

July 28, 1959

W. W. DODGE ET AL
TOLL TICKET DISPENSERS

2,896,531

Filed Dec. 2, 1957

4 Sheets-Sheet 1

FIG. 7

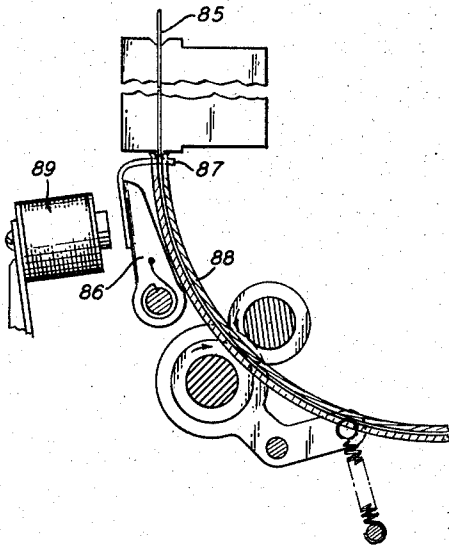


FIG. 1

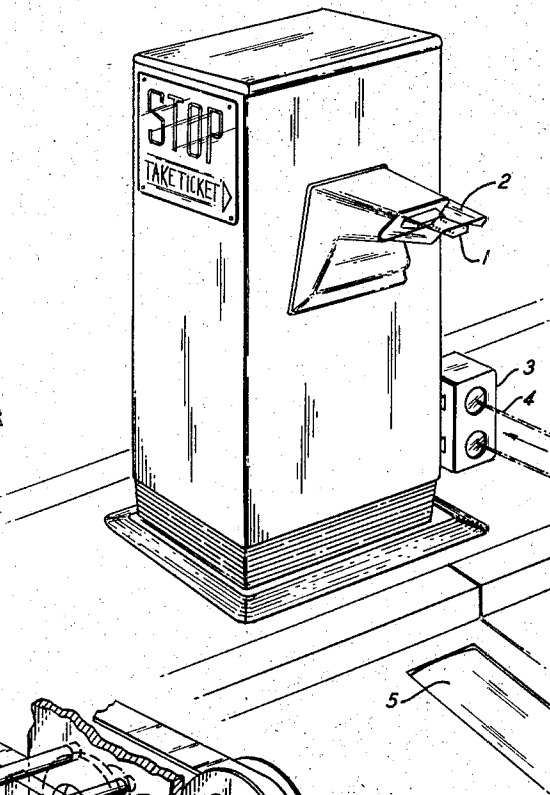


FIG. 8

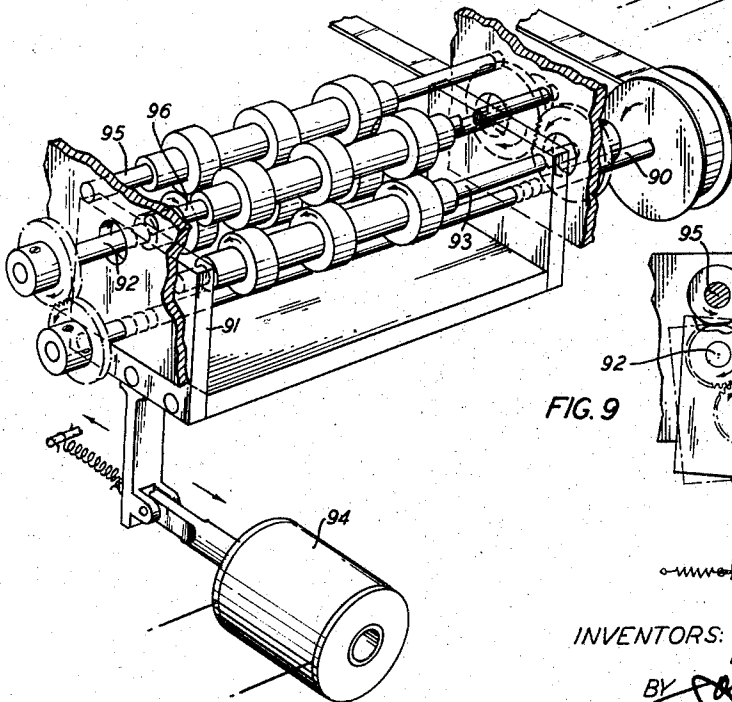
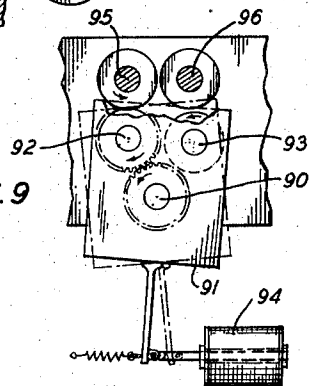


FIG. 9



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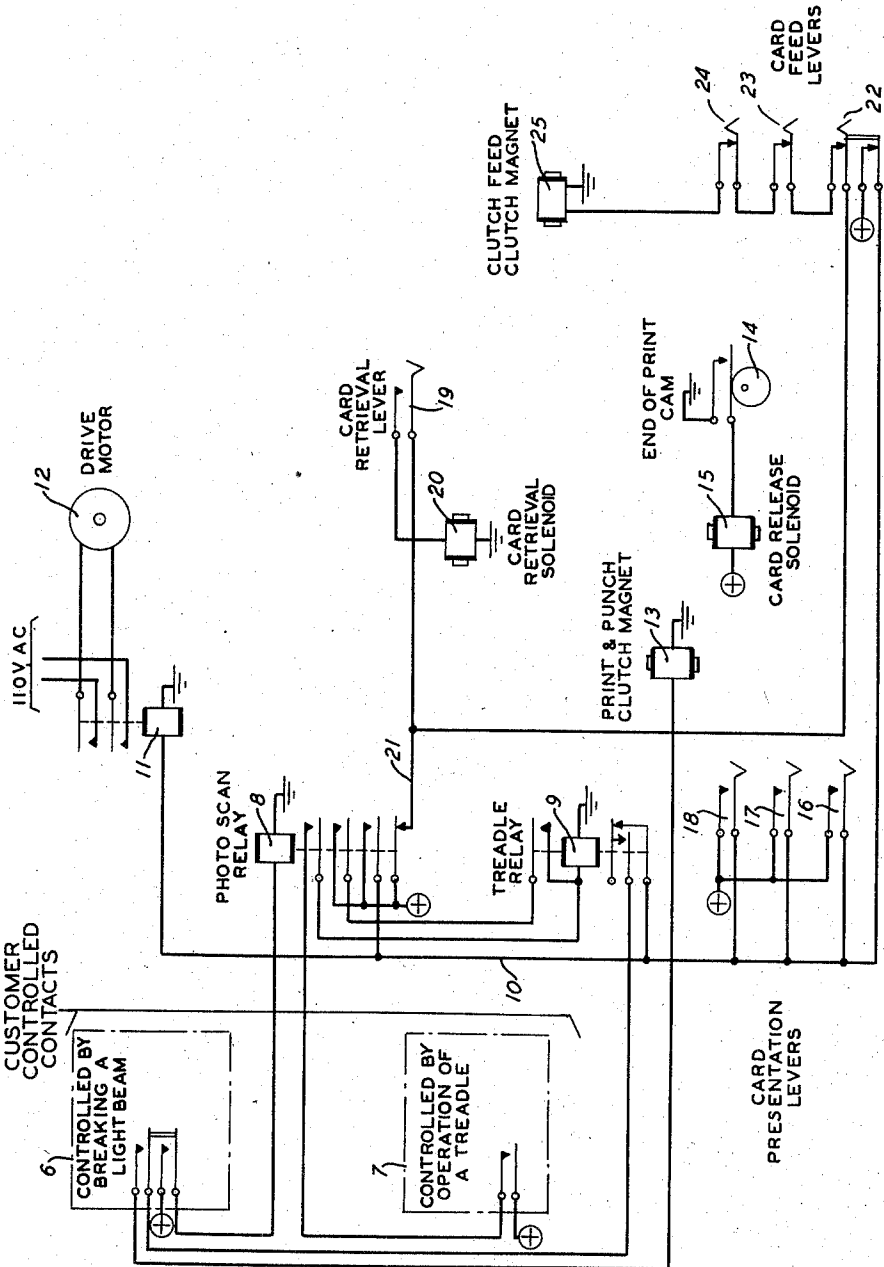


FIG. 2

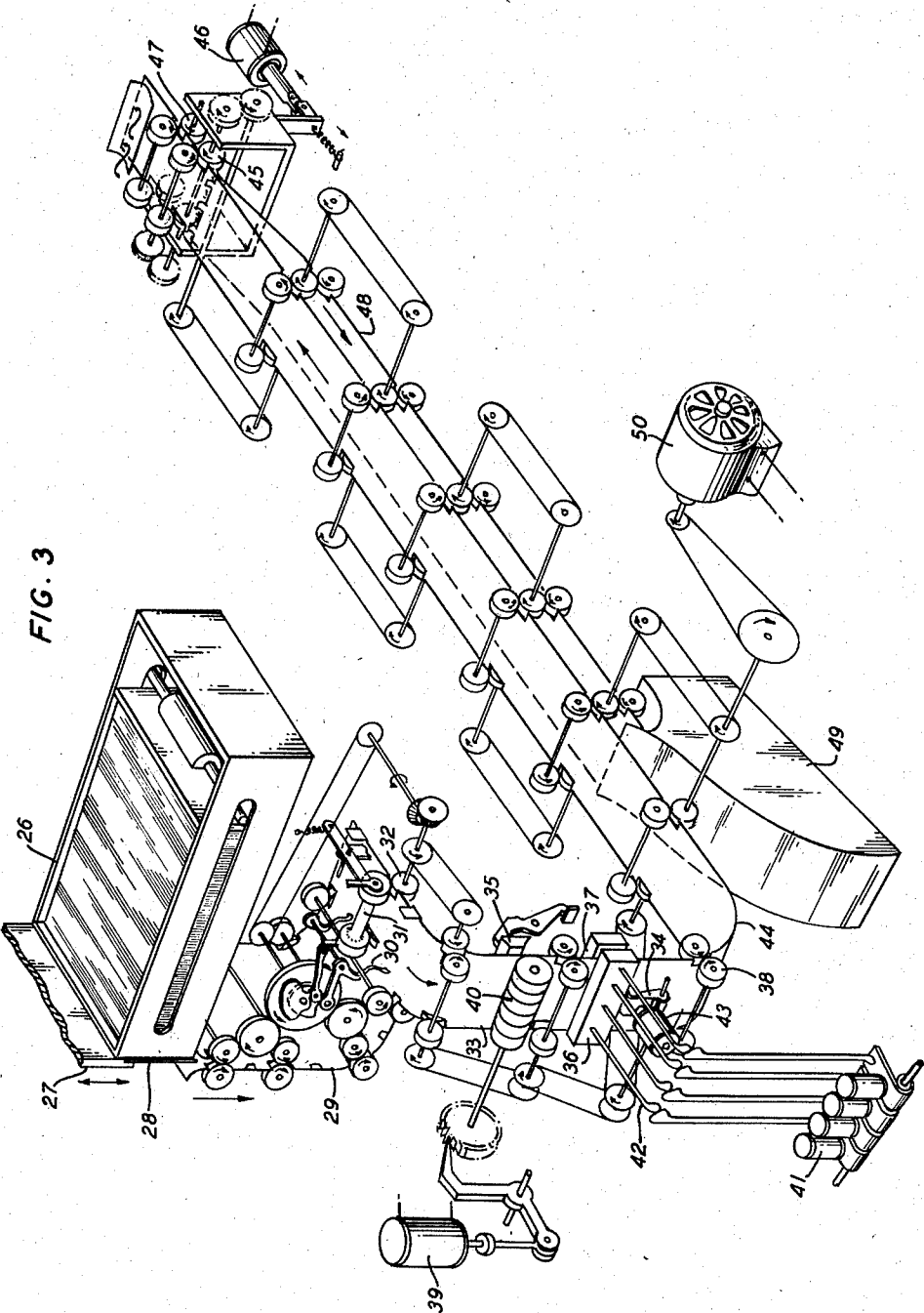
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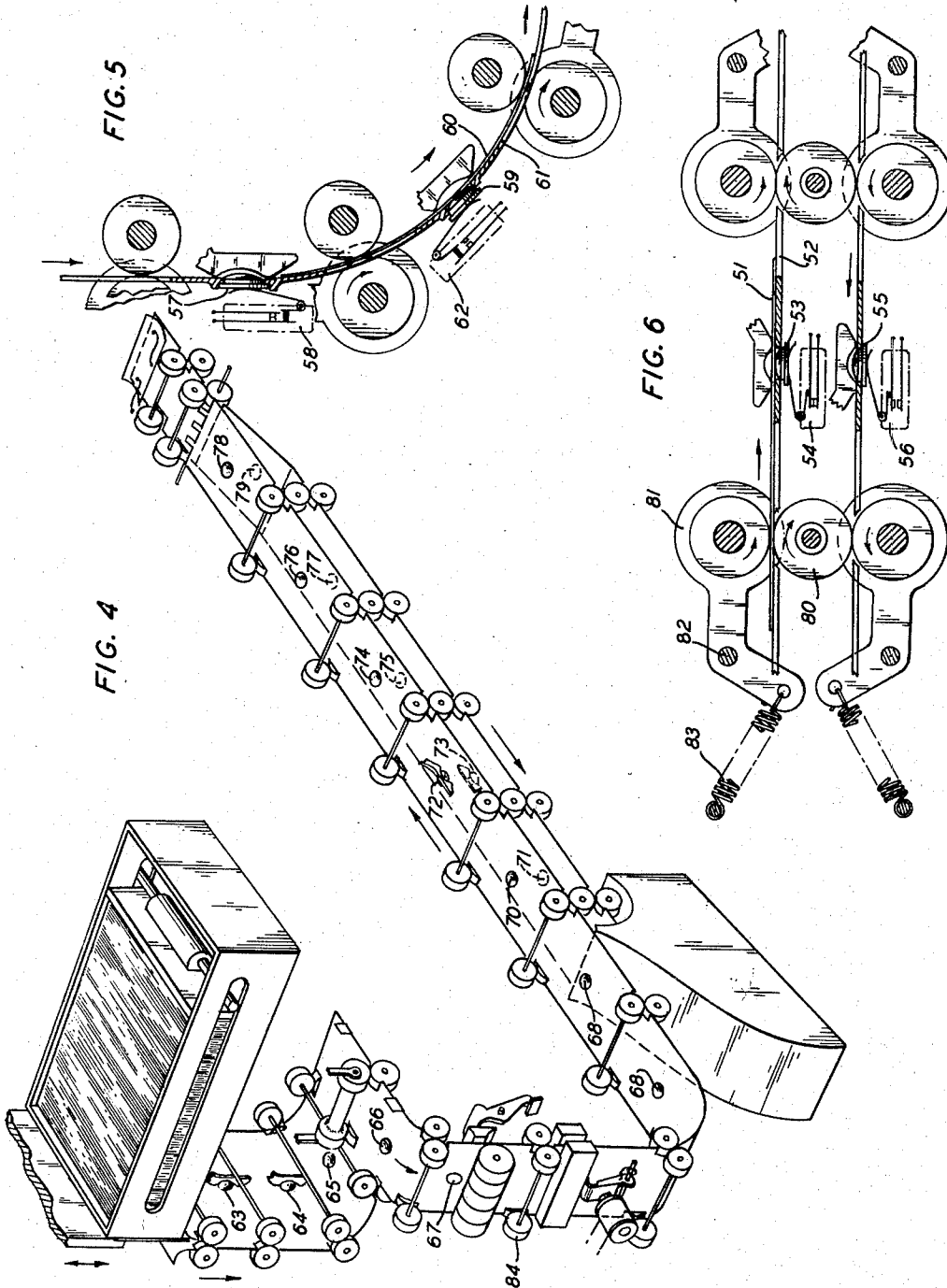
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2,896,531

TOLL TICKET DISPENSERS

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Application December 2, 1957, Serial No. 699,955

9 Claims. (Cl. 101—19)

This invention relates to dispensing devices and particularly to means for preparing and issuing tickets to measure the use made of any given facility and to provide a basis for charges made for such a use.

An object of the invention is to provide means responsive to the arrival of a customer at a given station to impress upon a blank ticket certain pertinent information, to move the ticket thereupon to a point of presentation where the customer may appropriate it and begin his use of the facility and to further provide means for retrieval of any such prepared ticket left in the presentation station of the device by a customer whereby a later arrival may become possessed only of a ticket especially prepared on his arrival and cannot gain possession of more than such one ticket.

The invention is embodied in a dispensing device capable of wide application but shown in a preferred form as a device located at an unattended toll station along a highway and situated at a car port where a driver may stop momentarily to obtain a toll ticket for accounting for his use of the highway. In its normal condition a toll ticket will be located within the machine at a print and punch station and the machine will be idle. When a car enters the port, by the conventional means of first breaking a light beam and then operating a treadle, the machine will be started into operation, the card will be prepared by having the usual data punched in and imprinted thereon and then moved to a presentation station where the driver of the car will receive it and proceed on his way. As he leaves the port and the light beam is reestablished, a new card will be taken from a supply and moved to the print and punch station and when this is properly seated the operation of the mechanism will come to a halt and will remain in this condition until another car enters the port.

Should the driver of the car fail to take the toll ticket presented, then as he moves away and the said light beam is reestablished, the card will be retrieved and stored in a bin provided for that purpose.

The novel features of the present invention are to be found particularly in the retrieval means provided to move an issued toll ticket left at the point of issuance by one driver out of the reach of a following driver so that no driver may possess himself of more than a single ticket.

In accordance with the present invention the device is provided with a plurality of card sensing levers controlling contacts any one or more of which will maintain the machine in operation until a normal condition is reached, in which a ticket is properly seated in the print and punch station and no other ticket is present in any one of the chutes provided for the mechanical guidance of the tickets to and from the various stations of the device. Thus, when a customer leaves the car port a new ticket is released from a store and moved to the print and punch station and it is not until this ticket has reached the print and punch station, been properly seated therein and all the chutes have been cleared that the operation of the device is stopped.

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A feature of the invention is a set of contacts connected in parallel at least one of which will be operated when a card is located anywhere in the system of chutes excepting in the punch and print station, such contacts being provided for maintaining the motor in operation. Through such arrangement the proper mechanical movement and the disposal of the cards may be insured.

Another feature of the invention is a set of contacts connected in series and which will be operated only when a card has been released from storage and started in its movement to the print and punch station and has been firmly seated therein.

Thus feeler contacts distributed along the chutes are provided at such intervals and at such places that at least one such set of feeler contacts will always be operated and the machine will come to rest when and only when a particular one of these sets of feeler contacts is properly operated, that is when a card is properly positioned in that portion of a chute known as the print and punch station.

The device consists generally of a system of chutes having constantly operated feed rollers located in cooperative relationship therewith and in such positions that when a card or ticket is moved out of a station where it may be held immobile it will be surely forwarded or impelled to move to the next station. The first resting station is the hopper where a large supply of cards is stored and from which a single card at a time may be detached and moved to the print and punch station. Thereafter when a customer approaches, the print and punch mechanism is operated and the card is moved to the presentation station where it may be appropriated by the customer. The device is now devoid of a card in the system of chutes so that as the customer moves away a new card will be taken from store and sent to the print and punch station where upon arrival and being properly seated the machine may be shut down until another customer arrives.

If the customer neglects to appropriate the offered card, then upon leaving and coincidentally with the selection of a blank card for movement into the print and punch station the offered card is retrieved, that is it is moved away from the presentation station and stored in a bin provided for that purpose.

Thus through a system of impellers or feed rolls and a set of supervisory contacts to maintain such impellers in operation, the cards may be moved from station to station under controlling signals produced by the arrival and departure of the customers.

Thus a feature of the invention is a combination of a plurality of feed rollers placed along a system of card chutes and at distances apart less than the dimensions of a card and a plurality of card feeding contacts placed likewise for maintaining the active operation of said feed rollers to insure the proper movement of the cards through the said chutes.

A feature of the invention is the use of a slide or skid roller at the print and punch station. Generally speaking these constantly operating impellers or rollers will firmly grip a card which has come into cooperative relationship therewith so that the card will surely be forwarded. However, at the print and punch station such an impeller is used which will, for very short periods, continue to move without forwarding the card and thus rub against such card while it is held stationary and such a device is known as a slide or skid roller. Such a roller will not grip a card as firmly as any of the other rollers but only gently enough to move the card when obstructions in its path are removed and not firmly enough to injure or mutilate the card otherwise. In actual practice, as the card enters the print and punch station and through the gentle urging of this slide or skid roller is firmly seated

in this station, the operation of the machine will be stopped and hence the slide roller will cease to operate. When another customer enters the car port and the customer contacts are again operated, the machine is started again and the slide roller operates in contact with a stationary card for a very short period during which the printing and punching mechanism operates after which an obstruction in the path of the card is removed and the card is allowed to start its movement toward the presentation station.

Another feature of the invention is the provision at the presentation station of a set of rollers for urging a card forward to and from that position in opposite directions, one set of rollers being normally effective to forward a card and the other set being ineffective to move the card. Means is then provided to reverse the effectiveness of said two sets of rollers whereby the forwarding rollers become ineffective and the other set become effective to move the card in the opposite direction. Thus, when the card presented to a customer is not appropriated by him this means is operated and the card is retrieved, that is, it is started to move along another chute to a retrieval bin.

Another feature of the invention is the provision of means whereby but a single card may be issued for each complete cycle of operations, including each cycle of operations of the customer controlled contacts. Since it is impossible for one car to leave the car port and another to enter it so closely that the light beam cannot be reestablished for an instant, such a complete cycle of operations must include a release of the customer controlled contacts. This complete cycle of operations will also include the stopping of the drive motor, for the bringing of a blank card from storage to the print and punch station takes little time and the operation of placing a fresh card in position to be validated on the entrance of the next car will always be completed before the said next car can enter the port. The operations are so rapid that as one car leaves the port, a new card is placed in position to be validated and while another car is entering the port such card will be validated and moved to the presentation station whereby such card will be ready for appropriation by the customer as or actually before he can bring his car to a halt. Thus the drive motor is started and stopped for each complete cycle of operations, the complete cycle starting and ending with the drive motor at rest.

The circuitry disclosed herein has been simplified to bring out the essential and novel features of the present invention. It will be understood, however, that this circuit may be incorporated in and made a part of a much more extensive and complicated network providing many of the so-called anti-cheat means by which dishonest customers may be prevented from obtaining more than one ticket or causing other operations from which they expect to obtain some one or another monetary benefit.

Essentially two sets of contact closers, operated by the entry and departure of a car in and from a car port are shown, known as the photo scan and the treadle contact and it will be understood that these are purely conventional, the photo scan contact being closed as the car enters the port and remaining so closed until the car leaves the port. During this time the treadle contact will be momentarily closed a number of times corresponding to the number of axles, once being sufficient to cause proper operation of the network.

More complicated and extensive networks in which the anti-cheat means are incorporated are shown in certain prior art disclosures cited hereinafter.

The drawings consist of four sheets having nine figures, as follows:

Fig. 1 is a perspective view of the device of the present invention which may be located at a car port at an unattended toll station along a highway and having an

indication of the conventional light beam and treadle devices;

Fig. 2 is a schematic circuit diagram showing the means for controlling the operation of the drive motor and various solenoids for operating the device;

Fig. 3 is a schematic representation of the system of chutes and drive rollers for moving the cards from station to station;

Fig. 4 is a schematic representation of the system of chutes provided especially to note the general position of card feelers for closing the various circuits to keep the motor in operation until all cards are properly disposed of;

Fig. 5 is a detailed view, partly in section of a portion of a chute between the card store and the print and punch station indicating in some detail the location of contact devices known as card feed levers which are normally closed and which operate to open a series circuit upon a card being taken from storage and to maintain such circuit open thereafter as the card moves to the said print and punch station until thereafter by the approach of a customer the card is validated and then moved on to the presentation station;

Fig. 6 is a similar detailed view showing a section of chute leading from the print and punch station to the presentation station with a card indicated therein so as to show the closure of a normally open set of contacts, and a section of chute leading from the presentation station to the retrieval bin and indicating the absence of a card so as to show the open circuit contacts controlled thereby;

Fig. 7 is a view, partly perspective and schematic and partly in section showing how a stop at the bottom of the print and punch station and against which the unvalidated card is firmly seated may be moved by a card release solenoid at the end of the print and punch operation to allow the card to be moved toward the presentation station;

Fig. 8 is a perspective view of the drive rollers at the presentation station together with the card retrieval solenoid used to take one set of rollers out of active operation and to put another set into operation whereby the card which has been presented but not appropriated may be retrieved; and

Fig. 9 is a front or plan view of the device of Fig. 8 to show more clearly how this card reversal means operates.

The prior art

The following is a list disclosing various systems and separate elements embodied in the present invention and is set forth herein for the purpose of disclosing certain details illustrated schematically and which are not necessarily described in full since their form and operation are well known.

Patents	Date	Patentee
1,878,935	Sept. 20, 1932	F. L. Lee.
2,173,089	Sept. 19, 1939	Geer et al.
2,173,105	do	Do.
2,281,998	May 5, 1942	F. Q. Rast.
2,312,340	Mar. 2, 1943	H. M. Kilpatrick.
2,504,535	Apr. 18, 1950	Do.
2,753,789	July 10, 1956	Gardiner et al.

Applications	Date	Applicant
Ser. No. 399,229	Dec. 21, 1953	Cunningham.
Ser. No. 443,264	July 14, 1954	Cunningham et al.
Ser. No. 535,494	Sept. 20, 1955	Pratt.

A publication entitled I.B.M. Time Equipment Division, Customer Engineering Manual of Instruction, Toll Recording Equipment, copyright 1955 by International Business Machines Corporation, 590 Madison Avenue, New York 22, New York, and printed in U.S.A. provides a disclosure of many intimate details of the mechanical construction of parts employed in the present device.

The general aspect of the device

The general aspect of the device is clearly shown in Fig. 1. It consists outwardly of a device properly housed to resist the weather, having an extension through which a card or ticket may be moved into reach of a passing motorist, the whole being mounted in a car port alongside the roadway. In Fig. 1, a ticket 1 is shown at the presentation station under a transparent canopy 2. Conventional photo scan means is indicated by the photo cell device 3 by which beams of light 4 may be broken by the entrance of a car in the port. Also, a conventional treadle 5 is indicated as being embedded in the roadway before the dispensing device. It will be understood that these conventional photo scan and treadle means, constituting the means for operating the customer controlled contacts may be physically placed otherwise than as shown and in conformity with standard and conventional practice. The ticket, when moved to the presentation station, will be in easy reach of a passing motorist.

Cycle of operation

The circuitry for the device of the present invention is shown in Fig. 2. Two broken line rectangles 6 and 7 are provided to show the customer controlled contacts, the rectangle 6 showing the conventional photo scan contacts which are closed as a customer's car enters the car port and by so doing breaks a light beam and the rectangle 7 showing the conventional treadle contacts which are momentarily operated two or more times as the customer's car passes through the car port. The photo scan contacts are operated once as the car enters the port, the customer pauses to appropriate the ticket presented to him and then leaves the port, whereupon these photo scan contacts are released. The several momentary operations of the treadle contacts occur during the period of operation of the photo scan contacts. It will be obvious that the photo scan relay 8 will follow the operation of the photo scan contacts in rectangle 6 and that after the photo scan relay 8 has been operated the first following operation of the treadle contacts in rectangle 7 will operate and lock the treadle relay 9 so that both these relays will operate and remain operated until the customer's car leaves the port, whereupon the photo scan relay will release and the treadle relay will follow, these two relays thus substantially releasing simultaneously.

Upon the initial operation of the photo scan relay 8, a source of battery will be applied to conductor 10, whereby the motor control relay 11 is operated and this by obvious connections will start the motor 12 into operation.

As the treadle relay 9 operates it will close a circuit momentarily in a passing contact arrangement whereby the print and punch clutch magnet 13 operates to release the print and punch clutch in its single and conventional operation, fully shown and described in several of the disclosures listed hereinbefore. This circuit may be traced from the battery applied to conductor 10 by the photo scan relay 8, the back and front contacts of the treadle relay 9 during that period while the armatures of this relay are in actual movement, the upper pair of customer controlled contacts in the rectangle 6 to the print and punch clutch magnet 13. This unlatches the print and punch clutch and allows the magnet 13 to release so that the operation of the clutch will be conventionally limited to a single operation.

Another conventional arrangement will be found in the so-called "end of print" cam 14 which closes as the punch and print operation is completed whereby the card release solenoid 15 may be momentarily operated to free the now validated card from the print and punch station and allow it to be moved to the presentation station. As the card moves away from this print and punch station, some one or more of the card presentation levers 16, 17 and 18 will be operated, each being arranged to connect battery to the control conductor 10.

When the card reaches the presentation station where it is positioned to be in reach of the motorist who has entered the car port, a pair of contacts 19 in the circuit of the card retrieval solenoid 20 will be closed, but this solenoid will not be operated unless the motorist fails to take the offered card and leaves the port thus causing the release of the photo scan relay 8.

When the motorist leaves the port and the beam of light in the photo scan device is reestablished, the photo scan relay 8 will be released whereby battery will be extended over the back contact of this relay to conductor 21 and thence through the contacts of the card feed levers 22, 23 and 24 in series to the card feed clutch magnet 25. This detaches a single card from the store of blank cards in a conventional manner and starts it on its movement to the print and punch station. As this movement is started, the circuit of the card feed clutch magnet is opened and this open circuit is maintained until this same point in another cycle is reached. During the waiting period in between the passage of customers, the card feed lever 22 remains operated and thus holds the circuit of the card feed clutch magnet open for an indefinite period.

When the blank card thus reaches the print and punch station, all card feed levers which are adapted to connect battery to the control conductor 10 will be opened and the operation of the motor will be shut down.

From a practical standpoint it is not necessary to place card levers such as the levers 16, 17 and 18 along the chute leading from the presentation station to the retrieval bin for even if the motor is shut down before such a card is fully retrieved it does not hinder the proper operation of the device to leave a card in this particular chute.

Thus it will be seen that a cycle consists of first a validation of a card, its movement to within the reach of the motorist and the movement of a blank card to the print and punch station. If a motorist fails to take a proffered card, then it will be retrieved simultaneously with the movement of the next blank card to the print and punch station.

Looking at Fig. 3 which is purely schematic, it will be seen that the device consists essentially of a system of chutes provided with impelling rollers whereby a card, taken from storage will be moved forward from station to station under the control of certain magnets and solenoids as above described. The hopper 26 represents the store of blank cards and the knife 27 represents the conventional means controlled by the card feed clutch magnet (25 in Fig. 2) for starting a card 28 from storage, sidewise along the chute 29 to a point where under control of certain card pusher fingers 30 it will be stationed under the roller 31 which thereupon will be brought into cooperative relationship with the impeller roll 32 to start the lengthwise movement of this blank card to the print and punch station. This station is that portion of the chute 33 where the card is positioned by the stop 34 and is held in readiness before the printing hammer 35 and the punching mechanism 36. The impelling roller 37 is known as a slip or skid roller since it is adjusted to bear against the card lightly, only sufficiently to move the card until it can come within the grip of the next set of impelling rollers 38 but insufficiently to injure or mar the card during the brief intervals during which the card may be held stationary by the stop 34. The solenoid 39 and the type wheels 40 constitute a purely schematic representation of the conventional mechanism employed to keep certain data type faces located before the hammer 35. When the print and punch clutch magnet (13 in Fig. 2) is momentarily operated, a single print and punch cycle of operations is started which results in the movement of the hammer 35 to strike the card against the type faces 40 and to operate the punching mechanism represented schematically by the solenoids such as 41 and the punches

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such as 42. At the end of this cycle the card release solenoid 43 (15 in Fig. 2) will be momentarily operated so that the stop 34 is moved out of the path of the now validated card and it enters and travels along the chute 44 to the presentation station. There it moves just beyond the control of the roller 45 into a position indicated in Fig. 1 where it is proffered to the customer.

If the customer fails to take the proffered card or ticket, then as he moves away from the car port the release of the photo scan relay and the treadle relay described in connection with Fig. 2 will cause the card retrieval magnet 46 to be operated, whereupon the effectiveness of the roller 45 will be relaxed and the roller 47 will become effective to move the unaccepted proffered card backward and through the chute 48 for deposit in the retrieval bin 49.

The motor 50 will be seen to have control of the various card forwarding rollers through a system of belts and gears represented herein schematically. The manner in which the motor is mounted and the various mechanical disposition of the belts, gears, cams and so forth, operated thereby is clearly shown in the Cunningham applications above noted and in the I.B.M. Manual of Instruction likewise noted.

Looking at Figs. 4, 5 and 6 the location and general arrangement of the card presentation levers and the card feed levers may be seen. The so-called levers are herein shown in the form of the ubiquitous microswitches operated by buttons normally protruding into a chute and capable of slight movement through the passage of a card therethrough. Fig. 6 is a good illustration of this arrangement, for a card 51 traveling along the chute 52 may be seen to press downwardly on the button 53 sufficiently to operate the microswitch 54 to close the so-called presentation lever contacts. Contrasting with this, the button 55, not being depressed by a passing card leaves the contacts of the microswitch 56 unoperated.

In like manner card feed levers, that is contact arrangements placed along the chutes from the card store to the print and punch station are shown in Fig. 5. Such contacts are normally closed and are adapted to be opened as a card passes. Thus a button 57, not depressed by a passing card, leaves the contacts of the microswitch 58 in their normally closed positions, but the button 59 pressed downwardly by the card 60 passing along the chute 61 has operated the contacts of the microswitch 62 to an open circuit position.

In the purely schematic showing of Fig. 4 the normally closed type of card feed levers shown in Fig. 5 may be located at the points 63 to 67 inclusive while the normally open card presentation levers such as those shown in Fig. 6 may be located at the points 68 to 79 inclusive. Thus a card, anywhere in the system of chutes, will be under supervision by one or more card levers for control purposes as described in connection with the circuitry, Fig. 2.

One other point should be noted particularly in connection with Fig. 6. The roller, 80, is being constantly driven by the motor shown and described in Fig. 3. The roller 81 is mounted on an arm pivoted at 82 and urged by a spring 83 so as to press the card 51 firmly against the roller 80. Most of the rollers along the chutes are of this nature, the pressure between the rollers 80 and 81 being sufficient to insure the movement of the card. A slip or skid roller such as the roller 84 at the print and punch station differs only in having a weaker spring 83 so that when the movement of the card is impeded, the card will not be mutilated by the continued rotation of this roller.

Fig. 7 shows one manner in which a card 85 which has entered the print and punch station may be held stationary until validated. A lever 86, having fingers 87 extending into the path of the card and preventing it from entering the chute 88, may be formed as an armature of the card release magnet or solenoid 89. When this electromagnet is energized, the fingers 87 move to the left and

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under influence of the skid roll the validated card moves into and along the chute 88.

Looking at Figs. 8 and 9 the card retrieval mechanism may be seen. The shaft 90 forms the pivot for a rocking member 91 which also carries the rollers on the shafts 92 and 93. The shaft 90 is constantly rotating and this is geared at one end (the left end in Fig. 8) to the shaft 92, which in turn is geared at its opposite end to the shaft 93. In the normal position, as indicated in Fig. 9, where the card retrieval solenoid 94 is not energized, the rollers on shaft 92 will be in cooperative relationship with rollers on the shaft 95 so that any card coming therebetween will be moved toward the right, that is, will be proffered to a customer. When the card retrieval solenoid 94 is energized, then the mounting 91 will be rocked in a counter clockwise direction whereupon the grip between rollers on shafts 92 and 95 will be relaxed and the grip between rollers on the shafts 93 and 96 will be tightened. Therefore the proffered card, if still present at this presentation station, will be moved backwardly and deposited in the retrieval bin.

What is claimed is:

1. A dispensing device for issuing tickets in the general form of business machine cards having a store of blank and unused cards, a print and punch station, a presentation station at which a card validated by marks printed thereon and punched therein is offered to a customer and a retrieval bin to which cards unappropriated by customers are moved and stored, a system of card chutes for guiding cards between said points, a plurality of card sensing contacts along said chutes at least one of which is operated whenever a card is present anywhere in said system of chutes, at said print and punch station or at said presentation station, a plurality of devices for moving cards through said chutes so placed along said chutes that at least one of said devices will be in controlling relation to a card at any point along said chutes, a motor for operating said card moving devices, customer controlled contacts operated upon the arrival of a customer in juxtaposition to the said presentation station and released by the departure of the customer therefrom, said motor being controlled jointly by said customer controlled contacts and said card sensing contacts whereby said motor will be maintained in operation excepting only when said customer controlled contacts are at their normal unoperated positions and a card is properly seated in said print and punch station.

2. A dispensing device as claimed in claim 1, in which a card sensing contact at said presentation station operated by a card thereat jointly with said customer controlled contacts in the normal and unoperated positions thereof operates means for moving said card from said presentation station to said retrieval bin.

3. In a dispensing device as claimed in claim 2, in which a set of card moving devices are provided at said presentation station, one said set being normally active to move a said card forwardly and another said set being normally inactive to move a said card backwardly and means for reversing said active and inactive conditions whereby a card at said presentation station may be retrieved.

4. A dispensing device as claimed in claim 1, in which means is provided responsive to said customer controlled contacts on the departure of a customer for starting a card at said presentation station along a said chute to said retrieval bin.

5. A dispensing device as claimed in claim 1, in which means is provided including said customer controlled contacts for operating means at said print and punch station for validating a card thereat by marks printed thereon and punched therein and for thereafter starting said validated card along a said chute to said presentation station.

6. A dispensing device as claimed in claim 5, in which means is provided to limit the operation of said validating

print and punch means to a single operation per complete cycle of operation of said customer controlled contacts.

7. A dispensing device as claimed in claim 1, in which means is provided responsive to the termination of a complete cycle of operation of said customer controlled contacts for extracting a blank card from said store and for starting said card along a said chute to said print and punch station.

8. A dispensing device as claimed in claimh 1, in which said chute between said store and said print and punch station consists of two sections, a first section being of a width equal to the length of a said card and a second section being of a width equal to the width of a said card, means being provided at the junction of said two sections of said chute to alter the direction of movement of a said card released from said store to move a said card into said print and punch station along the longitudinal axis thereof.

9. A dispensing device as claimed in claim 1, in which a card moving device at said print and punch station consists of a slide or skid roller capable of gently urging a card forward but incapable of mutilating a said card, said slide or skid roller becoming inactive responsive to the firm seating of a card in said print and punch station under pressure applied thereto by said slide or skid roller and becoming active again responsive to another operation of said customer controlled contacts for starting a validated card toward said presentation station.

References Cited in the file of this patent

UNITED STATES PATENTS

2,073,834	Duany et al. -----	Mar. 16, 1937
2,173,089	Geer -----	Sept. 19, 1939
2,173,105	Geer -----	Sept. 19, 1939
2,312,340	Kilpatrick -----	Mar. 2, 1943