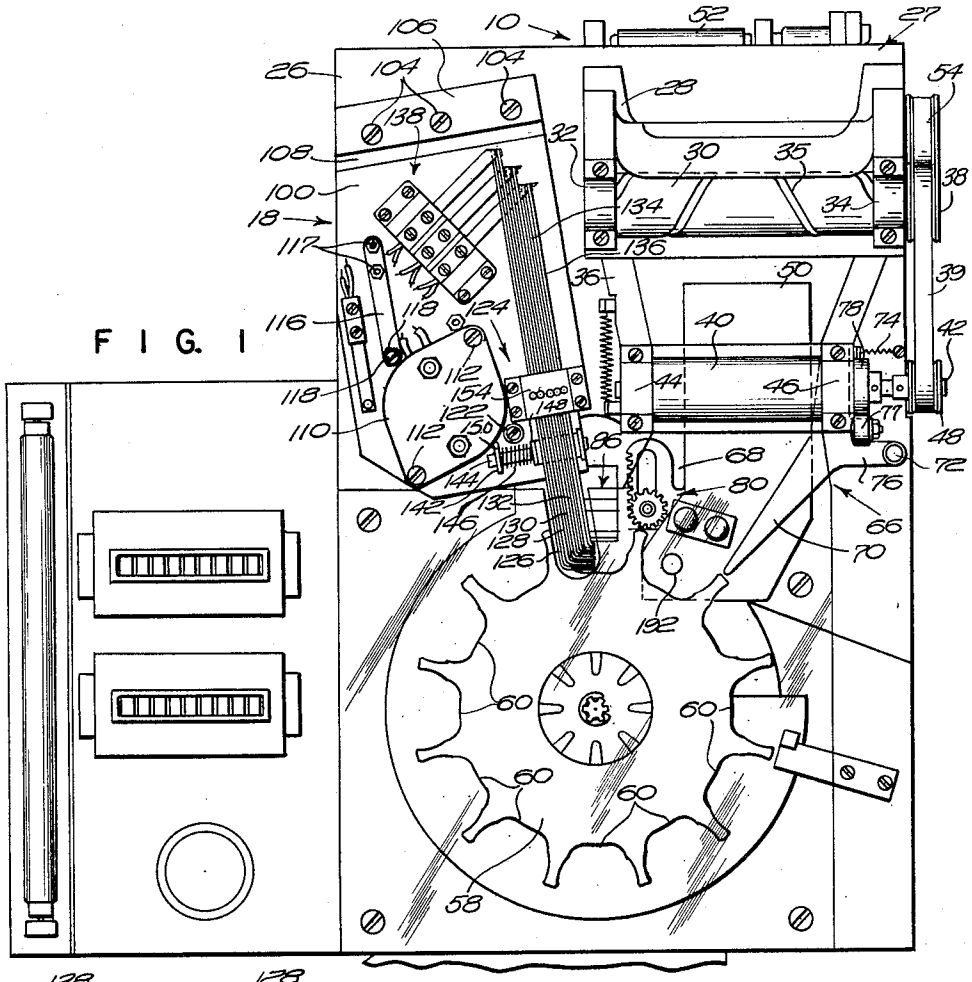
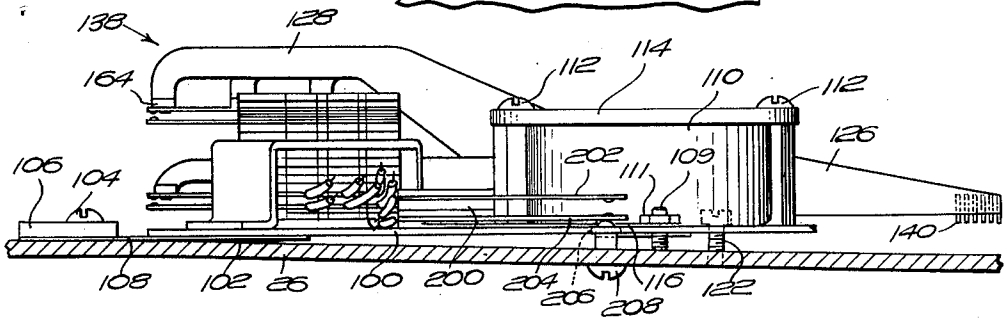
March 16, 1965 H. A. POWERS ETAL 3,173,531

FARE COLLECTING APPARATUS

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F I G. 1



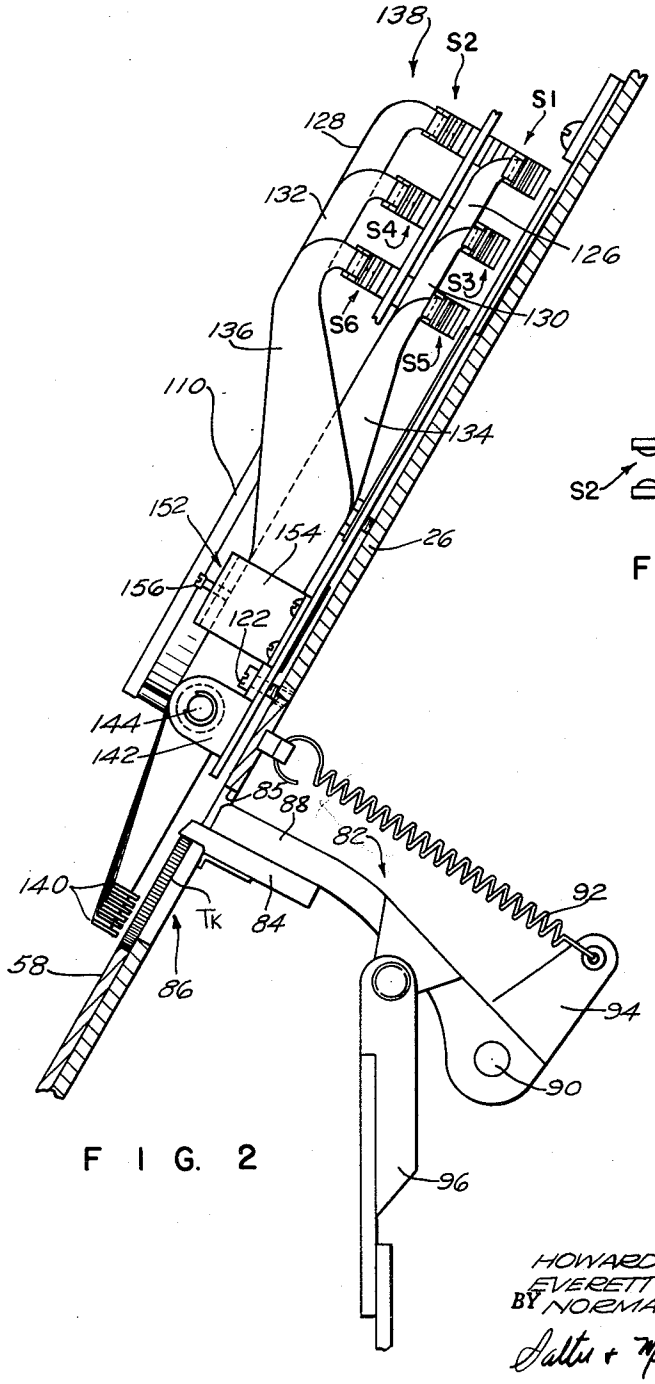
F I G. 3

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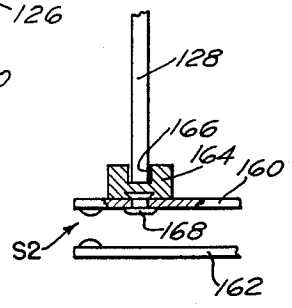
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FARE COLLECTING APPARATUS

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F I G. 2



F I G. 4

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FARE COLLECTING APPARATUS

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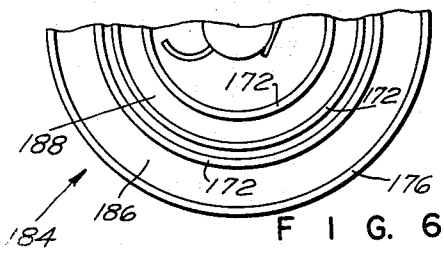


FIG. 6

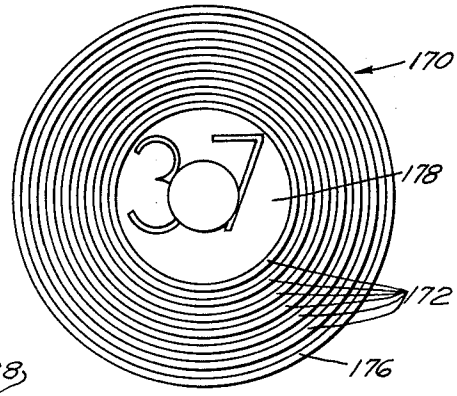


FIG. 5

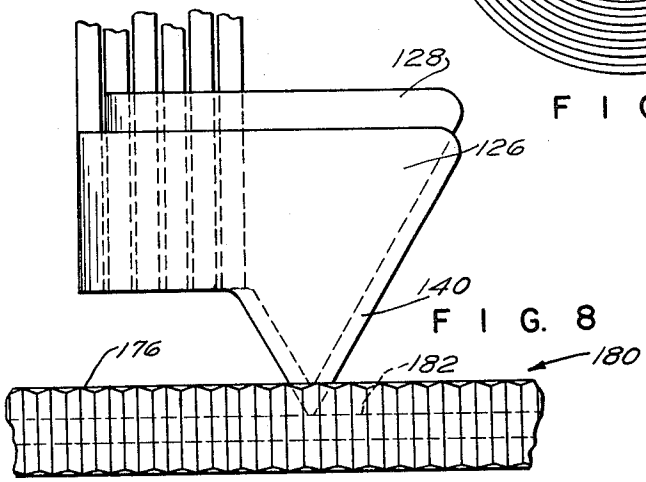


FIG. 8

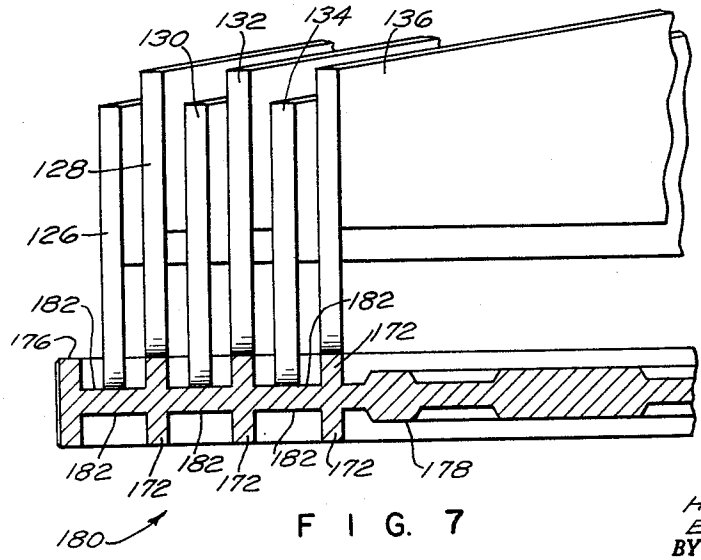


FIG. 7

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FARE COLLECTING APPARATUS

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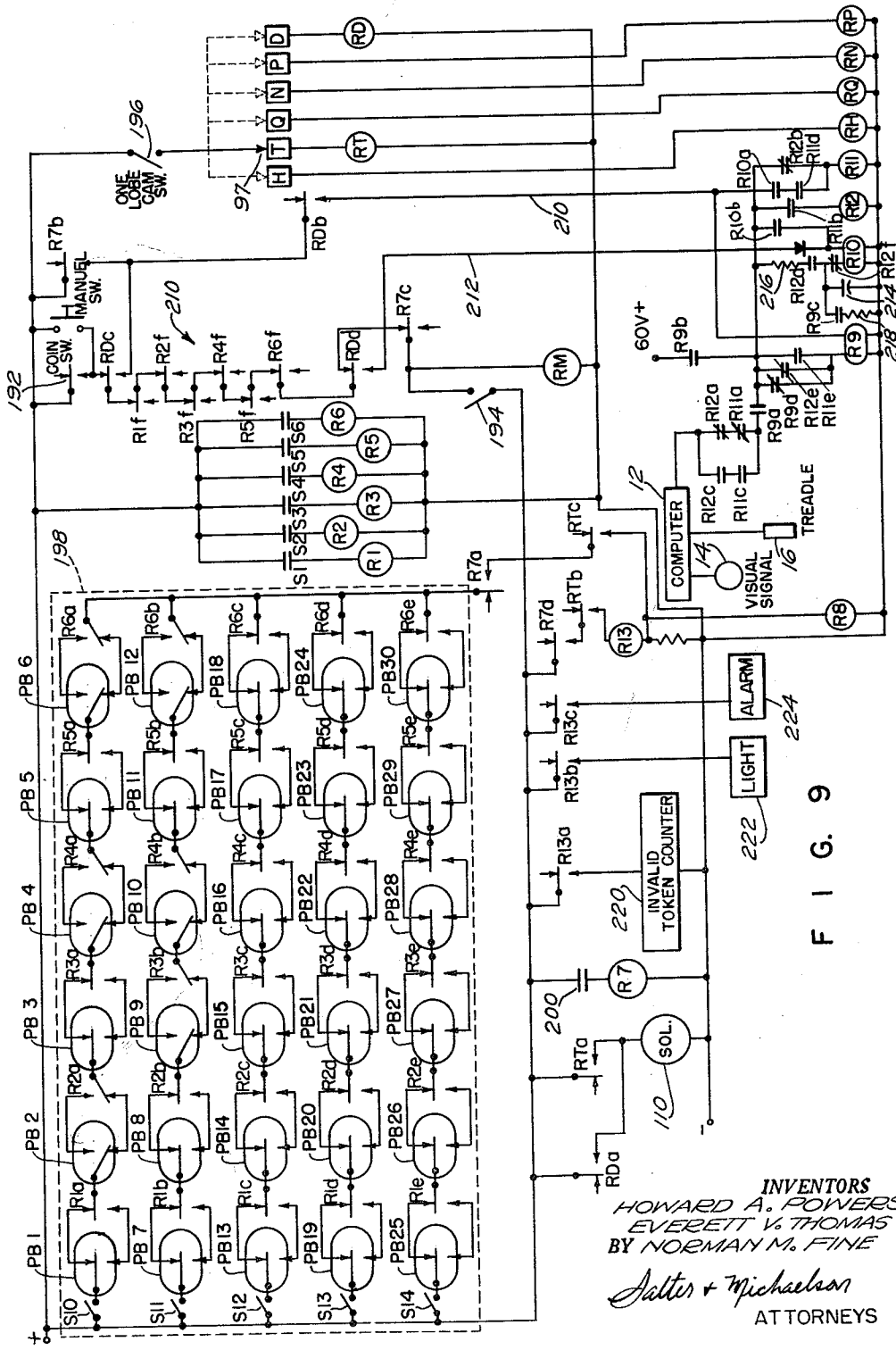


FIG. 9

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United States Patent Office 3,173,531 Patented Mar. 16, 1965

3,173,531
FARE COLLECTING APPARATUS

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Filed July 20, 1961, Ser. No. 125,574
24 Claims. (Cl. 194—4)

The present invention relates to fare collecting apparatus. More particularly, the present invention relates to a token identifying device for use in a coin collecting and registering machine and has particular application in toll collecting equipment that is adapted to control passage of vehicular traffic through toll stations located on bridges, superhighways and the like. In connection with the present invention, reference is made to the copending application of Grant et al., Serial No. 63,334, filed October 18, 1960, now Patent No. 3,128,038, entitled Fare Collecting Machine and the copending application to Powers et al. Serial No. 55,256, filed September 21, 1960, entitled Fare Collecting Apparatus, both of which disclose fare collecting devices with which the token identifying unit embodied herein may be employed.

In general, the fare collecting machine with which the token identifying device embodied herein is utilized, is adapted to accept coins of various denominations as well as tokens, and is electrically connected to a computer that automatically counts and registers the coins or token deposited therein. Where the coins received by the machine aggregate a predetermined amount, or if a valid token is deposited, the computer will indicate a fare paid and control a light signal or similar device to indicate to the passenger who has deposited the fare that passage through the toll station is permitted.

Although the description hereinafter relates to a device for the collection of vehicular tolls, it is understood that the concept of the invention embodied herein may be employed in the collection of fares, tolls, or admissions and at any station that is adapted to be controlled by the deposit or collection of fare parts.

It is the practice of many toll authorities today to sell ticket books to regular patrons, each ticket in the book constituting a fare and usually being sold at a reduced rate for accommodation of the regular patron. The automatic toll equipment in use today is not capable of receiving a paper ticket and therefore it is necessary to provide attendant-operated toll booth for supervising collections of fares from those patrons using tickets. In the copending applications hereinabove mentioned, the fare collecting devices disclosed therein are capable of receiving and identifying tokens, and therefore it has been suggested that tokens be substituted for tickets at those toll stations where tickets are accepted. It has been the practice by most toll authorities to permit the use of a specified ticket for only a limited period of time. However, since the automatic toll collecting machine can only accept a few tokens of predetermined diameter and since the automatic toll collecting machine will accept such tokens regardless of any time interval established by the toll authority, the prior known tokens are impractical as a substitute for tickets.

The present invention is designed to overcome the limitations hitherto imposed on the use of tokens in automatic toll equipment and incorporates a novel token identifying device that is adapted to be used in conjunction with an especially designed token. Briefly, the new token that is used with the token identifying device is formed with a plurality of annular ridges and grooves that are arranged in concentric relation on the surfaces

thereof. In order to distinguish one token from another, the relationship of the annular grooves and ridges is varied although the diameters of the tokens are the same so that the automatic coin machine or fare collection apparatus such as that described in the Grant et al. application can be employed to receive and register the tokens when the apparatus is located at a toll station.

The token identifying device embodied herein is adapted not only to identify tokens of the above described design but automatically detects whether a token having a particular arrangement of concentric grooves and ridges is acceptable. In order to determine the validity of the tokens the token identifying device is provided with a plurality of pivotally mounted detecting fingers, the outer ends of which are adapted to make contact with the token surface when it is moved to the gauging station of the coin machine. Any detecting finger that coincides with a ridge on the token surface will be pivoted, the pivoting movement resulting in the closing of a switch that completes a circuit to a relay. The relay controls a preset contact in a control panel and therefore when a plurality of similar contacts that are located in series and that are responsive to individually operated switch responsive relays are preset, a preselected circuit path is defined, that will be completed only when a token having a predetermined design is scanned by the detecting fingers of the token identifying device.

Accordingly, it is an object of the present invention to provide an automatic toll collecting device for use at a toll station that is adapted to not only receive multiple fare parts therein, but is also adapted to detect the validity of tokens having a specially designed surface.

Another object of the invention is to provide a fare collecting device for use at a toll station that is adapted to facilitate rapid transfer of patrons through the toll station.

Still another object is to provide a token identifying device for use at a toll collecting station that is adapted to identify a token of a predetermined design.

Still another object is to provide a new form of token for use at a fare collecting station that is formed with a plurality of alternating concentric ridges and grooves on the opposed surfaces thereof.

Still another object is to provide a fare collecting device that includes a token identifying means having a plurality of detecting fingers that are provided for scanning the surface of a token, the detecting fingers being adapted to actuate an electric circuit for indicating a fare paid when the token has a preselected design.

Still another object is to provide a token identifying device for use in a fare collecting machine that includes a plurality of contact fingers that are movable upon scanning a token of predetermined design to cause a circuit to be completed through a selected current path, completion of the circuit through the selected current path indicating that the token being identified is acceptable by the machine.

Still another object is to provide a token identifying device for use in a fare collecting machine that is adapted to indicate acceptance of a token of a predetermined design and will fail to indicate acceptance of any token that is not formed with the predetermined design.

Still another object is to provide an electrical circuit for a token identifying device that includes a plurality of presettable contacts that are adapted to be arranged to complete a preselected current path when a token of predetermined design is identified by the token identifying device.

Still another object is to provide an electrical circuit that cooperates with the token identifying device em-

bodied in the present invention to indicate the presence of two dimes that have been indexed together to the gauging station of the coin machine on which the token identifying device is mounted.

Still another object is to provide an electrical circuit for use with an automatic fare collecting device that includes means for producing electrical pulses in accordance with the denomination of the coins deposited in the fare collecting devices.

Other objects, features and advantages of the invention will become apparent as the description thereof proceeds when considered in connection with the accompanying illustrative drawings.

In the drawings which illustrate the best mode presently contemplated by us for carrying out our invention:

FIG. 1 is a front elevational view of a coin machine on which the token identifying device embodied herein is mounted;

FIG. 2 is a sectional view of the face plate shown in FIG. 1, the token identifying contact fingers and switches therefor of the token identifying device being illustrated in side elevation;

FIG. 3 is an elevational view of the other side of the token identifying device, the face plate of the coin machine being shown in section;

FIG. 4 is a fragmentary view of a set of the contacts of the multiple contact switch used in the token identifying device, the interengagement of a detecting finger with its associated contact being illustrated in detail;

FIG. 5 is a plan view of the new token embodied in the present invention showing one arrangement of the concentric rows of alternating ridges and grooves formed therein;

FIG. 6 is a partial plan view of a modified form of the token illustrated in FIG. 5;

FIG. 7 is a perspective view of the contact fingers illustrated in FIG. 2 showing their placement on the surface of a token that is shown in section;

FIG. 8 is an enlarged fragmentary elevational view of the ends of the token identifier contact finger showing the engagement thereof with the token illustrated in FIG. 7;

FIG. 9 is a diagrammatic illustration of the electrical circuit that controls the operation of the apparatus embodied herein.

Although not illustrated in the drawings, the coin machine embodied herein is adapted to be installed in a housing located at a toll booth that is positioned adjacent a vehicular toll lane. Referring to FIG. 1 a coin machine is generally indicated at **10** and is adapted to be electrically connected to a computer indicated at **12** in the electrical circuit in FIG. 9, the computer **12** being responsive to the operation of the coin machine **10** for controlling a visual signal indicated at **14** in FIG. 9. A ground positioned treadle **16** is electrically connected to the computer **12** and is responsive to the passage of a vehicle thereover for resetting the visual signal as is well known in the art. As will be described hereinafter and as illustrated and described in application Serial No. 63,334, upon the deposit of coins in the coin machine **10** aggregating a predetermined fare or upon deposit of a token constituting a valid fare, the coin machine **10** will complete an electrical circuit that will cause an electrical pulse to be fed into the computer **12** for counting and registering the fare. When the computer **12** determines that the deposited coins or token constitute a fare paid, the visual signal **14** will be actuated to indicate to the patron that passage through the toll lane is permitted. If the coins deposited do not aggregate a fare paid or if any of the coins or tokens are unacceptable, the coin machine **10** will not feed the necessary pulses into the computer **12**, and the visual signal **14** will fail to indicate that passage through the toll lane is permitted. It is understood that although the apparatus embodied herein is illustrated and described for use at a toll station on a superhighway or the like, such an installation may be utilized wherever tolls or fares are collected.

Referring again to FIG. 1, the token identifying unit embodied herein is generally indicated at **18** and as shown is mounted on the front of the coin machine **10**, the structural details of the coin machine being shown and described in the copending application Serial No. 63,334. As illustrated herein the coin machine **10** includes a frame construction that is cast as an integral unit and on the front portion of which a face plate **26** is mounted, the face plate **26** being inclined with respect to the horizontal, as shown in FIG. 2. The face plate **26** underlies a glass or clear plastic cover that is formed as part of the housing construction for the coin machine, and as will be set forth hereinafter, the components of the token identifying unit **18** are mounted on the face plate **26** adjacent a fare gauging station. Mounted on the upper portion of the face plate **26** and underlying an inlet (not shown) that receives the fare parts from the coin machine hopper is a fare guide assembly generally indicated at **27**. The fare guide assembly **27** includes an upper guide chute **28** that communicates with the fare inlet opening, the fare parts or coins gravitating into the upper guide chute **28** after they pass through the fare inlet opening. Mounted on the upper guide chute **28** is an upper feed roller **30** that is secured to a shaft that is journalled for rotation in spaced bearings **32** and **34**. The feed roller **30** is preferably formed of a rubber material and has a spiral or helical groove **35** formed in the periphery thereof that is adapted to turn the coins from an edge position to a flat position upon contact therewith, thereby orienting the coins for feeding into the coin machine. The shaft on which the feed roller is mounted has a pulley **38** secured to the outer end thereof that is driven by a belt **39**. The periphery of the feed roller **30** is spaced from the face plate **26** a sufficient distance to permit the oriented coins to fall therebetween into a lower guide chute **36**, the lower guide chute **36** directing the coins toward a lower feed roller **40** that is mounted on a shaft **42**. The shaft **42** is journalled in bearings **44** and **46** that are secured to the lower chute **36** and has a pulley **48** mounted on the outer end thereof that is also driven by the belt **39**. The feed roller **40** is formed of rubber material similar to that from which the feed roller **30** is formed, the periphery of the roller **40** being closely spaced from the surface of the face plate so as to permit single file entry of the coins therebetween. As illustrated in FIG. 1, the feed roller **40** overlies a scavenger door **50** that is adapted to permit scavenging of unacceptable fare parts, the scavenging door and operation thereof being more clearly described in the aforesaid copending applications. It is seen that as the coins gravitate through the lower chute **36** toward the feed roller **40**, they will be engaged by the feed roller **40** and will be directed downwardly to the coin machine rotor in an oriented or flat position with respect to the face plate **26**.

In order to drive the feed rollers **30** and **40**, a motor **52** is provided and is suitably mounted on the uppermost portion of the coin machine frame just rearwardly of of the fare guide assembly **27**. A suitable drive pulley **54** is driven by the motor **52** and is interconnected to the pulleys **38** and **48** by the belt **39** so that upon rotation of the shaft of the motor **52** a corresponding rotation of the pulleys **38** and **48** will be produced. Since the motor **52** is independently operated with respect to the drive for the coin machine, the feed rollers **30** and **40** will be continously rotated regardless of the operation of the coin machine.

Communicating with the coin feed channel defined by the fare guide assembly **27** is a rotor **58** which a plurality of peripheral pockets indicated at **60** are formed. Each of the pockets **60** is adapted to receive a coin or fare part therein during intermittent movement of the rotor **58**, and thus each of the pockets communicates with the coin

feed channel during the operation of the coin machine. In order to guide the fare parts as they are directed toward the pockets 60 of the rotor 58, a feed finger assembly generally indicated at 66 is provided together with a guide member 68 that is spaced from and opposite to the feed finger assembly 66. The feed finger assembly 66 and the guide member 68 are located immediately adjacent the rotor 58 in spaced relation and thus define a limited access passage through which the coins pass as they gravitate toward the pockets 60 of the rotor. As illustrated in FIG. 1, the feed finger assembly 66 includes a feed finger 70 that is pivotally mounted on the face plate 26 at 72. An upper extension of the feed finger assembly extends behind the feed roller 40 and is secured to one end of a spring 74, the other end of the spring 74 being secured to the face plate 26. Mounted on an arm 76 that is joined to the feed finger 70 is a follower 77 that engages a cam 78, the cam 78 being secured to the shaft 42 of the feed roller 40. Thus it is seen that as roller 40 is rotated by the belt 39, the cam 78 will also be rotated on the shaft 42. Rotation of the cam 78 will oscillate the feed finger assembly 66, and the feed finger 70 will thereby agitate the coins as they gravitate into contact therewith. The agitating or oscillating action of the feed finger assembly 66 thereby acts to break up any jams of the fare parts as they gravitate through the coin channel toward the rotor 58 and also tends to promote proper feeding of the fare parts into the pockets 60 of the rotor. The fare parts are thus induced to enter the rotor pockets individually and jams therein are effectively prevented.

The guide member 68 that is pivotally mounted on the face plate 26 cooperates with the feed finger 70 to guide the coins toward the pockets 60 of the rotor 58. A coin guard assembly generally indicated at 80 is also provided adjacent the coin channel and is disposed in spaced relation to the rotor 58 so as to prevent the entry of more than one coin to the gauging station of the coin machine. The description and operation of the coin guard assembly 80, the guide member 68 and the feed finger assembly 66 are illustrated and described in detail in copending application S.N. 63,334.

As described in the aforesaid copending applications the fare parts introduced into the rotor pockets 60 of the rotor 58 are adapted to be indexed to a gauging station the diameter thereof, wherein the denomination thereof is determined. The diameter of the fare parts are gauged by moving a diameter gauging blade into contact therewith, the position of the diameter gauging blade determining the position of a selector blade contact that is adapted to complete a circuit through a corresponding contact mounted on a selector plate. Accordingly the denomination of the fare part is determined by completing an electrical circuit through the contact on the selector plate that the selector blade contact engages, it being understood that the diameter of the fare part being gauged determines the position of the selector blade contact. Although the electrical circuit of the diameter gauging apparatus is described hereinafter, the structural elements therefor are illustrated only partially in FIG. 2 herein, the details of this structure being fully described in the aforesaid copending applications. As shown in FIG. 2, the gauging mechanism that is adapted to gauge the diameters of the fare parts is generally indicated at 82 and includes a gauging blade 84 that projects through an opening 85 formed in the face plate 26.

The gauging mechanism 82 is located just left of the coin guard 80 as seen in FIG. 1 at a gauging station generally indicated at 86. When a fare part is deposited within one of the pockets 60 of the rotor 58, it is indexed to the gauging station 86 the outer peripheral edge thereof projecting upwardly so that it may be contacted by the gauging blade 82. As described in the aforesaid copending applications, the consequent vertical position of the gauging blade 82 determines the position of the selector blade contact that acts to complete an electrical circuit for identifying the denomination of the fare part located at the gauging station. As shown in FIG. 2, the gauging blade 82 is mounted on the underside of an arm 88 that is secured to a shaft 90, the shaft 90 being journalled for rotation, thereby providing for free pivotal movement of the gauging blade 82. The gauging blade 82 is normally retained in the lower position thereof as shown in FIG. 2, and for this purpose a spring 92 is provided, one end of which is secured to an upstanding ear 94 that is formed integral with the arm 88 and the other end of which is secured to a suitable projection that extends from the rear of the face plate 26. It will be noted that a link indicated at 96 in FIG. 2 is elevated in response to movement of the gauging blade 86, the link 96 being adapted to move a selector blade having a contact 97 (FIG. 9) mounted thereon into contact with a selector contact segment, the segment contacted depending upon the denomination of the fare part that has been indexed to the gauging station 86.

Although the diameter gauging assembly 82, the electrical componets and circuitry associated therewith are necessary for the determination of the denomination of the fare part indexed to the gauging station 86 and hence are necessary in the gauging operation embodied in the present invention, the present invention is primarily related to the identification of tokens that are introduced into the coin machine. Thus, for purposes of the present invention, the diameter gauging assembly 82 is utilized primarily for determining that the fare part located at the gauging station is a token. The token identifying device 18 to be described hereinafter is then adapted to determine whether the token indexed to the gauging station 86 is acceptable as a valid fare as previously selected by the toll authority.

Referring again to FIGS. 1–3, the token identifying unit 18 is illustrated therein and includes a generally flat main plate 100 that is formed in a substantially rectangular configuration and that is suitably secured to an underlying hinge plate 102. The hinge plate 102 is attached to the face plate 26 by screws 104 that extend through an overlying block 106, the block 106 being spaced from the main plate 100 to expose a portion 108 of the hinge plate 102 that defines the hinge axis for the main plate. The main plate 100 is normally retained in spaced relation with respect to the face plate by a screw 109 that extends through the main plate and engages the face plate. A nut 111 maintains the position of the screw 109 on the main plate.

Since the main plate 100 is attached only to the hinge plate 102, it has free pivotal movement with respect to the face plate along the line defined by the hinge axis 108. In order to pivot the main plate 100, a solenoid 110 is provided and is secured thereto by mounting bolts 112 that extend through an upper plate 114 thereof. Although not shown, an opening is formed in the main plate 100 that communicates with the solenoid core, the opening exposing the core to the face plate 26. The solenoid 110, which is of the fixed armature type, is adapted to be energized upon the indexing of a token to the gauging station 86. The solenoid and core are then drawn toward the metallic face plate 26 which causes the main plate 100 to be pivoted with respect to the face plate. The pivotal movement of the main plate 100 is normally resisted by a tension spring 116 through the outer end of which the adjustment screw 109 extends. As shown in FIG. 1, the tension spring 116 is secured to the upper surface of the plate 100 by screws 117. Upon pivotal movement of the main plate 100 in response to actuation and movement of the solenoid 110 into contact with the face plate, the spring 116 will be tensioned and will act to return the plate to the normal position thereof when the solenoid 110 is deenergized. It is apparent that the adjustment screw 109 may be utilized to vary the position of the main plate with respect to the face plate for adjusting the tension that is applied

to the spring **116** when the plate **100** is pivoted. A limit screw **122** having an enlarged head is further provided and is threadably mounted in the face plate **26**. The underside of the head of the screw is adapted to be engaged by the main plate **100** and thereby acts to limit outer movement of the main plate.

The main plate **100** is adapted to be pivoted with respect to the face plate **26** for the purpose of moving a plurality of detecting fingers into contact with the surface of a token that is indexed to the gauging station **86**. As will be described hereinafter the tokens which the detecting fingers are adapted to engage are designed especially for use with the token identifying unit **18** and are formed with surface configurations that may be varied depending upon the requirements of the toll authority. Referring again to FIGS. 1 and 2 a detecting finger assembly is generally indicated at **124** and includes a plurality of detecting fingers **126, 128, 130, 132, 134** and **136**. As shown in FIG. 2, each of the detecting fingers is formed with an elongated body portion that terminates at the upper end thereof in a gooseneck construction, the curvature and length of which is dependent on the position of the detecting finger with respect to a switch construction generally indicated at **138**. As shown in FIGS. 1, 2 and 8, the lower end of each detecting finger is formed with a converging or V-shaped tip portion **140**, the plane of which is perpendicular to the plane of the finger body portion. The lowermost end of the V-shaped tip portions **140** of each detecting finger is spaced from the adjacent tip portion and is adapted to engage a particular area of the surface of a token that is indexed to the gauging station **86** as will hereinafter be described. The detecting fingers are located in side-by-side parallel relation on the main plate **100** and are pivotally mounted intermediate the ends thereof on a pivot block **142**. A pin **144** extends through the pivot block **142** and the parallel detecting fingers, and a spring **146** positioned on the pin **144** is compressed between spaced collars **148, 150** for firmly retaining the detecting fingers on the pivot block. As shown in FIG. 1, suitable collars are located between the detecting fingers to maintain them sufficiently spaced apart so that they may independently pivot with respect to each other. In order to vary the tension in the pivoting action of each detecting finger, a tension adjusting assembly **152** is provided and includes a bracket **154** through which a plurality of adjusting screws **156** extend. Each of the adjusting screws engages the upper edge of a detecting finger and upon adjustment thereof acts to vary the pivoting action of the associated detecting finger.

As will be described, the tip portion **140** of each of the detecting fingers is adapted to contact a specified area on the surface of a token that is indexed to the gauging station. The surface configuration of the token will then determine the extent of pivotal movement of the detecting fingers as they are carried toward the face plate **26** by the movable plate **100**. In order to detect the pivotal movement of the various detecting fingers the switch **138** is provided and is secured to the mounting plate by suitable screws adjacent the upper ends of the contact fingers. The switch **138** includes six pairs of contacts that extend outwardly therefrom for engagement with the contact fingers, and for purposes of illustration each pair of contacts represents an individually actuated switch indicated at **S1, S2, S3, S4, S5**, and **S6**. Referring to FIG. 4, each of the individual switches **S1–S6** as represented by the switch **S2** includes a pair of contact arms **160, 162** having contact buttons secured to the outermost ends thereof. An insulated block **164** having a groove **166** formed therein is secured to the upper contact arm **160** by a rivet **168**, the groove **166** being adapted to receive the outermost end of a detecting finger. It is apparent that upon pivotal movement of the detecting finger, the contact arm **160** will be pivoted inwardly to cause contact to be made between the contact buttons, wherein a circuit is closed as will be described in connection with FIG. 9. In order to produce the pivoting movement of the detecting fingers, the tokens indexed to the gauging station **86** must be formed in specific manner. Referring to FIG. 5, a token generally indicated at **170** is illustrated and is representative of the new token that is adapted to be utilized with the token identifying unit **18**. The token **170** is formed of a predetermined diameter so as to be identified as a token by the gauging blade **84** and has a plurality of concentric ridges **172** formed on the surfaces thereof. The ridges **172** are spaced apart sufficiently so that the V-shaped tip portions **140** of the detecting finger can make contact therewith when the token is located at the gauging station **86**. Since the diameter of the token is fixed, only six ridges **172** are formed thereon, not counting the outer rim **176**. Accordingly six detecting fingers as previously described are utilized, each of the detecting fingers being adapted to engage a ridge. The central portion of the token indicated at **178** is used as an identification area and it is understood that any convenient number, letter or other identifying indicia may be imprinted or embossed thereon. The token is normally formed of a metal material, although other materials such as plastic could be employed without departing from the spirit of the invention.

In use, the ridges **172** present a continuous surface to the spaced V-portions **140** of the detecting fingers, each of the detecting fingers engaging a corresponding ridge. Thus, if token **170** is indexed to the gauging station **86**, all of the detecting fingers will be pivoted as the solenoid **110** carries the main plate **100** into contact with the face plate **26** and all of the switches **S1–S6** will be closed. As will be described in connection with FIG. 9, a circuit on a control panel that includes push button controlled contacts, may be prearranged in accordance with the token design, each contact corresponding to a ridge **172** and the prearrangement thereof defining a preselected current path. Since the presence of a ridge **172** causes a corresponding detecting finger to pivot when the plate **100** is moved into contact with the face plate **26**, the removal of a ridge will prevent the corresponding detecting finger from being pivoted. Thus the preselected current path in the control panel may be varied depending upon the token design and will produce an electrical pulse, when a token of a design corresponding to the preselected current path is indexed to the gauging station **86**.

Referring to FIG. 7 a variation in the token design is illustrated and is generally indicated at **180**. The token **180** which is shown in cross section defines one form of token design that permits pivoting movement of less than all of the detecting fingers, and as shown in FIG. 7 the first, third and fifth ridges of the token have been removed to form annular grooves **182**, each of the grooves **182** being adapted to receive corresponding detecting fingers **126, 130** and **134** therein when the token **180** is indexed to the gauging station **86**. In FIG. 6 a further modified form of token design is generally indicated at **184** wherein the first, second and fifth annular ridges have been removed to define annular grooves **186** and **188**. With the token **184** formed in the manner illustrated, detecting fingers **126, 128** will engage the groove **186** while detecting finger **134** will engage groove **188** when the token **184** is indexed to the gauging station. As hereinafter described, if the control panel has been prearranged to conform the push button contacts in a current path that corresponds to the token designs as seen in FIGS. 6 or 8 an electrical pulse will be produced which will be transmitted to the computer **12** for indicating a fare paid. It is understood that both surfaces of the tokens are similarly formed so that the token will be properly detected regardless of the manner that it is presented to the detecting fingers. It is further understood that various combinations of tokens may be used, the positioning of the ridges and grooves being varied as required. By providing several token designs, one or more may be indicated by the toll authority as valid for a predetermined period of time and the token identifying circuit may be prearranged to accept only the

valid tokens. A valid token could be visually identified by the number or indicia appearing in the identification area 178.

In the operation of the coin machine, the selector blade contact indicated at 97 in FIG. 9 is adapted to be moved into engagement with one of the selector plate contacts indicated at H, T, Q, N, P or D depending upon the denomination or kind of fare part introduced into the coin machine and indexed to the gauging station 86. As hereinabove stated, the positioning of the selector bar contact 97 is determined by the position of the diameter gauging blade 84 during the diameter gauging operation. As described and illustrated in the aforesaid copending applications, the motor for operating the coin machine and a clutch solenoid associated therewith are adapted to be energized upon the introduction of a coin or token into the inlet of the coin machine and engagement with a coin switch as the coin gravitates into a pocket 60 of the rotor. The coin switch in the present invention is indicated at 192 in FIGS. 1 and 9. The motor relay which controls the operation of the motor and clutch solenoid is located in series with the cam switch 192 and is indicated at RM in FIG. 9. The cam switch 192 is a momentary contact and merely serves to energize the motor relay RM for indexing the coin to the gauging station. A motor lobe cam switch indicated at 194 in FIG. 9 is adapted to be closed in timed relation by a motor lobe cam (not shown) that is mounted on the main shaft of the coin machine, and will close the circuit for energizing the motor relay RM during the remaining portion of the operating cycle. A one-lobe cam switch 196 is located in series with the selector bar contact 97 and is closed by a one-lobe cam (not shown) that is mounted on the main shaft of the coin machine, current thereby being supplied through the selector bar contact 97 and the selector contact segment it engages for the duration of the gauging operation. The aforesaid portion of the circuit is more clearly described in the copending applications wherein the circuits disclosed therein are shown including the connections to the computer 12 for producing an electrical pulse in response to and in accordance with the coin or fare part located at the gauging station. In the present invention relays RH, RQ, RN and RP are located in circuit with the selector contact segments H, Q, N and P respectively, these segments representing a half dollar, quarter, nickel and penny. Upon energization of any of the relays RH, RO, RN or RP the contacts controlled thereby are actuated to close a circuit in the computer wherein the electrical pulse generated is then memorized and utilized for indicating a fare paid.

When a token is indexed to the gauging station 86, thereby causing the selector bar contact 97 to engage the "T" segment, a circuit is completed through a token relay RT to close contact RT*a* and energize the solenoid 110. The solenoid 110 then moves the main plate 100 into contact with the face plate 26 which causes the detecting fingers to engage the token. As described above the detecting fingers will be pivotally moved if the corresponding ridge on the token is contacted. Pivotal movement of any of the detecting fingers will then cause the switch associated therewith to close. Referring again to FIG. 9, each of the switches S1, S2, S3, S4, S5 and S6 is diagrammatically illustrated in circuit with a corresponding relay R1, R2, R3, R4, R5 and R6, and it is seen that closing of any of the switches S1–S6 by its detecting finger will cause the relay located in circuit therewith to be energized.

The basic purpose in forming the ridges and grooves in the tokens is to enable the token identifying unit 18 to scan the face of the token and identify it as a valid or invalid token. In order to indicate whether the token being identified is valid, a control circuit is provided and is located on a control panel indicated in dotted lines at 198 in FIG. 9. The control panel 198 has a plurality of push button controlled switches mounted thereon which are of the single-pole double-throw type and that are arranged in rows, each row including six push button switches. As shown in FIG. 9 each relay controls a bank of contacts, one contact being in each row. Each row of push button switches represents a single token and each switch in the row corresponds to a ridge on the token. Thus each push button switch is prearranged in accordance with the token design. Located in series with the contacts of the push button switches of each row of switches are the relay contacts that are actuated by the relays R1 to R6 respectively. Since only selected relays will be energized as determined by the token design, the relay contacts are combined with the push button contacts to define a preselected current path that will be closed only if a token having a predetermined design is indexed to the gauging station. This is best illustrated by assuming that token 180 illustrated in FIG. 8 is deposited in the coin machine and indexed to the gauging station. In the normal position of the push button switches, the movable contact thereof is located in the up position as illustrated by PB1 in FIG. 9. When the push button switches are preset, only those contacts corresponding to a ridge on a token are moved and will assume a position corresponding to PB2. Thus since the token 180 has alternate ridges and grooves formed therein, push button switches PB2, PB4 and PB6 are preset so that their movable contacts are located in the lower position as illustrated in FIG. 9. The movable relay contacts R1*a*, R2*a*, R3*a*, R4*a*, R5*a* and R6*a* are normally located in the up position and will be pulled down when the corresponding relay is energized. After the token 180 is indexed to the gauging station, the solenoid 110 will be energized to move the plate 100 against the face plate 26. As shown in FIG. 7 this movement will cause the detecting fingers 128, 132 and 136 to strike the ridges 172 which resist further movement thereof, whereas the detecting fingers 126, 130 and 134 are carried inwardly by the plate 100 into the grooves 182. The additional movement of the plate 100 toward the face plate 26 causes the detecting fingers 128, 132 and 136 to pivot thereby causing the upper ends thereof to move toward the plate 100 and to close their respective switches S2, S4 and S6. Closing of the switches S2, S4 and S6 completes the circuit to relays R2, R4 and R6 thereby energizing these relays and causing their contacts R2*a*, R4*a* and R6*a* on the control panel 198 to be moved to the position as illustrated in FIG. 9. Since the push button switches PB2, PB4 and PB6 had already been preset in accordance with the design of token 180 shown in FIG. 8, the movable push button contacts combine with the contacts R2*a*, R4*a* and R6*a* to define a current path. Assuming that on-off toggle switch S10 had been previously closed, a circuit is then complete through the push button switch PB1, contact R1*a*, PB2, R2*a*, PB3, R3*a*, PB4, R4*a*, PB5, R5*a*, PB6 and R6*a*. As will be described, the pulse generated by completing the selected current path through the push button switches will be directed to the computer 12 for indicating a fare paid. It is apparent that if a token having a design different from that of token 180 were indexed to the gauging station, the preselected current path would not be completed since relays other than R2, R4 and R6 would be energized. This would result in contacts other than R2*a*, R4*a* and R6*a* being moved which would then cause a break in the selected current path. For example, if a token having a ridge corresponding to the position of detecting finger 126 is deposited in the machine, the switch S1 would be closed, thereby energizing the relay R1. Since the movable contact of the push button PB1 had not been preset, movement of the contact R1*a* would result in a break in the current path. The circuit through the control panel 198 would be incomplete and a pulse could not be introduced to the computer 12 for indicating a fare paid.

Since there are five separate circuits available for use in the control panel as represented by the five rows of push button switches, more than one token may be accepted by the machine at the same time. Thus each row of push button switches illustrated in FIG. 9 may be prearranged to accept a token having a different design and will repre-

sent a single token. By providing the additional circuits, more flexibility is available by the toll authority for designating the interval of time that the tokens are acceptable. For example, one token may be accepted for a 60 day period, while a second token may be valid for only a 30 day period, but a portion of the period for the second token could overlap with the period that the first token was acceptable. During the overlapping period, two rows of the push button switches would be prearranged so that both tokens would be accepted by the coin machine for indicating a fare paid.

This may be illustrated by assuming that a token having a design as illustrated in FIG. 6 will be accepted at the same time that token **180** is accepted. With toggle switch **S11** closed, push buttons **PB9**, **PB10** and **PB12** would be present, these push buttons corresponding to the ridges **172** appearing on the token **184**. Upon deposit of token **184** into the coin machine and the indexing thereof to the gauging station the plate **100** would be moved inwardly, the detecting fingers **130**, **132** and **136** thereafter being pivoted, to cause the switches **S3**, **S4** and **S65** to be closed. Relays **R3**, **R4** and **R6** would then be energized to swing their corresponding contacts R3*b*, R4*b* and R6*b* to the position as illustrated in the second row of push buttons shown in FIG. 9. A circuit would then be completed through the second row of push buttons and relay contacts to cause a pulse to be impressed on the computer for indicating a fare paid. For purposes of illustration the remaining toggle switches for the lower three rows of push button contacts are indicated at **S12**, **S13** and **S14** while the corresponding rows of push button switch contacts are indicated at **PB13** to **PB18**, **PB19** to **PB24** and **PB25** to **PB30**. As mentioned above, the relay contacts located in series with the push button switch contacts are identified in accordance with the relay that controls them. It is understood that the coin machine will accept any token of predetermined design if the push button switches in any of the five rows of switches are arranged in accordance with the token design and if the corresponding toggle switch is closed.

Before an electrical pulse can be received by the computer **12**, a circuit must be completed from the circuit on the control panel **198** to the computer. In order to complete this circuit a relay contact R7*a* must be closed. For this purpose a relay **R7** is provided and is energized by the closing of a solenoid switch **200**. Referring again to FIG. 3, the switch **200** is shown mounted on the movable mounting plate **100** and includes contact arms **202** and **204**. An opening **206** is formed in the plate **100** beneath the outer end of the contact arm **204** and receives the end of an insulated screw **208**. The screw **208** projects through the face plate **26** and into the opening **206**, terminating just outwardly of the plate **100** for engagement with the contact arm **204**. When the solenoid **110** is energized, thereby moving the plate **100** against the face plate **26**, the screw **208** resists inner movement of the contact arm **204**. The contact arm **202** which moves with the switch **200** and plate **100** is then brought into engagement with the contact arm **204** to close the switch **200** and complete the electrical circuit to the relay **R7**.

Operation

The push button switches on the control panel **198** are first preset to provide for a preselected current path for as many token designs as are required by the toll authority. With the corresponding toggle switch for each selected row of push buttons closed it is next assumed that a patron who has entered the toll station deposits a token of an acceptable design into the coin machine. At this point the visual signal **14** is indicating that passage through the toll station is prohibited. The coin switch **192** is then closed to complete the circuit to the motor relay RM which causes the coin machine motor and solenoid to be energized for indexing the token to the gauging station **86**.

The gauging assembly **82** in response to the gauging blade **84** contacting the token indicated at T*k* in FIG. 2, moves the selector blade contact **97** into engagement with the token segment "T." Upon closing of the one-lobe cam switch **196** by the one-lobe cam the relay RT is then energized to close contact RT*a* for completing the circuit through the solenoid **110**. The solenoid **110** pivotally moves the main plate **100** and the detecting fingers thereon toward the face plate, which closes the appropriate switches **S1–S6** and energizes the corresponding relays **R1–R6**. Since it is assumed that the token is an acceptable design, the preselected current path will be completed through the selected row of push button switches. Movement of the solenoid **110** and plate **100** toward the face plate **26** also closes the switch **200** which causes the relay **R7** to be energized. Since contacts RT*c* had been closed when relay RT was energized, a circuit will be completed to the relay **R8** upon closing of relay contacts R7*a*. Relay contacts in the computer **12** will be closed by the energized relay R8 for completing a circuit therein and a pulse will be generated for indicating a fare-paid. The visual signal **14** is then actuated to indicate passage through the toll station. The token is finally indexed out of the gauging station by the coin machine rotor **58** which is rotated when a pulse is applied to the motor drive relay by a contact of the toll paid relay. In the event that an invalid token is received in the machine, the selected current path in the control panel **198** will not be completed and the pulse will not be received by the computer **12**.

In order to provide a safety feature in the event of a welding of a contact of one of the relays **R1–R6** or if one of the relays or switches associated therewith fails to operate, or if the solenoid **110** does not operate properly, a fail-safe interlock circuit is provided. The fail safe interlock circuit is generally indicated at **210** in FIG. 9 and includes a series of contacts R1*f*, R2*f*, R3*f*, R4*f*, R5*f* and R6*f* each of which is adapted to be actuated upon energization of the corresponding relay. As shown in FIG. 9, upon closing of the coin switch **192**, a circuit is completed to the motor relay RM through the contacts R1*f*–R6*f*, the energization of the relay RM causing the motor and clutch solenoid of the coin machine to be actuated, wherein the deposited fare part is indexed to the gauging station **86**. Assuming that one of the relay switches **S1–S6** sticks or that the solenoid **110** that causes the detecting fingers to operate the relays **R1–R6** is held in a closed position due to a defect in the relay, that particular relay will remain energized, and the associated relay contact in the fail safe interlock circuit **210** will open the circuit to the motor relay RM. Although the coin switch **192** will be closed by the next deposited fare part, the circuit will be open between the coin switch **192** and the motor relay RM. In this event the coin machine motor will not operate to move the fare part to the gauging station **86**.

As described hereinabove, any preselected token having a design that has been designated as a valid token will cause a circuit in the control panel **198** to produce an electrical pulse that will indicate a fare paid in the computer **12**. The coin machine in which the token identifying unit **18** is mounted is also adapted to receive and register coins of standard denomination. Because of the fact that half-dollars are adapted to be accepted by the coin machine it is possible that two dimes may slip into a rotor pocket **60** and will be indexed to the gauging station since the combined thickness of the dimes is approximately equal to that of a half dollar. The gauging blade **84** when moved into engagement with the outer peripheral edges of the two dimes can not indicate a double dime and therefore, unless provision is made for detecting the double-dime situation, an incorrect amount of fare will be registered. In the copending application to Grant et al., S.N. 63,334, a double-dime detecting device is disclosed that gauges the thickness of the coins received at the gauging station. In the present invention since the token identifying unit **18**, by means of the detecting fingers also gauges thickness, this device is further utilized to

detect the presence of a double-dime situation at the gauging station 86.

When a single dime moves under the gauging blade 84, the selector contact 190 engages the "D" segment. Thus, when the one-lobe cam switch 190 closes, relay RD is energized, thereby swinging the contacts RD*a* to close the circuit solenoid 110. The switch 200 is closed as the plate 100 swings downwardly into contact with the face plate 26 and power is supplied to the relay R7. The token identifying switches S1 through S6 are adjusted so that none of them will be actuated in the presence of a single dime, that is to say, the thickness of a single dime is not sufficient to cause the detecting fingers to be pivoted sufficiently to close any of the associated switches S1 through S6. Relays R1 through R6 then remain in the deenergized condition, and the relay R7 only applies power to two points in the double-dime pulse generator circuit. As seen in FIG. 9, one circuit is defined by the relay contacts R7*b*, RD*b* that has been swung to a circuit closing position upon energization of RD when the selector blade contact 97 is brought into engagement with the "D" contact, line 210 and the coil of R9. The second circuit is defined by closing of the relay contacts R7*b*, RD*c*, R1*f*, R2*f*, R3*f*, R4*f*, R5*f*, R6*f*, RD*d*, line 212 and the coil of R10. Both relays R9 and R10 have double-wound coils and will operate at the same time that the current path thereto is closed. The resultant pulses generated by completing the circuits to R9 and R10 will cause two pulses to be impressed upon the nickel chain in the computer. In this connection, reference is made to the copending application to Powers et al., S.N. 55,256, where the computer embodying the nickel chain and the memory-storing circuit is described in detail. The two pulses are generated in the following manner and will indicate the presence of a single dime at the gauging station 86. When the relay R9 operates, R9*a* closes and feeds a pulse to the nickel chain in the computer machine through the normally closed contacts R11*a* and the normally closed contacts R12*a*. Upon actuation of relay R9, contacts R9*b* are closed, and a 60 volt positive voltage is applied to the relay R11 through the normally closed contacts R12*b*. It would appear that the operation of relay R11 would prevent the first pulse from reaching the nickel chain in the computer. However, R11 is arranged so as to operate at a slow rate and requires about 20 milliseconds to be completely energized, thereby delaying the opening of R11*a*. The opening of contact R11*a* by actuation of R11 opens the circuit to the nickel chain and results in the first pulse being terminated. Upon actuation of the relay R11, the contact R11*b* closes, thereby applying power to the relay R12. Relay R12 is also a 20 millisecond slow operate relay and the first pulse will be applied to the computer 12 through the normally closed contact R12*a* before the relay R12 is fully energized.

The operation of relay R12 defines the path for producing the second pulse that is applied to the nickel chain in the computer. The second pulse is produced by a circuit that is routed through contacts R9*a*, R11*c* and R12*c*. Relay R11 remains in the circuit even though the normally closed contact R12*b* is open, since contact R11*d* locks up to contact R10*a*. When the one-lobe cam switch 196 opens, the circuits to relays R10 and R9 are broken, thereby terminating the dime pulse. In this event relay RD is dropped out permitting relays R9, R10, R11 and R12 to release. As described hereinbefore, in the case of a single dime the relays R11 and R12 are operated only once.

In the event that two dimes are indexed to the gauging station, the relays R11 and R12 will be operated through a second cycle, that is, relays R11 and R12 will be operated twice to generate the four pulses required for indicating two dimes. When two dimes are simultaneously indexed to the gauging station the relay R9 is energized in the manner described above after the selector bar contact 97 has been positioned in engagement with the "D" segment. Since the relay RD is energized, a circuit will be completed to contacts R7*b*, RD*b*, line 210 and the coil of R9. The first pulse follows the path through contacts R9*a*, R11*a* and R12*a*. The second pulse follows the path defined by contacts R9*a*, R11*c* and R12*c*. As will be described, the third pulse also reaches the chain through the normally-closed contacts R11*a* and R12*a*, while the fourth pulse is routed through the path including the normally-open contacts R11*c* and R12*c*. Assuming that two dimes have been indexed to the gauging station, if any one of the six switches S1 through S6 is closed by the pivotal movement of the actuating fingers associated therewith, there will be an indication of the presence of a double dime. Normally, if a double-dime situation is present, all six switches will be closed and relays R1, R2, R3, R4, R5 and R6 will be energized. Relay R7 will, of course, operate after the plate 100 is drawn into engagement with the face plate 26 upon power being supplied to the solenoid 110. The path to the coil of relay R10 is then broken through the "*f*" series of the token identifier relays. Therefore, relay R10 in this case is not energized simultaneously with relay R9. Relay R9 is energized when the selector blade contact 97 engages the "D" segment thereby applying power to the relay RD. Since contacts R7*b* and RD*b* are actuated by their respective relays, a circuit will be completed to the relay R9. When contacts R9*b* are closed, power is applied to the coil of relay R11 through normally-closed R12*b* contacts. Relay R11 is then energized but does not operate immediately. After the 20 millisecond delay, the contact R11*b* is closed to energize relay R12. This relay also requires approximately 20 milliseconds to operate. After the relay R12 operates, relay contact R12*d* is closed, completing a circuit through a capacitor 214, the charging path being through R9*b*, a resistor 216 and the relay R12*d*. The discharge path on the negative side of the circuit is now open through the contact R9*c* and a resistor 218. Since the relay R10 has not as yet operated, relay R11 has no locking path. Therefore with the relay contacts R12*b* open, the relay R11 must drop out. As the contact R11*b* opens, relay R11 will be deenergized. The charge on the capacitor 214 is then dumped through the coil of R10 and the second coil of this relay will lock up to contact R9*b* through its own contact R10*b*. With the release of relay R12, normally-closed contact R12*b* energizes relay R11 a second time. Relay R11 now locks up to contact R10*a* through contact R11*d*. Relay R12 also will operate a second time since the normally open contact R11*b* is now closed. Since the relays R11 and R12 will be held energized until the one-lobe cam switch 196 opens, no more than four pulses will be generated by the circuit. When the pulse generator as described begins the cycle, four pulses will be produced independently of the operation of the one-lobe cam switch 196. This is accomplished by utilizing a locking circuit that is connected to the coil of relay R9. The locking circuit consists of the parallel combination of contacts R9*d*, R12*e* and R113 in series with R9*b* and the coil of R9. Contact R9*d* will hold relay R9 during the first two pulses. The contact R12*e* then holds the relay R9 until the fourth pulse is completed.

In order to detect the depositing of an invalid or unacceptable token, an invalid token counter and circuit is provided. As illustrated in FIG. 9, a token counter 220 is located in series with a contact R13*a*, the purpose of the counter 220 being to count those tokens of proper diameter which are not acceptable during a particular period as determined by the toll authority. In the case of a valid token, the circuit through contacts R7*a* and RT*c* will apply a positive pulse to the negative side of a relay R13. This will shunt down the coil of relay R13 and will prevent the relay from operating, whereupon contact R13*a* will remain open and the invalid token counter 220 will be prevented from being actuated. When an invalid token is deposited in the machine contact R7*a* will remain open and no pulse will be applied to the negative end of relay R13. Since the contacts

R7*d* and RT*b* will apply a pulse to the positive end of R13, a difference in potential will be impressed on the coil of relay R13 which then operates. Contact R13*a* will now be actuated to operate the invalid token counter 220. It is also contemplated to utilize a visual and audible alarm for indicating an invalid token and for this purpose a light indicated at 222 and an alarm indicated at 224 are provided. Relay contact R13*b* is connected in circuit to the light 222 and will actuate the light when the relay R13 is energized as a result of an invalid token being received in the coin machine. Similarly a relay contact R13*c* is located in circuit with the alarm 224 and will cause the actuation thereof when the relay R13 is energized.

While there is shown and described herein certain specific structure embodying the invention, it will be manifest to those skilled in the art that various modifications and rearrangements of the parts may be made without departing from the spirit and scope of the underlying inventive concept and that the same is not limited to the particular forms herein shown and described except insofar as indicated by the scope of the appended claims.

What is claimed is:

1. In a fare collecting machine, a fare inlet for receiving fare parts therein, a rotor, means communicating with said rotor for directing said fare parts received in said fare inlet thereto, means for operating said rotor for indexing said fare parts to a gauging station, means located at said gauging station for gauging the diameter of a fare part indexed thereto for determining the classification thereof, means located adjacent said gauging station for engaging a surface of the fare parts indexed thereto simultaneously with the gauging of the diameter thereof, and means responsive to said engaging means for detecting the presence of an acceptable fare part when the fare part indexed to said gauging station is a token, and contact members being responsive to said detecting means and being selectively actuated to define an electrical path that provides for completion of an electrical circuit when the surface of said token has a preselected configuration.

2. In a fare collecting machine, a fare inlet for receiving fare parts therein, a rotor, means communicating with said rotor for directing said fare parts received in said fare inlet to said rotor, means for operating said rotor for moving said fare parts to a gauging station, means for gauging the diameter of said fare parts indexed to said gauging station for determining the classification thereof, means for engaging a surface of said fare parts simultaneously with the gauging of the diameters thereof, said engaging means including a plurality of detecting fingers each of which is interconnected to an electrical switch, said switches being adapted to be connected in circuit to means for indicating a fare paid when a circuit defined by a preselected current path is completed upon engagement of said fingers with a token having a surface configuration of predetermined design.

3. In a fare collecting machine that is adapted to receive tokens as fare parts wherein said tokens are formed with a plurality of alternating annular grooves and ridges on the surfaces thereof, means for directing said fare parts deposited in said machine to a fare detecting station, means for gauging the diameters of said fare parts at said fare detection station, wherein the classification of said fare parts is determined, and means for indicating that a fare part at said fare detection station is acceptable by said machine when said fare part is classified by said classifying means as a token, said indicating means including a plurality of pivotally mounted contact fingers that are adapted to alternately engage the grooves and ridges formed on said tokens, a plurality of contact members that are manually settable for selecting a current path that will be energized when a token having a predetermined number of grooves and ridges is detected at said detecting station, means responsive to movement of said contact fingers for completing the circuit to said selected current path and means electrically connected in circuit to said selected current path for indicating that an acceptable token has been deposited in said coin machine and that said acceptable token constitutes a valid fare paid.

4. A fare collecting machine that is adapted to receive tokens as fare parts wherein the surfaces of said tokens are formed with a plurality of alternating annular grooves and ridges, comprising means for directing said fare parts to a diameter gauging and token detection station, means for gauging the diameter of said fare parts, and means for detecting the presence of an acceptable token at said station, said detecting means including a plurality of pivotally mounted detecting fingers that are adapted to engage the annular grooves and ridges formed in said tokens, the arrangement of said ridges and grooves being preselected so that only those detecting fingers that engage said ridges are pivoted during the token detecting operation, a plurality of manually settable contact members that are adapted to be arranged in a predetermined pattern for selecting a current path that will be completed when a token having a prearranged grouping of annular ridges and grooves is engaged by said detecting fingers, means responsive to movement of said contact fingers for completing the circuit to said selected circuit path, and means electrically connected in circuit to said selected current path for indicating that an acceptable token has been deposited in said coin machine and that said acceptable token constitutes a valid fare paid.

5. In fare collection apparatus, a coin machine, a token identifying unit associated with said coin machine for identifying acceptable tokens deposited therein, said token identifying unit including means for analyzing said tokens, means responsive to said analyzing means for completing an electrical circuit through a preselected current path, said preselected current path being preset in accordance with the characteristics of said token, and means electrically connected to said preselected current path for receiving an electrical pulse when the token analyzed is a valid token.

6. In fare collection apparatus for use at a toll station, a coin machine for receiving fare parts therein, a token identifying unit associated with said coin machine for analyzing and identifying valid tokens that are deposited in said coin machine, said token identifying unit including means for engaging said tokens for determining the surface characteristics thereof, means responsive to said engaging means for completing an electrical circuit through a preselected current path, said preselected current path being preset in accordance with the surface characteristics of a token that has previously been selected as a valid fare, and means responsive to completing of the circuit through said preselected current path for receiving an electrical pulse, said pulse being utilized to indicate that the token is a valid fare and that passage through said toll station is permitted.

7. In fare collection apparatus, a coin machine having a fare inlet for receiving fare parts therein, a rotor for moving said fare parts to a gauging station, means for gauging the diameters of said fare parts, and a token identifying unit mounted on said coin machine for classifying tokens as acceptable or unacceptable depending upon their surface characteristics, said token identifying unit including a pivotally mounted plate on which are mounted a plurality of detecting fingers, means responsive to said diameter gauging means for pivoting said plate when the diameter of said fare part corresponds to that of a token, wherein said detecting fingers are brought into engagement with the surface of said token for determining the characteristics thereof, and means responsive to movement of said detecting fingers for closing a circuit through a preselected current path when the token is acceptable as a valid token, wherein an electrical pulse is produced that is utilized to indicate that said token is acceptable as a valid token.

8. In fare collection apparatus as set forth in claim 7

means for counting invalid fares, said invalid fare counting means being operative and responsive to means that is operated when said preselected current path is not completed.

9. In fare collection apparatus as set forth in claim 7 means for indicating that the token being identified is not acceptable as a valid fare, said indicating means being responsive to means that is operated when said preselected current path is not completed.

10. In fare collection apparatus as set forth in claim 9 said indicating means including a visual signal.

11. In fare collection apparatus as set forth in claim 9 said indicating means including an audible alarm.

12. In fare collection apparatus, a coin machine for receiving fare parts therein and including a rotor for indexing said fare parts to a gauging station, means for gauging the diameters of said fare parts, means responsive to said diameter gauging means for directing detecting means into engagement with the outer surface of the fare part located at said gauging station when said diameter gauging means determines that said fare part is of a predetermined diameter, and means for detecting and registering a plurality of electrical pulses when two dimes are simultaneously indexed to said gauging station.

13. In fare collection apparatus as set forth in claim 12, said pulse detecting and registering means including an electrical circuit that is completed upon simultaneous gauging of the fare parts as dimes and movement of said detecting means into engagement with the surface of the outer of said dimes, said electrical circuit including means for automatically generating four electrical pulses upon the completing thereof, each pulse being utilized to indicate a nickel and being fed to means for automatically storing said pulses for the indication thereof as a part of a fare paid.

14. In fare collection apparatus, a coin machine for receiving fare parts therein, said coin machine including means for moving said fare parts to a gauging station and means for gauging the diameter of said fare parts, means for detecting the surface configuration of said fare parts, means responsive to said diameter gauging means for directing said detecting means into engagement with the surface of the fare part at said gauging station when said fare part is gauged as a token, said directing means including a pivotally mounted plate on which a solenoid and said detecting means are mounted, said solenoid being energized when said fare part is gauged as a token to move said plate and detecting means therewith so that said detecting means engage the outer surface of said token.

15. In fare collection apparatus as set forth in claim 14, switch means including a plurality of switches mounted on said plate and engageable by said detecting means, said detecting means being adapted to close a preselected number of said switches in accordance with the design of the token located at the gauging station.

16. In fare collection apparatus as set forth in claim 15, each of said switches including spaced contact arms, one of which has an insulated member mounted thereon, said insulated member being formed with a groove, said detecting means including a plurality of elongated detecting fingers, one end of each detecting finger adapted to engage the surface of the token located at the gauging station, and the other end thereof being received within the groove in the corresponding insulated member.

17. In fare collection apparatus as set forth in claim 14, switch means responsive to movement of said detecting means for closing a circuit to a preselected current path for producing an electrical signal, a switch responsive to movement of said plate when said solenoid is energized for closing a circuit between said preselected current path and a means for computing and registering the signal, wherein a fare paid is indicated.

18. In a fare collecting machine, a fare inlet for receiving fare parts therein, a rotor, means communicating with said rotor for directing said fare parts received in said fare inlet to said rotor, means for operating said rotor for moving said fare parts to a gauging station, means for gauging the diameter of said fare parts indexed to said gauging station for determining the classification thereof, means for engaging a surface of said fare parts simultaneously with the gauging of the diameters thereof, said engaging means including a plurality of detecting fingers, each of which is interconnected to an electrical switch, said switches being adapted to be connected in circuit to means for indicating a fare paid when a circuit defined by a preselected current path is completed upon engagement of said fingers with a token having a surface configuration of predetermined design, said circuit interconnecting said switches and said indicating means including a plurality of control members, each of which is responsive to one of said switches, for completing said preselected current path, a safety circuit responsive to one of said control members, and located in series with a main coin switch and an electrical component that controls operation of said operating means for said rotor, wherein the circuit between said main coin switch and said electrical component that controls operation of said rotor is opened when one of said control members is defective and will not operate.

19. In fare collection apparatus, a coin machine for receiving fare parts therein, a rotor for indexing said fare parts to a gauging station, means for gauging the diameter of said fare parts, means responsive to said diameter gauging means for analyzing the outer surface of said fare part at said gauging station when said diameter gauging means determines that said fare part is of a predetermined diameter, means responsive to said analyzing means for receiving and registering an electrical pulse in accordance with the fare part received at said gauging station so as to indicate that a fare part aggregating a fare paid or part thereof has been deposited in said coin machine, and means for detecting when two dimes are simultaneously indexed to said gauging station in face-to-face relation, said detecting means being responsive to said analyzing means that is actuated by said diameter gauging means and including an electrical circuit that automatically generates four pulses, each pulse indicating a nickel and being fed to said receiving and registering means.

20. In fare collection apparatus as set forth in claim 19, means for generating at least two electrical pulses when the fare part indexed to said gauging station is a dime, said pulse generating means being located in circuit with pulse receiving and registering means and being responsive to said analyzing means when a dime is indexed to said gauging station to generate at least two pulses that are fed into said pulse receiving and registering means.

21. In fare collection apparatus as set forth in claim 19 means for detecting when two dimes are simultaneously indexed to said gauging station in face-to-face relation, said detecting means being responsive to said analyzing means that is actuated by said diameter gauging means and including an electrical circuit that automatically generates four pulses, each pulse indicating a nickel and being fed to said receiving and registering means.

22. In fare collection apparatus, a token identifying unit for identifying tokens that are deposited in said apparatus, said token identifying unit including means for detecting the surface configuration of said tokens, means for moving said detecting means into contact with said token, and means responsive to said detecting means after the movement thereof into contact with said token for indicating that said fare part is acceptable by said apparatus, said moving means including a pivotally mounted plate and a solenoid secured thereon, said solenoid being adapted to pivotally move said plate upon the energiza-

tion thereof and said detecting means being mounted on said plate and movable therewith into contact with said token when said solenoid is energized.

23. In fare collection apparatus as set forth in claim 22, means for automatically returning said plate to the original position after said solenoid is deenergized, said automatic returning means being defined by a tension member that is secured to said plate, and means for adjusting the position of said plate prior to movement thereof, thereby providing for adjustment of said tension member.

24. In fare collection apparatus as set forth in claim 22, means for limiting outward movement of said plate thereby providing for proper positioning of said plate and said detecting means during the detecting operation.

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