United States Patent

Dominick et al.

[15] **3,670,955**

[45] **June 20, 1972**

[54] EXACT FARE SYSTEM

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[21] Appl. No.: **20,884**

[52] **U.S. Cl.** **232/7,** 232/16

[51] **Int. Cl.** **G07b 15/00**

[58] **Field of Search** 232/7, 15, 16

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Primary Examiner—James C. Mitchell
Attorney—McDougall, Hersh & Scott

[57] **ABSTRACT**

A construction for collecting exact fares comprising a housing having an inspection surface for temporarily holding fares deposited and manually operable means for dumping fares from said inspection surface into a cash box area. A removable cash box is received in a cash box receptacle, and closure means are provided in the cash box for blocking an access opening to normally prevent access to the interior of the cash box. Means are located in the receptacle to normally lock the closure means against movement relative to said access opening, and key means operate to unlock the closure means upon insertion of the cash box into the receptacle to thereby permit rotation of the cash box to locate the cash box in a position such that the access opening will receive fares dumped from the inspection surface. An interlock arrangement is included in the receptacle door to prevent tampering and pilfering. The total exact fare system includes a vault associated collecting means with security features to prevent pilfering after removal of the cash box from the cash box receptacle.

28 Claims, 31 Drawing Figures

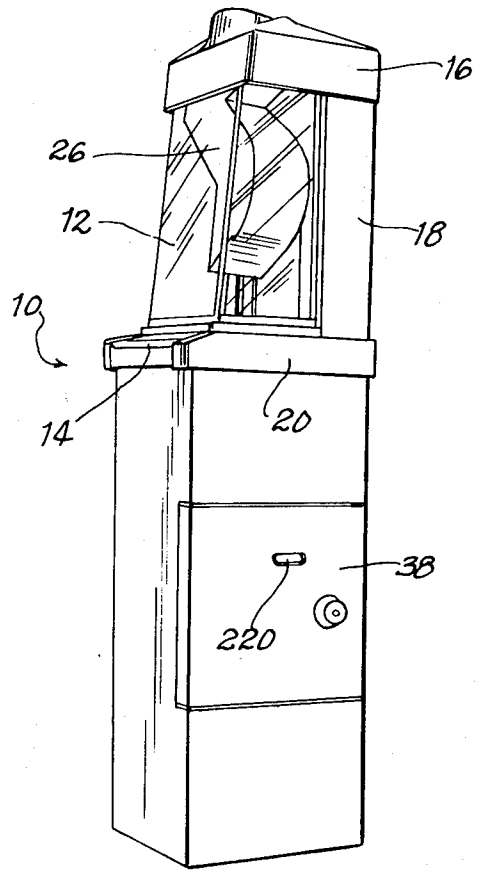


FIG. 1

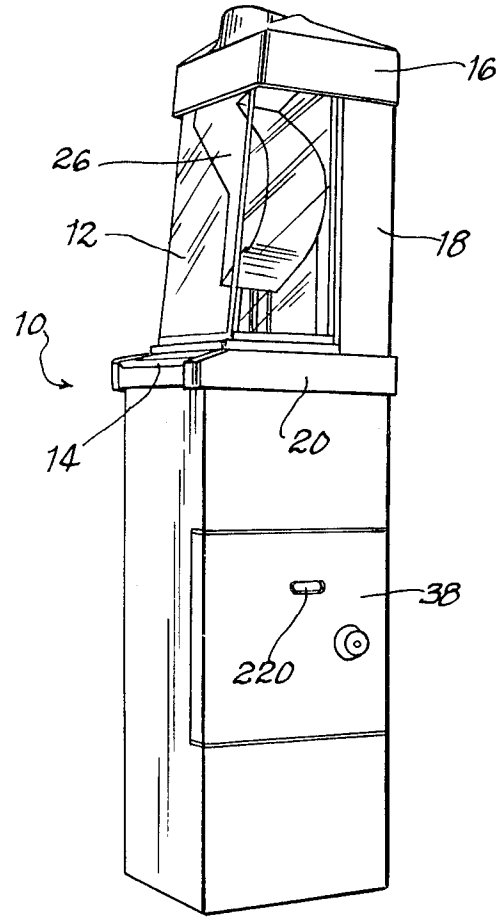
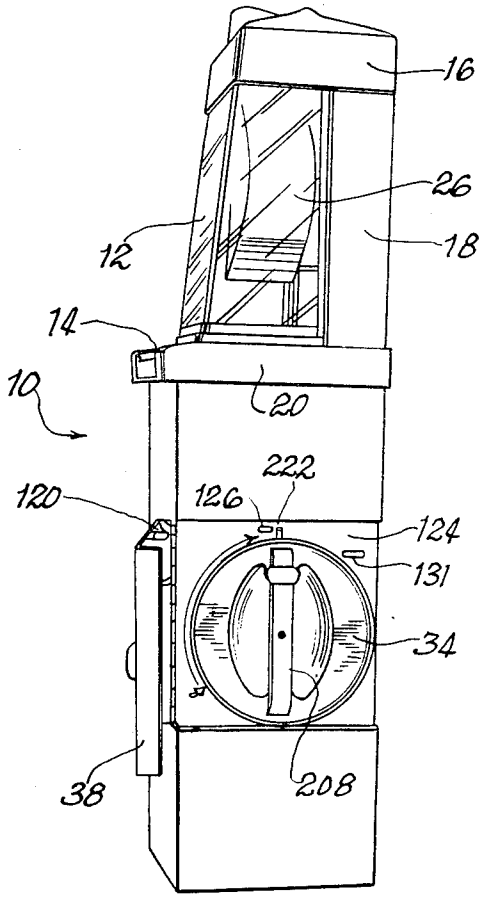


FIG. 2



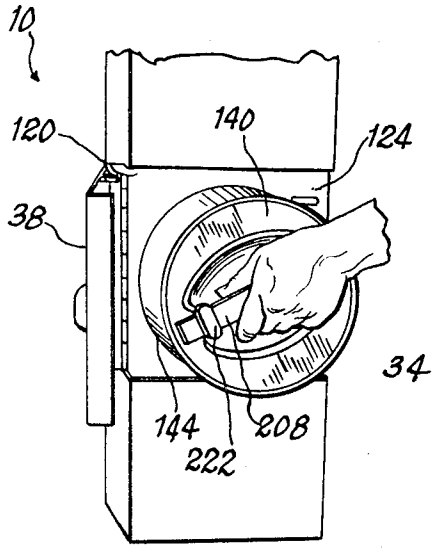


FIG. 3

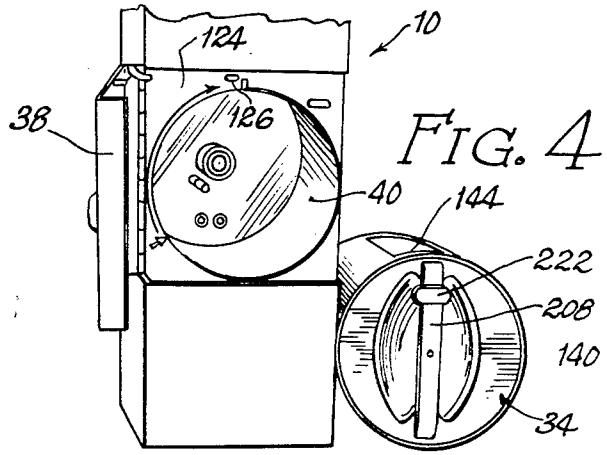


FIG. 4

INVENTORS
George G. Dominick, Rinaldo Sciacero,
George I. Wimpffen & Theodore Louis Kardos
by McDougall, Hersh & Scott Attys

FIG. 5

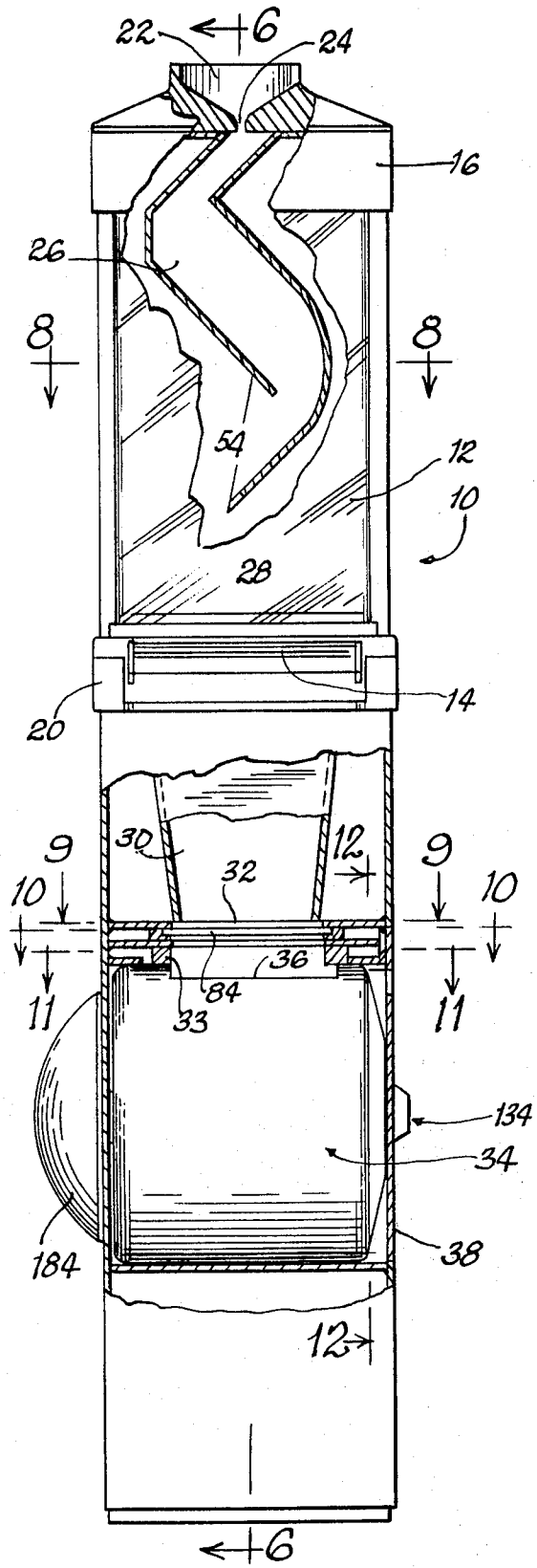

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FIG. 6

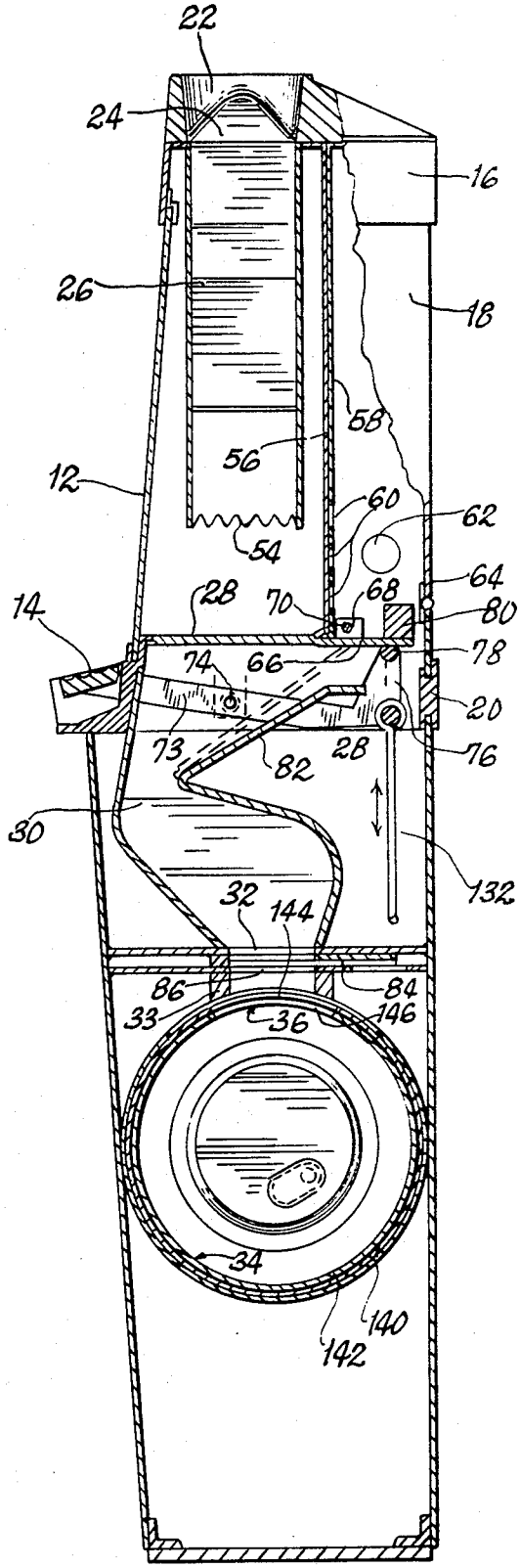

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FIG. 7

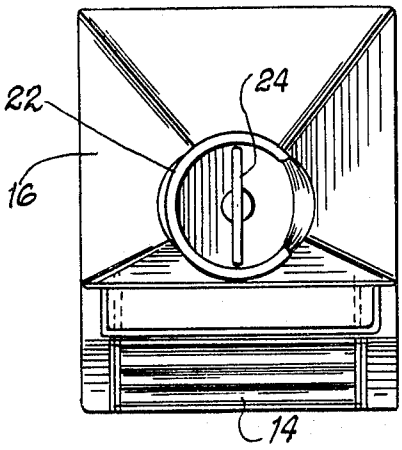


FIG. 8

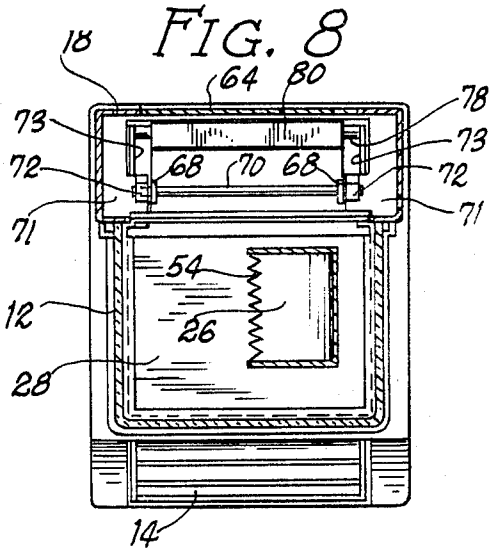


FIG. 9

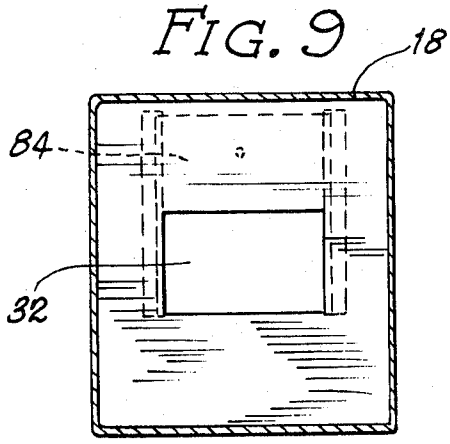


FIG. 10

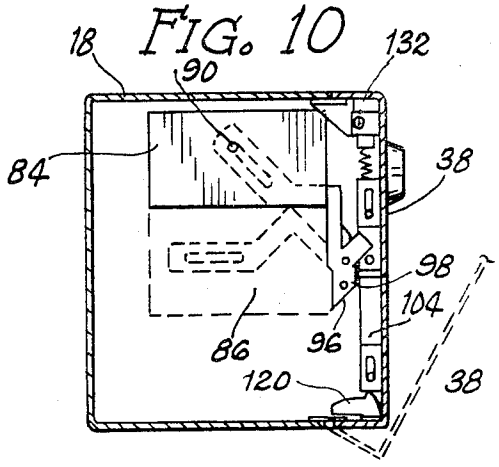


FIG. 11

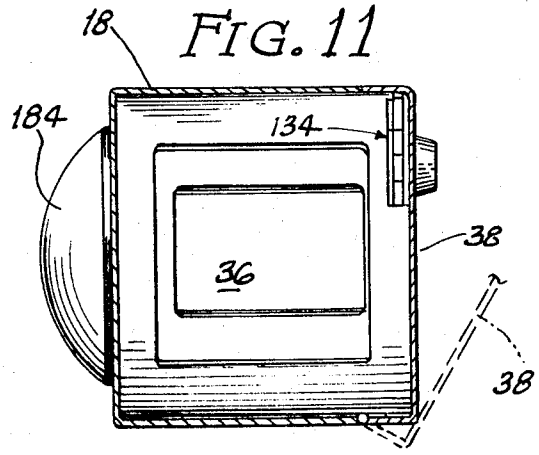


FIG. 12

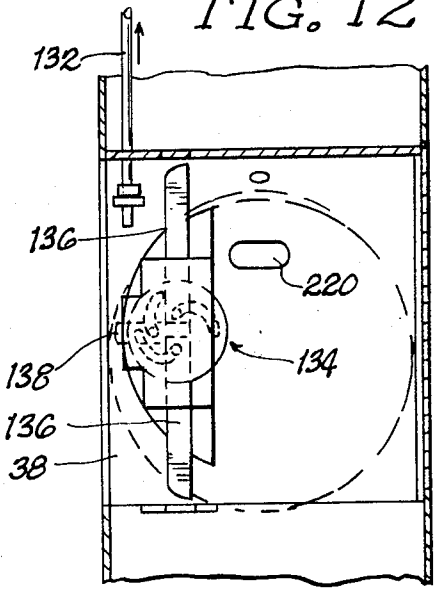


FIG. 13

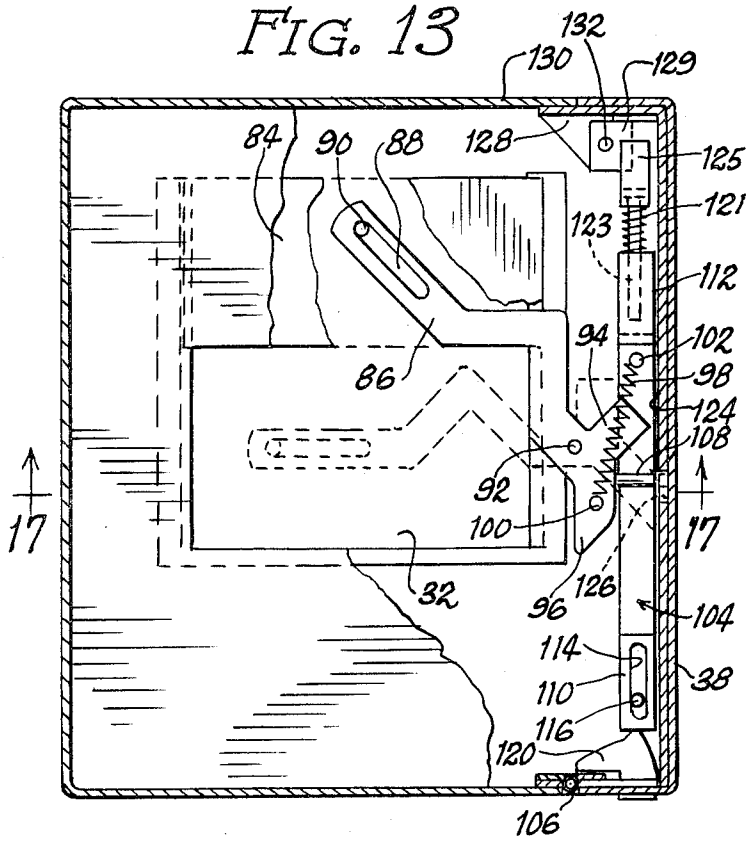


FIG. 14

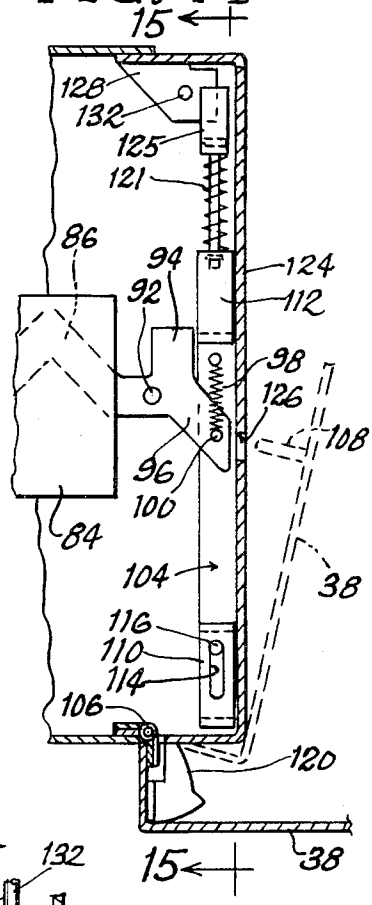


FIG. 15

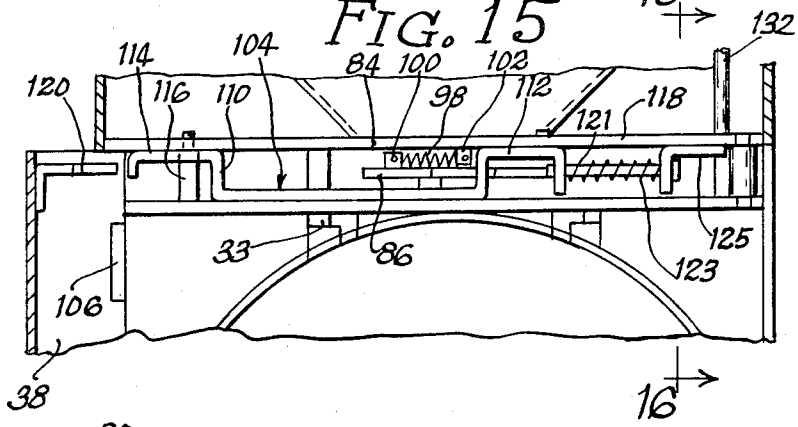
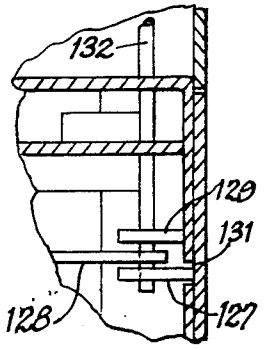


FIG. 16



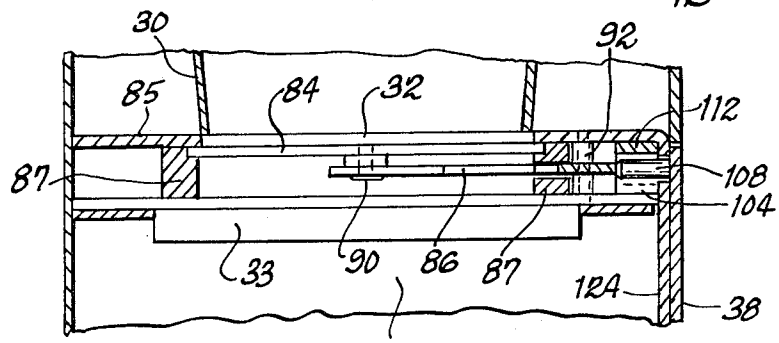


FIG. 17

FIG. 18

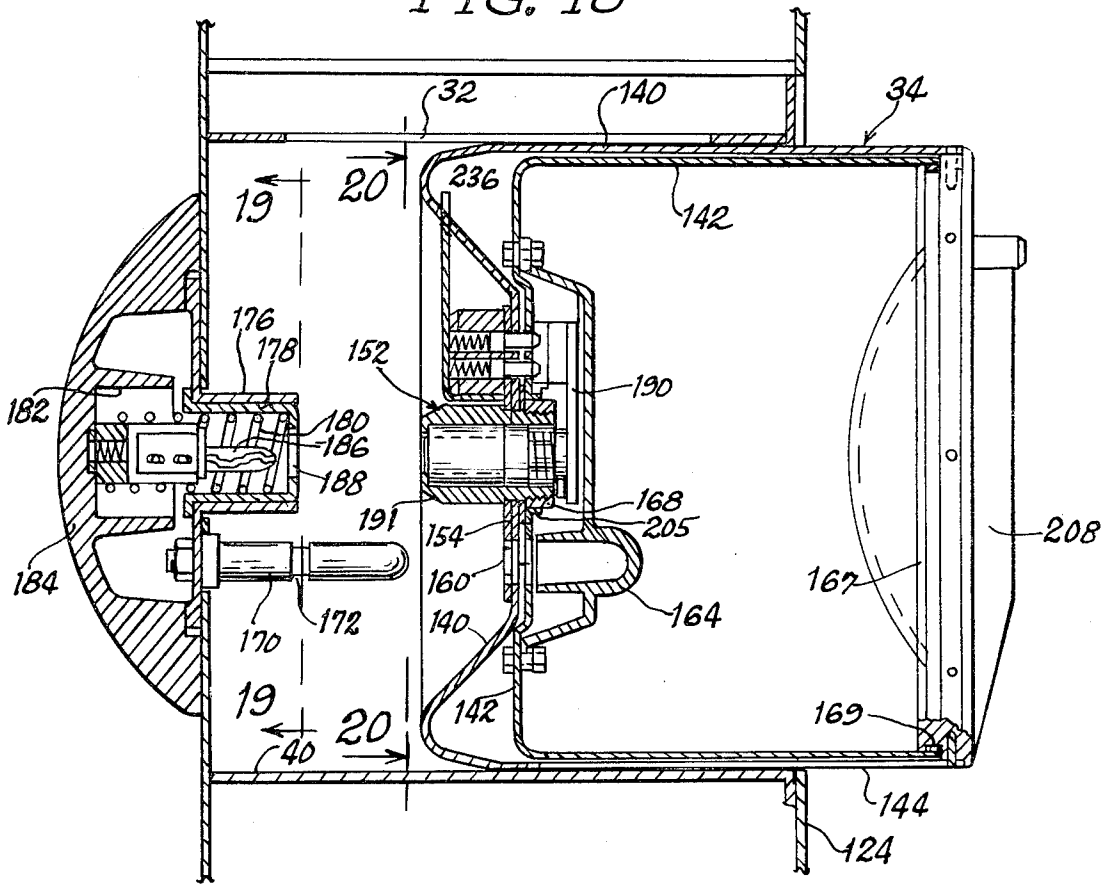


FIG. 19

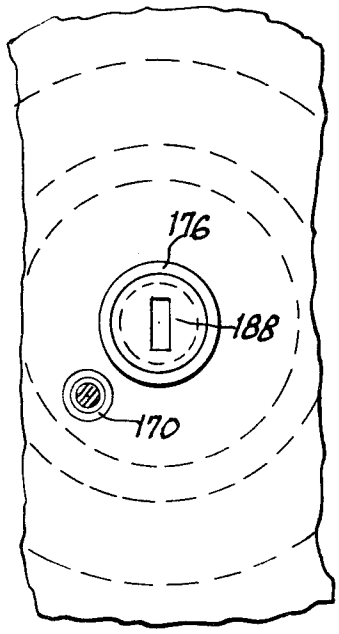


FIG. 20

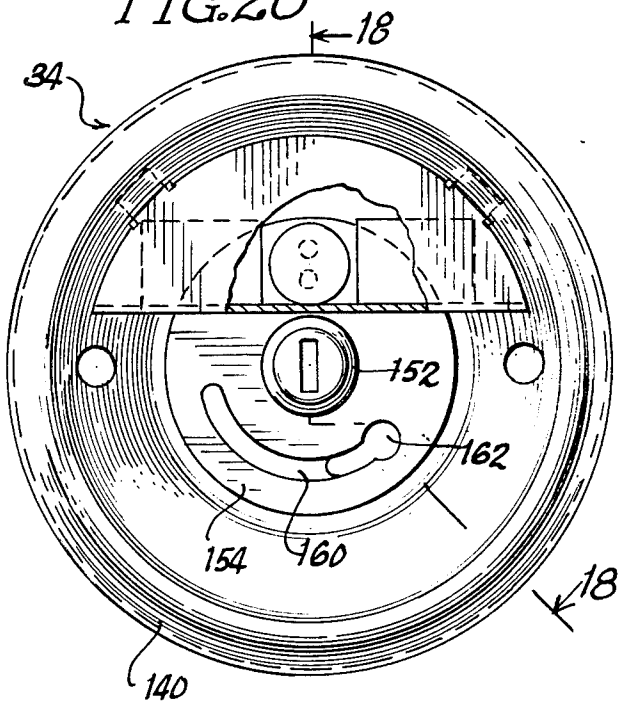


FIG. 21

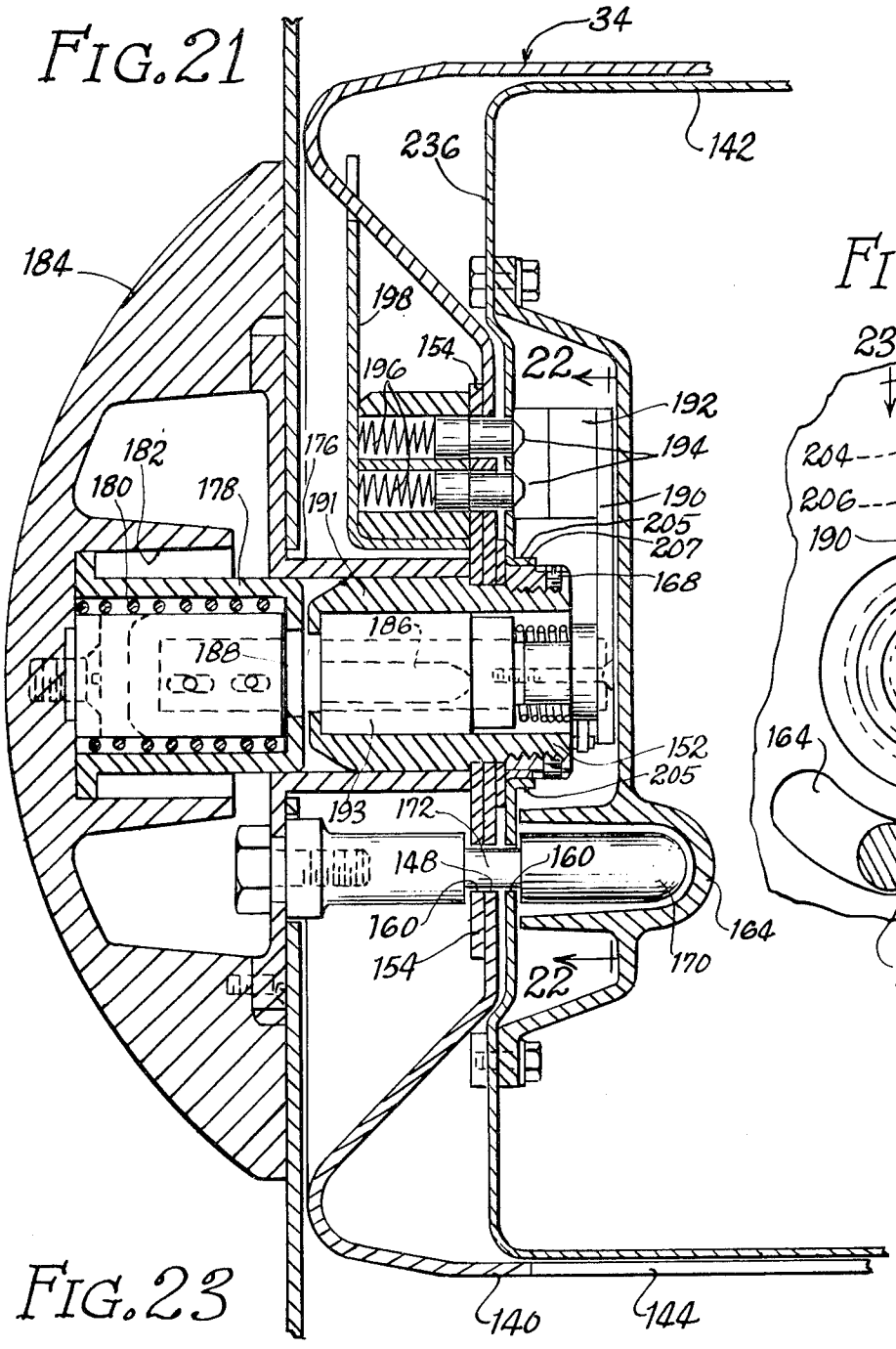


FIG. 22

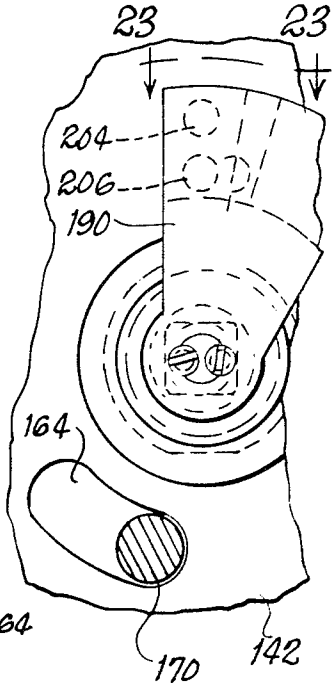
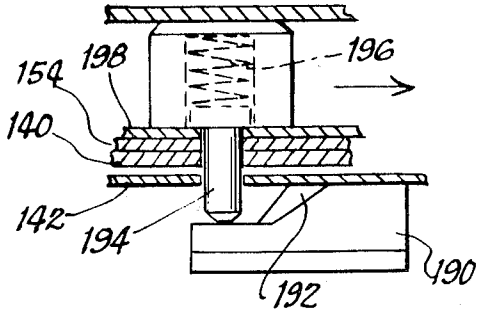


FIG. 23



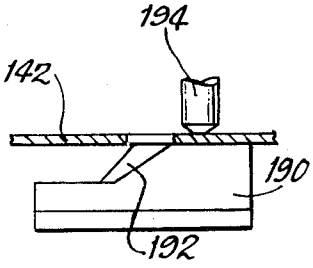


FIG. 24

FIG. 25

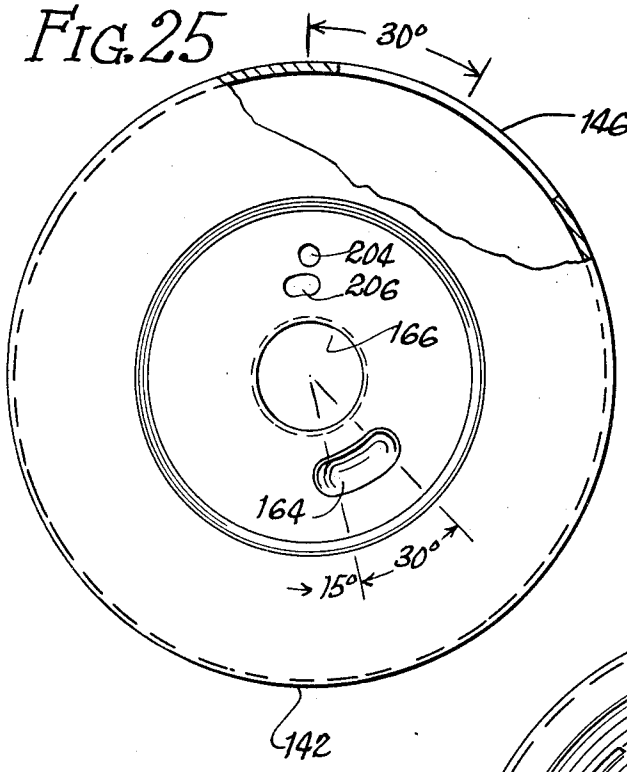
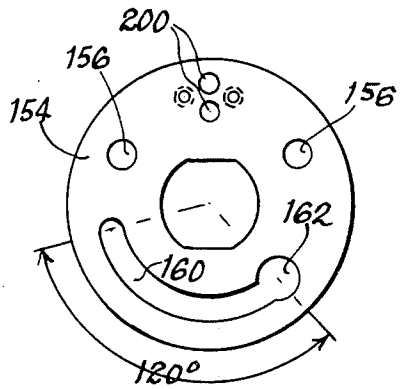


FIG. 26



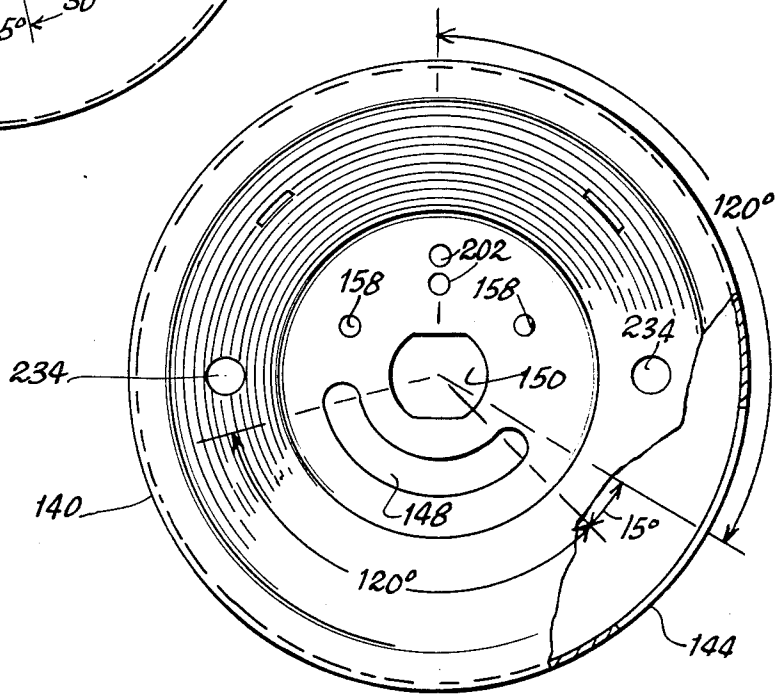


FIG. 27

FIG. 28

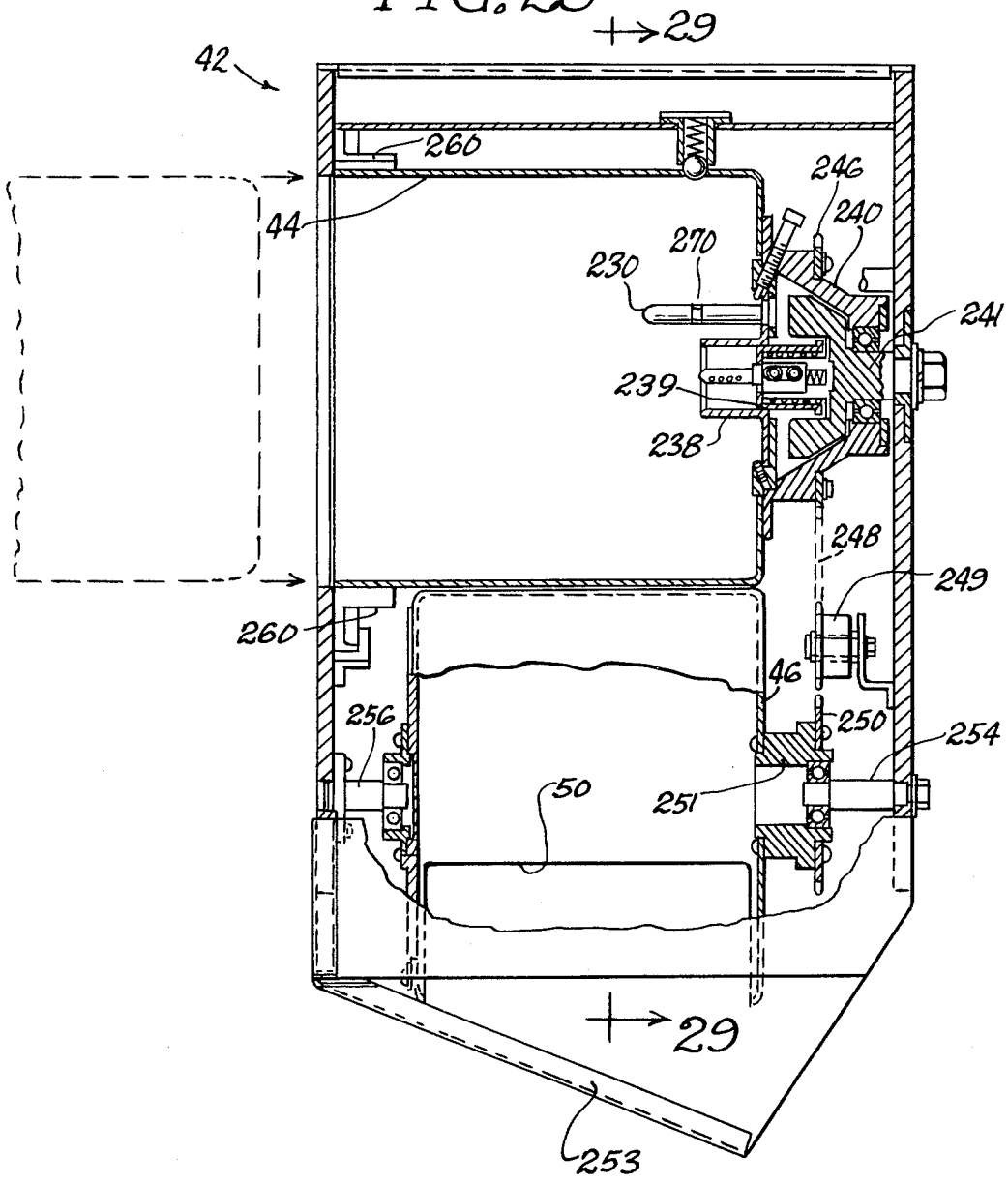

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FIG. 29

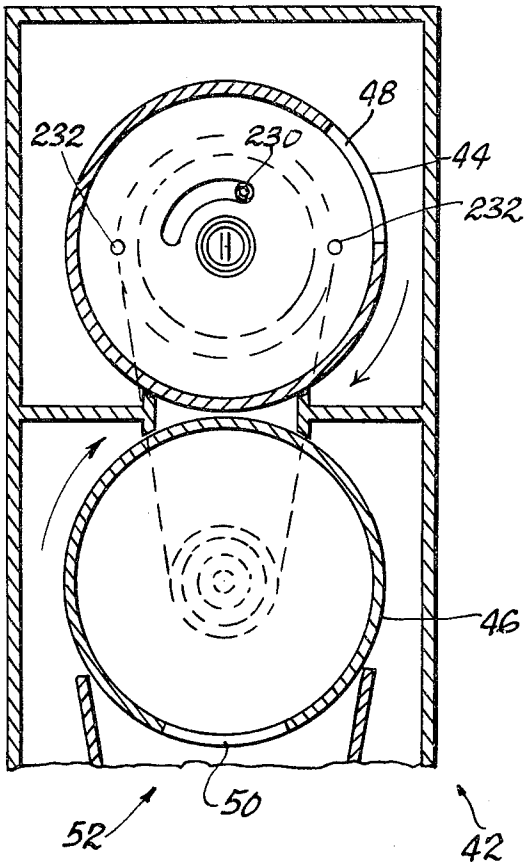


FIG. 30

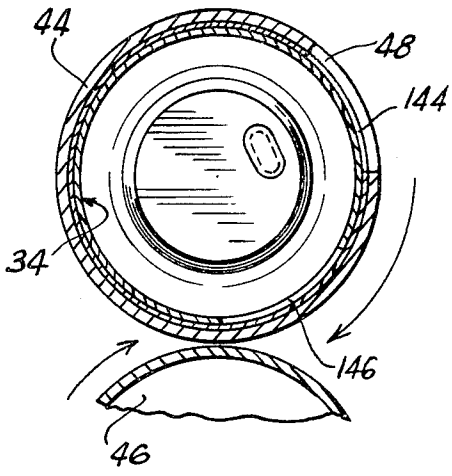
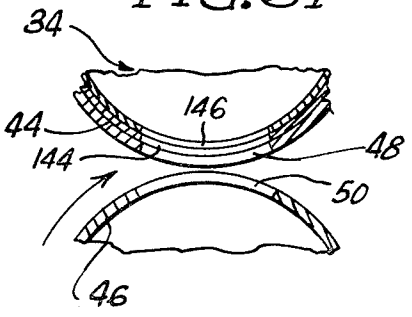


FIG. 31



EXACT FARE SYSTEM

This invention relates to a system which is particularly designed for collecting fares, tolls, or other fees which are usually accepted in large numbers but in relatively small monetary amounts from the general public.

The invention will be described with reference to a fare collection system designed for public transportation systems. In such systems, a passenger is required to pay a fare upon entering a bus, streetcar or the like, by depositing the fare in a collection box.

It will be apparent when considering the following description that the general system has utility in a wide variety of other areas. Thus, problems similar to those that arise in the collection of fares also arise in the collection of tools, admissions, etc. The concepts to be described may be totally adopted for such other applications or individual features of the invention may be used alone in other applications or incorporated in other systems.

The collection of fares or similar payments has caused many problems. Handling problems have been recognized particularly in the case of large transit systems where fares from many individual vehicles are received. Standard systems require handling of the fares by the operator of the vehicle in transferring the fares from the collection receptacle to coin changers or money bags. Additional handling is then required in delivering the fares to some central collection point. All of this handling takes time and, therefore, leads to additional expense. The problem is compounded where the operator of the vehicle is required to make some written account of the collection which must in turn be recorded at the central collection area.

Aside from the inefficiencies which characterize present collection systems, there are extreme security problems. Thus, pilferage on the part of anyone handling funds collected is extremely difficult to prevent, and a wide variety of techniques have been developed for cheating existing fare collection systems. The techniques involve mechanical alterations of the fare box structures thereby avoiding recording of the fares by counting mechanisms associated with the fare boxes, for example, by including means which divert coins deposited. Where the operator is required to handle deposits, schemes are devised which result in improper recording of amounts collected.

Robbery also constitutes a very severe problem in any system requiring fare collection. A bus driver, for example, is extremely vulnerable to robbery since in a matter of seconds, a robber can enter the bus and take the driver's coin changer and money bags. Since buses operate at night—often in remote locations—it is virtually impossible to adequately protect against such occurrences.

Because of the various problems referred to, transit authorities have reverted to "exact fare" collections. In such a system, passengers deposit money in a collection box; however, the driver is not required to carry any change, and the money is never removed from the collection box by the driver. Accordingly, the passenger must have the exact fare in his possession or must deposit an excess amount. The most that such systems require of the driver is that a receipt be given for any excess amount deposited in which case the passenger can obtain a refund at some specified location.

Since the driver does not carry any cash for change and is not authorized to personally accept any fares, the temptation to rob the driver is removed. It is, however, desirable to provide a collection system which is otherwise characterized by efficient operation and which includes mechanisms and a mode of operation which will discourage pilfering and schemes for cheating the system.

It is a general object of this invention to provide a system for collecting fares and the like which is characterized by a highly efficient mode of operation and which employs mechanisms which substantially eliminate pilfering and cheating.

It is a more specific object of this invention to provide a system which is particularly suitable for "exact fare" collections.

It is a still further object of this invention to provide mechanisms for a fare collection system which are characterized by various safety features and which can be produced with substantial structural strength so that robbery or cheating of the constructions can be virtually eliminated.

These and other objects of this invention will appear hereinafter and for purposes of illustration, but not of limitation, specific embodiments of the invention are shown in the accompanying drawings in which:

FIG. 1 is a perspective view of a farebox which incorporates various features of the invention;

FIG. 2 is a perspective view of the farebox showing the cash box access door in the open position;

FIG. 3 is a fragmentary perspective view of the farebox illustrating the cash box in the partially removed position;

FIG. 4 is a fragmentary perspective view of the farebox illustrating the cash box receptacle with the cash box located adjacent the farebox;

FIG. 5 is an elevational view, partly cut away, of the farebox;

FIG. 6 is a vertical sectional view of the farebox taken about the line 6—6 of FIG. 5;

FIG. 7 is a top view of the farebox;

FIG. 8 is a horizontal sectional view of the farebox taken about the line 8—8 of FIG. 5;

FIG. 9 is a horizontal sectional view of the farebox taken about the line 9—9 of FIG. 5;

FIG. 10 is a horizontal sectional view of the farebox taken about the line 10—10 of FIG. 5;

FIG. 11 is a horizontal sectional view of the farebox taken about the line 11—11 of FIG. 5;

FIG. 12 is a fragmentary vertical sectional view of the farebox taken about the line 12—12 of FIG. 5;

FIG. 13 is an enlarged horizontal sectional view of the farebox illustrating in detail the mechanisms shown in FIG. 10;

FIG. 14 is a fragmentary horizontal sectional view illustrating the mechanisms of FIG. 13 with the cash box access door in the open position;

FIG. 15 is a fragmentary view taken about the line 15—15 of FIG. 14;

FIG. 16 is a fragmentary sectional view taken about the line 16—16 of FIG. 15;

FIG. 17 is a fragmentary sectional view taken about the line 17—17 of FIG. 13;

FIG. 18 is a fragmentary vertical sectional view of the farebox taken through the center of the cash box receptacle with the cash box being shown in the partially removed position;

FIG. 19 is a fragmentary sectional view taken about the line 19—19 of FIG. 18;

FIG. 20 is a bottom view of the cash box taken about the line 20—20 of FIG. 18;

FIG. 21 is an enlarged fragmentary sectional view illustrating the cash box in the engaged position relative to the receptacle inner wall;

FIG. 22 is a fragmentary sectional view taken about the line 22—22 of FIG. 21.

FIG. 23 is a fragmentary sectional view taken about the line 23—23 of FIG. 22;

FIG. 24 is a fragmentary sectional view illustrating a different position for the elements of FIG. 23;

FIG. 25 is a bottom view, partly cut away, illustrating the inner seal portion of the cash box;

FIG. 26 is a detail view of a wear plate utilized in the cash box;

FIG. 27 is a bottom view of the outer shell portion of the cash box;

FIG. 28 is a vertical sectional view illustrating the cash box prior to entry into the cash box acceptance receptacle;

FIG. 29 is a cross-sectional view of the acceptance receptacle taken about the line 29—29 of FIG. 28;

FIG. 30 is a fragmentary sectional view illustrating the cash box in place in the acceptance receptacle; and,

FIG. 31 is a fragmentary sectional view illustrating the cash box in the discharge position in the acceptance receptacle.

GENERAL FAREBOX OPERATIONS

The farebox **10** is designed to be positioned at a fare collection location. Where the system is to be used in conjunction with a bus line, the farebox **10** is mounted on the bus floor and can be braced to the instrument panel bulkhead if required. The farebox is positioned with the driver of the vehicle in mind. Thus, the driver must be able to see through the window **12** of the box for purposes of viewing the money deposited. In addition, a trip bar **14** must be readily accessible to the driver when he is sitting in his normal position for driving the bus.

The farebox includes a top cover **16** which is primarily supported by the U-shaped side wall and back wall section **18**. The transparent window **12** is preferably a one-piece U-shaped section which is confined between the cover **16**, the wall section **18** and an intermediate frame portion **20**.

The cover **16** defines a funnel-shaped area **22** which terminates in a fare slot **24**. This slot is dimensioned to receive both coins and folding money. All of the fares deposited are directed through a baffle section **26** which is suspended from the cover **16**.

The fares which pass through the baffle **26** are collected on an inspection plate **28** which is clearly visible through the window **12**. When the operator is satisfied that a proper deposit has been made, the trip bar **14** is pushed down whereby the fare will be dumped into a second baffle section **30**.

The baffle section **30** extends from the inspection plate **28** to a discharge opening **32**. Immediately beneath the opening **32**, there is provided a cash box receptacle. As best shown in FIGS. **5** and **6**, a cash box **34** is located in this receptacle when fares are being collected. The cash box defines an opening **36** which provides for direct passage of the fares through the baffle discharge opening **32**, past baffle elements **33**, and into the cash box.

GENERAL ACCEPTANCE VAULT OPERATION

The farebox **10** is provided with a door **38** which provides access to the cash box receptacle **40**. When it is time to remove fares collected, the cash box is pulled out of the receptacle and taken to an acceptance vault of the type shown at **42** in FIGS. **28** and **29**. This acceptance vault defines a cash box receptacle **44** which is dimensioned to receive the cash box **34**.

When the cash box **34** is properly in place in the receptacle **44**, the cash box is turned in the receptacle and the fares are dumped into an escrow cylinder **46**. The cash box receptacle **44** defines an opening **48** which is brought into alignment with the opening **50** of the escrow cylinder **46** to achieve transfer of the fares into the escrow cylinder.

In order to remove the cash box, it must be rotated back to its original position, and in this case, the opening **50** of the escrow cylinder is rotated for dumping the fares into the main vault area **52**. The vault may be provided with any suitable door which will maintain the fares in a secure state.

SPECIFIC DESCRIPTION

1. Fare Deposit and Inspection Means

As noted, the fares to be collected are inserted in the funnel-shaped section **22** of the top **16** and then fall through the slot **24**. The baffle **26** defines a sinuous path which serves as the first blocking means insofar as pilfering is concerned. Thus, the walls of the baffle prevent any direct access between the slot **24** and the inspection plate **28**. As a further precaution, the lower edge of the baffle **26** defines teeth **54** which, as is well known, will prevent any attempt to withdraw money, for example by means of a thin wire. For example, if a wire were inserted which speared a bill on the inspection plate **28**, the teeth **54** would pull the bill off the wire before it could be withdrawn.

The intermediate wall in the upper portion of the farebox is preferably formed from a pair of sheets comprising an inner sheet **56** of translucent material and a backing sheet **58**. The sheet **58** defines an opening **60**, and two lights **62** are positioned behind this wall. This arrangement provides adequate light for the inspection plate **28**. Access holes are preferably formed in the side wall of the section **18** to permit access for replacing lights. Buttons may be employed for covering the access holes.

The inspection plate **28** includes an extension **66** which carries a pair of upstanding ears **68** for supporting the rod **70**. The ends of the rod are held by blocks **72** attached to plates **71** extending inwardly from the side portions of the wall section **18** whereby the rod **70** provides a pivot axis for the inspection plate **28**.

The inspection plate **28** is pivoted when the trip bar **14** is pushed downwardly. The trip bar **14** is mounted on the arms **73** which are pivotally mounted on pins **74** adjacent the side walls of the farebox. The arms **73** each include an upwardly extending portion **76** which supports a transversely extending bar **78**. The bar **78** engages the extension **66** of the plate **28** immediately beneath a counterweight **80** supported by the extension **66**.

The weight of the movable portions associated with the inspection plate **28** and the trip bar **12** is carefully balanced relative to the axes defined by the rod **70** and the pins **74**. Specifically, the weight of the counterweight **80** is preferably about 5 ounces in excess of the amount necessary to hold the system in perfect balance. With this arrangement, a normal fare or a bill on the inspection plate **28** will be insufficient to tip the plate. On the other hand, if fares are permitted to accumulate, which is considered undesirable under normal circumstances, then the inspection plate **28** will tip automatically when the weight of the fares exceeds approximately 5 ounces. The relatively delicate balance is also desirable since only a very mild application of force is required of the operator to push the bar **14** for removing fares from the plate **28**.

The arms **73** associated with the trip bar **14** straddle the second baffle **30**. The baffle defines an angularly directed wall **82** which serves to limit the tilt angle of the inspection plate **28**. The plate **28** is also dimensioned so that it will move freely between the arms **73**.

2. Cash Box Collection

Fares are transferred through the opening **32** defined by the baffle **30**, past the elements **33**, and then into the cash box **34**. The construction is provided with a gate **84** which, when open, permits passage of fares but is adapted to block the opening **32** to prevent unauthorized passage of fares through the opening when the door **38** is open. The gate is positioned beneath plate **85** which defines the opening **32**. Blocks **87** define shoulders which support the plate during sliding movement.

As illustrated in FIGS. **13** through **17**, the gate **84** is positioned on an arm **86** which defines slot **88** at one end. A pin **90** extends downwardly from the gate and is received by the slot **88**. The pin **90** moves along the slot from one end to the other when the arm **86** is pivoted about the pin **92** at the opposite end of the arm.

A pair of short extensions **94** and **96** are formed integrally with the arm **86** in the area of the pin **92**. A spring **98** has one end attached at **100** to the extension **96**, and the other end attached at **102** to a sliding bar **104**.

The access door **38** for the cash box **34** is pivotally attached by means of the hinge **106**. This door carries an inwardly extending abutment element **108** which is aligned with the extension **96** of the arm **86**. As best illustrated in FIGS. **13** and **14**, the abutment member **108** engages the extension **96** as the door **38** moves to the closed position. The abutment operates to force the arm **86** to the position shown in FIG. **13** when the door is completely closed. This places the gate **84** to the side of the opening **32** thereby clearing a path for fares deposited. When the door **38** is opened, the spring **98** operates to shift the gate **84** back to the blocking position. It will be noted that this shifting movement occurs as soon as the door **38** is opened a slight amount.

The sliding bar **104** defines a pair of upstanding portions **110** and **112**. The portion **110** defines a slot **114** which receives a pin guide **116**. The door **38** carries a cam **120** which

is adapted to engage the upstanding portion **110** on the sliding bar. As the door moves from an open to a closed position, the cam moves the bar in opposition to the spring **98**. A second spring **121** is fit around pin **123** which is attached between upstanding portion **112** of the sliding bar and member **125**. This spring also resists sliding movement of the bar during closing of the door and, therefore, assists in imparting return sliding movement to the bar when the door is opened.

The sliding movement imparted to the bar enhances the spring action which moves the gate **84** to the blocking position. Thus, as shown in FIG. **13**, the spring **98** is extended by the bar **104** when the door is closed. Accordingly, a strong spring action is provided for rapidly closing the gate **84** when the door is opened.

The upstanding portion **112** of the bar also serves as a blocking means relative to the extension **94** provided on the gate arm **86**. Thus, as shown in FIG. **14**, when the door is open, the extension **94** is blocked by the upstanding portion **112** so that the gate cannot be opened when the door is open. In this connection, the sliding bar is not accessible when the door is open since as shown in FIG. **4**, an interior wall **124** is located behind the door **38**. An opening **126** is defined by the interior wall for entry of the abutment member **108**. This security feature is desirable since it prevents access to the area above the cash box receptacle. If this access were available, an attempt might be made to block the passage of fares into the cash box by means which would not be visible when the door **38** is open.

The door **38** also carries a plate member **127**, and a second plate member **129** is mounted on the wall **124**. An opening **131** is defined in the wall **124** to receive the member **127** when the door is closed. These plate members are adapted to straddle the plate member **128** which is secured to the side wall **130**. Each of these plate members defines an opening adapted to receive a vertically extending lock rod **132**. The rod **132** extends upwardly to a connection with the portion **76** of the trip bar arm **72**. As shown in FIG. **16**, when the door **38** is closed, the lock rod **132** extends through the openings in the plate members so that the door will not open even after the door lock has been opened. The door will only open when the trip bar **14** is pushed down thereby lifting the lock rod and releasing the rod from engagement with the plate members. This feature insures that all fares on the inspection plate **28** have passed through before the door is opened. It will be noted that even if the door is opened rapidly to prevent such fares from falling all the way into the cash box, closing and locking of the gate **84** will prevent access to these fares.

The door **38** is provided with a lock structure generally designated **134** (FIG. **12**). When an appropriate key is inserted in the lock, the vertically extending bolts **136** are withdrawn from slots provided in the housing. A laterally extending bolt **138** is simultaneously withdrawn from a similar slot. The preferred structure thus consists of a maximum security three-bolt lock although locks of other conventional types could be employed.

3. The Cash Box

As noted, collection of the fares involves passage of the fares through the opening generally designated **36** in the cash box **34**. The cash box actually consists of a pair of shells comprising an outer shell **140** (FIG. **27**) and an inner shell **142** (FIG. **25**). The shell **140** defines an opening **144** and the shell **142**, an opening **146**. When these openings are aligned, they provide the passage **36** referred to. Accordingly, the basic structure of the cash box follows the concepts described in Sollenberger U.S. Pat. No. 2,815,166.

The outer shell **140** defines a first arcuate slot **148** in its bottom wall. This slot extends for 120°. A central opening **150** is provided for receiving a lock **152** (FIGS. **18** and **21**).

The plate **154** shown in FIG. **26** is adapted to be attached to the bottom wall of the outer shell **140** by extending appropriate fasteners through the aligned openings **156** in the plate and **158** in the outer shell. An arcuate slot **160** on the plate is coextensive with the slot **148**; however, only the end portion **162** of the slot **160** is of the same width, the remainder of the slot being narrower.

The inner shell **142** is dimensioned to be received within the outer shell. The inner shell defines a short arcuate cavity **164** which is coextensive with one end of the slot **148**. When the shells are assembled, the lock **152** extends through the central opening **166** of the inner shell. With the lock **152** in place, a threaded collar **168** is tightened around the end of the lock to thereby hold the assembly of the plate **154** and outer shell **140** together (FIG. **21**). The inner shell **142** is captivated between the outer shell and handle cover **167**. A bearing **169** is carried by the cover and engages the inner surface of the inner shell.

When the cash box **34** is outside the construction, the openings **144** and **146** are maintained in the relationship illustrated in FIGS. **25** and **27**. Thus, the center of the opening **146** is offset 30° from the vertical while the center of the opening **144** is offset 120° from the vertical. This orientation is maintained when the assembly is inserted into the cash box receptacle **40**. The cash box receptacle is provided with a pin **170** which defines a necked down central portion **172**. This pin is positioned so that the enlarged end **162** of the slot **160** will be aligned with the pin when the cash box is properly inserted. The pin diameter is such that it will pass through the opening **162** but not through the narrower portion of the slot **160**.

When the cash box is properly inserted, the pin **170** will pass through the slot **148** of the outer shell **140** and then be received in the cavity **164** of the inner shell. The necked down portion **172** is then aligned with the slot **160**. As will be explained, relative movement between the pin **170** and the slot is required, and the provision of the narrower slot **160** and the necked down portion **172** insures that the cash box be fully inserted before such relative movement can occur.

The receptacle **40** is also provided with a cylindrical projecting portion **176** which receives a cylindrical cap **178**. A spring **180** normally holds the cap in the extended position shown; however, a chamber **182** is provided in the block **184** to permit displacement of the cap **178**. A key **186** is held within the cap **178**, and a slot **188** is provided so that the key will project outwardly when the cap is depressed. The cap **178** provides a cover for the key to restrict entry for making a wax impression and to prevent breaking of the key.

As shown in FIG. **21**, the housing of the lock **152** engages the cap when the cash box is inserted so that the key **186** will enter the lock. The lock must be open in order to achieve the relative movement to be described and, accordingly, only a cash box which has a lock suitable for the specific key can be utilized in any given construction. This provides still further security since it significantly reduces the possibility of anyone inserting an unauthorized cash box into the construction. With the proper cash box inserted, the lock barrel **191** is free for movement relative to the lock bolt **190** which is secured to the lock plug **193**. A cam **192** is attached at the end of the bolt **190**, and this cam is provided for depressing a pair of pins **194**. These pins are normally held in the position shown in FIG. **21** by means of springs **196**. A bracket **198** is attached to the plate **154** for holding the assembly of the springs and pins. As shown in FIGS. **26** and **27**, openings **200** are provided in the plate **154** for receiving the pins, and corresponding openings **202** are provided in the outer shell **140**. The inner shell **142** includes a corresponding opening **204** and a short slot **206** which receives the pins.

The cash box **34** is inserted in the cash box receptacle **40** in the position shown in FIG. **3**. In this position, the opening **144** defined by the outer shell **140** is located left of center and is offset 120° from the vertical. The opening **146** in the inner shell **142** is also positioned left of center and is offset 30° from the vertical.

To place the cash box in position for receiving fares, it is rotated clockwise by means of a handle **208**. It will be apparent that when the outer shell has been rotated through 120°, the opening **144** in this shell will be positioned immediately beneath the opening **32** defined at the bottom of the baffle **30**.

The opening **146** in the inner shell is brought into alignment by limiting rotation of the inner shell to 30°. As best shown in FIG. **21**, the lock housing **191** is tied to the outer shell **140** and the associated plate **154**. Accordingly, the housing **191** will rotate when the operator turns the handle **208**. The lock plug **193** and the associated cam **192** will remain stationary. The inner shell **142** includes a flange **205** which engages the surface **207** defined by the collar **168**. This provides a bearing surface permitting rotation of the inner shell relative to the lock barrel **191**.

The pins **194** will rotate with the plate **154**, and the inner shell **142** will move due to engagement of the pins with the shell through the openings **204** and **206**. As the movement progresses, however, the cam **192** operates to drive the pins **194** upwardly in opposition to the springs **196**. Because of the beveled ends of the pins, they are eventually forced out of the openings **204** and **206** at which time driving engagement with the inner shell is removed. The cam **192** is positioned so that this driving engagement will be removed after the inner shell has rotated through 30°. Continued rotation of the outer shell through an additional 90° then brings the openings **144** and **146** into alignment.

Rotation of the plate **154** locates the narrow portion of the slot **160** around the pin **170**. Accordingly, the cash box **34** cannot be withdrawn until the cash box is rotated back to its original position. It is, therefore, not possible to remove the cash box when the openings **144** and **146** are in alignment.

The slot **206** extends for about 10°, and the provision of this slot insures that at least one of the pins will move to locking position when the cash box is rotated to its original position. This safety feature is particularly important after extensive use of a cash box which can result in the wear of parts to the extent that the cash box could be removed without rotation sufficient to allow a pin **194** to move into the opening **204**.

After the cash box **34** has been located in the receptacle **40**, the door **38** is closed and locked. The door defines an opening **220** which is aligned with a boss **222** formed on the cash box handle **208**. The boss may be provided with an identifying code. This arrangement is desirable for spot check inspection of vehicles. An inspector can readily determine whether a proper cash box is located in the farebox without opening the door **38**. In this way, the inspector need not identify himself which is desirable if there is a suspicion of cheating on the part of the vehicle driver.

4. The Vault

In the preferred practice of the system of the invention, vehicles carrying fareboxes are driven to a collection location where a vault **42** of the type shown in FIGS. **28** through **31** is located. At this station, an attendant will open the door **38** and remove the cash box **34** by rotating the cash box counterclockwise to the position shown in FIG. **3** and then pulling the cash box out of the receptacle **40**. The cash box is then inserted in the receptacle **44** of the vault **42**.

The bottom wall of the receptacle **44** carries a pin **230** which is adapted to be received in the same manner as the pin **170**. Thus, the end of the pin will pass through the enlarged opening **162** in the slot **160**, then through the slot **148** and into the cavity **164**.

A pair of additional aligning pins **232** are also located on the end wall of the receptacle **44**. These pins are positioned for entry through the openings **234** defined by the outer cash box shell **140**. It will be noted that the end wall **236** of the inner shell **142** is spaced from the end wall in the outer shell to provide room for receiving the pins **232**. Thus, these pins do not extend through the wall **236** of the inner shell.

The end wall of the receptacle **44** also carries a cylindrical housing **238** for a key. The key in the housing **238** is a master key so that several cash boxes with different tumbler arrangements can be employed. The arrangement within the cylindrical housing **238** is otherwise the same as the arrangement within the housing **176** in the farebox construction. The cylindrical cap **239** in FIG. **28** is shown in the forced-in position.

The cash box **34** is inserted in the vault, so that the opening **144** in the outer shell is positioned at the upper right, when viewed from the front of the vault, 60° offset from the vertical. The opening **48** in the receptacle will thus be lined up with the opening **144** while the opening **146** in the inner shell is positioned at the lower right, 30° offset from the vertical. Accordingly, when the cash box is rotated 120° clockwise by means of the handle **208**, the outer shell and the cylinder **44** will move together to a position facing downwardly. By the same mechanisms previously described, the opening **146** will move through 30° so that all the openings will be aligned as shown in FIG. **31**.

An annular member **240** is supported for rotation around a shaft **241**. A sprocket gear **246** is mounted on the annular member **240**, and a chain **248** extends from this sprocket past idler sprocket **249** to sprocket **250**. The sprocket **250** is mounted on an annular member **251** which is rotatably supported on shaft **254**. The cylindrical receptacle **46** defining an opening **50** is supported at one end on the annular member **251**. The other end of the receptacle **46** is supported for rotation about shaft **256**.

The sprockets **246** and **250** are selected so that the opening **50** in the cylinder **46** will move into position beneath the aligned openings **48**, **144** and **146** when the latter openings are facing downwardly. In the embodiment illustrated, a 3:2 ratio is provided so that the cylinder **44** rotates 120° while the cylinder **46** rotates 180°.

All of the fares in the cash box **34** will be transferred to the cylinder **46** when the described action occurs. The pin **230** defines a necked down portion **270** which operates in the same manner as the necked down portion **172** of the pin **170**. Thus, the cash box **34** cannot be removed from the vault receptacle until the cash box is rotated back to its original position. This return rotation moves the cylinder **46** back to its original position so that access to the cylinder **46** is never available. The bottom of the vault structure may be designed for retaining the fares. On the other hand, the structure illustrated may be employed simply for transferring the fares into a vault or other storage means by means of the chute **253**.

The use of the vault arrangement described provides a still further safeguard against pilfering. Thus, the cylinder **46** provides an escrow arrangement which cuts off access to the vault interior. When considering the entire system, it will be apparent that the fares are completely protected against pilfering from the time they are deposited by a passenger until the time they are placed in an accumulation area of a vault.

The system is thus designed with consideration of various pilfering and cheating techniques in mind from the time a fare is inserted to the time the fare is safely confined in a vault. The arrangements described provide maximum security while also being characterized by highly efficient operating components thereby making the system relatively economical while keeping maintenance expense to a minimum.

It will be understood that various changes and modifications may be made in the construction which provide the characteristics of this invention without departing from the spirit thereof.

That which is claimed is:

1. In a construction for collecting fares and the like comprising a fare deposit section, an inspection surface defined in said deposit section for temporarily holding fares deposited, manually operable means for dumping fares from said inspection surface into a cash box area, a cash box receptacle defined in said cash box area, and a removable cash box adapted to be received in said receptacle, said cash box defining an access opening, closure means in said cash box for blocking said access opening for preventing access to the interior of the cash box, means normally locking said closure means against movement relative to said access opening, means defined by said receptacle operating to unlock said closure means upon insertion of said cash box into said receptacle and to thereby permit rotation of said cash box relative to the receptacle to locate the cash box in position such that the

access opening will receive fares dumped from said inspection surface, means for locking said cash box in place in the receptacle upon rotation away from its inserted position and toward said receiving position, and wherein said closure means is automatically closed during rotation of the cash box back to said inserted position and prior to removal of the cash box from the receptacle.

2. A construction in accordance with claim 1 including a door for said receptacle and a viewing opening in said door for determining the presence of a cash box in the receptacle.

3. A construction in accordance with claim 2 wherein said cash box is formed of inner and outer shells with each shell defining an opening, said cash box being rotated upon insertion into said receptacle to achieve alignment of the openings in the cash box shells while positioning the openings for receiving fares dumped from the inspection surface.

4. A construction in accordance with claim 3 including spring loaded pin means mounted on one of said shells, openings defined by the shells for receiving said pin means whereby the pin means operate to tie the shells together during rotary movement of the shells, and including cam means associated with the cash box for displacing said pin means out of engagement with one of said shells when the access opening for said one shell is in position for receiving fares, and means for holding said one shell in position during continued rotation of the other shell to bring the access opening of the other shell into alignment with the access opening of said one shell.

5. A construction in accordance with claim 4 including a key positioned in the end wall of said receptacle, a lock mounted on said cash box, said other shell being secured to the barrel of said lock and said cam being secured to the plug of said lock, insertion of said cash box into said receptacle providing for entry of said key into said lock to free said barrel for rotary movement relative to said plug.

6. A construction in accordance with claim 3 including a key positioned in the end wall of said receptacle, a lock mounted on the end wall of said cash box said lock having a lock plug and a lock barrel normally tied to the plug, said outer shell being tied to the lock barrel with said lock plug being held stationary by said key, said outer shell being provided with a handle to accomplish rotation of said cash box, and said lock preventing such rotation unless the proper key is inserted in the lock to free the lock barrel for movement relative to the lock plug.

7. A construction in accordance with claim 6 wherein said key is confined within a spring mounted cylinder which normally surrounds the key, the housing of said lock being adapted to engage said cylinder when said cash box is inserted in the receptacle to depress the cylinder and to expose said key for insertion in the lock.

8. A construction in accordance with claim 1 wherein said cash box is formed of inner and outer shells with each shell defining an opening, the respective openings being movable into alignment upon relative rotation of said inner and outer shells, and including a lock normally preventing relative rotation of said inner and outer shells.

9. A construction in accordance with claim 8 including a vault for collecting fares from a plurality of cash boxes, said vault defining a cash box receptacle, a key mounted within said receptacle for engagement with the lock of each cash box to thereby permit relative rotation of the cash box shells for aligning the openings of the shells, and means associated with said vault for achieving relative movement of said shells for discharge of fares in the cash box through the aligned openings of the shells into the interior of the vault.

10. A construction in accordance with claim 9 including locking means located in said vault receptacle and movable into engagement with the cash box when said access opening is positioned for discharging fares, said locking means preventing removal of the cash box from the vault receptacle until relative movement of the cash box in the vault receptacle sufficient to close said closure means has taken place.

11. A construction in accordance with claim 9 wherein the vault receptacle comprises a first rotatably mounted cylinder, a second rotatably mounted cylinder positioned adjacent said first cylinder, an opening defined in the walls of each of said cylinders, said cash box, when inserted in said first cylinder, being tied to said cylinder whereby rotation of said cash box rotates said first cylinder to locate the opening defined by said first cylinder in a discharge position, and including drive means tying said second cylinder to said first cylinder whereby said second cylinder rotates with said first cylinder for positioning the opening in said second cylinder in alignment with the opening in said first cylinder, said opening in said cash box being aligned with said cylinder openings whereby said fares will be discharged from said cash box into said second cylinder.

12. A construction in accordance with claim 11 wherein said cash box must be rotated back to its original position to remove the cash box from said first cylinder, the return rotation of the cash box resulting in movement of said second cylinder to a discharge position whereby the fares collected by said second cylinder are discharged into the interior of said vault.

13. A construction in accordance with claim 11 including spring loaded pin means mounted on one of said shells, openings defined by the shells for receiving said pin means whereby the pin means operate to tie the shells together during rotary movement of the shells, and including cam means associated with the cash box for displacing said pin means out of engagement with one of said shells when the access opening for said one shell is in position for receiving fares, and means for holding said one shell in position during continued rotation of the other shell to bring the access opening of the other shell into alignment with the access opening of said one shell.

14. A construction in accordance with claim 13 wherein said other shell is secured to the barrel of said lock and said cam is secured to the plug of said lock, insertion of said cash box into said vault receptacle providing for entry of said key into said lock to free said barrel for rotary movement relative to said plug.

15. A construction for collecting fares and the like comprising a deposit section, an inspection surface in said deposit section for temporarily holding fares deposited, manually operable means for dumping fares from said inspection surface into a cash box area, and a cash box for receiving said fares, a sliding gate interposed between said inspection area and said cash box adapted to block access of the fares to said cash box, a door in said construction providing access for inserting and removing the cash box, and means associated with said door operably connected to said gate whereby the gate automatically closes when said door is opened.

16. A construction in accordance with claim 15 wherein said gate is attached to a pivotally mounted arm, abutment means attached to said door and engaging said arm, and spring means attached to said arm urging said arm to a position for closing said gate, said abutment means being removed from engagement from said arm when said door is only slightly opened whereby said spring means operates to rapidly move the gate to blocking position before the door is fully opened.

17. A construction in accordance with claim 16 including a sliding bar defining a blocking portion adapted to engage said arm, cam means associated with said door for engaging said sliding bar to move the blocking portion of said bar out of blocking position relative to said arm when said door is closed, and spring means for urging said bar into a position whereby said blocking position engages said arm when the door is open, said blocking portion preventing movement of said arm and opening of said gate when said door is open.

18. A construction in accordance with claim 17 wherein the spring means attached to said arm has one end attached to said sliding bar.

19. A construction for collecting fares and the like comprising a deposit section, an inspection surface in said deposit section for temporarily holding fares deposited, manually opera-

ble means for dumping fares from said inspection surface into a cash box area, and a cash box located in said cash box area for receiving said fares, said manually operable means comprising a trip bar exposed on the exterior of said construction, a pivotally connected arm having said trip bar attached at one end, said inspection surface comprising a pivotally mounted member operatively connected to said arm, said fares being collected on one side of the pivot axis of said member, and wherein the weight of those portions of said member and said arm on one side of the pivot axis of said member and said arm only slightly exceeds the weight of said trip bar, and the portions of the arm and member on the other side of the pivot axes whereby only a light touch on the trip bar is required to tip said plate, and including a door in the cash box area of the construction to permit insertion and removal of said cash box, and locking means for said door, at least a portion of said locking means being connected to said member whereby said member must be in the tipped position before said door can be opened.

20. A construction in accordance with claim **19** wherein said member comprises a normally horizontally mounted inspection plate, said locking means including a vertically extending rod attached to said inspection plate, means attached to a stationary wall of said construction defining an opening for receiving said rod, and means attached to said door defining a corresponding opening whereby said rod is adapted to be received in said openings for locking said door and whereby said door will be unlocked when said rod is moved vertically upon tipping of said inspection plate.

21. A construction in accordance with claim **19** wherein said deposit section includes a transparent wall portion to permit viewing of said inspection surface, a separate wall formed of a light transmitting material, and a light positioned behind said light transmitting wall to provide independent lighting for said inspecting surface.

22. In a system for collecting fares wherein the fares are deposited in a plurality of cash boxes situated at various locations with the cash boxes being thereafter brought to a common collection location, the improvement comprising a vault construction situated at said collection location, said vault construction defining a cash box receptacle, said cash box defining an access opening, closure means in said cash box for blocking said access opening to prevent access to the interior of the cash box, means defined by said receptacle operating to open said closure means during movement of the cash box relative to the receptacle in the course of locating the cash box in a position such that its access opening will discharge fares into said vault, and wherein said closure means is automatically closed in the course of movement of the cash box relative to the receptacle during removal of the cash box from the vault.

23. A construction in accordance with claim **22** including locking means located in said vault receptacle and movable into engagement with the cash box when said access opening is positioned for discharging fares, said locking means preventing removal of the cash box from the vault receptacle until relative movement of the cash box in the vault receptacle sufficient to close said closure means has taken place.

24. A construction in accordance with claim **22** wherein the vault receptacle comprises a first rotatably mounted cylinder, a second rotatably mounted cylinder positioned adjacent said first cylinder, an opening defined in the walls of each of said cylinders, said cash box, when inserted in said first cylinder, being tied to said cylinder whereby rotation of said cash box rotates said first cylinder to locate the opening defined by said first cylinder in a discharge position, and including drive means tying said second cylinder to said first cylinder whereby said second cylinder rotates with said first cylinder for positioning the opening in said second cylinder in alignment with the opening in said first cylinder, said opening in said cash box being aligned with said cylinder openings whereby said fares will be discharged from said cash box into said second cylinder.

25. A construction in accordance with claim **24** wherein said cash box must be rotated back to its original position to remove the cash box from said first cylinder, the return rotation of the cash box resulting in movement of said second cylinder to a discharge position whereby the fares collected by said second cylinder are discharged into the interior of said vault.

26. A construction in accordance with claim **24** wherein said cash box is formed of inner and outer shells with each shell defining an opening, said cash box being rotated upon insertion into said vault receptacle to achieve alignment of the opening for discharging fares into said second cylinder.

27. A construction in accordance with claim **26** including spring loaded pin means mounted on one of said shells, openings defined by the shells for receiving said pin means whereby the pin means operate to tie the shells together during rotary movement of the shells, and including cam means associated with the cash box for displacing said pin means out of engagement with one of said shells when the access opening for said one shell is in position for receiving fares, and means for holding said one shell in position during continued rotation of the other shell to bring the access opening of the other shell into alignment with the access opening of said one shell.

28. A construction in accordance with claim **27** including a key positioned in the end wall of said vault receptacle, a lock mounted on said cash box, said other shell being secured to the barrel of said lock and said cam being secured to the plug of said lock, insertion of said cash box into said vault receptacle providing for entry of said key into said lock to free said barrel for rotary movement relative to said plug.

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