

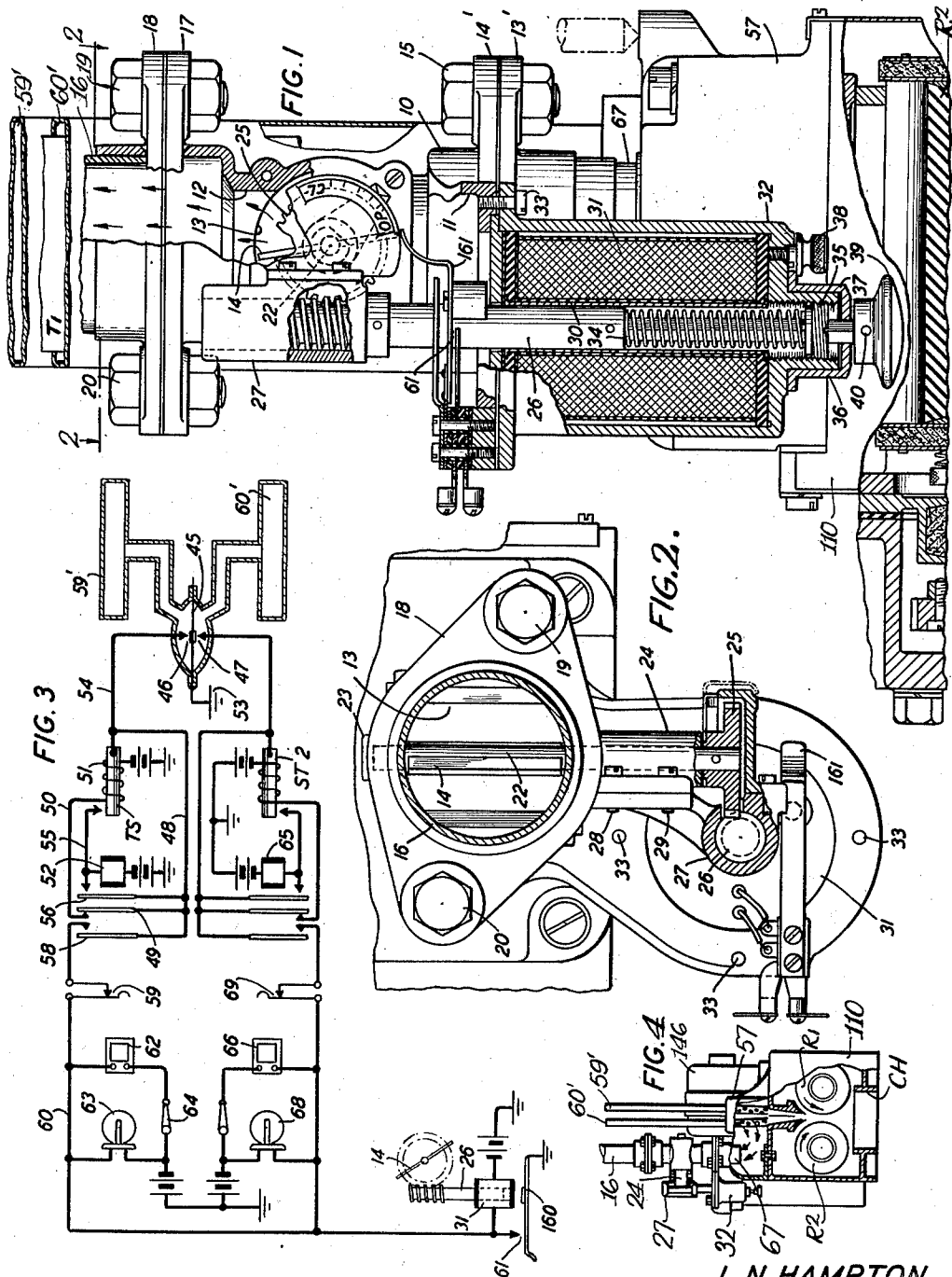
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L. N. HAMPTON ET AL

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PNEUMATIC TICKET DISTRIBUTING SYSTEM

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PNEUMATIC TICKET DISTRIBUTING
SYSTEM

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This invention relates to ticket distributing systems and more particularly to pneumatic ticket receiving valves of the type used in ticket distributing systems in telephone exchanges and the like.

The ticket receiving valve with which the invention is particularly well adapted for use is disclosed in Patent 1,982,805 to L. N. Hampton et al. dated December 4, 1934. In this ticket receiving valve, ticket carrying tubes intersect in a casing adjacent the contacting surface of two rollers between which the tickets pass for delivery into a chute to be received by the operator. The ends of the sending tubes are perforated for permitting the air to pass into a common tube having one of its ends connected with the roller casing and its other end connected to an exhaust-er provided for generating a current of air in the ticket sending tubes for propelling the tickets therein from so-called ticket sending valves to the ticket receiving valve with a cut-off valve connected to the common tube for controlling the air flow and thereby the traveling speed of the tickets in the sending tubes, a handle being provided for independently operating the air cut-off valve for causing air impulses in the ticket sending tubes when a blockade of tickets occurs in one of the tubes so as to force such tickets into the casing to be delivered through the action of the rollers.

A blockade of tickets is indicated by an alarm arrangement comprising a pneumatic gauge which is balanced to normal ticket tube operating pressure so that when a blockade develops the pressure balance is disturbed and this causes the energization of the alarm circuit. When the alarm indicates a blockade, as by the operation of an ordinary ringer, the maintenance man proceeds to the frame on which the blockade alarm relays are mounted in order to ascertain which of the tubes is obstructed. He then proceeds to the receiving valve to which the blocked tube is connected and moves the cut-off valve to its closed position so as to prevent the flow of air through these tubes and thereby preventing further insertion of tickets in the sending tubes. Considerable time, however, is required by this procedure and frequently a great number of tickets are dispatched during the delay between the ringing of the alarm and the manual operation of the cut-off valve by the maintenance man.

The object of the invention is to improve the operation of such a system.

In accordance with the invention means is provided whereby the pneumatic gauge in operat-

ing as a result of the unbalanced air pressure in the ticket sending tubes, as when a blockade of tickets occurs in any one of these tubes, causes the cut-off valve to be closed by means of a solenoid which is connected in a blockade alarm circuit for preventing further introduction or dispatching of tickets into the tubes. A lamp signal and a ringer device are energized in conjunction with the operation of the cut-off valve for indicating which of the sending tubes is obstructed, with means provided for cutting off the ringer from its operating circuit independently of the operation of the lamp signal, and a plurality of means in the form of thermostats, which are energized under control of the pneumatic gauge, are provided to cause a time delay in the operation of the cut-off valve upon certain pressure difference in the ticket sending tube which may occur independently of the ticket blockades.

Other novel features and advantages of the invention will appear from the following description and by the claims appended thereto, reference being had to the accompanying drawing in which,

Fig. 1 is an assembly view showing a number of operating parts in section, the cut-off valve being shown in the normal open position;

Fig. 2 is a top view thereof;

Fig. 3 is a diagrammatic view of a circuit for the automatic control of the cut-off valve of the invention.

Fig. 4 is a front elevation of the ticket receiving valve showing the ends of the ticket sending tubes and the exhaust tube attached to the casing, the casing being shown partly in section.

As shown in Fig. 4, the ticket receiving valve to which the invention is particularly well adapted for use consists of a casing 110 combined so as to form a ticket receiving chamber and to house a pair of parallelly disposed rollers R1 and R2, driven by a gearing mechanism, not shown, itself driven by a motor 146. The operation of rollers R1 and R2 is effective to drive the tickets through a chute CH in casing 110.

On casing 110 is mounted a casing portion 57 into which the ticket sending tubes 59' and 60' extend for guiding the tickets as T1 shown in Fig. 1, which have been introduced in the tubes 59' and 60' at the sending stations not shown.

As shown in Figs. 1 and 2 of the drawing the cut-off valve consists of a casting 10 formed with two coaxially disposed openings 11 and 12 and an opening 13 disposed thereacross to be closed by a butterfly 14 in a manner and for a purpose which will be hereinafter described in detail.

A bushing 67 has one of its ends secured to the casing portion 57 and is connected at its other end to the cut-off valve casting 10 by joint plates 13' and 14' secured together by a number of bolts 15. The common air exhaust tube 16 is connected at one end to the top end portion of casting 10 by joint plates 17 and 18, in turn, secured together by bolts 19 and 20, the other end of tubing 16 being connected to an exhauster, not shown, provided for generating an air flow in the ticket sending tubes 59' and 60', Figs. 1, 3 and 4, for propelling the tickets into the ticket receiving chamber for delivery through the chute CH by the operation of the rollers R1 and R2, the air passing through a series of holes in the ends of the ticket sending tubes 59' and 60' and entering the air exhaust tube 16 in a path indicated by the arrows in Fig. 4, and hence through the openings 11 and 12 in casting 10, Fig. 1, the area of which may be adjusted by the operation of the butterfly 14 in the opening 13 so as to control the flow of air through the common air exhaust tube 16 as will be hereinafter described in detail.

The butterfly 14 is securely mounted on one end of a rotatable shaft 22 journaled in bearing portions 23 and 24. These bearing portions are formed integrally with the casting portion 10 and on the other end of shaft 22 is securely mounted a worm gear 25 engaging the screw threaded end portion of a plunger member 26. This plunger is supported at its top end in a bearing portion 27 secured to the casting portion 10 by screws 28 and 29 as shown in Fig. 2 and its other end in the tubular core 30 of a solenoid 31 which is mounted in a housing 32 held securely on the casting 10 by a number of screws 33.

Plunger 26 is held in normal non-operated position by a retractile spring 34 having one of its ends abutting against the shoulder portion of the plunger and its other end against a washer at the end of an adjustable screw 35 engaging the interiorly threaded portion 36 of casing 32. This end of plunger 26 is of square cross-section and fits a hole in the screw 35 and a similarly shaped hole in a hub or knob 37, the latter being normally held against rotary movement by a clamping screw 38 engaging the casing 32 and thereby normally holding the plunger 26 and the butterfly 14 in adjusted position. A knob 39 which is secured at the extreme end of plunger 26 by pin 40 is provided for manually moving this plunger axially against the resistance of retractile spring 34 for rotating the worm gear 25 and thereby operating the valve 14 in chamber 13.

The valve 14 may also be rotated in the chamber 13 through the rotation of plunger 26 for adjusting the speed of the air flow in the ticket sending tubes 59' and 60' through the manual rotation of knob 39 or hub 37 upon the loosening of the clamping screw 38.

The ticket sending tubes 59' and 60' as shown in Fig. 3 are connected at points adjacent their receiving ends to an air chamber having a common wall in the form of a diaphragm 45 which operates upon a certain pressure difference in the ticket sending tubes for closing one of the contacts 46 and 47 as the case may be for causing the operation of the solenoid 31 and thereby the operation of the cut-off valve or butterfly 14.

The unbalance of air pressure in tubes 59' and 60', as when a ticket or a plurality of tickets are stopped in one of the tubes, causes the movement of diaphragm 45 in a direction to close one of its associated contacts, for example, contact 46, com-

pletes the heating circuit of a thermal switch TS through the conductor 48, the rear side of armature 49, the conductor 50, the heating element 51 to battery and ground. The operation of thermal switch TS after a predetermined period of time causes the energization of magnet 52 through an operating circuit including ground 53, contact 46, conductor 54, thermal switch TS, conductor 55, magnet 52 to battery and ground. The operation of magnet 52 attracts its armatures 56, 49 and 58 thus closing the operating circuit of solenoid 31 through a circuit including ground 53, contact 46 of the pneumatic relay, conductor 48, contact of armature 58, manual switch 59 in the closed position, conductor 60 and the winding of solenoid 31 to battery and ground.

The solenoid 31 is energized for operating the plunger 26 against the tension of its retractile spring 34 and thereby rotates the butterfly 14 through the engagement of the worm portion of plunger 26 with worm gear 25 and closes the common tube 16 for preventing the flow of air in the ticket sending tubes and therefore the conveyance of tickets in these sending tubes. The energization of solenoid 31 attracts the auxiliary armature 160 for closing contact 61 and thereby completing its holding circuit.

The closure of the contact by the operation of armature 58 also completes the operating circuit of a ringer device 62 and a lamp 63 thus readily indicating to the maintenance man that a ticket blockade in the sending tube 59' has occurred. The operation of armature 56 closes a locking circuit for magnet 52 through ground 53, contact 46, conductors 54 and 48, contact of armature 58, winding of magnet 52 to battery and ground so that the breaking of the circuit of heating element 51 when armature 49 is operated with the consequent return movement of thermal switch TS to normal, the magnet 52 remains energized as long as contact 46 remains closed due to the unequal air pressure in the sending tubes 59' and 60'.

The ringer 62 may be disconnected from the signal circuit by manually operating the switch 64 and both the ringer 62 and the lamp 63 may be disconnected collectively by the operation of the switch key 59, the magnet 31 remaining energized as above mentioned through its locking circuit closed at the contact 61 when the auxiliary armature 160 operates.

Upon the clearing of the blockade in the tube 59', and the reestablishment of the balance in the air pressure in the ticket sending tubes 59' and 60', the contact 46 is broken through the operation of diaphragm 45 while the manual operation of auxiliary armature 160 breaks the contact 61, causing the deenergization of magnet 31 and the plunger member 26 is returned to normal under the tension of spring 34 for moving the butterfly to its open adjusted position and thereby permitting the flow of air in the common tube, thus reestablishing the operating condition of the ticket sending tubes.

Similarly a ticket blockade in the ticket sending tube 60' will cause the operation of the diaphragm 45 for closing the contact 47 and thereby energizing the thermal switch ST2. The operation of this switch closes the energizing circuit of magnet 65 for operating the alarm ringer 66 and signal lamp 68 simultaneously with the energization of solenoid 31, the movement of plunger 26 operating the butterfly 14 and thereby preventing the flow of air to the ticket sending tube 60' as above described in connection with the ticket sending tube 59'.

In the course of clearing a ticket blockade in one of the sending tubes if it is desired to operate the butterfly 14 in quick succession as to cause air impulses in the ticket sending tubes, contact 61 is opened for deenergizing the magnet 31 thereby permitting the reciprocating movement of plunger 26 and that of the butterfly 14.

Thus by the operation of the alarm ringer, together with the operation of the signaling lamp, the maintenance man has positive indication as to which of the sending tubes is obstructed by tickets and may control the operation of the ringers and the lamps through the operation of keys 59 and 69, as the case may be, while the automatic operation of the butterfly prevents the conveyance of tickets in such blockaded sending tubes immediately and simultaneously with the operation of the alarm ringer and the lamp signal, thus improving such ticket distributing systems both from an operating and economic standpoint.

What is claimed is:

1. In a pneumatic ticket distributing system, the combination with a housing, a plurality of ticket sending tubes having their receiving ends connected to said housing and an air exhaust tube connected to said housing, of a valve connected to said exhaust tube and having an element operable for controlling the flow of air in the ticket sending tubes, a solenoid for operating said element, a pneumatic relay having a pair of contacts and a movable member, said member being operable upon a pressure difference in said sending tubes for engaging either one of said contacts for causing the energization of said solenoid, the operation of said element interrupting the air flow in the ticket sending tubes for preventing the conveyance of the tickets therein.
2. In a pneumatic ticket distributing system, the combination with a plurality of ticket sending tubes, and a housing connected to the receiving end of said tubes, of a valve connected to said housing and having a movable element for controlling the flow of air in said tubes, a solenoid, a movable armature for said solenoid, a gear actuated by said armature, a shaft for said gear operatively connected to said element, a pneumatic relay, said relay comprising a pair of contacts, a yieldable member for engaging one of said contacts upon a pressure difference in said sending tubes, thermal switches energized upon the operation of each of said contacts, and magnets energized upon the operation of each of said switches for causing the operation of said solenoid.
3. In a pneumatic ticket distributing system,

the combination with a plurality of ticket sending tubes and a housing connected to the receiving end of said tubes, a valve connected to said housing having a movable element for controlling the flow of air in said tubes, a solenoid, a movable armature for said solenoid, a gear actuated by said armature, a shaft for said gear operatively connected to said element, a pneumatic relay having a pair of contacts and means operating upon a pressure difference in said ticket sending tubes for engaging said contacts, thermal switches energized upon the operation of each of said contacts, magnets energized upon the operation of each of said thermostats for causing the operation of said solenoid, a plurality of alarm devices responsive to the operation of each of said magnets, and a plurality of manually operable switching means for controlling the operation of said alarm devices.

4. In a pneumatic ticket distributing system, the combination with a housing, a plurality of ticket sending tubes having their receiving ends connected to said housing and a common tube connected to said housing, of a valve connected to said common tube having an element operably controlling the flow of air in the ticket sending tubes, a solenoid for operating said element, a pneumatic device, a pair of contacts in said device disposed to be engaged selectively upon a pressure difference in the sending tubes, thermal switches, circuits connecting each of said contacts to each of said switches, electromagnets, circuits for said electromagnets energized upon the operation of the switches as determined by the operation of said device, alarm devices, sets of contacts actuated by the operation of each of said magnets, circuits connecting the last-mentioned contacts to said alarm devices for actuating them simultaneously with the energization of said solenoid for actuating said valve.

5. In a pneumatic ticket distributing system, the combination with a casing, a plurality of ticket sending tubes connected at their receiving ends to the casing, and a common air tube connected to the casing, of a valve connected to said common tube having an operable element, a pneumatic relay connected to the receiving tubes, said relay comprising a pair of contacts and a movable member operable upon a pressure difference in the ticket sending tubes for closing said contacts, a solenoid for operating said element, and thermal switches responsive to the closure of said contacts by said movable member for causing the operation of said solenoid a predetermined lapse of time after the closure of said contacts.

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