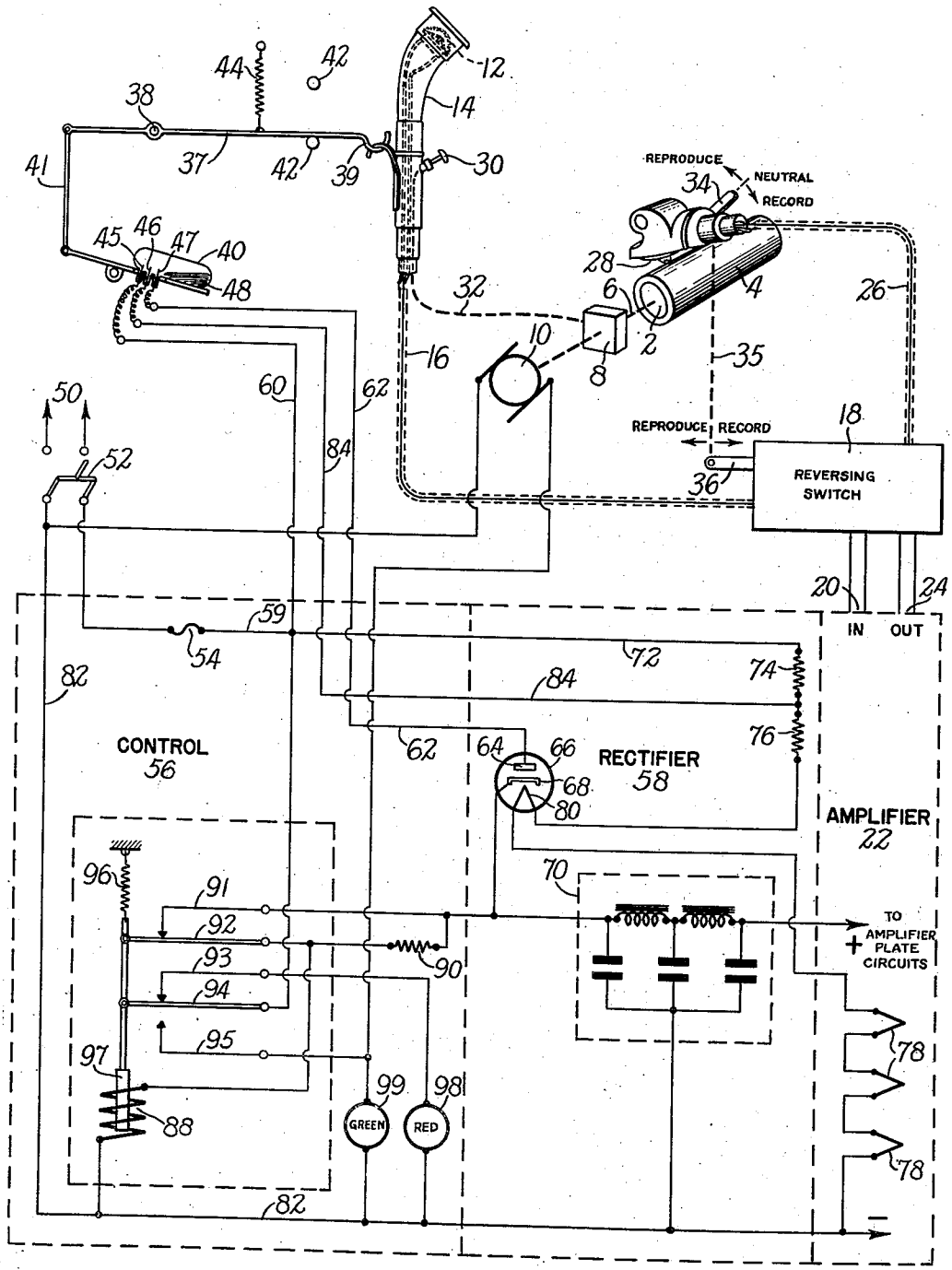
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CONTROL SYSTEM FOR PHONOGRAPHS

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CONTROL SYSTEM FOR PHONOGRAPHS

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This invention relates to electric dictating machines and more particularly to a control system for operating such machines, and to an indicating system for informing the operator of the operable condition of the machine at all times.

This invention is particularly applicable to electric dictating machines of the type illustrated and described in Patent No. 2,143,819 for transforming sound waves into electrical impulses, amplifying these impulses, recording them on suitable record blanks, or for reproducing sounds recorded on record blanks by converting the sound track into electrical impulses, amplifying these impulses and retransforming them into sound waves. In such electric dictating machines it is essential that the amplifier be in operable condition in order that complete dictation may be satisfactorily recorded or reproduced. It is therefore desirable that such machines be provided with a control system which is responsive to the operative condition of the amplifier and is so interconnected or interlocked with the remaining elements of the dictating machine that these elements are not permitted to operate, or at least some indication is given, when an attempt is made to operate the machine when it is not properly conditioned for satisfactory operation. If, for example, one of the amplifier vacuum tubes is burned out or if a D. C. amplifier is used and is connected to a D. C. power supply with reversed polarity, then it is desirable that this be indicated immediately to prevent the operator from dictating a long dictation before he discovers that the amplifier and therefore the machine is not in operative condition.

Furthermore, because dictating machines are frequently used only intermittently over long periods of time, for efficient operation it is preferable that a minimum amount of electrical power be supplied to the machine during "standby" periods. For this latter reason it is desirable to disconnect the motor from the power supply, to open the plate power supply circuit of the amplifier, and to insert a resistance in series with the heaters of the vacuum tubes of the amplifier and rectifier, so that the only input to the machine during "standby" periods is a small portion of the heating current necessary for normal operation of the vacuum tubes.

In an electric dictating machine arranged in this manner, when the main power switch of the dictating machine is closed, sufficient current is passed to heat the heaters of the tubes almost to operating condition so that they will always be warm and capable of heating up to the full operating temperature in a few seconds upon application of full heating current. At the same time, an indicator lamp, preferably red, may be lighted to show that the machine is in "standby" condition. When the dictator lifts the speaking tube to commence dictating, the resistor in series with the vacuum tube heaters is short-circuited, thus supplying full operating current to these heaters, and at the same time the plate power supply circuit of the amplifier is closed. In a few seconds the cathodes are heated to full emission temperature, the mandrel-driving motor is started, and the operator may start dictating. It is preferable to have another indicator operate at this time to indicate that the machine is in "operating" condition. This may be done by extinguishing the red indicator lamp and lighting a green one.

It frequently happens that the operator picks up the microphone and starts to dictate immediately, before the cathodes have reached their full emission temperature. When this occurs, the amplifier is not operative and several syllables of the dictation may be lost before the amplifier heaters reach operating temperature. This is especially true at the beginning of a period of dictation following a period of disuse with all electric circuits deenergized. In the latter situation, the operator may turn on the main power supply switch and start to dictate immediately. In this case, it may take the amplifier almost a minute to come to operative condition, and thus the initial portion of the dictation would be lost. It has been suggested that a thermostatic relay arrangement might be used whereby the "operating" or green light would not light for a predetermined period of time after the switch is closed, thus warning the operator that the machine is not operative. Such an arrangement has the disadvantage that if the operator has just turned the machine off and then turned it on immediately thereafter, the thermostatic switch relay might not have cooled sufficiently to open the circuit to the "operating" or green light. Thus the operator, seeing the green light, would commence dictation immediately whereas the amplifier tubes might have cooled sufficiently to render the machine temporarily inoperative.

It is an object of this invention to provide a control system for operating such an electric dictating machine, and, further, to provide such a control system which permits efficient operation when the machine is only used intermittently over a considerable period of time, and which permits

operation only when the amplifier is in operative condition.

It is a further object of this invention to provide an indicating system for such a dictating machine which is immediately responsive to the actual operative condition of the apparatus so that the "operating" indicator will never function unless the machine is in immediately operative condition.

These and other apparent objects and advantages are obtained by the means described in the following specification and may be more readily understood by reference to the accompanying drawing which shows a schematic diagram of an electric dictating machine embodying the present invention.

A record-supporting mandrel 2 carrying a cylindrical record blank 4 is driven through suitable gearing and drive shafts, represented by the dotted line 6, and a clutch mechanism, generally indicated at 8, by a suitable universal motor 10. A combined microphone-loudspeaker 12, mounted in a speaking tube 14, is connected by a suitable shielded cable 16 through a reversing switch 18 to the input 20 of an amplifier 22. The output 24 of the amplifier 22 is connected through the switch 18 and a shielded cable 26 to a suitable electromechanical recorder-reproducer unit 28. Thus, sounds impinging on the microphone 12 are converted into electrical impulses which are amplified by the amplifier 22 and thence recorded on the record blank 4 by operation of the electromechanical translation unit 28 acting as a recorder.

A button or switch 30, mounted on a speaking tube 14, operates the clutch 8 through a suitable transmission linkage, represented by the dotted line 32, to start and stop the rotation of the mandrel 2 and the record blank 4 at the will of the dictator. A control lever 34, associated with the recorder-reproducer unit 28, is adapted to move this unit 28 from recording to reproducing position when it is desired to reproduce the sounds recorded on the record blank 4. Operation of this lever arrangement 34 also simultaneously operates reversing switch 18 through a linkage 35 and a lever 36 to connect the translation unit 28 to the input 20 of the amplifier 22 and to connect the microphone-loudspeaker unit 12 to the output 24 of the amplifier 22, so that it acts as a loudspeaker to reproduce the sound recorded on record blank 4. A hanger 37, having a hook 39 at one end, is pivoted at 38 on the frame of the dictating machine (not shown), and is adapted to support the speaking tube 14 when the machine is not in use. This hanger 37 tilts a mercury switch 40 by means of a suitable linkage 41 to open the circuits therethrough when the speaking tube 14 is hung on the hook 39, in the position shown in the drawing. The movement of the hanger 37 is limited by stops 42 and it is normally biased by a spring 44 so that hook 39 is in its uppermost position when the speaking tube 14 is removed from the hook 39. The mercury switch 40 has three electrodes 45, 46, and 47, which are connected together by the pool of mercury 48 in the switch when the hook 39 is held in its uppermost position by the spring 44 against the stop 42, to close certain circuits in the power supply and control portions of the machine, as will hereinafter be described.

Electrical power for the dictating machine is supplied from a standard 110-volt A. C. or D. C. supply line 50 through a main line or "standby" switch 52 and a fuse 54 to the control and indicating portion of the machine, generally indicated at 56, and the power supply or rectifier unit, generally indicated at 58. One side of this power supply is connected through wires 59 and 60 to one electrode 45 of mercury switch 40, whence, when the mercury switch is closed, it is connected through a second electrode 47 and a wire 62 to the anode 64 of a rectifier tube 66. The cathode 68 of rectifier 66 is connected to a capacity and inductance filter 70 to the plate circuits of the amplifier 22 to supply plate power to the anodes of the amplifier tubes. The same side 59 of the power supply is also connected through a wire 72 and series resistances 74 and 76 through the series connected heater elements 78 of the vacuum tubes in amplifier 22 and the heater element 80 of rectifier 66 back to the other side of the power supply through wire 82. The third electrode 46 of the mercury switch 40 is connected through a wire 84 to the connection between resistors 74 and 76, so that resistor 74 is short-circuited when the mercury switch 40 is in closed position. When both resistors 74 and 76 are connected in series with heaters 78 and 80 only a small or "standby" current flows through these heater elements which is just sufficient to keep the elements warm, but not enough to bring them to full operating temperature. When the mercury switch 40 is closed by removing speaking tube 14 from hook 39, thus shorting resistor 74, the resistance 76 in series with the heater elements 78 and 80 is of such a value that the full operating heater current flows in this circuit to bring the cathodes to full emission temperature.

In the arrangement, thus far described, when the operator removes the speaking tube 14 from the hook 39, thus closing the circuits through the mercury switch 40, resistor 74 in the heating circuit is short-circuited, thus applying full heating current to the heaters 78 and 80. At the same time, the plate 64 of rectifier 66 is connected to one side of the line through wires 62, 60, and 59 to supply plate potential to the amplifier 22. Amplifier 22 is thus rendered fully operative as soon as the heaters 78 and 80 reach full operating temperature, and then the dictating machine may be used to record or reproduce as desired.

However, for a short period of time after the speaking tube 14 is removed from hook 39, while the heaters 78 and 80 are still coming up to temperature, the amplifier is inoperative, and if dictation is attempted during this period a portion of the dictation will not be recorded.

To prevent such a loss of dictation, in accordance with this invention, a control arrangement is provided which is interconnected with the motor 10 to prevent its operation after the speaking tube 14 has been lifted from hook 39 until the heaters 78 and 80 have heated their respective cathodes to full emissive temperature so that the amplifier is in operative condition. In addition, a green indicator light 99 is also provided which lights only after such operative condition has been attained. This is accomplished by providing a control relay, generally indicated at 86, in the control portion 56 of the instrument. This relay is actuated by a solenoid 88 which is connected to wire 82 from one side of the supply line 50 through a resistor 90 to the cathode 68 of the rectifier 66. This relay 86 is provided with a pair of contacts 91 and 92, normally closed due to the action of a biasing spring 96, forming a single-pole single-throw switch which is opened upon energization of solenoid 88, and three other contacts 93, 94,

and 95 forming a single-pole double-throw switch which normally makes contact between contacts 93 and 94 due to the action of spring 96, but which opens this circuit and makes contact between contacts 94 and 95 when the solenoid 88 is energized. These contacts are operated in this manner by an armature 97 associated with the solenoid 88.

Contacts 91 and 92 are connected across resistor 90 to short circuit it when the relay 86 is deenergized so that the initial current flowing through solenoid 88 is greater than its normal operating current, thus insuring rapid operation of the relay when it is energized but keeping the load on rectifier 66 due to the relay at a minimum. Contact 94 of the second group of contacts is connected to one side of the supply line 50 through wire 59. The upper, or normally closed contact 93, is connected to a red indicator lamp 98 which in turn is connected to the other side of the supply line 50 through wire 82. The lower contact 95, which connects with contact 94 upon energization of the solenoid 88, is connected to the green indicator lamp 99 which is also connected to wire 82. Contact 95 is also connected to one side of the universal driving motor 10, the other terminal of this motor being connected to wire 82. Thus motor 10 cannot operate until amplifier 22 is in operative condition as shown by energization of solenoid 88.

In the operation of the dictating machine herein described, when the operator wishes to have the machine ready for operation he closes the main line switch 52 which puts the instrument in "standby" condition. This permits a subnormal current to flow through the heaters 78 and 80, thus preparing them for rapid heating to operating temperature when actual operation is desired. Likewise, this causes current to flow from one side of the power supply 50 through wire 59, contact 94, contact 93, and the red signal lamp 98 back through wire 82 to the other side of the supply line 50, thus causing the red signal lamp 98 to light and indicate the "standby" condition. When the operator wishes to dictate and removes the speaking tube 14 from the hook 39, this tilts mercury switch 40, closing the circuit between electrodes 45, 46, and 47, thus connecting plate 64 of rectifier 66 through wires 62, 60, and 59 to one side of the power supply and also shorting out resistor 74 to permit full operating current to pass through the heaters 78 and 80. When this full operating current has been applied to the heaters for a sufficient length of time to heat the cathodes to emissive temperature, current flows through the rectifier 66 from one side of the power supply line through wires 59, 60, and 62, rectifier 66, contacts 91 and 92 of relay 86, and hence through solenoid 88 to wire 82 on the other side of the supply line 50, thus energizing the solenoid 88 and thereby attracting armature 96. This breaks the circuit between contacts 93 and 94 thus extinguishing the red indicating lamp 98, breaks the circuit between contacts 91 and 92 thus inserting resistance 90 in the circuit of solenoid 88, and makes the circuit between contacts 94 and 95 from one side of the supply line through wire 59, contacts 94 and 95, through indicator lamp 99 and motor 10 connected in parallel, to wire 82 on the other side of the supply line 50. This starts the motor, and also lights the green indicating lamp 99 to show the operator that the machine is instantly ready for recording or reproducing.

The amplifier tubes for the amplifier 22 are preferably chosen with cathode heating rates substantially equal to or less than that of rectifier 66. Thus, when the cathode 58 of rectifier 66 is hot enough to permit current to pass through the rectifier and thence through solenoid 88 to energize relay 86 to extinguish red indicating lamp 98 and light the green indicating lamp 99, the amplifier tubes, heated by heaters 78, are heated to emissive temperature and therefore that the amplifier 22 is ready for instant operation. As the flow of current through rectifier 66 is a direct indication of the operative condition of the amplifier 22, in so far as cathode heating is concerned, and inasmuch as relay 86 is directly responsive to the flow of current through rectifier 66, the indicator lamps 98 and 99 operate in immediate response to the actual condition of the amplifier 22 at all times. Thus, the operator at all times knows the condition of the dictating machine irrespective of whether he has just turned on the main line switch 52, or whether he has just hung the speaking tube 14 on hook 39, or removed it therefrom.

As many embodiments might be made of the above invention, and as many changes might be made in the embodiment above described, it is to be understood that all structure hereinbefore described as shown in the accompanying drawing is to be considered as illustrative only and not in a limiting sense.

I claim:

1. In a control system for an electrical dictating machine adapted for intermittent operation and equipped with electronic devices requiring a period of time after the application of electric power to said devices to reach full operative condition, in combination, means for applying electric power to at least one of said electronic devices, control means for rendering operative certain elements of said dictating machine, and means operative after the operation of said power-applying means and responsive to the normal flow of power through at least one of said electronic devices for permitting operation of said control means to render operative said dictating machine elements.

2. In a control system for an electrical dictating machine adapted for intermittent operation and equipped with electronic devices requiring a period of time after the application of electric power to said devices to reach full operative condition, in combination, control means for controlling the application of electric power to at least one of said electronic devices, motor means for driving said dictating machine, and means operative after the operation of said control means and responsive to the normal flow of power through at least one of said electronic devices for permitting operation of said motor means.

3. In a control system for an electrical dictating machine adapted for intermittent operation and equipped with electronic devices requiring a period of time after the application of electric power to said devices to reach full operative condition, in combination, means for applying electric power to at least one of said electronic devices, interlock means for preventing operation of certain elements of said dictating machine, and means operative after the operation of said power-applying means and respon-

sive to the normal flow of power through at least one of said electronic devices for preventing the operation of said interlock means to permit operation of said dictating machine elements.

4. In a control system for an electrical dictating machine adapted for intermittent operation and equipped with electronic devices requiring a period of time after the application of electric power to said devices to reach full operative condition, in combination, control means for controlling the application of electric power to at least one of said electronic devices, motor means for driving said dictating machine, interlock means for preventing operation of said motor means, and means operative after the operation of said control means and responsive to the normal flow of power through at least one of said electronic devices for rendering said interlock means inoperative to permit operation of said motor means.

5. In a control system for an electrical dictating machine adapted for intermittent operation and having an amplifier unit equipped with electronic devices requiring a period of time after the application of heating current for the cathodes of said devices to reach full operative emissivity, in combination, control means for controlling the application of cathode heating current to at least one of said electronic devices, an electrically operated dictating machine element, and means operative after the operation of said control means and responsive to the flow of emission current through at least one of said electronic devices for preventing operation of said dictating machine element until said emission current reaches its normal operating value.

6. In a control system for an electrical dictating machine adapted for intermittent operation and having an amplifier unit equipped with electronic devices requiring a period of time after the application of heating current for the cathodes of said devices to reach full operative emissivity, in combination, control means for controlling the application of cathode heating current to at least one of said electronic devices, motor means for operating said dictating machine, and means operative after operation of said control means and responsive to the flow of normal emission current through at least one of said electronic devices for operatively connecting said motor means to a source of power to permit operation of said dictating machine.

7. In a control system for an electrical dictating machine adapted for intermittent operation and having an amplifier unit equipped with electronic tubes having anodes, cathodes and control elements, in combination, a circuit for supplying operating potentials to the anodes of said electronic tubes, control means for connecting said circuit to said anodes, and means responsive to an attempt to operate said dictating machine for operating said control means to apply operating potentials to said anodes to render said amplifier operative.

8. In a control system for an electrical dictating machine adapted for intermittent operation and having an amplifier unit equipped with electronic tubes having anodes, cathodes and control elements, in combination, a circuit for supplying subnormal heating current to the cathodes of said electronic tubes, another circuit for supplying operating potentials to the anodes of said electronic tubes, control means for adjusting said first circuit to supply normal heating current to said cathodes and for connecting said second circuit to said anodes, and means responsive to an attempt to operate said dictating machine for operating said control means to render said amplifier operative.

9. In a control system for an electric dictating machine adapted for intermittent operation and having an amplifier unit equipped with electronic devices having anodes, cathodes and control elements which require a period of time after the application of heating current for the cathodes of said devices to reach full operative emissivity, in combination, a circuit for supplying subnormal heating current to the cathodes of said electronic devices, a second circuit for supplying operating potentials to the anodes of said electronic devices, control means for adjusting said first circuit to supply normal heating current to said cathodes and for connecting said second circuit to said anodes, motor means for operating said dictating machine, means responsive to an attempt to operate said dictating machine for operating said control means, and means operative after the operation of said control means and responsive to the flow of emission current through at least one of said electronic devices for preventing operation of said motor means until said emission current reaches its normal operating value.

10. In a control system for an electrical dictating machine adapted for intermittent operation and having an amplifier equipped with electronic devices requiring a period of time after the application of heating current for the cathodes of said devices to reach full operative emissivity, in combination, means for controlling the application of cathode heating current to said electronic devices, indicator means, and means operative after the operation of said first-named means and responsive to the flow of normal emission current through at least one of said devices for operating said indicator means to indicate that said amplifier is ready for instant operation.

11. In a control system for an electrical dictating machine adapted for intermittent operation and having an amplifier equipped with electronic devices requiring a period of time after the application of heating current for the cathodes of said devices to reach full operative emissivity and a rectifier having substantially similar heating characteristics for supplying power to said amplifier, in combination, means for controlling the application of cathode heating current to said electronic devices and said rectifier, an indicator device, and means operative after the operation of said first-named means and responsive to the flow of current through said rectifier for operating said indicator device to indicate that said amplifier is in instantly operative condition.

12. In a control system for an electrical dictating machine adapted for intermittent operation and having an amplifier equipped with electronic devices requiring a period of time after the application of heating current for the cathodes of said devices to reach full operative emissivity and a rectifier having substantially similar heating characteristics for supplying power to said amplifier, in combination, means for controlling the application of cathode heating current to said electronic devices and said rectifier, an indicator light, a relay including an energizing solenoid and a plurality of contacts, said solenoid being connected in series with said rectifier, said contacts being connected in a circuit with said indicator light and a source of electrical power, whereby said relay is actuated after operation of said first-named means to operate said light to indicate

that said amplifier is in instantly operative condition.

13. In a control system for an electrical dictating machine adapted for intermittent operation and having an amplifier equipped with electronic devices requiring a period of time after the application of heating current for the cathodes of said devices to reach full operative emissivity, in combination, a circuit for supplying subnormal heating current to the cathodes of said electronic devices, control means for adjusting said circuit to supply normal heating current to said cathodes, means responsive to an attempt to operate said dictating machine for operating said control means, signaling means, and means operative after said control means and responsive to the flow of normal emission current through at least one of said electronic devices for operating said signaling means to indicate that the amplifier is in operative condition.

14. In a control system for an electrical dictating machine adapted for intermittent operation and having an amplifier equipped with electronic devices requiring a period of time after the application of heating current for the cathodes of said devices to reach full operative emissivity and a rectifier having substantially similar heating characteristics for supplying power to said amplifier, in combination, means for controlling the application of cathode heating current to said electronic devices and said rectifier, an electrically operated dictating machine element, a relay including an energizing solenoid and a plurality of contacts, said solenoid being connected in series with said rectifier, certain of said contacts being connected in a circuit with said dictating machine element and a source of electrical power, an impedance connected with others of said contacts and said solenoid whereby said relay is actuated after operation of said control means to permit operation of said dictating machine and said impedance is connected in series with said solenoid to decrease the load on said rectifier.

15. In a control system for an electrical dictating machine adapted for intermittent operation and having an amplifier equipped with electronic devices requiring a period of time after the application of heating current for the cathodes of said devices to reach full operative emissivity and a rectifier having substantially similar heating characteristics for supplying power to said amplifier, in combination, a circuit connecting the cathode heaters of all of said electronic devices and said rectifier in series, means for controlling the application of cathode heating current to said heater circuit, a dictating machine element, and means operative after the operation of said control means and responsive to the normal flow of current through said rectifier for preventing the operation of said dictating machine element upon failure of the heaters of any of said electronic devices.

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