

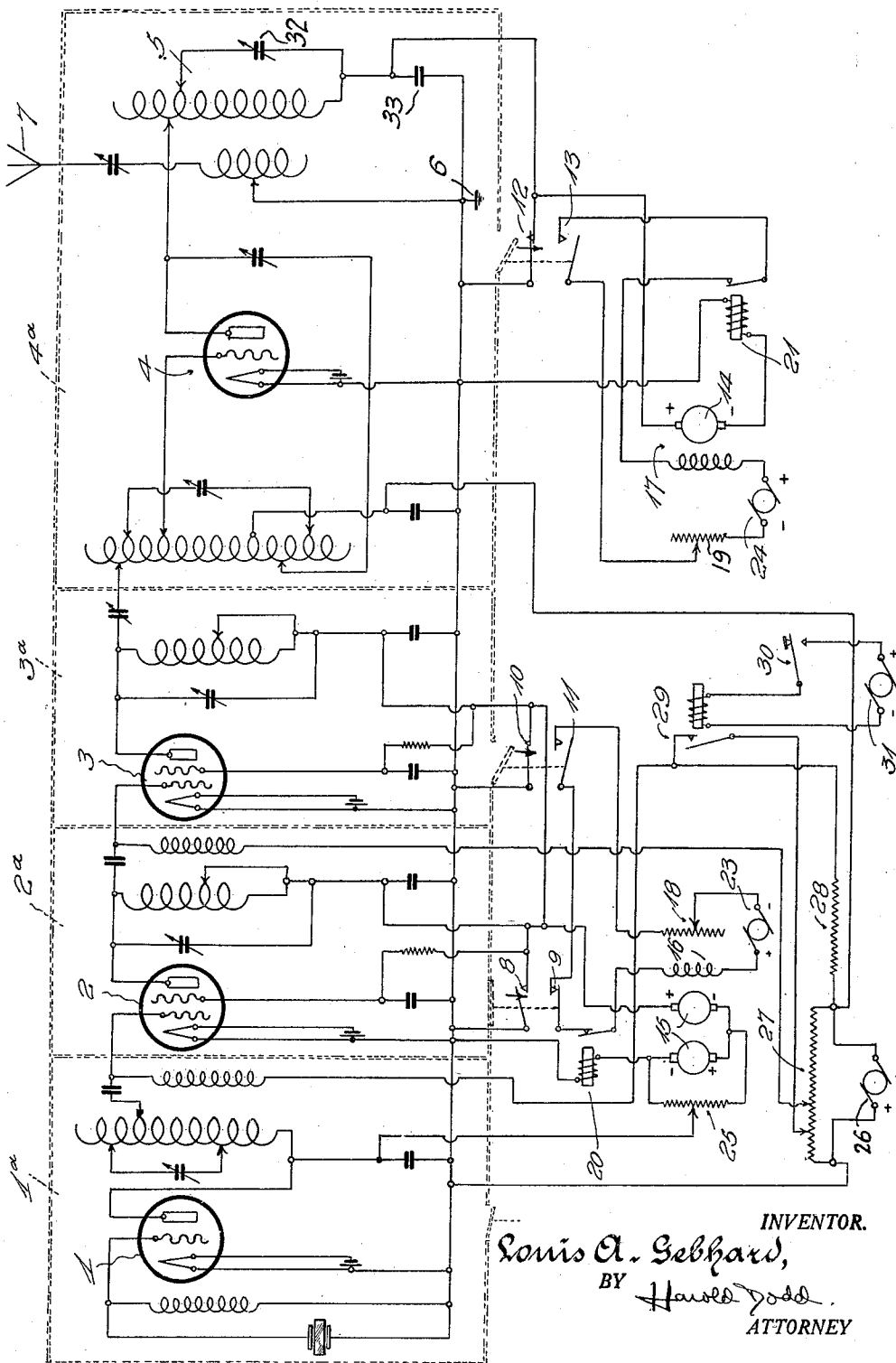
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RADIO TRANSMITTER

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RADIO TRANSMITTER

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My invention relates broadly to radio transmitters and more particularly to radio transmitters employing thermionic tubes.

One of the objects of my invention is to provide means for preventing injury to attending operators of radio transmitters.

Another object of my invention is to provide certain improvements in radio transmitters whereby accidental contact with the anodes of thermionic tubes employed in radio transmitters will not cause personal injury.

Still another object of my invention is to provide a radio transmitter wherein access to the thermionic tubes is impossible when the anode supply is connected thereto.

Other and further objects of my invention are to provide certain improvements in radio transmitters and the control circuits thereof as will appear from the specification following and from the accompanying drawing which is a schematic circuit diagram showing the improvements in radio transmitters of my invention.

Thermionic tube 1 is connected with a constant frequency oscillatory circuit arrangement, the entirety of which is enclosed in shielded metallic compartment 1a. The output circuit of thermionic tube 1 is delivered to the input circuit of thermionic tube 2. Thermionic tube 2 is connected with suitable input and output circuits constituting an amplifier. Thermionic tube 2 and immediately associated circuits are enclosed in shielded metallic compartment 2a. The output of thermionic tube 2 is delivered to the input circuit of thermionic tube 3 which is in like manner contained within a shielded metallic compartment 3a. The output of thermionic tube 3 is delivered to the input circuit of thermionic tube 4 which in turn is contained within shielded metallic compartment 4a. For the purpose of explanation it will be assumed that the power rating of tubes 1, 2, 3 and 4 will be of increasing value in the order named, thermionic tube 4 being of the water cooled anode design. The anode supply potential would in like manner be of increased value in the order named and that supplied thermionic tube 4 of such a value as to endanger human life. On the other

hand, the anode supply potential to thermionic tube 1, would not be assumed to be of sufficient value to warrant precaution, however the arrangement may be employed in combination with the low power tubes equally as well as with tubes 2, 3 and 4 as shown in the accompanying drawing. The output of thermionic tube 4 is connected with inductance 5, which in turn is connected with space radio radiating system 6, 7. Space radio radiating system 6, 7 may be replaced by any suitable load circuit such as a wired radio transmission line.

The anode circuits of thermionic tubes 1, 2 and 3 are energized from source 15. The anode circuit of thermionic tube 4 is energized from source 14. The arrangement and design of sources 14 and 15 will depend upon the power of the transmitter. Sources 14 and 15 are shown as generators however, it is obvious that other sources, such as rectified alternating current may be employed. The field circuit of generator 15 is excited from source 23, the excitation being controlled by field rheostat 18. The armature circuit is shown as including a double commutator, however, this is merely a matter of choice. A voltage divider 25 is shunted across one of these commutators and a connection made on this resistance for the supply of anode potential to thermionic tube 1. An overload circuit breaker 20 is connected in series with the load circuit of generator 15. Included also in the field circuit I provide switch and contact members 9 and 11, either of which, when opened, opens the excitation circuit of field 16. Switches 9 and 11 are so mounted as to be actuated by opening and closing of the doors admitting access to compartments 2a and 3a respectively. Mechanically connected thereto or operable therewith, I provide a second group of switches 8 and 10. The latter switches are delayed by any suitable means whereby the circuits connected with the field circuit 16 of generator 15 are opened, before the actuation of switches 8 and 10. Switches 8 and 10 are connected to the anode circuits of thermionic tubes 2 and 3 respectively, a common connection from the switches leading to ground. Thermionic

tube 4 is likewise supplied from source 14. The field circuit 17 of generator 14 is excited from source 24, the excitation of which is controlled by field rheostat 19.

The armature circuit of generator 14 is connected to the anode of thermionic tube 4 through the winding of overload relay 21. The contact members of relay 21 are connected in series with field circuit 17. Switch 13 is in like manner connected in series with field circuit 17. Operable with switch member 13, I provide a second switch member 12, having time delay being similar to that of switch members 8 and 10 previously referred to. The contact members of switch 12 are connected to the anode circuit of thermionic tube 4 and to ground 8. A key circuit including source 31, key 30 and relay 29 is adapted to control the operation of the transmitter by varying the potential from source 26 and resistor 27. Resistor 28 is also included in this circuit. The key circuit in its entirety may be dispensed with, the circuit arrangements of tubes 1, 2, 3 and 4 being modified in any suitable manner for voice transmission.

In normal operation of the set, coil 5, condensers 32 and 33, and tube 4 are all at high potential. When source 14 is made inoperative these parts may retain a dangerous charge.

The operation of this system is such that with the transmitter in sending condition, should an operator open any of the doors the potentials to the anode of the tubes in that particular compartment will be removed and the anode circuit connected to ground, thus removing the charge before the door of the compartment is completely open. Thus the operator can touch the various parts of the circuit without possible injury. In this operation the contacts 9, 11 and 13 will open the field circuits of generators 15, and 14. The field circuit being interrupted, the supply of anode potential falls to zero. Any residual potential due to charges on condensers will then be removed by connecting the anode circuits to ground, which is accomplished by the closing of switch members 8, 10 and 12.

Contacts 9, 11 and 13 must operate before contacts 8, 10 and 12. The time delay may be effected in any suitable manner. The potentials involved in the control electrode circuits of the various amplifiers with possible exception of amplifier 4 are generally considered not dangerous to life, but if it is so desired another set of contacts may be controlled by the doors leading into the several compartments which will connect the control electrode circuits of the various amplifiers to ground. In this latter case still another set of contacts must be employed. These contacts should be normally closed when the doors are closed and open when the

doors are open. The contacts should be placed in the starter or control circuits of the negative potential supplied to the control electrode circuits in order to prevent injury to the sources of supply potential.

I realize that many modifications of my invention are possible without departing from the spirit of my invention. Any number of thermionic tubes may be employed associated with any suitable source of energy. Relay circuits and special design of switch members may be employed where necessary. It is to be understood that the embodiments of my invention are not to be restricted by the foregoing specification or by the accompanying drawing, but only by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a radio transmitter employing thermionic tubes, each having cathode, anode, and grid electrodes, an enclosure surrounding said thermionic tubes, a door in said enclosure permitting access thereto, a source of potential for the electrodes of said tubes comprising a generator having armature and field windings, a line switch controlled by the movements of said door and adapted to open the field circuit of said generator when said door is opened, a grounding switch controlled by the movements of said door and adapted to connect said electrodes to a point of substantially ground potential when said door is opened, and retarding means for delaying the closing of said grounding switch until after said field circuit is opened.

2. In a radio transmitter employing thermionic tubes, each having cathode, anode and grid electrodes, an enclosure surrounding said thermionic tubes, a door in said enclosure permitting access thereto, a source of potential for the electrodes of said tubes, a line switch controlled by the movements of said door and adapted to interrupt the application of potential to said electrodes from said source when said door is opened, a grounding switch controlled by the movements of said door and adapted to connect said electrodes to a point of substantially ground potential when said door is opened, and retarding means for delaying the closing of said grounding switch until after the interruption of the application of said potential from said source.

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