Vehicle Actuated Pneumatic Tube System for Motor Banking

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A pneumatic motor banking system employs a tape switch on the driveway beside the customer kiosk so that the system is activated to begin a depositing cycle by arrival of the customer's vehicle. The tape switch also deactivates the system to end the depositing cycle when the customer's vehicle drives away. Improvements in the customer kiosk itself are also disclosed in that the chamber into which the carrier arrives does not form a part of the pneumatic system and thus does not need to be sealed in order for the system to function.

9 Claims, 6 Drawing Figures
VEHICLE ACTUATED PNEUMATIC TUBE SYSTEM FOR MOTOR BANKING

BACKGROUND OF THE INVENTION

It is typical of many pneumatic tube systems currently in use for drive-up banking that the customer upon arriving at the kiosk must consciously activate the system to begin a depositing cycle, as by pushing a button, opening a door, calling the teller and the like. Or in some cases, the teller himself must first observe the customer and then activate the system, which of course requires him continuously to keep track of the arrival and departure of customers. It is preferable, however, to have the system more automatic, and so relieve the customer or the teller or both from consciously having to activate and deactivate the system. This reduces possible confusion of both customers and tellers as well as teller fatigue. The foregoing is thus the chief object of the present invention which is hereinafter described together with other improvements and features of the customer kiosk.

SUMMARY OF THE INVENTION

In order so to relieve the customer and the teller, the depositing cycle is initiated by the arrival of the customer’s vehicle before the kiosk. For this purpose, a tape switch is placed across the driveway by the kiosk so that it is contacted by the front wheels just before the vehicle is halted in position before the kiosk. Some other vehicle actuated means could of course be used instead. The tape switch in turn opens a door in the kiosk to present the carrier to the customer and begins the depositing cycle which progresses according to the “logic” of a controlling circuitry as the various steps in the cycle occur, e.g., turning on the blower to send the carrier to the teller, return of the carrier by the teller, and the like. The cycle is also terminated by the tape switch when the rear wheels of the vehicle pass over it as the customer drives away, the system then being ready for another depositing cycle. Another aspect of the invention is that during normal operation of the system the blower is energized only when required to transport a carrier, thus conserving power and reducing expense.

The kiosk itself is improved in that it includes a carrier receptacle mounted on the inner face of the door. The receptacle is part of a chamber in the kiosk into which the carrier arrives through the pneumatic system and from which it is sent. However, the chamber forms no part of the pneumatic system itself and hence need not be sealed nor need the door be closed in order for the pneumatic system to function to transport a carrier. In the case in which a door or other device is not employed to present the carrier to the customer, such as where the carrier is merely stored adjacent the kiosk sending tube in view of the customer, the tape switch could merely activate the blower or perform some other operation to begin the depositing cycle.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical section through the customer kiosk taken along the line 1—1 of FIG. 2 illustrating, somewhat diagrammatically, some of the parts and structure of the system and the kiosk.

FIG. 2 is a horizontal section taken along the line 2—2 of FIG. 1 illustrating, also somewhat diagrammat-ically, other parts and structure of the system and the kiosk.

FIG. 3 is a diagrammatic layout of the pneumatic system as a whole, including parts of the teller station and still others of the kiosk.

FIG. 4 is a block-flow diagram illustrating the sequence of operations of the system during a depositing cycle.

FIGS. 5 and 6 are a schematic illustrating the electrical circuitry and, in connection with FIG. 4, the “logic” of the system.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The system includes a customer kiosk station KS and a teller station TS. The former comprises an overall housing mounted on an island 10 between adjacent driveways 11. The housing includes a rear wall 12, end walls 13, a top wall 14, a front wall 15, and a bottom wall 16 which mounts various parts of the pneumatic tube system including a typical blower B and a blower motor BM. A compartment or chamber 18 is formed in an upper portion of the housing by means of the rear wall 12, top wall 14, a pair of spaced, fore and aft partition walls 19 and 20, and a floor 21 which inclines downwardly from the rear wall 12 part way toward the front wall 15. Access to the chamber 18 is through a door 22, hinged at 23 along its lower edge to the front wall 15, forming a portion of the front wall 15. A carrier supporting floor 24 is fixed to the lower edge of the door 22 and extends rearwardly and upwardly in alignment with and in abutting relation to the floor 21. The door 22 and the floor 24 thus form a carrier receptacle 25 which is outwardly movable when the door 22 is opened on its hinge 23, the door 22 and the plate 24 being braced by arcuate gusset plates 26 at their ends. Intermediate its side edges, the floor 24 is rectangularly apertured at 27, which aperture is carried rearwardly into the abutting edge of the floor 21, for reasons which will later appear. The side edges of the aperture 27 in the floor 24 are provided with depending guide plates 28 which extend rearwardly just within the side edges of the aperture 27 in the floor 21. The receptacle 25 is swung in and out by means of a reversible electric motor KM mounted in the space between the partition wall 19 and the adjacent housing end wall 13. A crank arm 29 is fixed to the motor shaft and a link arm 30 is pivoted to the crank arm 29 and a post 31 extending laterally from the adjacent gusset plate 26 through an aperture in the partition wall 19 whose exposed face is provided with a pad 32.

The upper rear corner of the partition wall 20 is provided with a carrier receiving inlet 35 communicating with the horizontally disposed end 36 of a pneumatic receiving tube 37 through a typical receiving valve 38. Upstream of the latter, a conduit 39 connects the tube end 36 with the blower B and a second conduit 40 connects the latter with the vertically disposed end 41 of a pneumatic sending tube 42. The tube end 41 includes a sending valve 43 disposed between the conduit 40 and a flared carrier sending inlet 44 which opens up through the aperture 27 in the floors 21 and 24 between the guide plates 28. The two tubes 37 and 42 extend from the kiosk station KS to the teller station TS and are there connected by a horizontal conduit 45. Just above the latter, the tube 37 emerges vertically through a receiving valve 46 to a teller sending inlet 47.
The tube 42 also emerges vertically through a receiving valve 48 just above the conduit 45 into a vertically disposed, cylindrical receiving chamber 50 closed at its upper end and provided with a door 51, hinged at 52 along its lower edge, forming a portion of the chamber 50. The inner face of the door 51 is equipped with a carrier arresting catch in the form of a spring, loaded plate 53 adjacent the hinge 52 which folds upward to permit a carrier to enter the chamber 50 but then springs down to prevent the carrier from dropping from the chamber 50 as it is repositioned from a pad 54 at the upper end of the chamber 50. The door 51 is opened and closed by an electric motor TM fitted with a pitman arm 55, a link 56 being pivoted to the arm 55 and the door 51. The design of the teller station TS is quite conventional and includes other apparatus typically used at such stations which is not described in as much as it plays no part in the present invention.

When the blower B is operating, forced air will be circulated through the tubes 37 and 42 and the connecting conduits 39, 40 and 45. Since the kiosk chamber 18 and the teller chamber 50 are not a part of the air circuit, they need not be sealed and the operation and efficiency of the system is not affected by the opening of the kiosk door 22 or the teller door 51. Carriers are sent and received in the usual manner through the valves 38, 43, 46 and 48. As indicated in FIG. 4, when the motor KM is energized upon arrival of the customer's vehicle, the door 22 is swung open and presents a carrier 60 to a customer who picks it up, starting the blower motor BM, deposits his transaction, and dispatches the carrier 60 through the sending inlet 44 to the teller station TS. When the carrier 60 arrives in the chamber 50, the blower motor BM is turned off, the kiosk door 21 closes and the motor TM is energized to open the teller door 51. The teller picks up the carrier 60, receives the transaction, and reduplicates the carrier 60 through the sending inlet 47, starting the blower motor BM and closing the teller door 51. When the carrier 60 arrives horizontally through the kiosk receiving inlet 35, it is halted by the pad 32, whereupon it falls to the floor 21 and rolls down into the receptacle 25, coming to rest on the floor 24, bridging the flared sending inlet 44, whereupon the blower motor BM is turned off and the motor KM energized to open the door 22 which is thereafter closed when the customer's vehicle departs.

The electrical controls which govern the foregoing sequence include, at the kiosk station KS, a tape switch A, operated by a tape T across the driveway 11, open and close position limit switches B and C for the kiosk door motor KM disposed adjacent the post 31, a pressure switch D located on the upper face of the carrier floor 24 and responsive to the weight of a carrier thereon, and a blower on-off switch E on the blower motor BM. At the teller station TS are a pressure switch F located on the teller door 51 and responsive to the presence there of a carrier, open and closed position limit switches G and H for the teller door motor TM located on the chamber 50, and a teller send switch J located downstream of the teller sending inlet 47 and responsive to the sending of a carrier 60 by the teller through the tube 37. The foregoing switches are also indicated in FIGS. 4, 5 and 6, the latter figures illustrating the nature of each. FIGS. 5 and 6 also depict the various relays KK1-10 located at the kiosk station KS and their contacts, and the relays KT1-7 located at the teller station TS and their contacts.

The relays control the logic sequence of the system during a depositing cycle illustrated in FIG. 4. In addition to the relays and switches already identified the circuit includes, at the teller station TS, manual override switches K and L, M and N, whereby the teller can respectively open and close respectively the kiosk door 22 and the teller door 51 independently of the circuit logic, as well as a signal lamp Y and Z to indicate whether the kiosk door 22 is open and if a carrier is in the receptacle 25. A manual override switch P is located within the kiosk station KS for opening the kiosk door 22 independently of the circuit logic. A 30-second delay timer is incorporated which is halted when the customer picks up the carrier 60, resulting in energizing the blower motor BM owing to the kiosk pressure switch D, the relay KK6 and the latter's contacts. If the customer does not pick up the carrier 60 in 30 seconds, the teller is alerted to the customer's possible need of help through activation of the relay KT5 whose contacts (not shown) sound a buzzer in the sound communication system (not shown) by which the kiosk and teller stations KS and TS are typically also connected.

A 1-second delay timer is placed in the circuit for the teller door motor TM through the relay KT6 and its contacts in order to give the carrier 60 time to "settle down" in the teller chamber 50 before the door 51 opens. The main power switches are also located at the teller station TS and provide for automatic or continuous operation of the blower B. In the case of the former, as shown particularly in FIG. 4, the blower B is turned on when the customer picks up the carrier 60 from the receptacle 25, off when it reaches the teller door 51 and its pressure switch F, on again when it is returned by the teller and activates the teller send switch J, and finally off again when the customer drives away activating the tape switch A. Continuous operation is preferred when temperature and humidity conditions might otherwise result in moisture condensing in the tubes 37 and 42, especially if, as is typical, the latter run beneath the ground.

The circuit in FIGS. 5 and 6 is shown with the power off and no relays energized. When the circuit is initially energized by the power switch for automatic operation and a carrier is in the receptacle 25, the relays KK1 and KK6 are activated and the system is ready for a depositing cycle which begins when a customer drives over the tape T, closing the tape switch A and energizing the relay KK7. Thenceforth operation of the system is governed by the logic of the relays KT1-7 and KK1-10 and the switches A-J as the steps of the depositing cycle previously described proceed, all as will be apparent from referring to FIG. 4 in conjunction with FIGS. 5 and 6. Other details of the system will also be apparent to those skilled in the art. It will be understood of course that there has been shown and described only one such system and that where several customers are to be served at one time an equal number of the systems must be installed for that purpose.

Though the invention has been described in terms of a particular embodiment, being the best mode known of carrying out the invention, it is not limited to that embodiment alone. Instead, the following claims are to be read as encompassing all adaptations and modifications of the invention falling within its scope and spirit.
We claim:

1. In a customer kiosk station for banking, the station having a housing and portions of a pneumatic tube system including a carrier sending tube and a carrier receiving tube, the sending tube having a carrier inlet and a sending valve downstream of the inlet with respect to the direction of travel of a carrier therein, the sending valve being effective to close off the inlet from the tube system except when a carrier is inserted therein for sending through the tube, the receiving tube having a carrier outlet and a receiving valve upstream of the outlet with respect to the direction of travel of a carrier therein, the receiving valve being effective to close off the outlet from the tube system except when a carrier is received therefrom through the outlet, the sending and receiving tubes being pneumatically interconnected downstream of the sending valve and upstream of the receiving valve with respect to the direction of travel of a carrier in the sending and receiving tubes for forced circulation of carrier moving air through the system by a blower, and an electrical control circuit controlling sending of a carrier through the tube system, the improvement comprising: a carrier chamber in the kiosk station having a pair of opposite side walls, an upright front door and a floor inclining downwardly toward the door, the floor having a forward portion for supporting a carrier in horizontal position with its long axis alongside the inner face of the door, an electrical motor in the control circuit operatively connected to the door for opening thereof when the motor is energized in one direction of rotation and for closing thereof when the motor is energized in the opposite direction of rotation, the receiving tube inlet being disposed in a rear portion of one of the side walls above the floor so that a carrier received therefrom enters the chamber in a substantially horizontal position and is halted by the opposite side wall, whereupon the carrier rolls forwardly down the floor towards the door and onto the forward floor portion, the carrier being thereafter manually removable from the chamber when the motor is energized in its door opening direction and the door is open, the sending tube being generally vertically disposed with its inlet exposed through an aperture in the floor disposed intermediate the chamber side walls and immediately behind the rear face of the door whereby the chamber forms no part of the path of the air circulating through the tube system.

2. The kiosk station of claim 1 wherein the door is horizontally hinged along a lower edge to the kiosk station for outward pivoting movement from a closed to an open position when the motor is energized in its door opening direction, the rear portion of the floor being fixed while said forward portion thereof is secured adjacent the lower edge of the door for pivoting outward movement therewith, whereby a carrier supported on the forward floor portion as aforesaid is transported outwardly of the chamber when the door is opened as aforesaid.

3. The kiosk station of claim 2 wherein the control circuit includes first sensing means carried by the forward floor portion and responsive to the presence or not of a carrier thereon and actuating means successively responsive to the arrival and departure of a customer's vehicle at and from the station, the first sensing means when a carrier is thereon and the actuating means together energizing the motor in its door opening direction upon said arrival, the actuating means and the first sensing means upon redeposit thereafter of a carrier upon the forward floor portion by the customer together energizing the motor in its door closing direction to close the door upon said departure, the actuating means being disposed upon a driveway before the kiosk station and responsive to the weight of a vehicle passing thereover.

4. The kiosk station of claim 3 wherein, after the motor has been energized in its door opening direction as aforesaid, the first sensing means upon the removal of a carrier from the forward floor portion by a customer also energizes the blower; and wherein, after redeposit thereafter of the carrier upon the forward floor portion by the customer, the first sensing means and the actuating means together also de-energize the blower upon said vehicle departure.

5. The kiosk station of claim 1 in combination with a teller station for banking employees, the carrier sending and receiving tubes interconnecting the kiosk and teller stations, the sending tube at the teller station having a carrier inlet and a sending valve downstream of the inlet with respect to the direction of travel of a carrier therein, the receiving tube at the teller station having a carrier outlet and a receiving valve upstream of the outlet with respect to the direction of travel of a carrier therein, the sending and receiving tubes at the teller station being pneumatically interconnected downstream of the sending valve and upstream of the receiving valve with respect to the direction of travel of a carrier in the sending and receiving tubes, the sending valve at the teller station being effective to close off the inlet at the teller station from the tube system except when a carrier is inserted therein for sending therefrom, and the receiving valve being effective to close off the outlet at the teller station from the tube system except when a carrier is received therefrom through the outlet; and wherein the control circuit includes first sensing means carried by the forward floor portion and responsive to the presence or not of a carrier thereon, second sensing means responsive to the sensing of a carrier from the kiosk to the teller station, the first sensing means upon removal of the carrier from the forward floor portion and the second sensing means upon the sending thereafter of the carrier as aforesaid together energizing the motor in its door closing direction to close the door and third sensing means responsive to return of the carrier thereafter from the teller to the kiosk station, the first and third sensing means together energizing the motor in its door opening direction to open the door when the carrier has arrived in the chamber and upon the forward floor portion.

6. The combination of claim 5 including customer actuated means, the actuated means when actuated by a customer and the first sensing means when a carrier is thereupon together energizing the motor to open the door.

7. The combination of claim 6 wherein the first sensing means, when the carrier is removed from the forward floor portion by the customer after the door is opened as aforesaid, also energizes the blower.

8. The combination of claim 7 wherein the second sensing means, when the carrier is sent by the customer from the kiosk station and arrives at the teller station as aforesaid, also de-energizes the blower; and wherein the third sensing means, when the carrier is returned to
the kiosk station from the teller station as aforesaid, also energizes the blower.

9. The combination of claim 8 wherein the actuated means is disposed upon a driveway before the kiosk station and is successively responsive first to the weight of a customer’s vehicle arriving before the kiosk station and second to the weight of the vehicle departing from the kiosk station, the first sensing means upon redeposit thereafter of the carrier upon the forward floor portion by the customer and the actuated means upon said departure also together de-energizing the blower.

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