

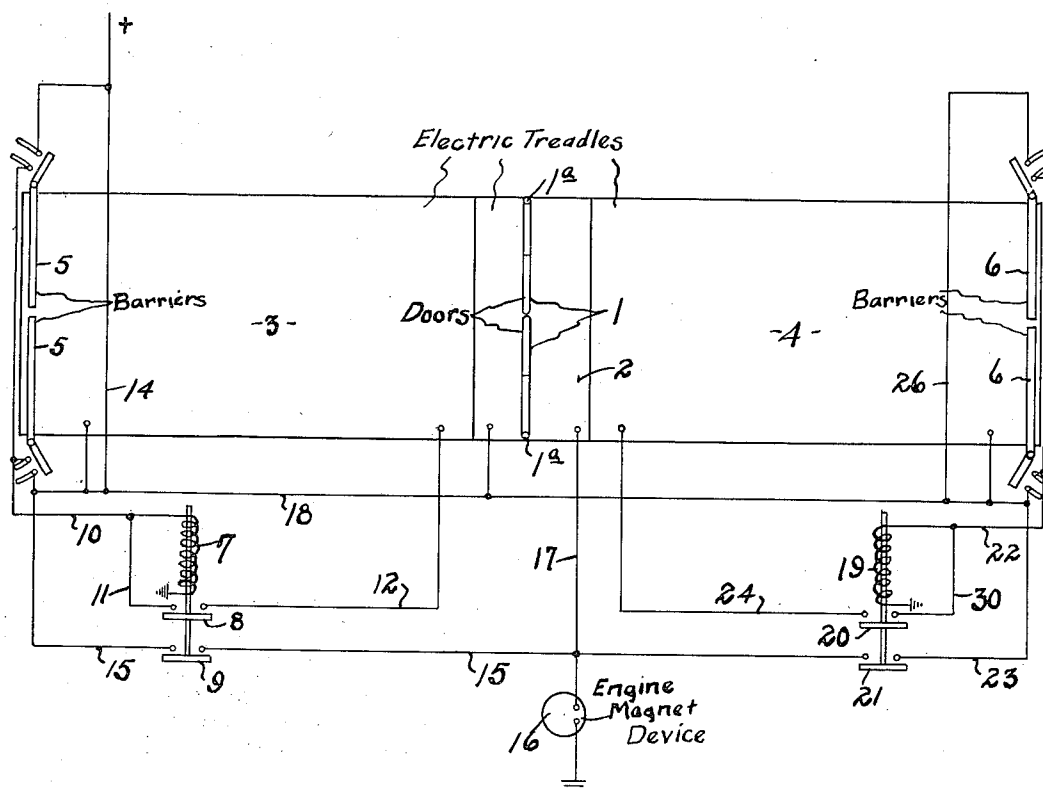
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MULTIPLE UNIT TREADLE DOOR CONTROL APPARATUS

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## MULTIPLE UNIT TREADLE DOOR CONTROL APPARATUS

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4 Claims. (Cl. 268—34)

This invention relates in general to improvements in power-operated doors which are controlled by means of a multiple unit treadle.

The basic object of this invention is to provide a power operated door system in which the power mechanism is controlled by a plurality of treadles arranged so that a person intending to pass through the doors will unconsciously set the parts in motion so that by the time he reaches the doors they will be open, and having passed through them they will immediately close.

The many objects of this invention which are successfully secured by means of the apparatus herein described will be apparent as the description proceeds.

This invention resides substantially in the combination, construction, arrangement and relative location of parts, all as will be set forth below.

In the drawing,

The single figure is a diagrammatic illustration of the apparatus as associated to provide this invention.

At the present time it is common practice to provide power actuated doors for buildings, offices, railway stations, vehicles and the like. In the usual forms of such equipment as now employed, the apparatus being arranged for operation by persons approaching the doors from either side, there is an undesirably long period during which the doors remain open after the person has passed therethrough. This is obviously a disadvantage from many viewpoints and particularly in the case where the doors close off a heated space such as a room from a colder space such as outdoors, a train shed, or the like.

Likewise the power consumption is increased and the strain on the apparatus is increased if it is energized or held in operated position longer than is absolutely necessary for the equipment to accomplish its intended functions. The basic object of this invention is to so arrange the apparatus that as soon as a person has passed through the doors they may begin to close, thereby materially reducing the time period during which the doors are open.

This object is accomplished in accordance with the present invention by means of the mechanism which will now be described.

The doors are diagrammatically illustrated at 1, and as illustrated are of the double-leaf folding type. These doors are secured to vertical door shafts 1' at opposite sides of the doorway which are rotated by means of any suitable form of engine, causing the doors to swing open and the leaved sections to fold back upon the other sec-

tions. This type of door is of course well known in the art. For the purpose of illustrating one feature of this invention, it will be assumed that the door sections swing to the right (the figure being a diagrammatic plan view). For this reason the central treadle 2 is positioned so that it is more exposed to the right of the doors than to the left, so as to allow for the fact that the doors will not begin to close so soon after the person has passed through them in moving from the left to the right as to be likely to strike the person before he has moved out of their range. Obviously, when a person is moving from the right to left the doors may begin to close more quickly since they are following him and not moving towards him in the case of reverse direction of travel of the person. Contiguous to, and lying at each side of the treadle 2, are the longer treadles 3 and 4.

The treadles may be of any one of a large number of forms of treadle construction known in the art, and are preferably, but not necessarily, of the electric type. The apparatus as illustrated in the drawing is of the electric treadle type in which when the treadle is stepped upon an electric switch in a control circuit is closed, and held closed until the pressure is removed from the treadle. Thus the three treadles 2, 3 and 4 are arranged in line in the passageway to the door at both sides thereof, as illustrated in the drawing. The switches operated by these treadles are illustrated in the drawing in the form of two contacts for each treadle as clearly shown. Rotatably supported adjacent each end of the treadle path of the doors are the barriers 5—5 and 6—6 which may be in the form of arms, gates, or the like pivoted so as to swing on a vertical axis. These barriers are provided with extensions as shown, each of which cooperates with a pair of fixed contacts. The showing in the drawing is merely diagrammatic since any suitable form of switch may be employed for each section which will be closed when the barrier begins to move towards the doors and will remain closed until the barriers have swung back, almost to the closed position illustrated. A relay is shown comprising a solenoid winding 7 and a pair of contact discs 8 and 9 operated thereby. One terminal of the winding is grounded and the other terminal is connected by a wire 10 to one contact of each of the barrier switches. Wire 10 is connected by wire 11 to one of the fixed contacts controlled by the contact disc 8. The corresponding contact is connected by wire 12 to one of the contacts of the switch operated by treadle 3. The other contact of this switch is connected by wire 13 to one contact of

the switch of treadle 2, and to one contact of the switch of treadle 4.

Wire 18 is also connected to one of the contacts of each of the barrier switches operated by the barriers 6—6. Wire 18 is also connected to the other contact of the barrier switches operated by the barriers 5 by means of wire 14 which also connects to one of the contacts controlled by the contact disc 9. At the other end of the apparatus wire 18 is connected by wire 23 to the other contact of each of the barrier switches controlled by the barriers 6—6, and to one of the contacts controlled by contact disc 21. The other fixed contacts controlled by the discs 9 and 21 are connected by the wire 15 which in turn is connected by the wire 17 to one terminal of the winding of the magnet valve 16, and which wire is also connected to the other contact of the switch operated by treadle 2. The other contact of the winding in the magnet valve is grounded. The contact discs 20 and 21 are operated by the grounded solenoid winding 19 which is connected at its other terminal by wire 22 to one of the contacts of each of the barrier switches operated by the barriers 6—6. Wire 22 is connected by wire 30 to one of the contacts controlled by the contact disc 20. The corresponding contact is connected by wire 24 to the other contact of the switch operated by barrier 4. The wire 14 is connected to the positive side of a current source, the other terminal of which is grounded.

The magnet valve may be of any of a number of well known forms. Basically it consists of a valve which normally assumes one position, and which when the solenoid winding thereof is energized, assumes another position. This valve in normal position supplies fluid pressure to the engine which operates the doors, so as to close them and maintain them closed. In its other position when the winding is energized it supplies air to the engine to open the doors. This device may also be any suitable type of electromagnetically operated control device.

In describing the operation of the apparatus it will be assumed that a person approaches the doors from the left hand end of the figure. In approaching the doors he first moves the barriers 5 in the direction he is going, closing one or both of the associated barrier switches. The current then flows from the positive side of the current source through either or both of the barrier switches to wire 10, and thence to ground through the solenoid winding 7. The energization of this winding pulls the discs 8 and 9 to a position to interconnect the corresponding contacts. In the meantime the person has stepped on the treadle 3, closing its switch. Current then flows from the positive side of the current source through wire 14, wire 18 to switch of treadle 3, wire 12, contact disc 8, wire 11 and solenoid winding 7 to ground. This supplies a holding circuit for the winding 7. The operation of the barrier switches also supplies current from wire 14 through contact disc 9, wire 15, wire 17, winding of magnet valve 16, and continues to ground.

The establishment of the holding circuit for the winding 7 maintains the circuit to the magnet valve winding. Operation of the magnet valve supplies fluid pressure to the door engine so that the doors begin to open. By the time the person reaches the doors they are fully open. As he steps on treadle 2 its switch is closed and current is then directly supplied from wire 14 through wire 18, the switch of treadle 2, wire 17, and thence to ground through the winding of the

magnet valve 16. Thus even though the person has now left treadle 3 the doors will be held open because the switch of treadle 2 is closed.

The person having left treadle 3, the holding circuit to the winding 7 is broken, and hence the circuit to the magnet valve through wire 15 is broken. As soon as the person leaves treadle 2 the circuit to the magnet valve is broken so that the engine begins to close the doors. As pointed out above, the treadle 2 projects somewhat further beyond the right side of the doors than it does the left, it having been assumed that the doors open to the right. The purpose of this is to permit the person to fully move out of the range of the doors before they begin to close. The person leaving treadle 2 and stepping on treadle 4 does not complete any circuits since when the barriers 6—6 are displaced by a person moving to the right the corresponding switches are not closed.

It will not be necessary to describe the operation of the apparatus by a person approaching the doors from the right since a similar sequence of operations occurs when solenoid 19 is energized.

From the above description it will be apparent that this invention resides in certain principles of construction and operation which may be embodied in other physical forms without departure from the scope of this invention. I do not, therefore, desire to be strictly limited to the disclosure as given for purposes of illustration, but rather to the scope of the appended claims.

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

1. In a motor operated door system, the combination comprising a pair of doors, a treadle supported under the doors, at least one treadle supported in the door passageway adjacent the ends of the first mentioned treadle, each of said treadles having a switch which is closed when the treadle is stepped upon, barriers supported adjacent the ends of the terminal treadles, switches controlled by said barriers, a motor magnet valve, and circuit means including all of said switches and said magnet valve whereby the displacement of either barrier only towards the doors and the closing of any treadle switches will cause the energization of the magnet valve, the magnet valve being deenergized when a person passing through the doors in either direction leaves the central treadle.

2. In a motor operated door system the combination comprising a motor control valve, a plurality of independent treadles in the passageway at both sides of the door, switches operated by said treadles, circuit including said switches and said magnet valve, and barrier switches operated only by a person approaching the doors from either side to initially energize the magnet valve, the magnet valve being maintained energized by the closing of the treadle switches until the person passes through the door.

3. In a motor operated door system the combination comprising a movable door, a central treadle supported thereunder, at least one additional treadle mounted on each side of the central treadle, switches controlled by each of said treadles, a movable barrier supported at the end of each treadle, switches controlled thereby and a magnetically operated motor control device interconnected with all of said switches whereby displacement of either barrier only by movement towards the door and depression of the adjacent treadle energizes the magnet device to cause the doors to fully open, said magnet device remaining ener-

gized until a person passing through the doors leaves the central treadle.

4. In a motor operated door system the combination comprising a door, a plurality of separate  
5 treadles mounted in the passageway on either side of the door to form a continuous gangway, one of said treadles being mounted below the door, a switch controlled by each treadle, barriers supported at the ends of the treadles, switches oper-

ated by said barriers, an electro-magnetically operated motor valve, and circuits including all of said switches and said magnet valve including relays whereby the displacement of either barrier only by movement towards the door energizes a  
5 corresponding relay to complete the circuit to the magnet valve and the closing of the treadle switches maintains the circuit to the relay.

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