United States Patent

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[54] **TICKET COLLECTION METHOD AND APPARATUS**
5 Claims, 9 Drawing Figs.

[52] **U.S. Cl.** ..... **194/4 R,** 70/338, 70/383, 83/364, 83/590
[51] **Int. Cl.** **G07f 1/06**
[50] **Field of Search** ..... 83/364, 372, 575, 577, 590; 70/338, 382—384; 194/4

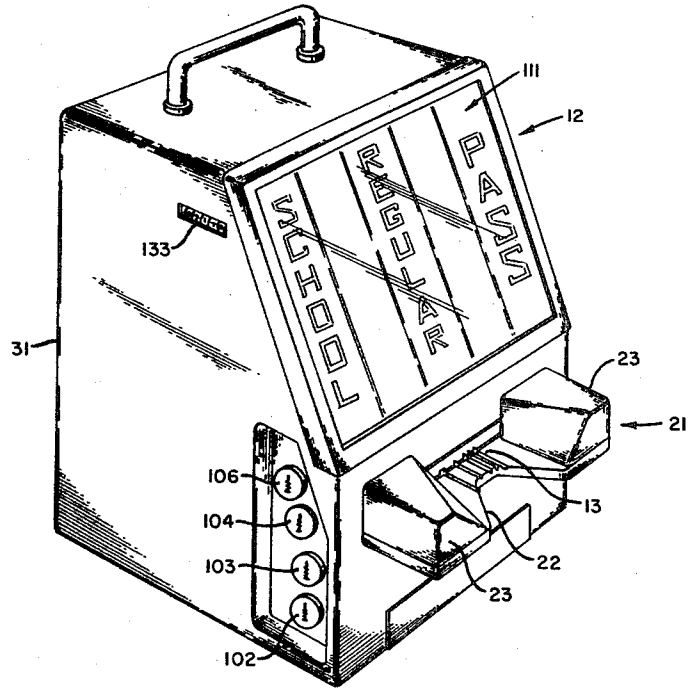
[56] **References Cited**

UNITED STATES PATENTS

1,501,303	7/1924	Berry	310/15 X
2,276,111	3/1942	Spears	194/4
2,719,941	10/1955	Presenz	83/575 X
2,794,869	6/1957	Noregaard	194/4
3,039,582	6/1962	Simjian	194/4
3,204,741	9/1965	Maxwell et al.	194/4
3,486,600	12/1969	Tanaka	194/4

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ABSTRACT: A method and system of fare collection employing novel semirigid card having preformed longitudinal deformities mating with ridges and/or grooves in a multiple keyway or slot for insertion therein. Card engagement with switching means in the keyway actuates a cutter to remove a predetermined portion of the card for each insertion as a fare collection. Mechanical gates cooperating with the keyway are operable to establish which cards of different configuration may be inserted.



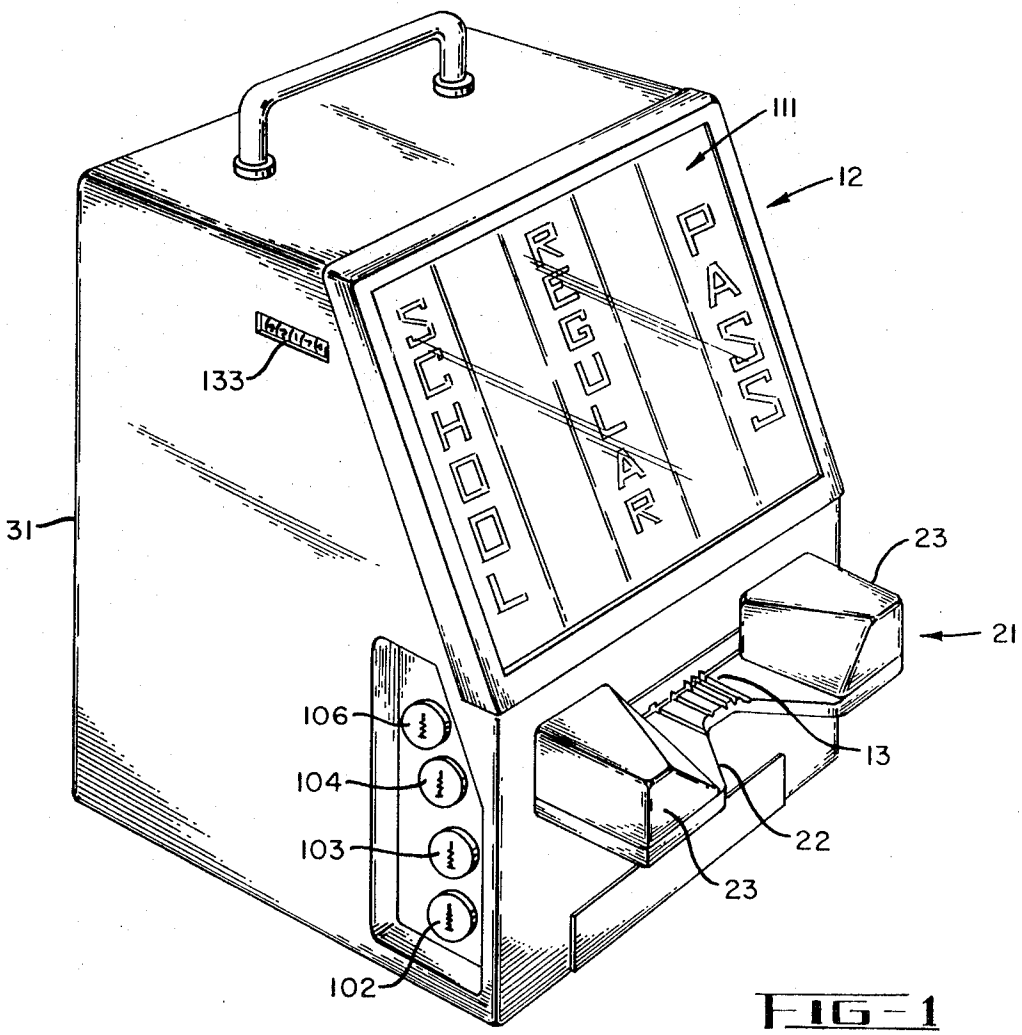


FIG-1

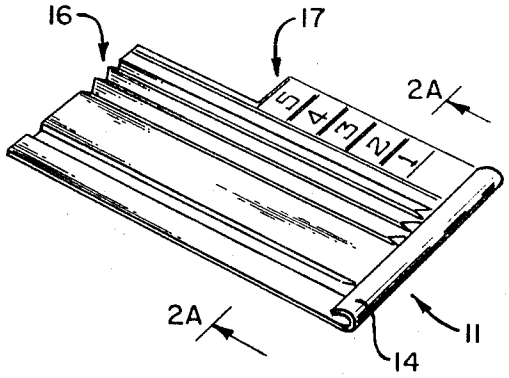


FIG-2

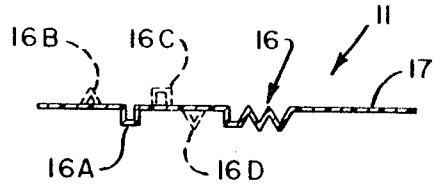


FIG-2-A

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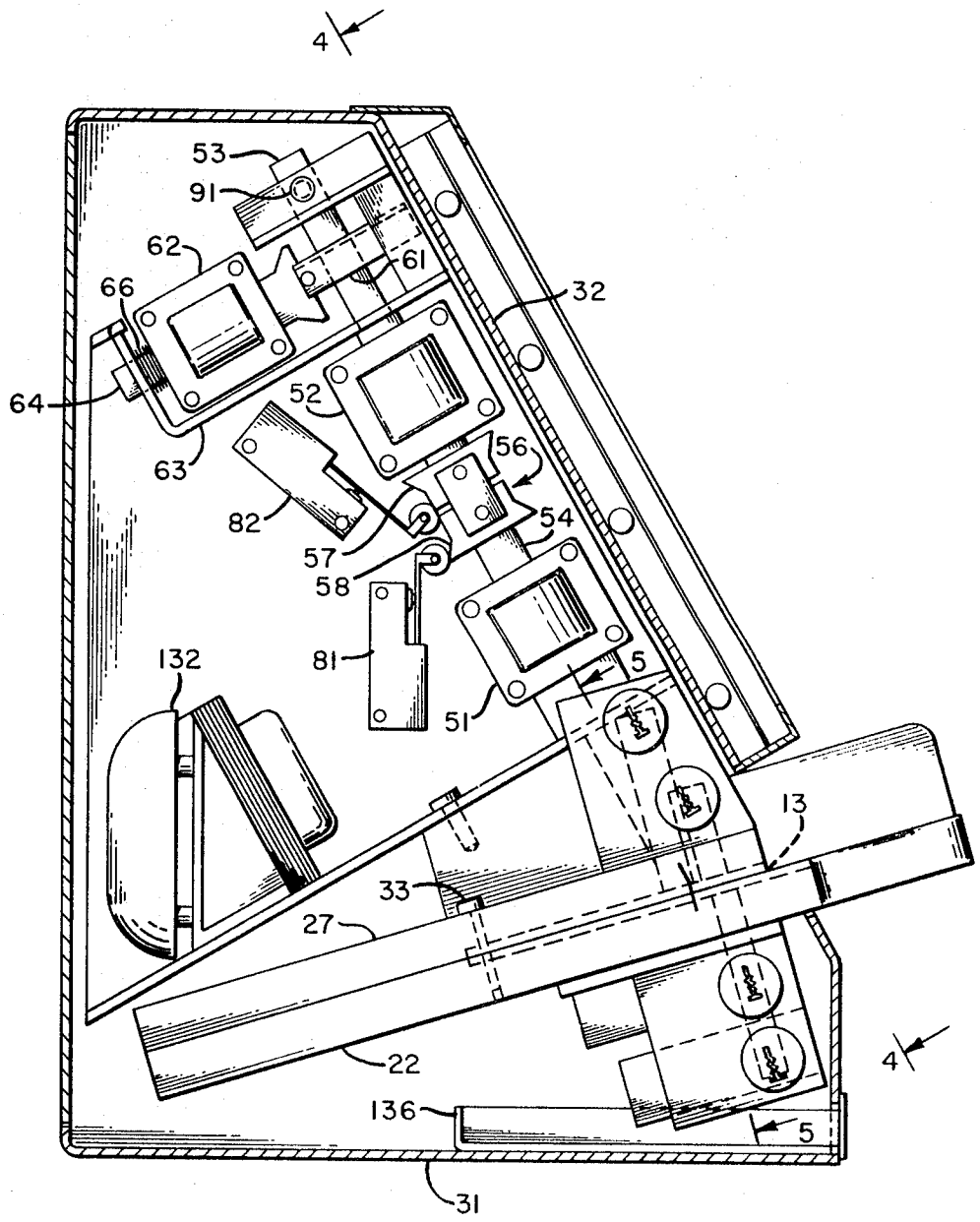


FIG-3

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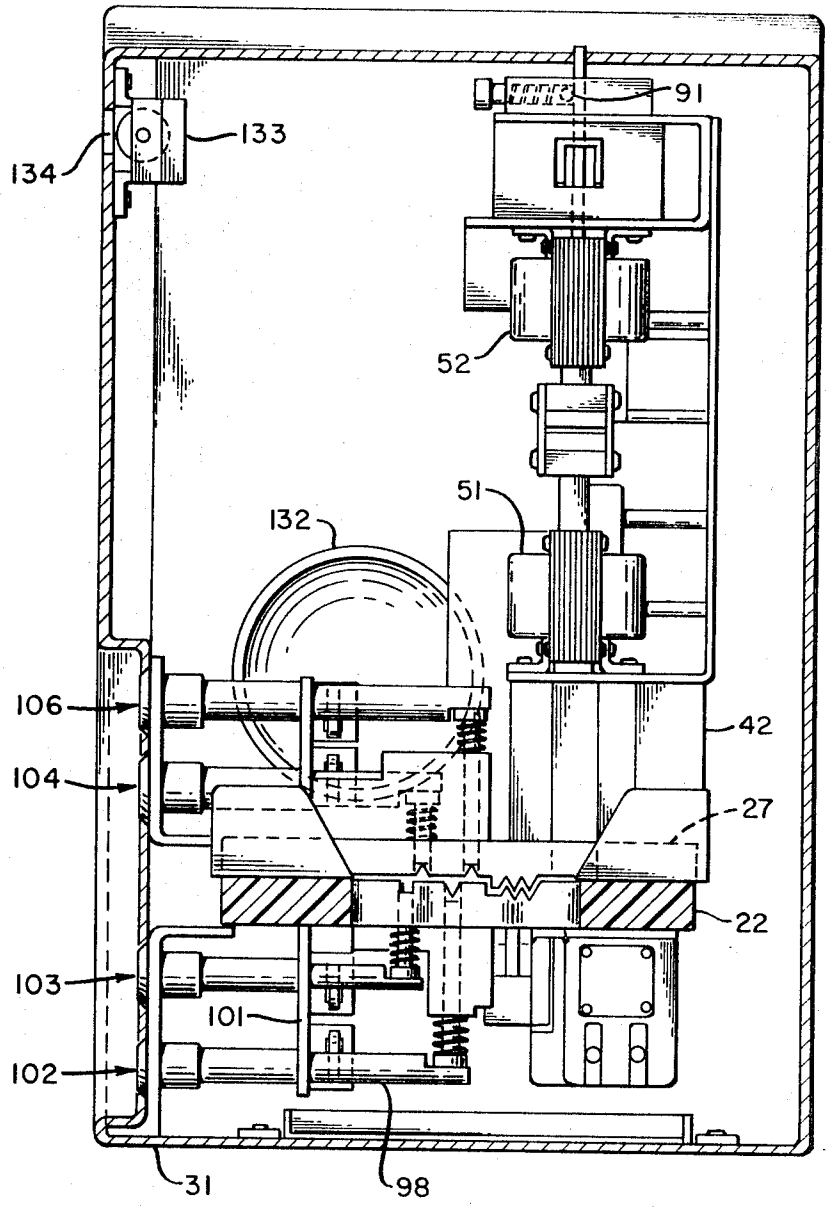


FIG-4

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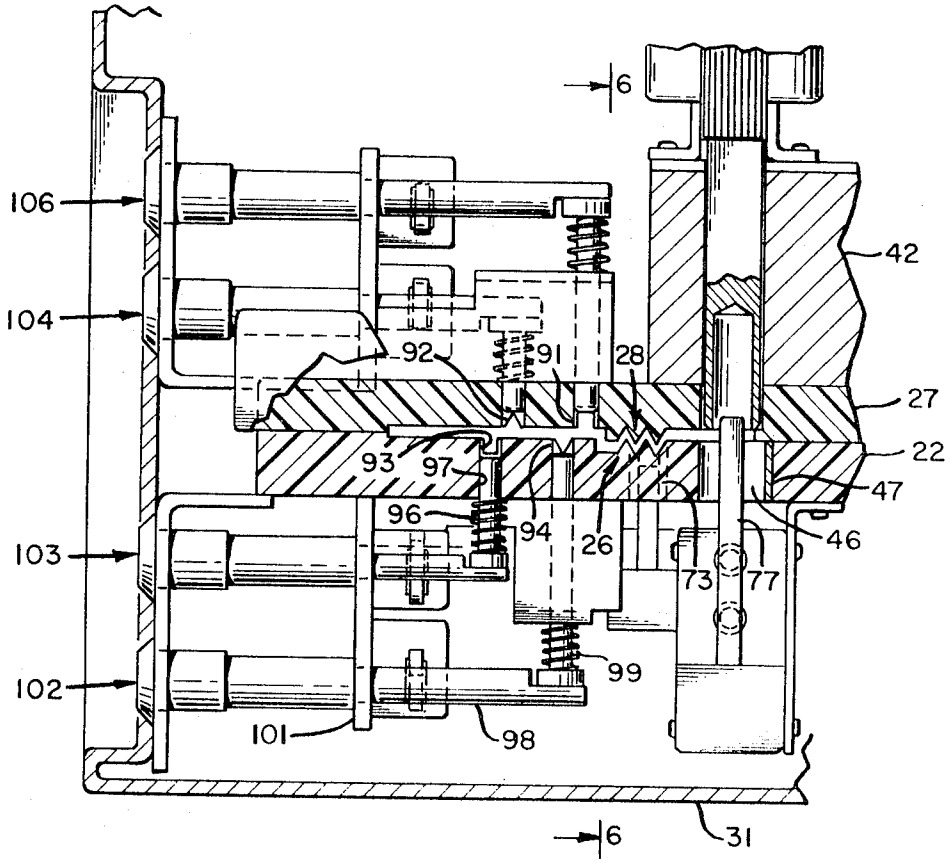


FIG-5

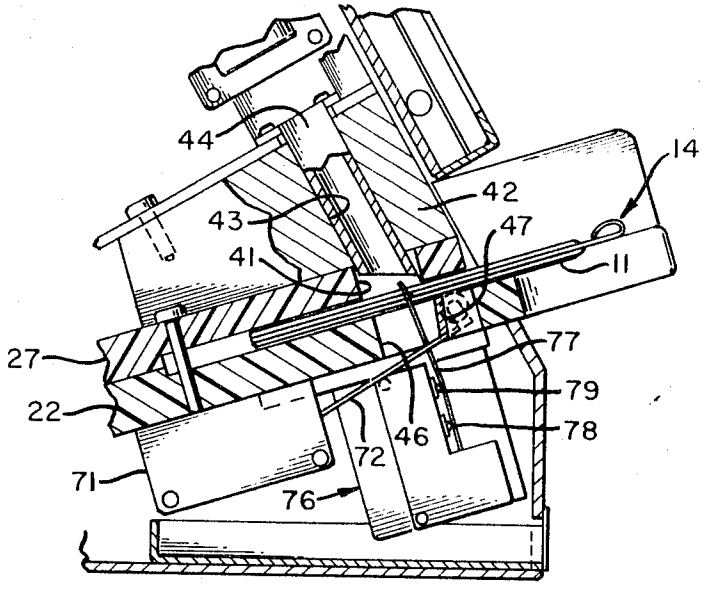


FIG-6

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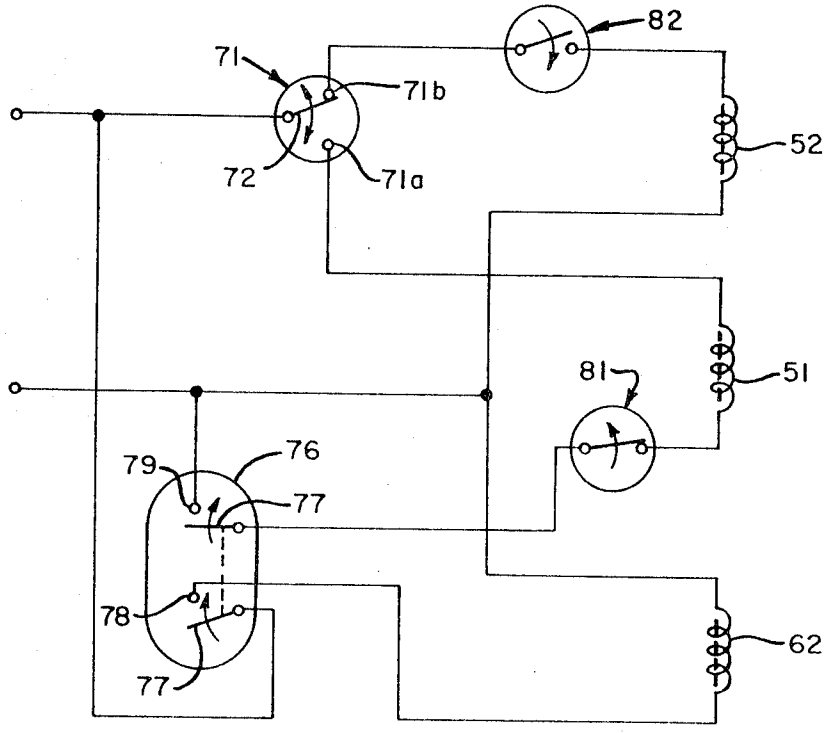


FIG-7

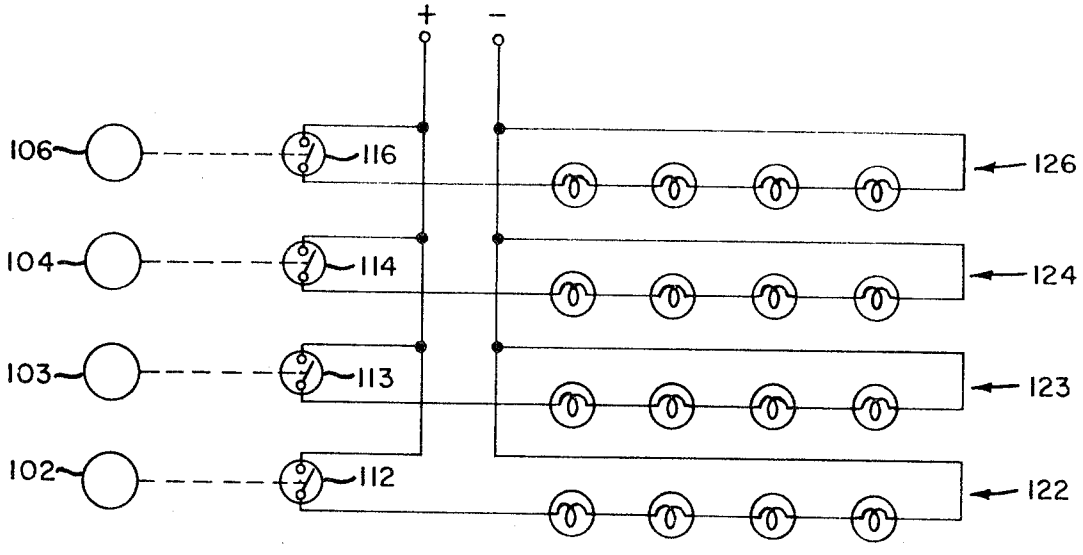


FIG-8

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TICKET COLLECTION METHOD AND APPARATUS

BACKGROUND OF INVENTION

There have been developed a wide variety of mechanisms and systems for receiving, recording and indicating fares or admissions. Aside from manual fare collection, it has become conventional to employ some type of coin receiver into which the entrant deposits the proper amount of coins to pay an entry fee or fare. These mechanical coin receivers may have widely divergent complexities.

In order to obviate the necessity of coin handling both by the one paying the fare and the receiver, there have been developed various systems for tickets, passbooks and the like. For a variety of reasons explained in the prior art and apparent to those considering the problem, it is advantageous to dispense with the handling of coins both from the standpoint of convenience and safety. For these reasons the use of metal tokens in place of coins has become widespread and while this does solve certain of the problems of money exchange and the handling, it does not solve the problem of token handling. Additionally, the cost of tokens is considerable.

In an effort to further advance this art, there have been developed various systems employing, for example, magnetically treated cards or tickets for use with sophisticated detection means. Such systems may operate by sale of cards having some kind of indicator located in predetermined positions thereon so that the customer may insert same into a detecting device which indicates a pass or no-pass condition depending upon the location of such indicator. These systems commonly employ complicated electronic detection and indicating systems.

It has been recognized that advantage lies in the elimination of coins in the transaction of fare or admission collection. A striking example of this is to be found in the field of public transportation where not only the convenience of the traveler and conveyance operator need be considered but also the cost of operations and the safety of the operator. At least in certain localities the robbery of public conveyance operators has become commonplace. This alone clearly establishes the need for a fare collection method and system which does not involve the direct employment of coins. While the use of tokens in part solves this problem, there remains then the substantial disadvantage of token handling, counting and sale. Added to this general problem is the overall necessity of minimizing cost of installing and operating any type of automated fare collection system for, at least in the field of public transportation, it is necessary to minimize fares to every extent possible.

SUMMARY OF INVENTION

There is provided by the present invention a very simple method and system for fare collection employing preformed semirigid cards adapted to be sold in advance to persons paying fares or admissions. These cards are formed with ridges and/or grooves longitudinally thereof and are of uniform size so as to slidably engage a multiple keyway in a fare receiver. The card itself is utilized as the actuator of the system, for insertion of the card in the multiple keyway actuates switching means to energize a solenoid-operated cutter so that upon card insertion a predetermined card portion is cut therefrom. The card is preferably appropriately marked as to the number of fares it represents and each cutting operation removes one of the marked sections so that the user at all times may readily determine their remaining number of fares on a card.

The detection or collection apparatus itself incorporates a multiple keyway or card slot having longitudinal ridges and/or grooves of predetermined configurations so that only cards having like longitudinal grooves or ridges can be slid therein. Additionally, the apparatus incorporates mechanical gates which may be operated to close one or more keyway grooves in order to control the particular type of card acceptable to the device. Internally of the fare receiver, there is disposed a positive acting solenoid-actuated cutter. As the card is inserted in the above-noted slot or multiple keyway, it operates electrical switches which unlock the cutter mechanism and energize solenoid drive thereof so that the cutter moves to remove a portion of the inserted card. The degree of card insertion is controlled by the number of cuts previously removed therefrom so that each card insertion causes removal of a successive like card portion until all of the successive fare portions are removed. The fare portion of the card is then used up so that it may no longer be employed for fare purposes.

Further with regard to the cutting operation, it is noted that the invention provides for positive cutter action in both cutting and retracting movement, as well as a positive cutter locking in retracted position of the cutter head. Although sequencing of events is required, the invention accomplishes same without the employment of complex circuitry or components. The apparatus of this invention is particularly adapted to rough usage including sustained and substantial vibration, as may be experienced by apparatus hereof installed upon various types of public conveyances. The invention may additionally provide visual and audio indication of fare receipt with a total count thereof and visual indication to users of the types of fare cards which may be inserted in the receiver slot at any particular time. A removable receptible in the receiver collects card portions as they are cut from fare cards and, although in general practice these are intended merely to be disposed of, it is possible for them to be sorted and counted if desired.

A substantially foolproof, simple and low cost fare collection method and system, are provided hereby with a high degree of convenience to the user and to the operator of the vehicle. The present invention provides a highly advantageous solution to many of the existing problems of fare or admission collection.

DESCRIPTION OF FIGURES

The present invention is illustrated as to a single preferred embodiment thereof in the accompanying drawings wherein:

FIG. 1 is a perspective view of a fare collection receptacle or receiver;

FIG. 2 is a perspective view of a fare card in accordance with the present invention and suitable for use with the receiver of FIG. 1;

FIG. 2*a* is a transverse sectional view in plane 2*a*–2*a* of the card of FIG. 2;

FIG. 3 is an elevational view taken in section through a plane just inside the near end wall of the receiver of FIG. 1;

FIG. 4 is a sectional view taken in the plane 4–4 of FIG. 3;

FIG. 5 is a partial enlarged sectional view taken in the plane 5–5 of FIG. 3;

FIG. 6 is an enlarged partial sectional view including the cutter head mechanism and taken in the plane 6–6 of FIG. 5;

FIG. 7 is a schematic wiring diagram of the switches and solenoids of the apparatus of FIG. 1; and

FIG. 8 is a schematic wiring diagram of switches and lights employed in the receiver of FIG. 1.

DESCRIPTION OF PREFERRED EMBODIMENT

The present invention embraces both method and system for fare collection as well as a novel fare card, and in the following description the term "fare" is employed in the context of not only passage money but any type of admission or even of egress wherein it is desired to control, count or charge for the movement of people past a particular point. While most applications of the present invention initially appear to lie in the collection of a charge as for transportation or admission to some type of location, consideration of the following description will indicate other applications of the invention.

Considering first the method of fare collection hereof, it is noted that there are provided particularly configured semirigid cards adapted to be sold or otherwise distributed to persons employing the method or system of this invention. These cards are formed with longitudinally extending trans-

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verse deformities such as ridges or grooves of a wide variety of predetermined configuration. Such cards are intended to operate in somewhat the manner of a key in a lock. The cards are formed with a portion thereof adapted to be incrementally removed, with each such increment then representing one fare or admission.

Card cutting is accomplished under control of the card itself by electrical switching. Insertion of a proper card in the receiver slot causes the card to enter such slot and actuate switches that in turn energize cutting means. Provision is made for restraining card entry in the receiving slot at particular positions according to the number of fare increments already removed from the card. Additionally the invention provides for visual and audio indication of card increment removal by cutting.

Further to the method of the present invention, there is provided herein for substantially instantaneous changes in the receiver slot configuration so as to control the type of fare card which will fit therein. Visual indication is provided at the receiver of the type of card that will fit the receiver slot so that the card user will be advised of which one or more of several types of fare cards may be employed at any particular time.

Considering now one preferred embodiment of the apparatus employed in the system of the present invention, reference is first made to FIGS. **1** and **2** of the drawing illustrating a fare card **11** and a receiver unit **12** having a card slot **13** therein for receiving the fare card. The card itself is formed of a rigid or a semirigid material such as plastic which will retain its shape, yet which is very inexpensive. The card may be formed with the outer end thereof folded over so as to form a gripping surface **14** and the remainder of the card is formed with lateral deformities extending longitudinally of the card. This is best illustrated in FIG. **2***a* wherein it will be seen that there are formed grooves and/or ridges longitudinally of the card, with these deformities having predetermined configurations in cross section. In practice it has been found advantageous to form the grooves or ridges **16** by stamping of the card between metal dyes. However, it is to be appreciated that they may be formed in any of a variety of ways such as by embossing, attachment of material or the like. One card embodiment has longitudinal ridges thereon, as may be formed by wires affixed to a card surface, for example. The particular card illustrated includes a plurality of contiguous grooves of predetermined configuration at **16** and there is further shown an additional groove **16***a* laterally spaced therefrom and also extending longitudinally of the card. Additional ridges or grooves extending above or below the general plane of the card may also be provided on the same side of the card as the groove **61***a*. Such ridges and grooves are generally illustrated at **16***b*, **16***c* and **16***d* by dotted lines in FIG. **2***a* indicating location of possible configuration and locations thereof.

The right-hand side of the card, as viewed in FIG. **2** and **2***a*, may be denominated as the fare collection portion **17** thereof and is adapted to be incrementally cut from the card during successive usages thereof. As illustrated in FIG. **2**, this portion **17** may have successive increments numbered as by stamping, painting or the like, to indicate to the user the remaining number of increments or fares. The card is adapted to fit a multiple keyway or slot having mating grooves or indentations so that only the card formed for the slot will fit therein. In order to provide flexibility to the system the additional grooves or ridges **16***a* to **16***d* may be variously provided on different cards, and employed in the manner more fully described below. Not only is the card adapted to fit into a slot **13** of the receiver **12**, but furthermore, the card itself actuates the receiver by its insertion and thus a certain amount of card rigidity is quite necessary. This also will become apparent from the following description of the receiver.

As stated above, the slot **13** of the receiver is formed with opposing ridges and grooves of particular configuration defining a multiple keyway extending into the receiver so that only a particularly preformed card **11** will fit into the slot or multiple keyway. The receiver may be formed with an external guide **21** having a lower plate **22** leading into the slot **13** with the same ridges and/or grooves therein as the lower portion such slot and side members **23** tapered to the slot to facilitate sliding of the card into the slot. Additionally this bottom plate **22** may be indented at the center of the slot, as shown, to provide additional room for the fingers of one holding the card and inserting it in the slot.

Internally of the receiver **12**, there is provided a bottom slot plate which may in fact be a continuation of the guide plate **22**, and in the illustrated embodiment having lower indentations **26** longitudinally thereof configured to mate with the undersurface of the card ridges or grooves. There is also provided an upper slot plate **27** engaging the lower slot plate **22** and together therewith defining the slot **13**. This upper plate thus includes, in the illustration of FIG. **5** for example, projections **28** longitudinally of the slot **13** which are configured to mate with the upper surface of the ridges and grooves in the card and which are disposed immediately above the indentations **26** in the lower plate **22**. These plates **22** and **27** may, for example, be formed of a hard plastic.

The receiver **12** exteriorly comprises a generally rectangular housing **31** preferably having an inclined front face **32** and the top and bottom slot plates **27** and **22** may be inclined somewhat with respect to horizontal inwardly of the housing as illustrated, for example, in FIG. **3**, to facilitate sliding of the card into the slot by a person standing in front of and somewhat above the receiver. The slot plates **22** and **27** are held together as by bolts **33** (FIG. **3**) and are mounted in the housing by engagement therewith in any suitable secure manner.

Internally of the housing **32** of the receiver, there are provided means for cutting a small portion or increment from each card inserted in the multiple keyway or slot **13** of the device. Referring first to FIGS. **5** and **6** in this respect, it is noted that a first rectangular aperture **41** is formed in the upper slot plate **27** adjacent to the front thereof, and on the right of the plate as viewed from the front of the receiver. A block **42** is mounted above the upper plate **27** with an aperture **43** therethrough extending into communication with the plate aperture **41**. Slidably disposed within this block opening **43** there is provided a reciprocally mounted cutter head **44** of hard material such as steel, which has the bottom thereof inclined from the front of the receiver upwardly toward the back thereof and which is hollow, at least at the lower portion. This cutter head **44** is adapted to move from a retraction position, as illustrated in FIG. **6**, downwardly through the opening **41** in the upper plate **27**. There is also provided an opening **45** in the lower plate **22** beneath the opening **41** in the upper plate and an L-shaped cutting die **47** of hard material is secured in the opening **46** of the lower plate across the front and along one side thereof. The cutter head **44**, upon reciprocation, moves not only through the opening **41** in the upper plate **27** but also passes through the slot or multiple keyway **13** into the opening **46** in the lower plate **22**. The head and die preferably do not actually touch each other during cutting but the head passes very closely past the die edge. Consequently a card **11** disposed in the keyway will be subject to the cutting action of this cutter **44**. Control over the position of the card at the instant of cutting is described below.

The cutter or cutter head **44** is reciprocated in the block **42** for cutting an incremental portion of a card inserted in this slot **13** by means of a solenoid **51** mounted in the housing above the block **42** with the moveable shaft thereof, or an extension of such shaft, comprising the cutter head **44**. Energization of the solenoid **51** drives the cutting head downwardly through the slot **13**, and a second solenoid **52** is provided for retracting the cutter. This second solenoid **52** is mounted in the housing **32** above the first solenoid **51** and has an extended moveable core, hereinafter denominated as an upper shaft **53**, and energization of this solenoid **52** causes the shaft **53** thereof to move upwardly. The upper solenoid shaft **53** is aligned with and connected to the shaft or core **54** of the lower solenoid **51** above such solenoid as by a suitable fixed connec-

tion or linkage 56, such as illustrated in FIGS. 3 and 4. This linkage 56 also includes a pair of tapered cam surfaces 57 and 58. Movement of the solenoid shafts together thus not only reciprocates the cutterhead 44, but also moves the cam surfaces 57 and 58, for purposes described hereinafter.

Provision is herein made for positively locking the cutter in retracted or uppermost position by means of a solenoid-operated locking pin 61 mounted for engagement with the upper solenoid shaft 53, as at a notch therein. A positive acting solenoid 62 is mounted upon a bracket 63 in the housing with the locking pin 61 extending axially from the solenoid as a portion of or an extension of the solenoid core shaft 64. The locking pin 61 is urged toward the upper solenoid shaft 53 by a spring 66 mounted, for example, between a portion of the bracket 63 and a flange about the solenoid shaft 64 and is drawn out of the notch in the upper solenoid shaft 53 by energization of the solenoid 62. It will thus be seen to be necessary for the solenoid 62 to be energized to withdraw the locking pin 61 before it is possible to free the cutter for actuation.

The cutting mechanism described above is actuated in response to the fitting of a card into the slot 13 and sliding such card therein. This control is herein accomplished by means of electrical switches illustrated to be combined in this embodiment in the circuit of FIG. 7. Beneath the lower slot plate 22 in the housing there is mounted a 2-position microswitch 71 having a flexible contact arm 72 extending upwardly through a lower plate opening 73 with a roller at the end thereof extending into the slot 13 ahead of the cutter 44, preferably through the grooves 26. As illustrated in FIG. 7, the switch 71 has two stationary contacts 71*a* and 71*b* and the moveable contact 72 thereof normally engages fixed contact 71*b* but upon movement of the flexible contact 72 downwardly, as by means of a card 11 entering the slot 13, contact is made between the moveable contact 72 and the fixed contact 71*a* of the switch 71. A second microswitch 76 is also mounted beneath the lower plate 22 in the housing with a flexible moveable contact 77 extending upwardly through contact A of switch 71, switch 81 and contact 79 of switch 76. The cutter head 44 is thus forcibly moved downwardly by action of the solenoid 51 to cut a portion from the card 11 inserted in the slot 13. It is to be particularly noted that the switch 76 is disposed with the moveable contact 77 thereof disposed in the slot in alignment with the portion of the card comprising the fares, i.e., the right-hand portion of the card as illustrated in FIG. 2. Thus the switch 76 is actuated by the leading edge of the remaining portion of the card whether it be fare No. 1 or any subsequent fare.

As the cutter head is moved downwardly by the solenoid 51, the roller on the moveable contact of switch 81 rides off of the cam surface 58 to deenergize the solenoid 51. As noted above, the cutter head 44 is hollow and thus as the card is cut the moveable contact 77 of switch 76 is freed to swing upwardly into the hollow cutter head and thus terminate contact with both the stationary contacts 78 and 79 of the switch. As a consequence of this action, the locking solenoid 62 is deenergized so that the spring 66 urges the locking pin on the solenoid against the upper solenoid shaft 53. Inasmuch as the shaft 53 and cutting head is depressed at this point, the locking pin cannot enter the notch therein but merely bears upon the shaft. It will be seen that the lower solenoid 51 is also deenergized by an opening of switch 76.

An additional switch 82 is mounted within the housing with the movable contact thereof having a roller at the outer end thereof and disposed in position for actuation by the cam surface 57. As shown in FIG. 3, downward movement of this cam surface closes the switch 82, and it will be seen in FIG. 7 that such switch is disposed in circuit between the upper solenoid 52 and contact 71*b* of the switch 71. As the card is retracted from the slot after a fare portion has been removed in the manner noted above, the flexible arm 72 of switch 71 is released to move upward, thus engaging contact 71*b* through switch 82 and retracting solenoid 52. This causes the cutter head to be moved upwardly into retracted position as illustrated in FIG. 6, and as the cutter head is so positioned, the notch in the upper solenoid shaft 53 aligns with the locking pin 61, which then, under the influence of the spring 66 enters the notch to lock the cutter head in retracted position. The receiver is then in condition to receive another card for repeating the operation described above.

It is to be appreciated that the cutting operation of the present invention is performed by mechanical means with actuation thereof dictated by the card itself through electrical switches. Although certain sequencing of operations are necessary herein, no complicated timing or delay means are employed. There may, however, be included a spring-loaded detent 91 operating upon the top of the upper solenoid shaft 53 to prevent any slippage of the cutter head between locking pin retraction and energization of cutter solenoid 51. No complex sensing means are required, and only rugged long-lived elements are employed in the device. Microswitches and solenoids, in themselves, are extremely trustworthy throughout long use, so that positive cutting action and very good reliability is obtained. In addition to the ability of the present method and system to operate only upon cards of a particular configuration, the invention is further adapted to accommodate cards of the same configuration, but with additional ridges or grooves thereon. Such a card is illustrated in FIG. 2*a* and described above. Insofar as the receiver is concerned, provision is made for selectively accepting cards with additional ridges or grooves. To this end, the upper and lower slot plates 27 and 22 are provided with longitudinal grooves laterally disposed in position for alignment with additional card ridges, as may be provided longitudinally of the card on the left side thereof and illustrated in FIG. 2*a*. Such ridges may, for example, be applied as a separate material such as a wire or the like. Mechanical gating means are provided in the receiver for selectively blocking each of these auxiliary or additional grooves. The card ridges may have different configurations, as shown, and the slot grooves may be similarly formed. Regarding gating, reference is made to FIGS. 4 and 5, illustrating gating means of the present invention. In the illustrated embodiment, there are provided four slot grooves, 91, 92, 93 and 94. Each of the aforementioned grooves has a corresponding opening extending through the slot plate in which the groove is formed, again as shown in FIG. 5, for example. Each of the mechanical gates operates in the same manner, and considering the gate associated with groove 94 for example, it will be seen that there is provided a bar 96 extending through an aperture 97 in the lower plate 22 to the groove 93. This bar is adapted to be moved between the retracted position illustrated in FIG. 5 and a closed position even with the bottom of the slot defined by the upper surface of the plate 92. Such movement is mechanically accomplished by means of a shaft 98 having a cutout at the end to form a cam surface and bearing upon an enlarged end of the shaft 96. A spring 99 is compressed between an enlarged end of the bar 96 and a spacer extending below the plate 22 so as to urge the shaft outwardly from the slot. The shaft 98 extends through an apertured support 101 from a locking mechanism 102 having the opening thereof on the outside of the housing 31. Thus by insertion of a key in the lock 102 and turning of the key, the shaft 98 is rotated 90° to compress the spring 99 and force the plunger or shaft 96 upwardly for closing the groove 93. Similar locking means 103, 104 and 106 are mounted in the sidewall of the housing with shafts extending inwardly of the housing therefrom, so that turning of the key in such locking means will rotate a shaft to insert an associated plunger or bar into a corresponding one of the auxiliary grooves of the slot, as shown

The purpose of this mechanical gating of the slot grooves is to provide flexibility to the overall system. As shown in FIG. 1, the receiver 12 has a transparent panel 111 upon the slanted front thereof with signs formed thereon representing different types of fares. In this particular illustration there are shown three different types of fares, including regular, school and pass. Regular operation of the system may, for example,

require a card such as illustrated in FIG. 2*a* preferably having only the deformations **16** thereon. Thus, if it is desired to limit the receiver to receipt of regular fares, each of the locking means **102, 103, 104** and **106** will be oriented to dispose the associated plunger or rod thereof in the slot grooves **91, 92, 93** and **94**. A school fare card may, for example, have the additional deformation **16***a* thereon, such as illustrated in FIG. **2***a*, and in order for the receiver to accept this card, the operator would then insert his key in the locking mechanism **102** and turn the key to retract the bar **96** from the groove **93**, so as to allow such a card to enter the slot. Similarly, pass cards may have additional ridges, or the like, such as shown at **16***a*, *b*, *c*, and *d* of FIG. **2***a*, or possibly even a combination thereof. Such a card would then be received in the slot by opening appropriate auxiliary grooves **91, 92, 93** or **94**.

In practice, it is normally preferable to provide regular fare cards with the least number of grooves or ridges, such as the basic configuration shown at **16** of FIG. **2***a*, and it will be appreciated that the system is adapted to handle additional fare zones, for example, in the same manner as described above in connection with school fares or passes. Mechanical gating of additional receiver slots provides for acceptance of different fare cards. Control over which cards will fit the slots of the receiver is entirely at the discretion of the operator, such as, for example, a bus driver or the like.

Further to the present invention, there may be provided additional visual and audio indicating means facilitating use of the invention. Thus, for example, the locking means **102, 103, 104** and **106** may have associated therewith electrical switches **112, 113, 114** and **116**, respectively, in a circuit such as illustrated in FIG. **8**. These switches are individually actuated by their associated locking means to energize individual rows of lights **122, 123, 124** and **126**. These rows of lights are physically disposed on the front inclined face of the housing behind separate signs on the transparent face thereof. Partitions may be provided between the separate vertical signs so that energization of any one set of lights will only light up an individual sign. In normal practice, lights are provided behind the "regular" sign, which are normally turned on, as in common practice a regular fare card will at all times be receivable by the receiver **12**.

In addition to convenience for the card holder or user provided by the illuminated signs on the front of the receiver, as described above, there may be further provided indicating means for assistance of an operator or attendant that may be located adjacent the receiver. Each cutting operation wherein a fare portion or increment of a card inserted in this slot **13** may close a simple circuit energizing lamps indicating the type of fare received and also energizing a bell **132** disposed within the housing, as shown in FIG. **3**. It is particularly noted that in order to prevent confusion in illustration, the drawings herein illustrate only physical elements of the receiver without inclusion of electrical wiring. It will be appreciated that adequate space is available within the housing **31** to accommodate wires as required to interconnect switches, solenoids, lamps and the like as herein described. Additionally it is to be appreciated that the receiver is adapted to be connected to a source of electrical power which is of course available across the input terminals of FIGS. **7** and **8** and is also employed to energize the bell **132**. There is also preferably provided as a part of receiver **12** a counter **133** which may be a conventional Veeder counter or other commercially available counter having, for example, a drum visible through a window **134** in the side of the housing **131**. This counter may be actuated from the cutter or extension thereof such as the upper solenoid shaft **53** by mechanical means including cooperating arms, for example or by connection of the counter across the solenoid **51** or switch **81**. There is additionally provided a receptacle in the form of a drawer or the like **136** internally of the housing beneath the cutter for receiving fare portions of cards cut from fare cards in the receiver. Normal usage of the invention does not require any operation upon these card portions and thus usually the portions are merely discarded as, for example, at the end of the day. The portions are however collected in the drawer **136** so as to be easily removed from the housing either for discarding or possibly even for counting or sorting if desired.

The present invention both as to method and system thereof has been described above in terms of particular desired steps of the method and preferred apparatus of the system. A description of operation of the apparatus has been incorporated along with the description of elements and connections and thus no additional description of operation appears necessary. It is of course not intended to limit the invention to the details of illustration or description but instead reference is made to the appended claims for a precise definition of the invention.

I claim:

1. A method of fare collection comprising:

a. forming thin plastic cards with a plurality of longitudinal ridges,

b. forming a slot having mating ridges and grooves and selectively closing and opening individual grooves in the slot to establish predeterminable slot configurations for receiving differently configured cards of (a),

c. inserting a card of (a) in the slot of (b), d. physically actuating electrical switching means with the card of (a) in the slot of (b),

e. cutting a portion from the card in the slot in response to actuation of said electrical switching means, and

f. indicating a fare receipt from the cutting step of (e).

2. Fare collection mechanism comprising:

a. card receiving means defining a multiple keyway slot having a plurality of longitudinal grooves therein for slidably receiving a card having at least one longitudinal ridge thereon, the card ridges being positioned and configured to mate with particular slot grooves, and mechanical gating means including at least one element controllably movable into and out of at least one groove of said slot to close and open same for establishing the configuration of card insertable in the slot,

b. a solenoid-operated cutter movable transversely across said slot for cutting a portion from a card inserted in said slot,

c. electrical switching means connected to energize said solenoid-operated cutter and having actuating means extending into said slot on the opposite side of said cutter from said slot entrance for operation by a leading edge of a card inserted in said slot whereby a portion of a card inserted in the slot is cut from the card, and

d. means indicating said cutting as a fare collection.

3. Fare collection mechanism comprising:

a. means defining a multiple keyway slot having at least one longitudinal groove therein for slidably receiving a card having at least one longitudinal ridge thereon, the card ridges being positioned and configured to mate with slot grooves,

b. a solenoid-operated cutter including a cutter head reciprocally mounted for movement transversely through said slot, a first solenoid having a movable core carrying said cutter head for moving the head across said slot upon solenoid energization, a second solenoid having a movable core connected to the core of said first solenoid for retracting said cutter head from said slot upon second solenoid energization, and a third locking solenoid having a spring loaded plunger retractable by solenoid energization and normally extending into engagement with means connected to said cutter for locking said cutter in a retracted position out of said keyway,

c. electrical switching means connected to said solenoids of (b) and having actuating means extending it to said slot on the opposite side of said cutter from said slot entrance for operation by a leading edge of a card inserted in said slot to energize said first and third solenoid and deenergize said second solenoid whereby a portion of a card inserted in the slot is cut from the card, and

d. means indicating said cutting as a fare collection.

4. Fare collection mechanism comprising:

a. means defining a multiple keyway slot having at least one longitudinal groove therein for slidably receiving a card having at least one longitudinal ridge thereon, the card ridges being positioned and configured to mate with slot grooves,

b. a solenoid-operated cutter movable transversely across said slot for cutting a portion from a card inserted therein and comprising a reciprocally mounted cutter head connected to the plunger of a first cutter solenoid and a second retracting solenoid having the plunger thereof connected to the first solenoid plunger,

c. electrical switching means connected to energize the solenoids of said cutter and having actuating means extending into said slot on the opposite side of said cutter from said slot entrance for operation by a leading edge of a card inserted in said slot, said switching means comprising a first switch having a movable contact operated by first actuating means and including fixed contacts, said movable contact being moved by said first actuating means to disconnect said second solenoid and close a power supply connected to said first solenoid, and second switching means having a separate actuator in position for engagement with a fare portion of a card and connected between said power supply connection and said first solenoid for completing an energizing circuit through said first solenoid whereby said cutter head is moved forcibly across said slot to remove a predetermined segment of said card, and

d. means indicating said cutting as a fare collection.

5. The fare collection mechanism of claim 4 further defined by a third locking solenoid having a spring-loaded plunger normally extended to prevent movement of said cutter head from retracted position, and said second switch having a pair of fixed contacts and a movable contact successively contacting said fixed contacts in numbered order by said second actuator, said second switch having the first fixed contact and movable contact in circuit with power supply means and said locking solenoid to retract the plunger of the latter and said second fixed contact and movable contact in circuit with power supply means and said first cutter solenoid.