SIDEWALK BANKING APPARATUS
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Application November 16, 1951, Serial No. 256,627

14 Claims. (Cl. 186—1)

This invention relates to improvements in sidewalk banking apparatus and more particularly to new mechanisms for controlling a service door for an opening through which articles are transferred in the use of such apparatus.

Sidewalk banking apparatus is used to carry out transactions between a customer at the sidewalk level outside a bank building or other business structure, for example, a pedestrian or the occupant of an automobile parked at the street curb, and a person servicing the apparatus from within the confines of the building.

In known types of this apparatus a closed panel of a wall or stand at the sidewalk has a service door within convenient reach of the customer, which may be opened for access to a receiver through which deposits, receipts or other articles can be transferred between the customer and the attendant.

The operation of this service door has been subject heretofore to objectionable interference by persons outside the apparatus. Further, the door mechanisms used have lacked desired features of safety and have been vulnerable to tampering or vandalism.

It is an object of this invention to provide in a sidewalk banking apparatus a service door operating mechanism which restricts the operation of the service door exclusively to the control of an authorized person attending the apparatus from within the confines of the bank or other building.

A more specific object is to provide such an apparatus whereby the positions of the service door are automatically controlled in coordination with movements of an article carrier to and from a position to receive articles through the door opening.

Another object of the invention is to provide a service door operating mechanism which utilizes a driven means to open the service door and which positively prevents movement of the door from closed position by anything but the driven means.

Another object of the invention is to provide in such a service door operating mechanism a safety device that prevents injury to a hand or finger caught by the closing door, and whereby the mechanism itself is protected from damage if movement of the door is obstructed.

Still another object of the invention is to provide a sidewalk banking apparatus having a service door normally preventing access from outside the apparatus to an article receiver within the apparatus, which is in open position not only gives access to the article receiver but also serves as a convenient depository tray or work table for articles handled by the customer.

The foregoing and other objects, features, and advantages of this invention will become apparent from the following description and the accompanying drawings of an illustrative embodiment. In the drawings:

Fig. 1 is a vertical cross-section through the embodiment of the invention by which teller service or the like may be rendered through a stand that extends above a sidewalk from a station in a room, beneath the sidewalk;

Fig. 2 is a front view of an upper portion of the stand shown in Fig. 1;

Fig. 3 is a fragmentary rear elevation taken along line 3—3 of Fig. 1, showing the door mechanism and showing an article carrier positioned behind the door opening;

Fig. 4 is an enlarged fragmentary vertical cross-section of the door in closed position, showing in side elevation parts of the door mechanism and its driving motor;

Fig. 5 shows parts of the structure of Fig. 4 in the position which they occupy when the service door is open;

Fig. 6 is an elementary wiring diagram of a suitable circuit for controlling the operation of the door motor;

Fig. 7 is an enlarged side view of parts of the door operating and locking mechanism; and

Fig. 8 is a cross-section taken along line 8—8 of Fig. 7.

As seen in Fig. 1 of the drawings, the illustrated embodiment of a sidewalk banking apparatus includes an elongated stand or kiosk 10 disposed in an opening 12 of sidewalk 14, through which the stand projects upward adjacent the curb 16 of street 18 from a room 19 beneath the sidewalk. This room forms part of a bank or building or similar business structure and is bounded by a retaining wall 20 at one side of the street foundation.

The stand 10 has a front wall 24, top wall 25, back wall 26 and side walls 28 and 30 interconnecting the front and back walls. Its lower end rests on a suitable framework 32 in room 19, where a teller may be stationed to carry on banking transactions with a customer at the sidewalk.

The front wall 24 of the stand is provided with a sight window at 34, a service door 36 for article transfers, and suitable means (not shown) for oral communications between a customer and the teller. The window 34 is formed by a generally tubular member 38 which projects inward from wall 24 and supports across its inner end a transparent bullet-resistant glass panel 40 in the customer's line of sight to a downwardly facing mirror 44 within the stand. Within room 19 the lower portion of the stand has its back wall 26 cut away to form an opening 42 at the eye level of an attendant, and an upwardly facing mirror 46 behind this opening provides, with the vertically aligned parallel mirror 44, a means of visual communication between the attendant and anyone in front of the stand.

The service or article transfer door 36 normally closes an opening 48 in wall 24, through which a customer may transfer articles into and from a receiver behind this wall. The article receiver in this embodiment is a movable carrier 50, resembling an elevator car, which is arranged to travel between an elevated position at opening 48 and a lowered position where the carrier is accessible to an attendant through an opening 52 in the lower part of the stand structure.

The carrier 50 is suspended as a part of one flight of an endless chain 54 which extends below the carrier to pass around a sprocket wheel 56 on the shaft 58 of a reversible electric driving motor 60. Above the carrier, chain 54 passes over a pair of idler sprocket wheels. One idler sprocket, at 62, is disposed directly above opening 48 so as to guide the carrier into a position opposite this opening; the other idler sprocket (not shown) is disposed to one side of idler 62 and keeps the return flight of chain 54 from interfering with the carrier movements. It will be evident that operation of the motor 60 in one direction lifts carrier 50 to its elevated position, while reverse operation of the motor lowers the carrier to a position opposite opening 52. The carrier position at any time is...
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The service door 36 is pivotally mounted at its lower edge on an axis at pin 65, about which the door may swing outward and downward to a horizontal open position in which it serves as a convenient table or deal tray for items to be handled by a customer. The inner side of the door may be dished as at 67 to enhance its usefulness as a deal tray when in open position.

The positions and movement of door 36 are governed by a door operating and locking mechanism generally indicated at 70. The operation of this mechanism is subject to the control of a switch 61 in the reversible motor circuit. These two limit switches 76 and 78, respectively, are arranged to be actuated by suitable cam surfaces 77 and 79, as hereinafter described, in such manner that they initiate a door opening operation when the carrier 59 is moved into its elevated position, and such that the door mechanism closes the door when the carrier is moved away from its elevated position.

The door motor 72 is supported by bracket 82 on the inside of stand wall 24, with the motor shaft (not shown) extending upwardly in driving relation to a suitable speed reducing worm gear drive in a gear housing 84. A shaft 86 driven at low speed extends from the reduction gear housing and constitutes a mounting and driving element for a disc assembly generally indicated at 88, which embodies principal elements of the operating mechanism. This assembly has an eccentric pivotal connection at 91 with one end of a rigid link or rod 90, the other end of which is pivotally connected at 92 to the inner end of a quadrant 94 which is fixed at its outer end to the door 36.

At one operative position of the apparatus, as seen in Fig. 4, the eccentric connection at 91 lies at a side of shaft 86 away from the door quadrant connection at 92, with the door 36 in closed position and with pivots 91 and 92 substantially on a line that passes through the axis of shaft 86. Accordingly, a force applied to the door sant 26a, open it as long as the mechanism is so positioned, for the resulting force on link 90 acts directly against and is absorbed by the axially fixed disc assembly. On the other hand, a rotation of eccentric pivot 91 about the axis of the disc assembly produces an upward thrust on door quadrant 94 to move the service door 36 away from its closed position, and after a half revolution of pivot 91 the apparatus takes the position shown in Fig. 5 of the drawings. In that position the service door extends forward from wall 24 substantially horizontally, and the quadrant-link connection at 92 is again aligned with pivot 91 and the axis at 86, in such manner that a force applied to the door itself cannot change its position but is absorbed by the disc assembly.

The rotation of pivot 91 from one to the other of the described positions is effected in this embodiment by rotating the disc assembly 88 through links 26a and 26b and the speed reduction gear train interconnecting these parts. The described positions may be obtained automatically in successive half-revolution of the disc assembly, in the manner hereinafter described. It will be evident now, however, that if the disc assembly unyieldingly joins the link end at 91 with the cam axis 86, the door 36 will be opened and closed under the full power of the driving elements; and if the door movement in such case is obstructed, such as by striking an obstacle as it opens or closes, or by catching the finger or hand of a customer as it closes, the door mechanism or the obstruction is likely to be damaged.

According to a further feature of the invention, this problem is overcome by constructing the disc assembly with relatively rotatable driven elements, one connected in fixed relation to the driving elements and another connected in fixed relation to the link pivot 91, and interconnecting these driven elements through torque limiting means which yield to allow them to turn independently whenever the torque load on the assembly exceeds a predetermined desired limit.

To this end, the disc assembly comprises two discs 102 and 104 carried in face-to-face relation on a common stepped head or hub 106 keyed to shaft 86; disc 102 being fixed to a nut 108 which in turn is screwed and locked by a set screw 101 onto a threaded lower step 103 of head 106, and disc 104 being freely mounted for relative rotation on an upper step 105 of the driven head. An end flange of the head at 109 and a washer or shim 110 between it and disc 104 confines this disc against movement away from disc 102. Disc 104 carries at a fixed peripheral location the pivot pin 91 for link 90.

This disc, however, has a positive driving connection with the driving elements only when a yieldable clutch interconnecting the two discs is in engagement.

The yieldable clutch as shown is a ball clutch comprising two balls 112 movable laterally in sockets 114 which extend through disc 102 at opposite sides of its axis. The balls normally project from the inner face 113 of disc 102 into two aligned recesses 116 in the adjacent face 115 of disc 104. The balls are held yieldably in that normal position by leaf springs 118 which are fixed at one end to the outer face of disc 102, near the mounting nut 108, and which have free ends overlying the outer ends of the ball sockets 114.

It results that discs 102 and 104 are interconnected for rotation in unison as long as the balls stay engaged in the aligned recesses, but whenever excessive torque load develops in the disc assembly the balls are thrust laterally against the tension of the leaf springs and either disc then may rotate independently of the other until the balls and recesses have become realigned. The torque load effective to disengage the ball clutch depends upon the strength of the leaf springs and can be adjusted by adjusting or changing these springs.

When the service door 36 is fully open or fully closed a force applied through it to link 90 and pivot 91 has no tendency to disengage the ball clutch. Any torque absorbed at shaft 86. As the door moves to open or to close, however, link 90 lies at one side or the other of the shaft axis, and a sufficient force or obstruction applied through the door will then disengage the yieldable clutch.

The clutch having been disengaged, the door may be moved easily to closed position by hand as the balls 112 roll over the inner face of disc 104. The clutch becomes reengaged whenever the balls are realigned with their respective recesses 116.

As seen in Fig. 8, one of the clutch balls works at a greater radius than the other from the axis of the disc assembly, so that the discs 102 and 104 must have a certain orientation and a certain position relative to pivot 91 whenever the clutch is operative.

An automatic control of the desired positions of the disc assembly and pivot 91 is obtained as follows:

Cam 78 is an 86°, motor operated periphery of disc 102 in position to depress the operating arm 78 of limit switch 82 through half of the path of rotation of the disc assembly. In the arrangement shown, this cam extends counterclockwise about disc 102 over an arc of 180°, from a point normally adjacent the axis of pin 91, after the ball clutch is in a normal operative position, to rotate it in a clockwise direction. Switch 82 is so located at the bottom of the disc assembly that it is held depressed by the cam while the door 36 is either closed.
as in Fig. 4 or is moving toward the open position of Fig. 5, and so that the switch arm is free of the cam when the door either is fully open or is closing.

With an opening for article transfers and a door mounted thereon for movements from and to a position closing said opening, a door operating mechanism within said housing and connected with the door and having successive door opening and door closing phases of movement, means for driving said mechanism, said article transfer means comprising an article receiver means controlled by an attendant at said teller's station to render the receiver accessible or inaccessible at said opening, and control means including elements operated by action of said movable means to render said driving means operative for door opening movement when the receiver is rendered so accessible and to render the same operative for door closing movement when the receiver is rendered so inaccessible.

2. In a sidewalk banking apparatus or the like including a housing structure providing a customer station and a separate station for a teller or the like and respective means between said stations for effecting visual and oral communications and for transferring articles between a customer and an attendant at said stations, said structure having a wall portion formed at said customer's station and a separate station for a teller or the like and a depository within said housing and a door mounted thereon for movements from and to a position closing said opening, a door operating mechanism within said housing and connected with the door and having successive door opening and door closing phases of movement, means for driving said mechanism, said article transfer means comprising an article receiver means controlled by an attendant at said teller's station to render the receiver accessible or inaccessible at said opening, and control means including elements operated by action of said movable means to render said driving means operative for door opening movement when the receiver is rendered so accessible and to render the same operative for door closing movement when the receiver is rendered so inaccessible.

3. In a sidewalk banking apparatus or the like including a housing structure providing a customer station and a separate station for a teller or the like and respective means between said stations for effecting visual and oral communications and for transferring articles between a customer and an attendant at said stations, said structure having a wall portion formed at said customer's station and a separate station for a teller or the like and a depository within said housing and a door mounted thereon for movements from and to a position closing said opening, a door operating mechanism within said housing and connected with the door and having successive door opening and door closing phases of movement, power operated means for driving said mechanism, said article transfer means comprising an article receiver means operated by movable means controlled by an attendant at said teller's station to render the receiver accessible or inaccessible at said opening, two actuators for said driving means, one associated with a part of said mechanism and the other associated with said movable means, two control elements respectively operated by said actuators and each having alternate connections for energizing said driving means, said connections of the two control elements being interconnected in tandem, said one actuator being moved by said part to shift the connections of one control to each of the two phases of said mechanism, and said other actuator being moved by said movable means to shift the connections of the other control element so that the door operating mechanism is driven to open said door when the movable means render the receiver so accessible and to close said door when the same render the receiver so inaccessible.

4. In a sidewalk banking apparatus or the like including a housing structure providing a customer station on the outside thereof and a station on the inside thereof for a teller or the like, said structure having a wall portion formed at said customer's station with an opening for the transfer of articles by a customer into and from a depository within said housing and a door mounted for movements from and to a position closing said opening,
an operating mechanism within the housing controlling positions of the door and comprising a plurality of relatively rotatable elements forming a rotary assembly, means mounting said assembly for rotation on a fixed axis, reciprocable means interconnecting said door and one of said elements and having pivotal connection with the latter so as to be reciprocated by its rotation, driving means connected with another of said elements for rotating the assembly, and yieldable clutch means normally interconnecting said elements for rotation in unison but operative to disconnect them for free relative movement whenever the torque on said assembly exceeds a predetermined value.

5. In a sidewalk banking apparatus or the like including a housing structure providing a customer station on the outside thereof and a station on the inside thereof for a teller or the like, said structure having a wall portion formed at said customer's station with an opening for the transfer of articles by a customer into and from a depository within said housing and a door mounted for movements from and to a position closing said opening in an operating mechanism within the housing controlling positions of the door and comprising a rotary driven assembly, means mounting said assembly for rotation about a fixed axis, reciprocable means having a pivotal connection with a part connected to said door and with an eccentric part of said assembly so as to be reciprocated by rotation of the latter, said assembly and said reciprocable means having successive door opening and door closing phases of movement in each revolution of said assembly, and driving means connected with said assembly for rotative it to open and close the door, said pivotal connections lying approximately in line with the axis of said assembly at the end of said phases of movement so that the door is immovable from its closed and fully open positions by force exerted only on the door.

6. In a sidewalk banking apparatus or the like including a housing structure providing a customer station on the outside thereof and a station on the inside thereof for a teller or the like, said structure having an upright wall portion formed at said customer's station with an opening for the transfer of articles by a customer into and from a depository within the housing and a service door mounted to swing outwardly and downwardly from a vertical position closing said opening to a substantially horizontal position in which it exposes the opening to render the depository accessible from the outer side of the housing and serves as a tray for articles handled by the customers, a door operating mechanism connected with said door and comprising a rotary disc assembly including relatively rotatable discs held in face-to-face relation and ball clutch means yieldably interconnecting said discs for rotation thereof in unison yet disengagable by a predetermined torque to permit relative rotation thereof, a rigid link connected pivotally at one end to a part of the inside of said door and at the other end to an eccentric part of one of said discs, a shaft supporting said assembly for rotation on a fixed axis and connected in fixed relation to another of said discs, said door moving open in one half revolution of said assembly and moving closed in another half revolution thereof, and power operated rotary driving means connected with said shaft.

7. In a sidewalk banking apparatus or the like including a housing structure providing a customer station on the outside thereof and a station on the inside thereof for a teller or the like, said structure having an upright wall portion formed at said customer's station with an opening for the transfer of articles by a customer into and from a depository within the housing and a service door mounted to swing outwardly and downwardly from a vertical position closing said opening to a substantially horizontal position in which it exposes the opening to render the depository accessible from the outer side of the housing and serves as a tray for articles handled by the customers, a door operating mechanism connected with said door and comprising a rotary disc assembly including relatively rotatable discs held in face-to-face relation and ball clutch means yieldably interconnecting said discs for rotation thereof in unison yet disengagable by a predetermined torque to permit relative rotation thereof, a rigid link connected pivotally at one end to a part of the inside of said door and at the other end to an eccentric part of one of said discs, a shaft supporting said assembly for rotation on a fixed axis and connected in fixed relation to another of said discs, said door moving open in one half revolution of said assembly and moving closed in another half revolution thereof, and power operated rotary driving means connected with said shaft.

8. In a sidewalk banking apparatus or the like including a housing structure providing a customer station and a separate station for a teller or the like and respective means between said stations for effecting visual and oral communications and for transferring articles between a customer and an attendant at said stations, said structure having a wall portion forming a station at said opening for article transfers and a door mounted thereon for movements from and to a position closing said opening, a door operating mechanism within said housing and comprising a rotary driven assembly, means mounting said assembly for rotation about a fixed axis, link means having a pivotal connection with a part on said door and with an eccentric part of said assembly, said assembly and said link means having successive door opening and door closing phases of movement in each revolution of said assembly, and driving means connected with said assembly for rotative it to open and close the door, said pivotal connections lying approximately in line with the axis of said assembly at the end of said phases of movement so that the door is immovable from its closed and fully open positions by force exerted only on the door.

9. In a sidewalk banking apparatus or the like including a housing structure providing a customer station and a separate station for a teller or the like and respective means between said stations for effecting visual and oral communications and for transferring articles between a customer and an attendant at said stations, said structure having a wall portion forming a station at said opening for article transfers and a door mounted thereon for movements from and to a position closing said opening, a door operating mechanism within said housing and comprising a rotary driven assembly, means mounting said assembly for rotation about a fixed axis, link means having a pivotal connection with a part on said door and with an eccentric part of said assembly, said assembly and said link means having successive door opening and door closing phases of movement in each revolution of said assembly, power-operated driving means connected with said assembly for rotating it to open and close the door, said article transfer means comprising an article receiver and means controlled by an attendant at said teller's station for moving the receiver to and away from said opening, control means including separate switchable elements connected in tandem to energize said driving means, each of said elements having alternate working positions, means operated by movement of said article receiver to hold one of said elements at one of its working positions when said receiver is at said opening and to hold the same at the other of its working positions when said receiver is away from said opening, and means carried by a part of said assembly for shifting another of said elements from one to the other of its working positions at the end of each of said phases of movement so as to deenergize said driving means.

10. In a sidewalk banking apparatus or the like includ-
including a housing structure providing a customer station and a separate station for a teller or the like and respective means between said stations for effecting visual and oral communications and for transferring articles between a customer and an attendant at said stations, said structure having a wall portion formed at said customer's station with an opening for article transfers and a service door mounted thereon for swinging movements from and to a position closing said opening, a door operating mechanism within said housing and comprising a rotating disc assembly including relatively rotatable discs held in face-to-face relation and clutch means yieldably interconnecting said discs for rotation thereof in unison yet disengageable by a predetermined torque to permit relative rotation thereof, a rigid link connected pivotally at one end with said door and at the other end to an eccentric part of one of said discs, a shaft supporting said assembly for rotation on a fixed axis and connected in fixed relation to another of said discs, said door moving open in one half revolution of said assembly and moving closed in another half revolution thereof, power-operated rotary driving means comprising an article receiver controlled by an attendant at said teller's station and movable between a position behind said opening and a position accessible to said attendant, control means including a first switch adjacent said opening having alternate working positions for energizing said driving means, said switch being shiftable by said article receiver to one working position as the receiver is moved to said opening and to another working position as the receiver is moved away from said opening, another switch adjacent said disc assembly having alternate working positions and connected with said first switch for energizing said driving means, and a semi-circular cam carried by the other of said discs for shifting the position of said other switch after each half revolution of said assembly so as to deenergize said driving means.

11. In a sidewalk banking apparatus or the like including a housing structure providing a customer station and a separate station for a teller or the like and respective means between said stations for effecting visual and oral communications and for transferring articles between a customer and an attendant at said stations, said structure having a wall portion formed at said customer's station with an opening for article transfers and a service door mounted thereon for swinging movement from and to a position closing said opening, a door operating mechanism within said housing connected with said door comprising a rotary disc assembly including relatively rotatable discs held in face-to-face relation and clutch means yieldably interconnecting said discs for rotation thereof in unison yet disengageable by a predetermined torque to permit relative rotation thereof, a rigid link connected pivotally at one end to a part on said door and at the other end to an eccentric part of one of said discs, a shaft supporting said assembly for rotation on a fixed axis and connected in fixed relation to another of said discs, said door moving open in one half revolution of said assembly and moving closed in another half revolution thereof, power operated rotary driving means connected with said shaft, the pivotal connections of said link and said shaft being substantially aligned at the limits of movement of said door so that the door is immovable from its closed and fully open position, force exerted only on the door, said article transfer means comprising an article carrier movable to and from said opening under the control of an attendant at said teller's station, and control means for energizing and deenergizing said driving means including a switch adjacent said disc assembly having alternate working positions, a semi-circular cam carried by said other disc for changing the position of said switch after each half revolution of said assembly, and another switch moved to alternate working positions in response to movement of said carrier to and from said opening.

12. In a sidewalk banking apparatus or the like, including a closed stand to extend upward from a sidewalk or like surface and having an upright wall bordering a customer's station on the outside of the stand, and stand depository means including a door at an opening in said wall mounted for movement from and to a position closing said opening and an article carrier movable, under the control of an attendant servicing the apparatus from a remote station, between a position behind the opening and a position accessible to the attendant at such remote station, a motor and motor driven mechanism within the stand and connected with said door to move it between open and closed positions, and control means operative in response to movement of the carrier to and from said position behind the opening to make connections with said motor rendering it operative to move the door to open and closed positions, respectively.

13. In a sidewalk banking apparatus as claimed in claim 12, said motor driven mechanism including releasable elements operative to interrupt the drive therethrough upon the striking of an obstruction by the door.

14. In a sidewalk banking apparatus or the like, including a closed stand to extend upward from a sidewalk or like surface and having an upright wall bordering a customer's station on the outside of the stand, and stand depository means including a door at an opening in said wall pivotally mounted to swing from a substantially vertical position closing the opening to a substantially horizontal position in which said door exposes said opening and forms a deal tray for articles handled by the customer, an article carrier movable, under the control of an attendant servicing the apparatus from a remote station, between a position behind the opening and a position accessible to the attendant at such remote station, a motor and motor driven mechanism connected with said door for moving it between its positions aforesaid, and control mechanism responsive to movement of the carrier to and from said position behind the opening to make connections with said motor rendering it operative to move the door to open and closed positions, respectively, said motor driven mechanism including elements operative when the door is in closed position as to hold the door locked against movement by a force applied only to the door, said mechanism also including releasable elements operative to interrupt the drive therethrough upon the striking of an obstruction by the door.

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