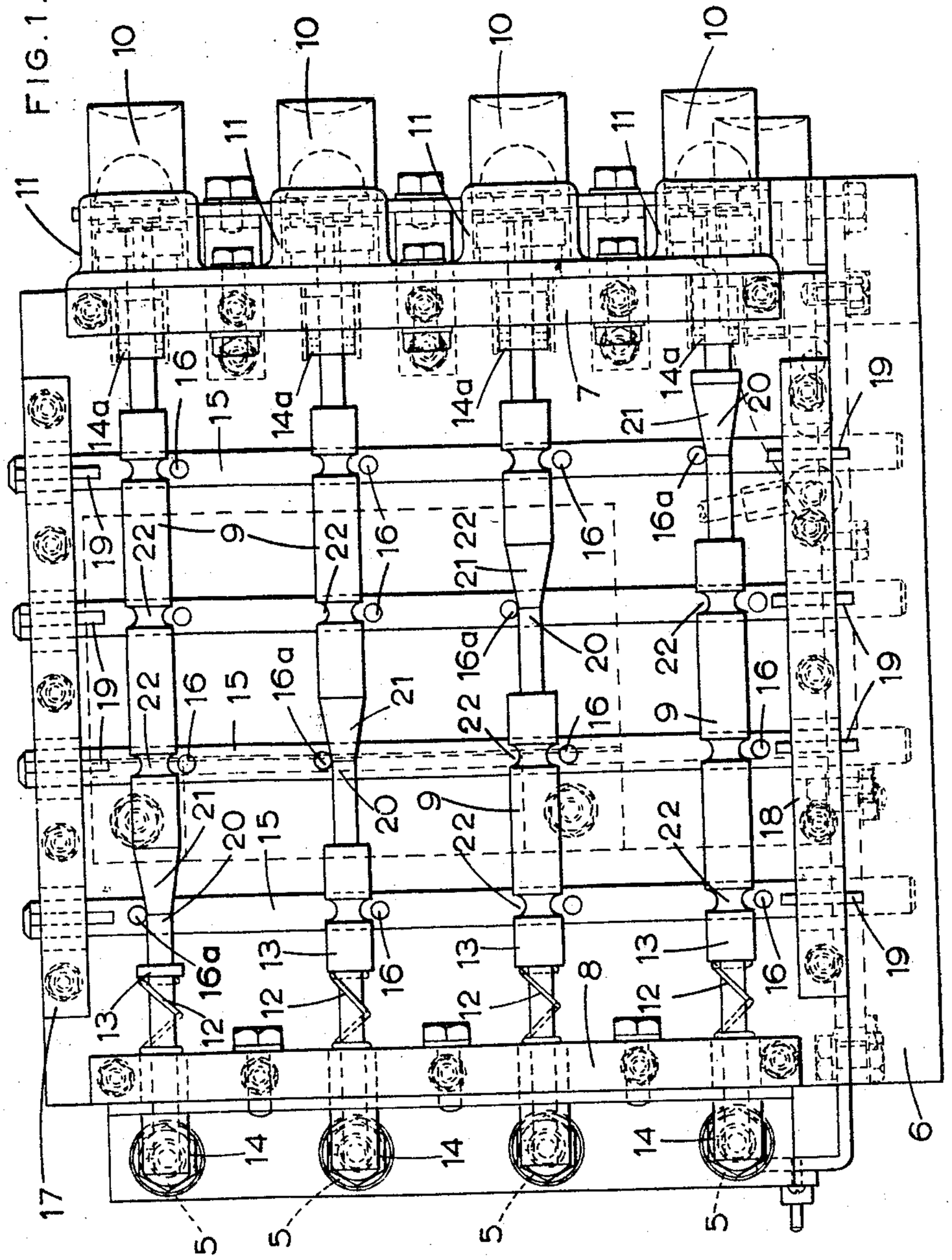
Aug. 27, 1963 D. S. SILVER 3,101,867

LOCKOUT MECHANISM FOR VENDING MACHINE

Filed Sept. 26, 1961 4 Sheets-Sheet 1

FIG. 1



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LOCKOUT MECHANISM FOR VENDING MACHINE

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FIG. 2.

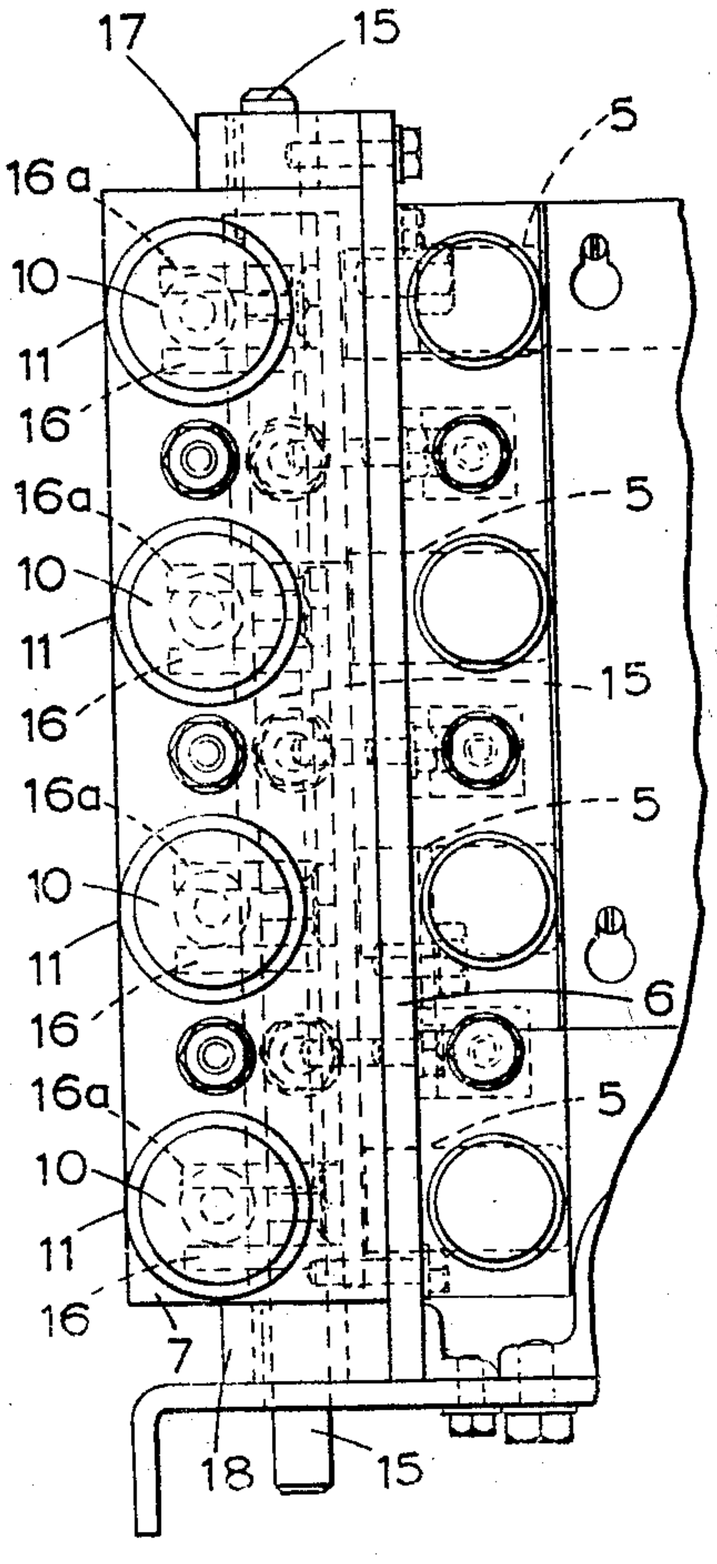
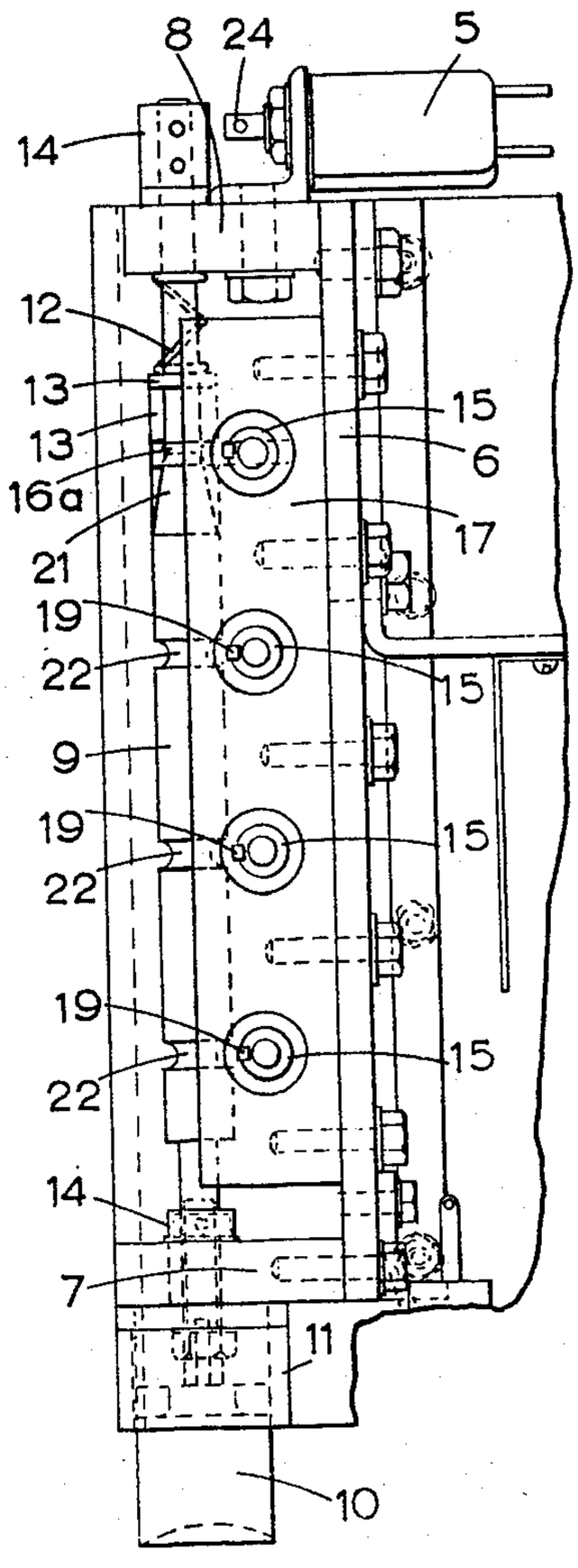


FIG. 3.



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LOCKOUT MECHANISM FOR VENDING MACHINE

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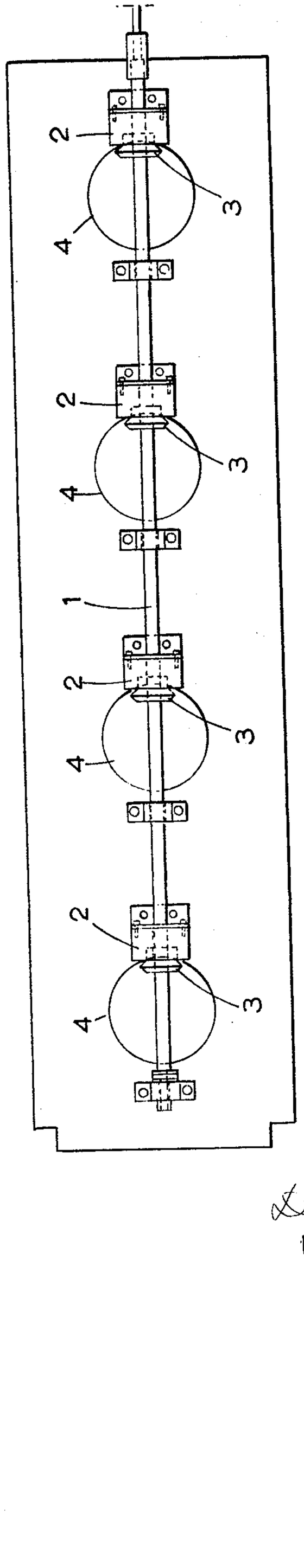
FIG. 4.



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LOCKOUT MECHANISM FOR VENDING MACHINE

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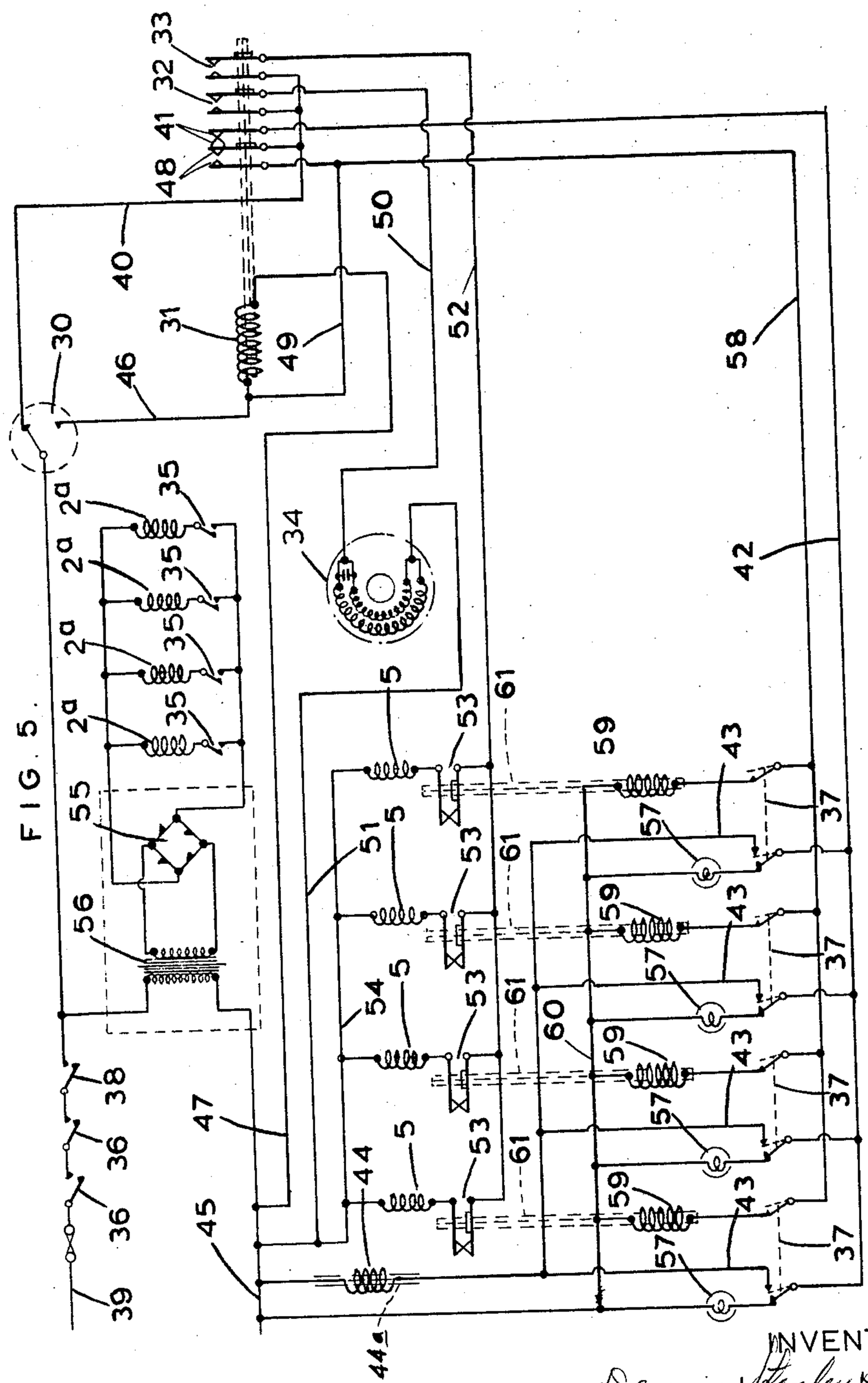

FIG. 5.

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LOCKOUT MECHANISM FOR VENDING MACHINE

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1 Claim. (Cl. 221—125)

This invention relates to vending mechanisms for controlling more than one source of supply of goods under the control of a single token-freed mechanism. The token-freed mechanism is, of course, usually coin operated. The invention is particularly concerned with the control of sources of goods constituted by conveyor devices, such as the conveyor devices described in the specification of our co-pending patent application Serial No. 140,714, to which power can be selectively applied according to the choice of a customer who has put a coin in coin-freed mechanism common to the conveyors. One object of the invention is to provide mechanism enabling particularly compact vending machines, incorporating two or more conveyors to be operated alternatively at the choice of a customer, to be constructed, the mechanism readily being adapted to any number of conveyors that it may be desired to incorporate in the machine.

According to the invention, vending mechanism, arranged to control more than one source of supply of goods in conjunction with a single token-freed mechanism, includes as many selector members and as many detent members as there are sources of supply of goods, each selector member and each detent member having a normal position and an actuated position, and the selector members having a biunique relationship with the detent members so that the movement of any one of the selector members to its actuated position results in the movement of the associated one of the detent members to its actuated position in which it holds the remaining selector member, or each remaining selector member, in its normal position, and means under the control of the said members and of the token-freed mechanism for rendering available the goods in the one of the sources that corresponds to whatever selector member has been selected for actuation. Advantageously the selector members are bars mounted parallel to one another for longitudinal sliding movement, and yielding means, such as springs, are provided for holding the bars in their normal positions, means under the control of the token-freed mechanism being provided for latching the bars in their actuated positions. Then the detent members may be parallel rods mounted for longitudinal sliding movement at right angles to the selector bars and each arranged to be moved between its normal and actuated positions under the control of cam mechanism interposed between the rod and the associated one of the selector bars. Conveniently each rod may be furnished with a series of pins, one of which provides a cam-follower that co-operates with a cam surface on the associated selector bar, and the remainder of which coact with the remaining selector bars to lock them in their normal positions when the rod is moved to its actuated position.

When the sources of goods are constituted by conveyor devices, the mechanism preferably includes electromagnetic clutches, allocated respectively to the conveyor devices and under the control of the selector members, for connecting the conveyor devices selectively to an electric motor arranged to start under the control of the token-freed mechanism.

In order that the invention may be clearly understood and readily carried into effect, apparatus in accordance therewith will now be described, by way of example, with reference to the accompanying drawings, in which:

FIGURE 1 is a side elevation of selector mechanism;

FIGURE 2 is a front elevation of a portion of the mechanism appearing in FIGURE 1;

FIGURE 3 is a plan of the portion of the mechanism appearing in FIGURES 1 and 2;

FIGURE 4 is a plan of mechanism associated with the mechanism of FIGURES 1 to 3; and

FIGURE 5 is a circuit diagram.

In this example, the vending machine is encased in a cabinet not more than fourteen inches deep, from front to back, and having the bulk of its volume occupied by a compartment containing four vertical helical conveyor units as described in the specifications of our aforesaid co-pending patent application Serial No. 140,714. Extending along the top of the compartment is a small additional compartment containing a horizontal shaft **1** common to the four rotors in the conveyor units. The rotors are selectively connected to the horizontal shaft **1** (FIGURE 4) under the control of selector mechanism described below. For this purpose four electromagnetic clutches **2** are mounted coaxially on the horizontal shaft and are associated respectively with the rotors. The driven member (not shown) of each clutch is provided coaxially at one end with a bevel gear **3** in mesh with a bevel gear **4** fixed coaxially at the top of the associated rotor (not shown). Before the clutch **2** is engaged, the horizontal shaft **1** can rotate idly in the driven member without turning the bevel gears. When the clutch is caused to engage by feeding current through a stationary field winding **2***a* (FIGURE 5) in the clutch, the driving member of the clutch is attracted magnetically to the face of the driven member remote from the bevel gears. The said face has a layer of friction material so that the driving and driven members are locked together frictionally. The driving member is splined to the horizontal shaft so that it can move axially thereon but must rotate therewith. Accordingly the drive is transmitted from the shaft to the bevel gears and rotor.

To one side of the compartment containing the conveyor units are two smaller compartments, one above the other. The lower compartment contains refrigerator apparatus and a fan for causing cooled air to circulate over the conveyor units. The upper compartment contains coin freed mechanism of a standard type, and selector mechanism which is the subject of the present invention.

The four conveyor units are allocated respectively to four groups of cartons containing, for example, beverages having four different flavours and, in operation, it is necessary for the customer to insert a coin into the coin-freed mechanism and then to press one of four buttons **10** to select the one of the four flavours he requires. When a coin is inserted into the coin-freed mechanism, it momentarily closes a micro-switch **30** (FIGURE 5) to do two things. The first of these is, through a relay **31** incorporating a locking circuit, to close a switch **32** to start an electric motor **34** geared to the aforesaid shaft **1**, which starts without putting any appreciable load on the motor **34** because none of the electromagnetic clutches is engaged. The second is, through the relay **31**, to close a switch **33** to energize four electro-magnets **5** (FIGURES 1 to 3 and 5) in the selector mechanism now to be described, the details of the electrical circuit being described later.

The selector mechanism is mounted on a vertical rectangular frame **6** (FIGURES 1 to 3) extending from near the front towards the back of the cabinet, and provided with front and rear vertical, parallel flanges **7**, **8** through which four equidistantly spaced, horizontal selec-

tor bars **9** extend, the selector bars being mounted for longitudinal sliding movement in the flanges **7**, **8**. The forward ends of the selector bars carry respectively the four buttons **10**, as aforesaid, the buttons **10** being guided in fixed sockets **11**. Normally the buttons are held in their forward positions by helical compression springs **12**, concentric with the bars **9**, between the rear flange **8** and annular shoulders **13** on the bars, located fairly close to the rear flange **8**. The forward movement of the rods is limited by collars **14** thereon engaging the rear flange **8**. Collars **14***a* on the front ends of the bars **9** are guided in bearings in the front flange **7**.

In a vertical plane parallel to the vertical plane containing the selector bars **9** are four vertical, equidistantly spaced detent rods **15**, one function of which is to lock the remaining three selector bars against longitudinal movement when the button **10** on a fourth bar **9** has been pressed inwards. In this connection, it must be explained that, when any one of the buttons **10** is pressed inwards, its selector bar **9** is latched in the innermost position by means to be described below.

Each detent rod **15** carries four horizontal pins **16**, three of which respectively project beneath three of the selector bars **9** and the fourth **16***a* above the fourth selector bar. However, the four sets of four pins **16**, **16***a* are arranged in different permutations; that is to say, the fourth pin **16***a* on each rod **15** lies above a different one of the selector bars **9** from the fourth pins **16***a* on the other rods. These fourth pins **16***a* are, in fact, cam followers and will be referred to as cam pins **16***a* below. The remaining three pins **16** on each rod **15** are locking pins.

The four rods **15** are mounted for vertical reciprocation in flanges **17**, **18** in the frame **6**, the downward movement of the rods **15** under gravity being limited by the engagement of the cam pins **16***a* with the bars **9**.

To maintain the four pins **16**, **16***a* on each rod in a plane at right angles to the plane containing the axes of the selector bars **9**, splined connections **19** are provided between each end of each rod **15** and the flanges **17**, **18**.

When the selector bars are in their outer, inoperative positions, the cam pins **16***a* on the rods rest respectively on portions **20** of their respective selector bars that are of reduced diameter. To one side of the reduced portion, each selector bar is formed with a frusto-conical portion **21** which services as a cam arranged so that, when the bar is pressed inwards, the cam pin **16***a* is cammed upwards so as to lift the associated rod **15** and bring the three locking pins **16** thereon into locking engagement with the other three selector bars **9**. For this purpose, above each locking pin **16**, each selector bar is formed with a portion of increased diameter having a peripheral groove **22**. Thus, assuming that a particular selector bar **9** is not pressed inwards but any one of the other selector bars **9** is pressed inwards, one of the locking pins **15** is lifted into one of the three grooves **22** on the selector bar **9** that is not pressed inwards, so that the latter selector bar is locked against being pressed inwards.

The four aforesaid electromagnets **5**, that are energized by the insertion of a coin, are used to latch the selector bars in their innermost positions. Thus, the electromagnets have their axes at right angles to the axes of the collars **14** so that, when the electro-magnets are energized their armatures **24** are brought, counter to spring action, against the peripheries of these collars **14**. When however, one of the selector bars **9** is moved inwards, the associated armature **24** can move further to engage behind the collar **14** and hold the selector bar in its innermost position. In an alternative arrangement, the armatures of the electromagnets are dispensed with and the electromagnetic windings are mounted respectively coaxially with and beyond the inner ends of the selector bars so that, when a selector bar is pressed inwards, it is held electromagnetically within the winding, the end of the bar being made of an appropriate iron alloy.

Four switches **35** (FIGURE 5) are associated respectively with the rods **15** and connected respectively to the field windings **2***a* of the four clutches **2**. Therefore, when the required selector bar **9** has been pressed inwards, the associated rod **15** is raised so as to close its switch **35** and the appropriate clutch **2** is engaged with the result that the corresponding conveyor rotor begins to revolve. The fact that friction clutches are employed means that no sudden load is put on the electric motor.

Ultimately a carton falls from the selected conveyor and falls through one of two spring-loaded trap doors, one trap door being allocated to each pair of conveyors. By moving the trap door, the carton operates one of two switches **36** (FIGURE 5) that opens the locking circuit for the aforesaid relay **31**, to stop the motor **34** and to de-energize the electromagnets **5**. The selector bar **9** that has been pressed inwards is, therefore, released and the clutch is disengaged. After the carton has passed the trap-door, the latter returns to its normal position and closes its switch **36** so that the apparatus is ready for further operation. The nature of the conveyor units is such that when a clutch is disengaged, the rotor does not continue under its own inertia. There is enough friction to cause the rotor to stop immediately the clutch is disengaged.

The circuit diagram of FIGURE 5 will now be described in greater detail and in this figure it will be seen that there are four double-pole, one pole being double-throw, the other single pole, switches **37** allocated to the four conveyors. Each of these switches **37** is in the dotted line position if there is a carton in the lowermost position in the associated conveyor, but when that conveyor is empty the switch changes over the full line position. In series with the switches **36** there is a switch **38** that is closed so long as the door of the cabinet is closed but opens when the cabinet is opened. Thus, when the machine is in normal working order, ready to receive a coin a circuit is complete from an alternating current line **39**, through the switches **36**, **38**, the coin switch **30**, a conductor **40**, switch contacts **41**, a conductor **42**, the parallel switches **37**, four parallel conductors **43**, and a coin-blocking relay **44** to the neutral line **45** of the alternating current supply. The coin-blocking relay **44** is, therefore, energized and holds its armature **44***a*, which is connected to a member (not shown) for blocking the path of a coin to the coin switch **30**, in a position such as to permit a coin to be inserted to close momentarily the coin switch **30**. This completes the circuit through the relay **31** by way of conductors **46**, **47**. The relay **31**, therefore, opens the contacts **41**, permitting the coin-blocking relay **44** to prevent the insertion of a further coin, and closes contacts **48**, as well as the switches **32**, **33**. The contacts **48** complete the locking circuit for the relay **31** through the line **45**, switches **36**, **38** and **30**, conductors **40**, **49**, **47**, and line **45**. A parallel circuit from the conductor **40** to the line **45** is completed by the switch **32** through a conductor **50**, the motor **34** and a conductor **51**, to start the motor **34**. A further parallel circuit is completed from the conductor **40** to the line **45** by the switch **33** through a conductor **52**, four parallel switches **53**, the electromagnets **5** in parallel, and a conductor **54**. Therefore, pressure on one of the four buttons **10** will bring about the closure of one of the switches **35** and the energization of the associated clutch field winding **2***a*, these parallel field windings **2***a* being supplied through a rectifier circuit **55** by a transformer **56** connected between the supply lines **39**, **45** and controlled by the switches **36**, **38**.

As soon as a carton causes one of the switches **36** to open, the circuits through the relay **31** and the transformer **56** are opened and the motor **34** stopped, the electromagnets **5** de-energized, and the selected clutch field winding **2***a* also de-energized. The selected field winding **2***a* is, as already explained, de-energized also as a result of the opening of the associated switch **35**.

However, it is desirable for the transformer 56 to be disconnected when the door switch 38 is open.

When ony one of the four conveyors becomes empty, the associated one of the switches 37 changes over to the full line position. Before a coin is inserted, therefore, an associated one of four warning lights 57 is illuminated. When a coin is inserted so that the circuit through the contacts 41 and conductor 42 is opened, the warning light 57 is extinguished but a circuit is completed from the conductor 40 and the line 45 by way of the contacts 48, a conductor 58, the one of the switches 37 that has been moved to the full line position, an associated one of four solenoids 59, and a conductor 60. The one of the four solenoids that is thereby energized then moves its armature 61 to open the associated one of the four switches 53 to prevent the operation of the corresponding electromagnet 5. Thus, if a purchaser ignores the warning light and presses the button 10 associated therewith, the corresponding selector bar 9 will not remain in its innermost position when the pressure is released, and a more productive choice can be made for the same coin.

When all the conveyors are empty, so that all the switches are in the full line positions, there is no circuit through the parallel conductors 43, so that the coin blocking relay 44 prevents the insertion of a further coin.

I claim:

Vending mechanism arranged to control more than one source of supply of goods and including, in combination, as many selector bars as there are sources of supply of goods, said bars being mounted parallel to one another for sliding movement between a normal position and an actuated position and each bar being formed with a cam surface and with a number of grooves, each cam surface having a circular cross section surrounding the associated bar, each groove being a circular groove surrounding the associated bar, said number being one less than the number of selector bars in the mechanism, as many detent rods as there are selector bars, said detent rods being mounted parallel to one another at right angles to said selector bars for sliding movement between a normal position and an actuated position and each detent bar being furnished with as many laterally projecting pins as there are selector members, one pin being engaged by the cam surface on the associated selector bar for movement of the rod by the bar to the actuated position while the remaining pins on the rod enter grooves on the other bars to prevent them from being moved to their actuated positions, a single token-freed means, and means controlled by said token-freed means and by the members constituted by said bars and rods for rendering available the goods in the one of the sources that corresponds to whichever selector member is moved to its selected position.

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