and operated from the output side of the tube when the first object-controlled means is operated before the second object-controlled means is operated, whereby when the first object-controlled means is operated first, the control potential may be produced and maintained regardless of subsequent operation of the second object-controlled means, said object-controlled means being arranged sequentially to be successively operated by objects moving along a given path, whereby the potential may be produced only when the objects move in one direction, and switch means to reverse connections of the object-controlled means to reverse said direction.

18. In an electronic control apparatus, a tube having grid means, the tube being in conducting or non-conducting condition in accordance with the condition of the grid means, an output circuit means connected with said tube and being operative when the tube is in one of said conditions and inoperative when it is in the other condition, means quickly actuated and deactuated to change the bias on the grid means to cause the tube to make its output circuit operative, relay means in the output circuit means, additional circuit means interconnected with the output circuit means by the relay means, and energized when the output circuit is operative, an additional tube having grid means biased from said additional circuit means, a second output circuit, for the additional tube, holding means connected in the second output circuit, and rendered effective when said additional tube is thus biased, to hold the bias on the grid means of the first tube after the quick actuated means is deactuated, and time delay means connected with grid means of the additional tube after predetermined time has elapsed, and render its output circuit incapable of maintaining the holding means effective to bias the grid means of the first tube as aforesaid, and additional means adapted to be rendered operative by the second output circuit to hold the bias on the additional tube beyond said predetermined time.

19. In an electronic control apparatus, a tube having grid means, the tube being in conducting or non-conducting condition in accordance with the condition of the grid means, an output circuit means connected with said tube and being operative when the tube is in one of said conditions and inoperative when it is in the other condition, means quickly actuated and deactuated to change the bias on the grid means to cause the tube to make its output circuit operative, relay means in the output circuit means, additional circuit means interconnected with the output circuit means by the relay means, and energized when the output circuit is operative, an additional tube having grid means biased from said additional circuit means, a second output circuit, for the additional tube, holding means connected in the second output circuit, and rendered effective when said additional tube is thus biased, to hold the bias on the grid means of the first tube after the quickly actuated means is deactuated, and time delay means connected with grid means of the additional tube to change the bias on the additional tube after predetermined time has elapsed, and render its output circuit incapable of maintaining the holding means effective to bias the grid means of the first tube as aforesaid, supplemental bias producing means for the second tube, means in the

14

second output circuit to energize the supplemental bias producing means, said supplemental bias producing means being adapted, when energized, to hold the additional tube biased after said time period has elapsed.

20. In an electronic control apparatus, a tube having grid means, the tube being in conducting or non-conducting condition in accordance with the condition of the grid means, an output circuit means connected with said tube and being operative when the tube is in one of said conditions and inoperative when it is in the other condition, means quickly actuated and deactuated to change the bias on the grid means to cause the tube to make its output circuit operative, relay means in the output circuit means, additional circuit means interconnected with the output circuit means by the relay means, and energized when the output circuit is operative, an additional tube having grid means biased from said additional circuit means, a second output circuit, for the additional tube, holding means connected in the second output circuit, and rendered effective when said additional tube is thus biased, to hold the bias on the grid means of the first tube after the quickly actuated means is deactuated, and time delay means connected with grid means of the additional tube to change the bias on the additional tube after predetermined time has elapsed, and render its output circuit incapable of maintaining the holding means effective to bias the grid means of the first tube as aforesaid, supplemental bias producing means for the second tube, means in the second output circuit to energize the supplemental bias producing means, said supplemental bias producing means being adapted, when energized, to hold the additional tube biased after said time period has elapsed, the time delay means being divided, and having a unidirectional conducting means between its parts, whereby the additional circuit means may charge both parts, and the supplemental bias producing means may charge only one part, the sum of the parts having a different time interval from that of the said one of the parts.

21. In an electronic control apparatus, a tube having grid means, the tube being in conducting or non-conducting condition in accordance with the condition of the grid means, an output circuit means connected with said tube and being operative when the tube is in one of said conditions and inoperative when it is in the other condition, means quickly actuated and deactuated to change the bias on the grid means to cause the tube to make its output circuit operative, relay means in the output circuit means, additional circuit means interconnected with the output circuit means by the relay means, and energized when the output circuit is operative, an additional tube having grid means biased from said additional circuit means, a second output circuit, for the additional tube, holding means connected in the second output circuit, and rendered effective when said additional tube is thus biased, to hold the bias on the grid means of the first tube after the quickly actuated means is deactuated, and time delay means connected with grid means of the additional tube to change the bias on the additional tube after predetermined time has elapsed, and render its output circuit incapable of maintaining the holding means effective to bias the grid means of the first tube as aforesaid, a sequentially actuatable means adapted to be operated sequentially after

the quickly actuated means, suppressing means operated when the sequentially actuatable means is operated first, to produce a bias on the first tube to maintain its output circuit inoperative regardless of subsequent operation of the quickly actuatable means, and means to prevent said suppressing means from being effective when the quickly actuatable means is operated first.

22. In an electronic control apparatus, a tube having grid means, the tube being in conducting or non-conducting condition in accordance with the condition of the grid means an output circuit means connected with said tube and being operative when the tube is in one of said conditions and inoperative when it is in the other condition, means quickly actuated and deactuated to change the bias on the grid means to cause the tube to make its output circuit operative, relay means in the output circuit means, additional circuit means interconnected with the output circuit means by the relay means, and energized when the output circuit is operative, an additional tube having grid means biased from said additional circuit means, a second output circuit, for the additional tube, holding means connected in the second output circuit, and rendered effective when said additional tube is thus biased, to hold the bias on the grid means of the first tube after the quickly actuated means is deactuated, and time delay means connected with grid means of the additional tube to change the bias on the additional tube after predetermined time has elapsed, and render its output circuit incapable of maintaining the holding means effective to bias the grid means of the first tube as aforesaid, a sequentially actuatable means adapted to be operated sequentially after the quickly actuated means, suppressing means operated when the sequentially actuatable means is operated first, to produce a bias on the first tube to maintain its output circuit inoperative regardless of subsequent operation of the quickly actuatable means, and means to prevent said suppressing means from being effective when the quickly actuatable means is operated first, the sequentially actuatable means including a biasing circuit for the first tube, and time delay means in said circuit to maintain the bias and hold the output circuit inoperative for a period after the sequentially actuatable means is operated.

23. In an electronic control apparatus, a tube having grid means, the tube being in conducting or non-conducting condition in accordance with the condition of the grid means, an output circuit means connected with said tube and being operative when the tube is in one of said conditions and inoperative when it is in the other condition, means quickly actuated and deactuated to change the bias on the grid means to cause the tube to make its output circuit operative, relay means in the output circuit means, additional circuit means interconnected with the output circuit means by the relay means, and energized when the output circuit is operative, an additional tube having grid means biased from said additional circuit means, a second output circuit, for the additional tube, holding means connected in the second output circuit, and rendered effective when said additional tube is thus biased, to hold the bias on the grid means of the first tube after the quickly actuated means is deactuated, and time delay means connected with grid means of the additional tube to change the bias on the addi-

tional tube after predetermined time has elapsed, and render its output circuit incapable of maintaining the holding means effective to bias the grid means of the first tube as aforesaid, a sequentially actuatable means adapted to be operated sequentially after the quickly actuated means, suppressing means operated when the sequentially actuatable means is operated first, to produce a bias on the first tube to maintain its output circuit inoperative regardless of subsequent operation of the quickly actuatable means, and means to prevent said suppressing means from being effective when the quickly actuatable means is operated first, the sequentially actuatable means including a biasing circuit for the first tube, and time delay means in said circuit to maintain the bias and hold the output circuit inoperative for a period after the sequentially actuatable means is operated, and means for preventing the quickly actuatable means from charging the last named time delay means.

24. In an electronic control apparatus, a tube having grid means, the tube being in conducting or non-conducting condition in accordance with the condition of the grid means, an output circuit means connected with said tube and being operative when the tube is in one of said conditions and inoperative when it is in the other condition, means quickly actuated and deactuated to change the bias on the grid means to cause the tube to make its output circuit operative, relay means in the output circuit means, additional circuit means interconnected with the output circuit means by the relay means, and energized when the output circuit is operative, an additional tube having grid means biased from said additional circuit means, a second output circuit, for the additional tube, holding means connected in the second output circuit, and rendered effective when said additional tube is thus biased, to hold the bias on the grid means of the first tube after the quickly actuated means is deactuated, and time delay means connected with grid means of the additional tube to change the bias on the additional tube after predetermined time has elapsed, and render its output circuit incapable of maintaining the holding means effective to bias the grid means of the first tube as aforesaid, and means operated when the output circuit is rendered inoperative, to maintain it inoperative for a predetermined period of time regardless of reoperation of the quickly actuatable means.

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