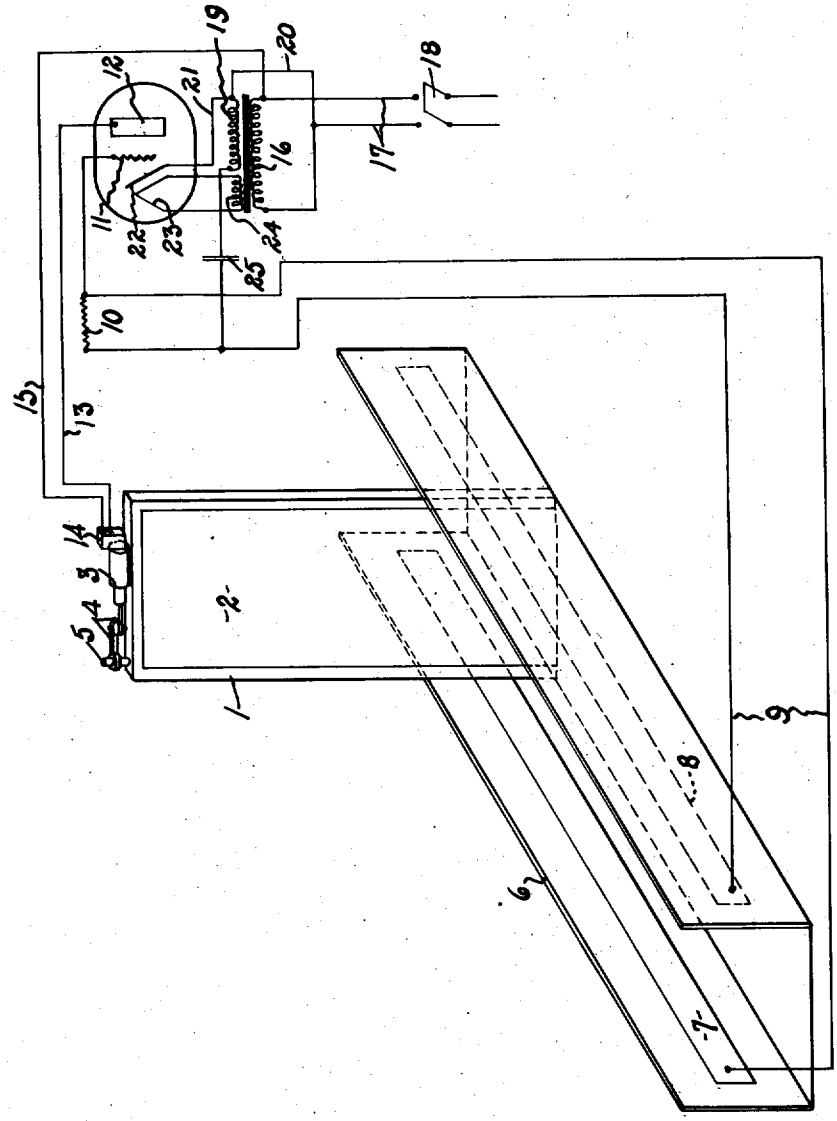
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DOOR OPERATOR

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DOOR OPERATOR

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This invention relates to improvements in automatic power operated door mechanisms.

The basic object of this invention is to provide a power operated door controlled by a device which is subject to changes in electrostatic capacity produced by the presence of a person's body in approaching the door.

The invention has many objects which will be more clearly understood from the following disclosure when taken in connection with the attached drawing.

This invention resides substantially in the combination, construction, arrangement and relative location of parts, all as will be more fully described in the following specification.

In the drawing the single figure is a diagrammatic view showing the combination of elements of this invention.

The arrangement is shown as applied to door operation, but it is, of course, apparent to those skilled in the art that the system is adapted for controlling and operating many forms of devices. There is shown in the drawing a door frame 1 in which a door 2 is mounted upon a vertical shaft 5 which may rotate about a fixed vertical axis. Supported over the door is a pneumatic motor 3 which is connected to the door shaft by the pivotally interconnected levers 4. This manner of operating doors and the interconnection of the parts is so very well known in so many forms that it is believed that the diagrammatic illustration is sufficient. It may be noted at this point as will be apparent to those skilled in the art, that although a pneumatic motor is disclosed any other form of power device may be equally well controlled and be employed for operating the door.

The walls 6 define the passageway leading to and from the doorway. Mounted upon these walls in any suitable manner are a pair of metal plates 7 and 8 which extend beyond the doors at both sides the necessary distance so that the door will have time to fully open by the time a moving pearson reaches it from either direction. These metal plates are connected by the wires 9 to a resistance 10. One terminal of this resistance is connected to the grid 11 of a thyratron vacuum device which is preferably of the mercury vapor type. The plate or anode 12 of the thyratron is connected by wire 13 to one terminal of the solenoid winding of an electromagnetic valve 14.

It is also here noted that the electromagnetic valve and its association with a pneumatic motor is very well known in the art. The other terminal of the solenoid winding of the electromagnetic valve is connected by wire 15 to one terminal of the primary 16 of a suitable transformer. The other terminal of the primary is connected by wire 20 to one terminal of the secondary 19 of the transformer and to the cathode 22 of the thermionic vacuum device. The primary of the transformer is energized through the power supply wires 17 and the switch 18. The other terminal of the secondary is connected through a condenser 25 to that wire 9 which connects to the opposite end of resistance 10 from that which is connected to the grid. 23 represents the usual heater for such devices energized by a suitably proportioned winding 24 which may likewise comprise a part of the secondary of the transformer.

Thermionic devices of this type are well known in the art. When switch 18 is closed the transformer is energized with the result that the heater 23 raises the temperature of the equi-potential cathode 22 to a point where it emits electrons. The usual potential is present upon the plate 12 but the flow of electrons from the cathode to the plate is interrupted by the fact that there is present a charge on the grid which blocks their flow.

It will be noted that the grid circuit of the vacuum device includes the resistance 10, the inductance of the secondary 19, the condenser 25 and the condenser provided by the separated plates 7 and 8. The resistance, inductance and capacity of the grid circuit are so proportioned that when there is no one between or near the plates 7 and 8 the potential of the grid 11 is such as to substantially completely block the passage of electrons from the cathode to the anode. However, as soon as a person initially moves between the plates 7 and 8 in approaching the door the capacity of the grid circuit is changed, causing a phase shift whereby the grid no longer acts to block the flow of electrons to the plate and the device is set in operation. The result is that a current flows in the plate circuit of the vacuum device which includes the electromagnetic valve. The electromagnetic valve therefore operates to supply compressed air to the engine 3 so that the door opens. As soon as the person passes beyond the range of the condenser plates 7 and 8 the phase of the grid circuit shifts back to normal and a blocking charge is applied to the grid. The flow of current in the plate circuit immediately stops and the magnet valve returns to normal position, cutting off the supply of fluid pressure so that the engine closes the door. It may be noted here that the engine illustrated is of the differential type where

fluid pressure is always present in the smaller cylinder and the engine is moved back and forth by supplying compressed air to and exhausting it from the larger cylinder. This is likewise very well known in the art. It is apparent that the standard type of engine may be employed, in which case the magnet valve is modified in accordance with well known principles so as to alternately supply fluid pressure to opposite ends of the engine and to exhaust fluid pressure from the other end. As noted above, this arrangement could equally well control an electric motor for operating the door.

The above described operation of the thermionic device is a description of the operation of that well known form of device which operates with what is popularly termed "trigger action". No current flows in the plate circuit until the potential on the grid falls below a certain value when the device immediately goes into action and continues to operate until the potential on the grid is raised to a point completely blocking the plate circuit.

From the above description it will be apparent that this invention resides in certain principles of construction and operation which may be embodied by those skilled in the art in other forms without departure from the scope thereof. I do not, therefore, desire to be strictly limited to this disclosure, but rather to the appended claims.

What I seek to secure by United States Letters Patent is:

1. A door operating system as described comprising a movably supported door, power means connected to the door for moving it and control means for said power means including a pair of elongated electrified metal electrodes having an electric field therebetween mounted in the passage and extending to the door, whereby a person approaching the door and into the electrode field actuates the control means, said electrodes being of sufficient length so that the door is fully open when the person reaches it.

2. A door operating system as described comprising a movably supported door, power means connected to the door for moving it and control means for said power means including a pair of elongated electrified metal electrodes having an electrostatic field therebetween mounted in the passage and extending to the door on each side thereof, whereby a person approaching the door and into the electrode field actuates the control means, said electrodes being of sufficient length so that the door is fully open when the person reaches it.

3. A door operating system as described comprising a movably supported door, a power device connected to the door for moving it to open and closed position, control means for the power device, and means including a pair of elongated metal plates mounted in the door passageway for creating an electrical field and connected to the control means, whereby the presence of a person in the passageway causes the door to open and remain open, the plates being of a length and positioned with respect to the door so that the door is fully open when the person reaches it.

4. A door operating system as described comprising a movably supported door, a power device connected to the door for moving it to open and closed position, control means for the power device having a balanced control circuit and a pair of metal plates extending from the door in the passageway thereof and connected to the balanced circuit so as to form an electric field therebetween, whereby a person approaching the door unbalances said circuit causing the door to be fully opened by the time he reaches it and to remain open as long as his presence in the passageway maintains the circuit unbalanced.

EDWARD G. PARVIN.