March 27, 1934. L. N. HAMPTON ET AL 1,952,859

PNEUMATIC RECEIVING VALVE

Filed Aug. 11, 1932 3 Sheets-Sheet 1

FIG. 1

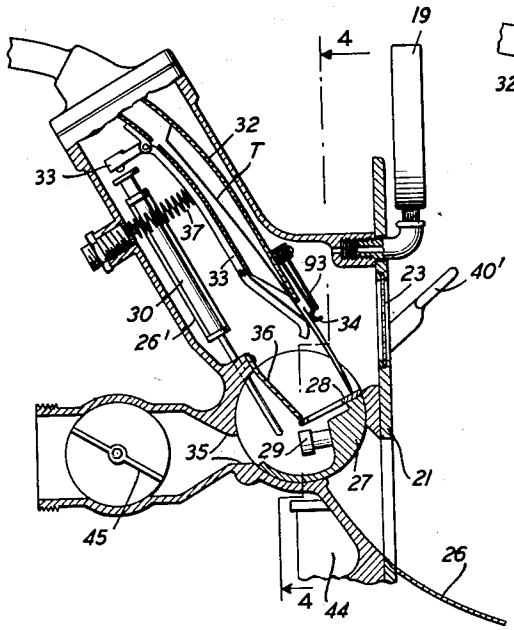

FIG. 2

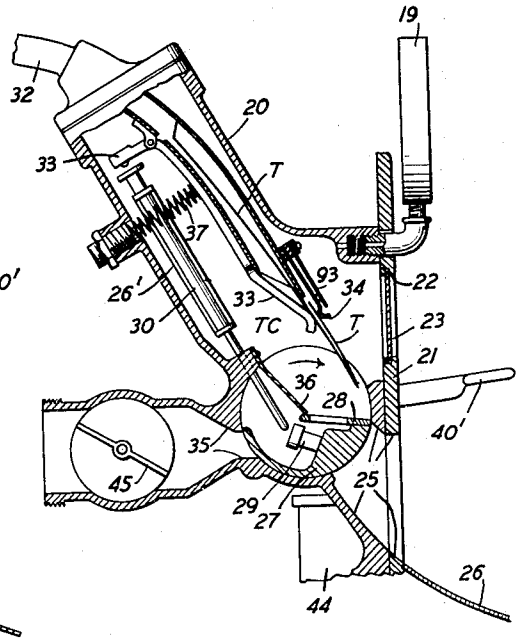

FIG. 4

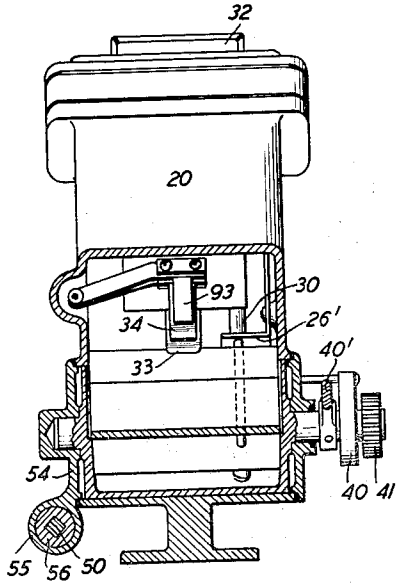

FIG. 3

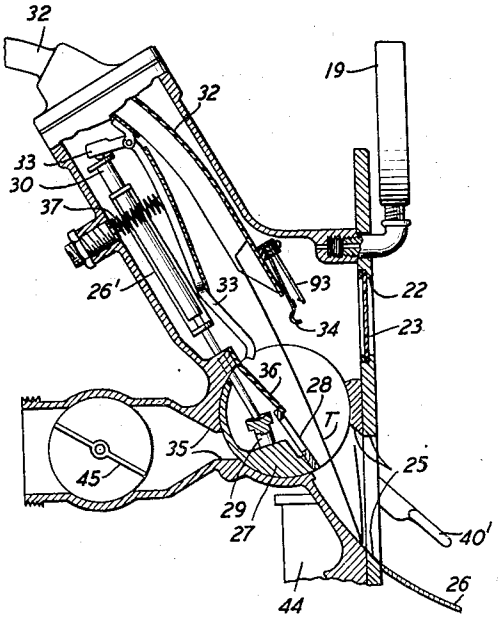

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FIG. 5

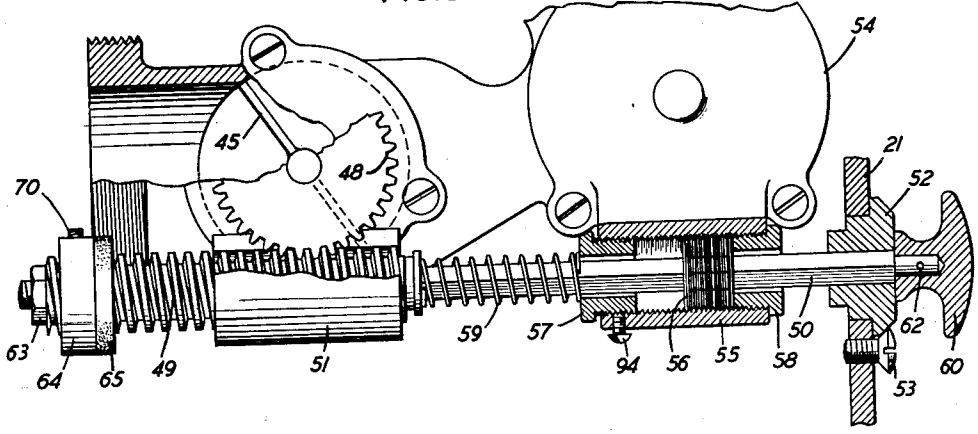

FIG. 6

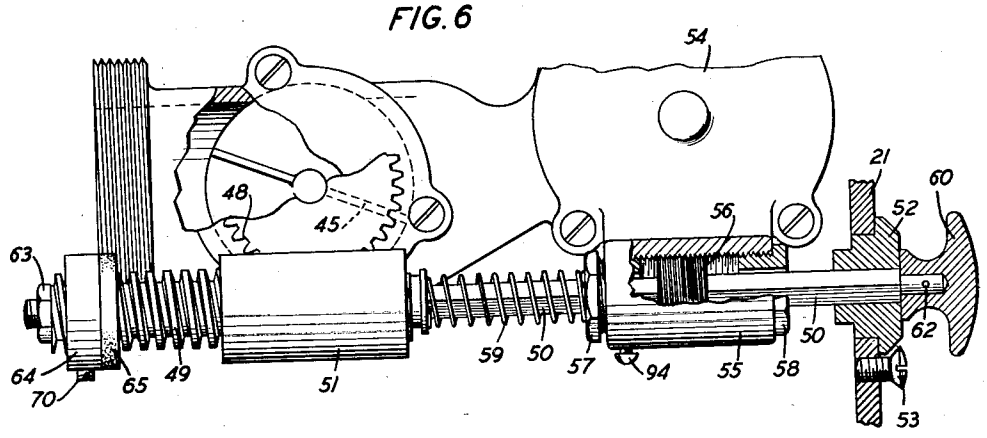

FIG. 7

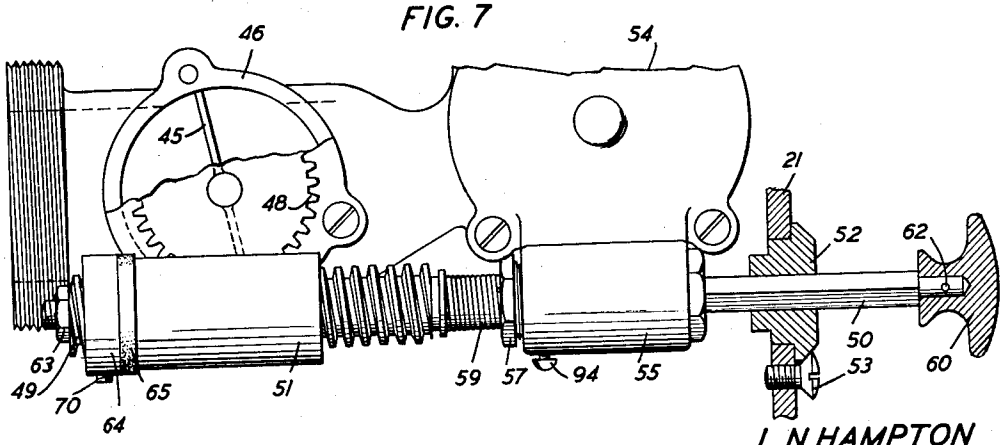

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FIG 8

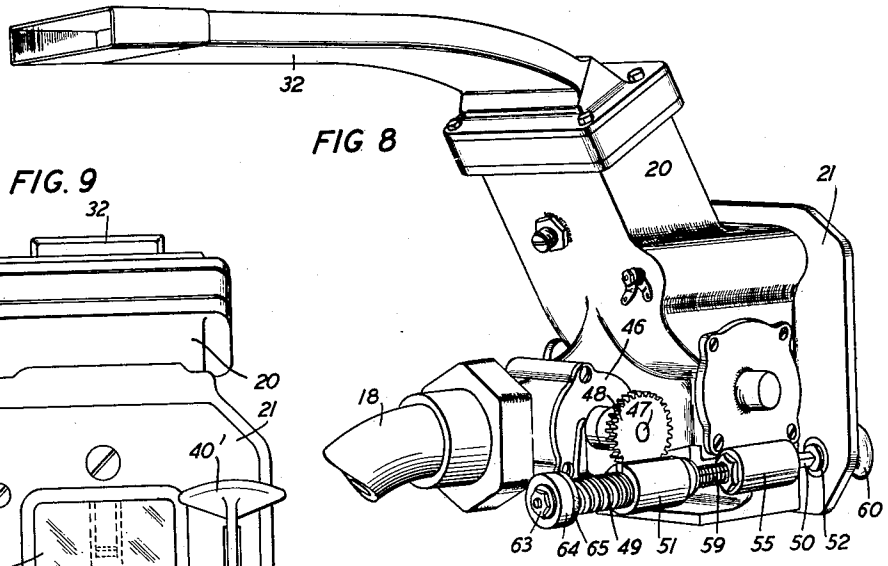


FIG. 9

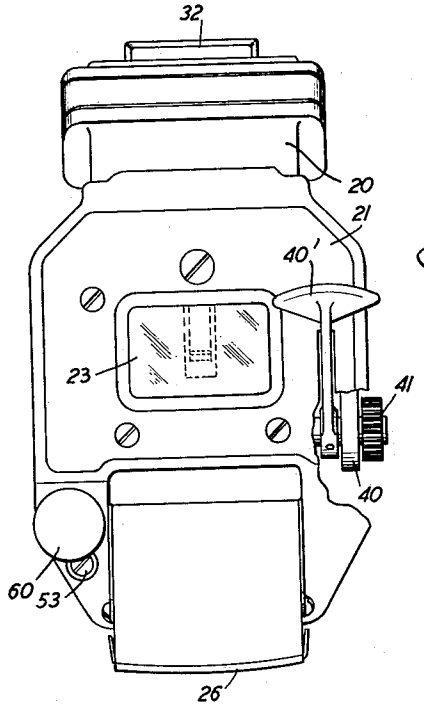


FIG. 10

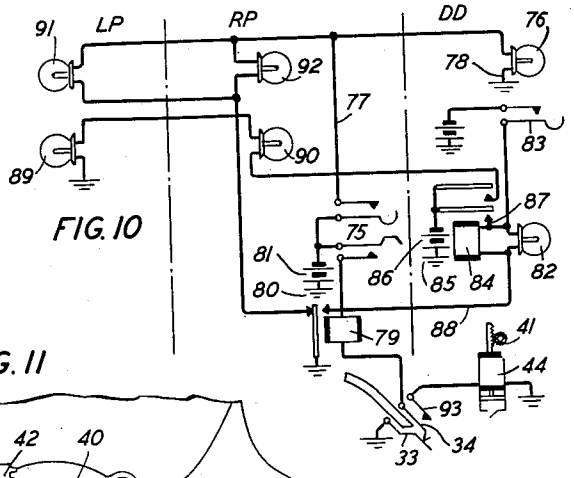
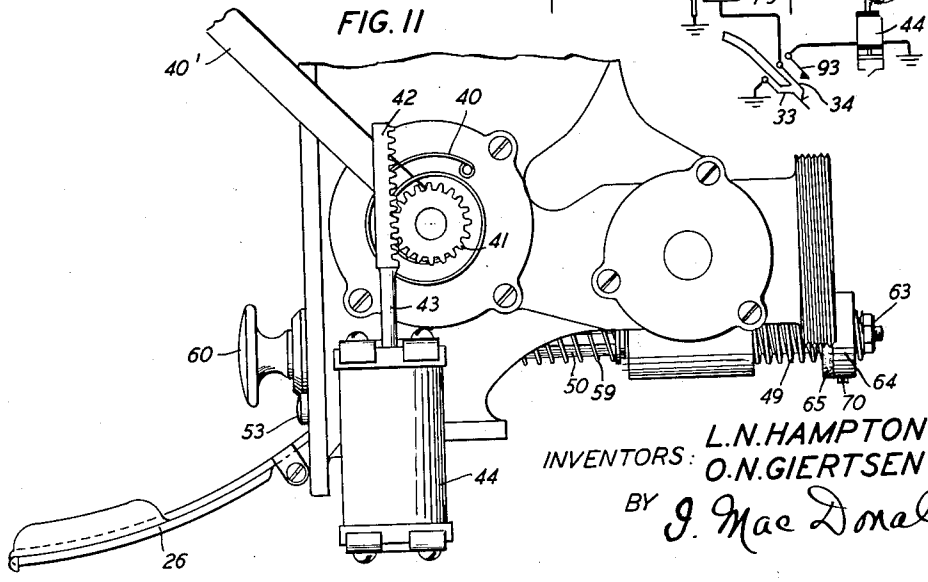


FIG. 11



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1,952,859

UNITED STATES PATENT OFFICE

1,952,859

PNEUMATIC RECEIVING VALVE

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Application August 11, 1932, Serial No. 628,378

9 Claims. (Cl. 302—2)

This invention relates to pneumatic conveying systems and particularly to receiving valves used in connection with pneumatic conveying systems of the type used in telephone exchanges or the like for handling toll tickets.

The object of this invention is to improve the operation and construction of such a valve.

According to this invention a casing which forms the ticket receiving chamber is provided with an exhaust conduit and a chute opening for the delivery of the ticket. In this casing is mounted a rotatable member of segmental cross section, which is operable manually upon the movement of a handle lever or by a motor preferably in the form of a solenoid for opening or closing the exhaust conduit and the chute. Contact members which are arranged to be opened by the passing of the ticket therebetween cause the operation of the solenoid and signaling devices which are provided for indicating that a ticket has been received in the ticket receiving chamber. The operation of the rotatable member either manually or through the operation of the solenoid is effective to operate one of the contact springs for releasing the ticket which is held therebetween to permit it to fall in the chute in the bottom of the casing. The rotatable member when in normal position cooperates with the spring members to stop the motion of the ticket at the front of a window where when the valve is manually operated it may be visually observed by the operator and a mechanism in the form of a two-way movable rod is provided for adjustably controlling the vacuum in the system and for causing air impulses therein whenever a ticket is stopped while in transit in the tube, thus facilitating the movement of the ticket and thereby its arrival at the receiving valve.

Fig. 1 is a central longitudinal sectional view of the receiving valve partially in section showing a ticket in the receiving chamber;

Fig. 2 is a sectional view showing the rotary member closing the exhaust outlet;

Fig. 3 is a sectional view showing the rotary member, the chute and the springs operated for the release and delivery of the ticket;

Fig. 4 is a cross-sectional view of the valve taken approximately on the line 4—4 of Fig. 1;

Fig. 5 is a partial side view of the valve showing the exhaust vane adjusting mechanism with the vane in its closed position;

Fig. 6 is a partial side view showing the exhaust valve in its operated position;

Fig. 7 is another partial view of the exhaust valve showing the position reached by the vane when actuated by the axial movement of its operating rod;

Fig. 8 is a perspective assembly view;

Fig. 9 is a front view;

Fig. 10 is a diagrammatical view of a circuit controlled by the operation of the contact springs by the ticket; and

Fig. 11 is a partial view showing the rotary valve operating mechanism.

In the drawings, 20 represents a casing which cooperates with a front plate 21 secured thereto to form a ticket receiving chamber TC. In the plate 21 there is provided an opening 22 fitted with a glass plate 23 provided to permit the visual observation of the ticket from outside the casing. Casing 20 and the plate 21 are provided with registering apertures 25 at their lower ends and to the front plate is secured a chute 26 on which the ticket T is delivered as will be hereinafter described in detail and a gauge 19 is provided for indicating the vacuum in the air receiving chamber.

In casing 20 is pivotally mounted a crescent-shaped valve 27 which carries an apertured plate 28, the free edge of which extends substantially to the center of rotation of the valve 27 and when this valve is in normal position the plate occupies a position as indicated in Fig. 1 and serves as stop for the ticket T upon the arrival of this ticket in the casing 20. Another plate 36 which is secured to the casing extends in contacting relation with the free edge of plate 28 and forms an air path leading through the aperture of plate 28 and hence through an exhaust conduit 35 to which the exhaust pipe 18 is connected.

The valve 27 carries a stud 29 disposed in engageable relation with an axially movable rod 30 mounted in a bracket 26′ secured on the casing 20 as shown in Figs. 1, 2, 3 and 4. This rod in turn is disposed in engageable relation with a right-angled lever 33 pivotally mounted on the end of a pneumatic tube 32 projecting into the casing 20. This lever normally engages a contact spring 34 mounted on the end of tube 32 under the tension of a spring 37 for frictionally retarding the movement of the ticket prior to its engagement with the stop offered by the plate 28.

The disengagement of lever 33 from spring 34 by the passing of the ticket therebetween is effective to control the operation of a signaling circuit shown diagrammatically in Fig. 10 and to cause the operation of a motor magnet in the form of solenoid 44 for actuating the valve

27 in a manner that will be hereinafter described in detail.

On one of the pivots of valve 27 there is mounted a handle lever 40' shown in Figs. 1, 2, 3, 4 and 11 for manually operating the member 27 and a gear 41, the latter operatively engaging a gear rack 42 carried by the plunger 43 of solenoid 44. The energization of the solenoid through the closing of springs 34 and 93 by the ticket is effective to rotate the valve 27 from the position shown in Fig. 1 to the position shown in Fig. 3 for closing the exhaust conduit 35, opening the chute 25 and operating the lever member 33 against the resistance of spring 37 for releasing the ticket in order to permit it to fall by gravity on the chute 26 aided by the air pressure which is built up in the ticket chamber upon the closure of exhaust conduit 35. The return movement of valve 27 to normally unoperated position is effected by the spring 40 under control of an ordinary dash-pot arrangement shown diagrammatically in Fig. 10 combined with the solenoid 44.

In the exhaust conduit 35 there is pivotally mounted a vane 45 having one of its pivots 47 shown in Fig. 8 extending through a bearing plate 46 for mounting a gear 48. This gear is disposed in operable relation with a worm screw 49 secured on a shaft 50 of square cross shown in Figs. 5, 6, 7, 8 and 9. Worm screw 49 is rotatably mounted in a sleeve 51 formed with the bearing plate 46 and supports the shaft 50 at that end, the front end of shaft 50 being supported by a bushing 52 in turn rotatably mounted in the plate 21 which may be secured against rotary movement therein by a set screw 53 also engaging the plate 21.

Integrally formed with the bearing plate 54 of valve 27 there is provided a sleeve 55 which is interiorly screw-threaded, as shown in Figs. 5 and 6, to receive a similarly screw-threaded plug 56. This plug is fitted over the square shaft 50 and is rotated thereby for moving it in axial direction against oppositely disposed stops in the form of plugs 57 and 58 which are provided for limiting the axial movement of the plug 56 and thereby the rotation of shaft 50 and worm screw 49 carried thereby in either clockwise and counter-clockwise direction for controlling the position of vane 45 in the exhaust conduit 35, the plug 57 being secured in adjusted position by a set screw 94.

A longitudinal movement of shaft 50 against the resistance of a retracting spring 59 from the position shown in Fig. 5 to the position shown in Fig. 7 is effective to impart an angular movement to gear 48 and the vane 45 carried thereby for causing sudden air impulses in the pneumatic tube whenever a ticket is stopped in the tube for forcing it into the valve receiving chamber. The operation of rod 50 is effected by a knob 60 secured to the front end of this rod by a pin 62. A nut screw 63 engages the opposite end of shaft 50 for holding the worm screw 49 in adjusted position thereon and the spring 59 abutting against one end of the worm screw and the stop plug 57 is provided for returning the rod 50 and the vane actuating mechanism to normal after each axial movement of this rod, which movement is limited by a felt ring 65 and a metallic ring 64, the latter threadedly engaging the worm 49 and held in adjusted position thereon by a set screw 70.

The signaling circuit controlled by the operation of lever 33 and spring 34 upon the engagement of these contact members by the ticket generally consists of three sections, namely, the ticket distributing desk DD and the so-called left position LP and right position RP serving the valve placed in another room from that of the distributing desk DD.

In the operation of this circuit either one of the operators at the left or right position first operates the switch key 75 to close a circuit for lamp 76 placed at the distributing desk. This circuit extends from ground 80, battery 81 connected to the key, the wire 77, the lamp 76, the wire 78 to ground. The operation of lamp 76 indicates to the distributing operator that tickets may be sent. The closure of key 75 also energizes magnet 79 through ground 80, battery 81, the key 75, the closure of lever 33 with spring 34 to ground on lever 33. Magnet 79 attracts its armature and prepares a circuit for lamp 82 also placed at the distributing desk. The operator at the distributing desk DD before sending a ticket operates the key 83 and thereby causes the operation of lamp 82 and simultaneously the energization of magnet 84 which keeps the lamp 82 operated after the release of key 83 through ground 85, battery 86, the closure of armature of magnet 84 with contact 87, the lamp 82, wire 88, to the front contact of armature of magnet 79 to ground. The energization of magnet 84 also causes the operation of lamps 89 and 90 for indicating to the left and right operators that a ticket is in the tube. Upon the arrival of the ticket in the receiving chamber, the opening of the contact of lever 33 and spring 34, causes the deenergization of magnet 79 which releases its armature for operating the lamps 91 and 92 for indicating to the operators of the left and right position that this ticket has reached the valve, and simultaneously causes the operation of the solenoid 44 through the closure of spring 34 with contact 93. The operation of solenoid 44 is effective to rotate the valve 27 for closing the exhaust conduit 35, and operating the lever 33 for releasing the ticket which then falls by gravity in the chute 26, aided by the air pressure which is built up in the receiving chamber as above described. However, should a ticket be stuck in the pneumatic tube, the lamp 82 at the distributing desk and lamps 89 and 90 at the right and left positions will be kept in operation. The distributing desk through the operation of lamp 82 is informed not to send more tickets in the tube and the operators at the left and right positions through the operation of lamps 89 and 90 are informed that a ticket is stuck in the pneumatic tube and that the rod 50 should be operated. The reciprocation of rod 50 from the position shown in Fig. 5 to the position shown in Fig. 7 is effective to impart axial movements to the worm 49 and thereby angular movements to the gear 48 and the vane 45 for causing sudden air impulses in the pneumatic tube and thus forcing the ticket into the receiving chamber. It is to be noted that the axial movement of rod 50 is ineffective to disturb the adjustment of vane 45 and thereby the adjusted flow of air in the tube which adjustment as above described is effected by the rotation of rod 50 which is then set in such a position by the screw 53 engaging the front plate 21, the maximum adjusting angular movement of vane 45 being limited by the movement of plug 56 to and from the stop plugs 57 and 58 as above described.

The forcing of this ticket into the receiving chamber TC so as to break the contact between

the lever 33 and spring 34 as above described, causes the deenergization of magnets 79 and 84 for extinguishing the lamps 89 and 90 and 82 and simultaneously causing the operation of lamps 91 and 92. The engagement of spring 34 with contact 93 upon the passing of the ticket between the lever 33 and spring 34 closes the energizing circuit of solenoid 44 and thereby actuates the valve 37 into the position shown in Fig. 3. The springs 34 and 93 are caused to open upon the movement of lever 33 actuated by the rod 30 when this rod is engaged by the stud 29 carried by valve 27 thus deenergizing the magnet 44 to permit the return of the valve 27 to normal by the spring 40 under control of the dash-pot arrangement and permit the reengagement of lever 33 with spring 34 to prepare the circuit for a subsequent operation.

What is claimed is:

1. In a pneumatic receiving valve for ticket distribution systems, a casing forming a ticket receiving chamber and having an exhaust conduit and a chute for the ticket, a member mounted in said casing for controlling the opening and closing of said conduit, and said chute, and means for operating said member, said member in one of its movements closing said conduit prior to the opening of said chute.

2. In a pneumatic valve for ticket distribution systems, a casing forming a ticket receiving chamber, a chute and an exhaust conduit coextensive from said chamber, a rotatable member mounted in said casing and normally closing said chute, a plate carried by said member having one of its edges extending toward the revolution center of said member and serving as a stop for the ticket, and means for operating said member to open said chute for releasing the ticket from said receiving chamber and closing said conduit prior to the opening of said chute.

3. In a pneumatic valve for ticket distribution systems, a casing forming a ticket receiving chamber and having an inlet and an exhaust conduit, a rotatable member mounted in said casing for controlling the opening and closing of said exhaust conduit, a plate carried by said member having one of its edges extending toward the center of revolution of said member and serving as a stop for the ticket when said member is in normal position, and means for actuating said member for closing said exhaust conduit and releasing the ticket.

4. In a pneumatic valve for ticket distribution systems, a casing having a chute opening and an exhaust conduit, said casing forming a ticket receiving chamber, a rotary member mounted in said casing and normally opening said exhaust conduit and closing said chute, an apertured plate carried by said member for stopping the ticket and serving to form an air path from said chamber to said exhaust conduit, and means for operating said member for closing said exhaust conduit and opening said chute for releasing the ticket from said chamber.

5. A pneumatic valve for ticket distribution systems comprising a casing forming a ticket receiving chamber and having a chute opening and an exhaust conduit, a movable member in said casing for controlling the opening and closure of said chute and said exhaust conduit, a pair of normally closed spring members in said casing arranged to stop the ticket in said chamber, means for operating said rotatable member, and means actuated by the movement of said rotatable member for actuating said springs for releasing said ticket upon a predetermined movement of said rotatable member.

6. A pneumatic valve for ticket distribution systems comprising a casing having a chute and an exhaust conduit, a member movable in said casing for controlling the opening and closure of said chute and said exhaust conduit, and a vane in said exhaust conduit for controlling the flow of air through said chamber.

7. A pneumatic valve for ticket distribution systems comprising a casing forming a ticket receiving chamber and an air conduit coextensive from said casing, an adjustable vane for controlling the flow of air through said conduit, and a member operable in directions at right angles to each other for rotating said vane, the movement of the latter in one direction causing air impulses in said conduit and in the other direction adjusting the position of said vane in said conduit.

8. A pneumatic valve for ticket distribution systems, comprising a casing forming a ticket receiving chamber and having an air exhaust conduit, an adjustable vane rotatably mounted in said casing for controlling the flow of air through said chamber, a mechanism for actuating said vane, said mechanism including a shaft for supporting said vane, one end of said shaft extending outward from said casing, a gear mounted on said shaft, a worm disposed in engaged relation with said gear, and a two-way movable rod for rotating said gear to impart movements to said vane.

9. A pneumatic valve for ticket distribution systems comprising a casing forming a ticket receiving chamber and having an air exhaust conduit, an adjustable vane rotatably mounted in said casing for controlling the flow of air through said chamber, a mechanism for actuating said vane, said mechanism including a shaft for supporting said vane, one end of said shaft extending outward from said casing, a gear mounted on said shaft, a worm screw disposed in engaged relation with said gear, a rotary and axial movable rod for rotating said gear to impart movements to said vane, and means for predetermining the angular and axial movements of said rod.

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