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⑤4 Coin-freed mechanism.

(57) A coin-free mechanism for a vending machine has electrical sensing means (7, 9, 16) which are actuated to free the mechanism by relying on the electrical conductivity of an inserted coin (24) or a series combination of inserted coins (24, 25) of the correct denomination(s); the inserted coins themselves "make" or energize an electrical circuit which causes the normally-locked mechanism to be freed and goods to be dispensed from the machine.

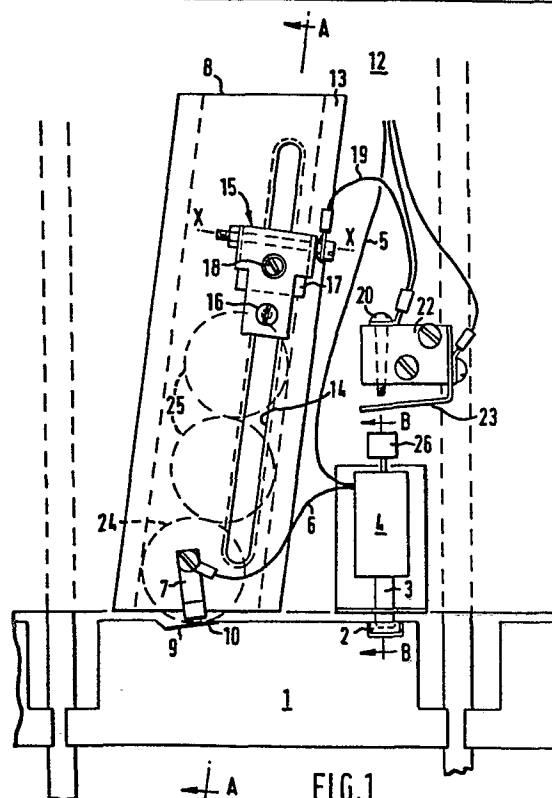


FIG. 1

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"COIN-FREED MECHANISM"

This invention relates to coin-freed mechanisms, particularly coin-freed mechanisms for automatic vending machines or so-called "slot machines".

5 Known slot machines have coin testers which test each individual coin inserted into the machine for properties such as size and weight, the coin tester rejecting counterfeit or defective coins before they can release the locking mechanism
10 of the slot machine. Normally, a slot machine can be opened on the insertion of a number of coins of the same or different denominations, and the invention was devised to provide a coin-freed mechanism which checks the complete combination of coins inserted. As indicated
15 below, however, the invention is also applicable to a coin-freed mechanism which is released by a single coin of a particular denomination.

Particular problems arise in devising a coin-freed mechanism which checks a combination of inserted coins.
20 For example, the mechanism should be able to cope with

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dissimilar coins inserted into the machine in different orders and must be capable of aligning the inserted coins accurately for checking purposes. To allow for different diameter coins to be inserted, sufficient
5 lateral clearance must be provided in the coin inlet yet the coins must come to rest in predetermined positions in which an overall dimensions can be checked.

These requirements are met by the present invention which provides a coin-freed mechanism
10 having electrical sensing means which are actuated to free the mechanism by relying on the electrical conductivity of an inserted coin, or a series combination of inserted coins, of the correct denomination(s); hence the inserted coins are used to make an electrical circuit
15 which causes the mechanism to be freed.

Preferably, the electrical sensing means have contacts which are so positioned and arranged that they engage the edge of the inserted coin of the correct denomination or the edges of the coins at the top and
20 bottom of a stack of coins of the correct combination arranged with their edges resting one on the next. Since electrical contact is made through the edges of the or each coin, the mechanism will not be released on the insertion of a coin which is made to simulate a
25 coin of a larger denomination by the expedient of wrapping the edge of the coin with adhesive tape so that it conforms in size to the larger denomination coin. Also, in the

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usual case of the mechanism requiring a certain combination of coins of the correct denomination to be freed, the sensing means detect the aggregate distance across the edges of the stack of inserted coins, so that coins
5 of different denominations may be inserted in any order and still cause release of the mechanism providing that their total value is the correct one.

One of the contacts is preferably formed at the base of a coin chute and the other at a position spaced
10 above the lower base contact at a height which is conveniently adjustable to enable the coin or combination of coins which causes release of the mechanism to be varied. The coin chute is preferably inclined slightly to the vertical, the lower base contact being inclined
15 both with respect to the coin chute and to the horizontal so that the first coin inserted is caused to occupy a predetermined position with its edge resting on the base contact and against one side of the coin chute. The upper contacts may be pivotally mounted on or adjacent the coin chute, the inserted coins
20 engaging and pivotally displacing the upper contact as they pass down the chute, the upper contact returning to its normal position in which it projects into the coin chute to make engagement with the edge(s) of the coin(s).
The upper contact may project into the chute at a position
25 offset from the diametral line passing through the uppermost coin and parallel to the chute.

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In one preferred embodiment to be described hereinafter, the lower base contact is mounted on a slidable drawer which dispenses products from an automatic vending machine and which is retained in a retracted
5 locked position by the coin-freed mechanism until the latter is freed on the insertion of the correct combination of coins. When the drawer is in its retracted position, the base contact is preferably engaged by a spring contact which is connected in series within the electrical circuit
10 and which ensures that the latter cannot be completed to free the mechanism unless the drawer is in its withdrawn closed position.

The electrical sensing means preferably comprises a solenoid which, when the electrical contacts
15 are electrically interconnected through the coin(s), is energised to release a locking mechanism which may take the form of a bolt engageable in a latch plate attached to the drawer or other lockable member of the automatic vending machine.

20 A coin-freed mechanism according to the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a rear elevation of the mechanism, Figures 2 and 3 are fragmentary views on the
25 planes A-A and B-B of Figure 1 respectively, and

Figures 4 and 5 are views respectively similar to figures 1 and 2 but showing an alternative preferred embodiment, Fig. 5 being a section on the plane c-c of Fig. 4.

Referring to Figure 1, the coin-freed mechanism is used to lock a drawer 1 which is slidable from

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the locked position shown to an open position in order to dispense cigarettes in an automatic vending machine. The direction of opening movement of the drawer 1 is into the plane of Figure 1. The drawer 1 is fitted with a latch plate 2 (see also Figure 3) into which projects a movable bolt 3 formed by the armature of an electrical solenoid 4. One terminal of the solenoid 4 is connected by a lead 5 to a battery (not shown) and the other terminal is connected by a lead 6 to a sprung wiper contact 7 attached at the lower end of a coin chute 8.

As can be seen from Figure 2, the wiper contact 7 has a sprung lower end which engages a strip contact 9 mounted in a groove 10 being inclined to the horizontal, as shown in Figure 1. The mechanism has a back panel 12 of wood on which is mounted the solenoid 4 and a channel-shaped piece of clear plastics 13. The chute 8 is defined between the piece of plastics 13 and the back panel 12.

The plastics piece 13 of the coin chute 8 has an elongated slot 14 within which is clamped, at a preselected position along the slot 14, a top contact assembly 15 having a top contact 16 capable of pivoting about an axis X-X relative to a block 17 clamped in the slot 14 by a clamping screw 18.

The top contact 16 is connected by an electrical lead 19 to a contact screw 20 mounted in an insulating block 22 carrying a depending beryllium copper

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spring contact 23, the block 22 being mounted on the back panel 12.

When coins are inserted into the mechanism they fall down the coin chute 8, displacing the top contact 16 which pivots about axis X-X with a rocking motion as the coins pass. The inclination of the coin chute 8, combined with the angle of the lower strip contact 9 mounted on the drawer 1, ensures that the lowermost coin (shown at 24 in Figure 1) occupies a predetermined position with its outer peripheral edge in contact with the lower strip contact 9. The strip contact 9 makes an obtuse angle with the right-hand side of the coin chute 8, as seen in Figure 1. Subsequently inserted coins 25 form a stack, the edges of the coins being in contact one with the next and with the right-hand edge of the coin chute 8, as seen in Figure 1. If the combination of coins inserted is the correct one, the top contact 16, which acts as a sensitive feeler, will engage the edge region of the uppermost coin at a position offset from the diametral line through the two coins 25. Assuming that the drawer 1 is in its retracted closed position shown in Figure 2, electrical continuity is established from the top contact 16, through the stack of inserted coins, through the lower strip contact 9 mounted on the drawer 1, through the wiper contact 7 and thence to the solenoid 4. Completion of this electrical circuit energises the solenoid 4 the armature of which moves upwardly to release

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the drawer 1. The upper end of the solenoid armature carries a nylon cap 26 which, on its upward movement, engages the beryllium copper spring contact 23 and urges the latter into electrical contact with the contact screw 20 so as to complete a circuit to a device which produces a "vend accept" audible signal.

If electrical continuity is not established through the stack of coins, for example if a coin has been encircled with tape to make it larger in an attempt to pass it off as a coin of larger denomination, the bolt 3 will remain engaged with the latch plate 2 and the drawer 1 will not be openable. The coins are returned by the operator pushing the drawer 1 in slightly to allow the coins to fall through a coin slot 27 (Figure 2) in the drawer 1. It will be appreciated that if the overall size of the stack of coins, as measured at the off-centre position of the contact or feeler 16, is not of the predetermined magnitude determined by the position of the block 17 in the slot 14, the drawer 1 will also remain locked.

On release of the drawer 1 and the delivery of the product therein, the coins fall from the chute 8 behind the end of the drawer 1. On return movement of the drawer, the bolt 3 rides up an inclined edge of the latch plate (shown in Figure 3) before engaging therein.

Referring now to Figures 4 and 5 showing an alternative preferred embodiment, certain parts similar or functionally equivalent to corresponding parts in the embodiment of Figures 1 to 3 have been
5 omitted for clarity and will not be described. Other parts requiring description to understand the embodiment have had their reference number increased by 100 relative to the embodiment of Figures 2 and 3.

In this embodiment the drawer 100 has a groove
10 110 with a step 111. A contact plate 109 is secured in the groove 110 and co-operates with a wiper contact 107 attached to the lower end region of a coin chute 108 that is inclined to the vertical.

An elongated slot 114 is formed in the chute
15 108. In the slot 114 are clamped, at preselected and variable positions, two top contact assemblies 115 and 115a, capable of pivoting about parallel axes X-X, X'-X' relative to a block 117 clamped in the slot 114 by a respective clamping screw 118.
20 They are electrically in series. The two contact assemblies 115 and 115a are essentially identical, so it will be sufficient to describe one, 115, only. The assembly has a metal plate flap 130 carrying a pair of aligned screws 116, 132. The screw 116
25 is in a lower plane as viewed, and its curved surface (or at least the bottom portion thereof) is provided with an insulated covering or coating 134. Its plane end face 136 will remain as bare metal so that only this end face 136 can make electrical

contact with the coins to complete a circuit.

The other screw 132 carries at its end a knob 138 of insulating material. The bottom surface of the knob 138 is partly chamfered at 140
5 so that it tapers to a tip 142 on the side nearer the screw 116. The screw 132 with the tip 142 is slightly longer than the screw 116.

The operation of this embodiment is essentially similar to that described previously and only
10 the differences will be highlighted. The mechanism can be actuated by one high-value coin (such as the newly announced U.K. £1 coin) or by an equal-value combination of two or more coins. Moreover, if the high-value coin (again, such as the U.K. £1 coin)
15 is of relatively small diameter, the step 111 in the groove 110 will ensure that it comes to rest in the desired plane and does not, for instance, roll too far to the right, as viewed in Figure 4.

When a coin is inserted into the chute 108
20 the contact assemblies 115, 115a are pivoted about the axes X-X, X'-X', as before. The screw 132 with the insulating knob 138 and chamfered surface 140 will be pushed up by the coins and serves to hold the contact screw 116 out of contact with the coins, unless
25 the coins are "right".

Moreover, by use of the coating or covering 134 it is ensured that electrical contact is made only when a correct coin is directly under the end face 136, thereby preventing fraud e.g. by jogging the

drawer or rocking the whole vending cabinet in an attempt to make coin edge-to-screw contact.

The contact assembly 115a has a fine adjustment mechanism for its position. The block 117
5 is slidably mounted in the slot 114 and carries a bracket 150 formed with a threaded aperture in which engages one end of a fine adjustment screw 152 extending from a bracket 154 fixed to the chute 108. The other end of the screw 152 has a head 156
10 which can be turned by a screwdriver to raise or lower the bracket 150 and so the assembly 115a

Purely by way of example the mechanism is designed to dispense on (i) one £1 win, or (ii) two 50p coins, but a) one 10p or 50p or other current
15 U.K. coin would not have the right diameter or thickness to disable the insulating knob, or b) one 50p and one 10p coin are of insufficient length and the screws 116, 132 would be above them in the chute and engage the back panel 12 or c) one 50p and
20 two 10p coins would be of sufficient length but the wrong thickness and so the chamfered surface 140 would hold the surface 136 of screw 116 away from the third coin.

Clearly the selection of the number of
25 contact assemblies, their distance from each other, the distance between the screws 116, 132, the angle of chamfer on the knob 138 are all best determined empirically to suit the coinage of a given country.

CLAIMS

1. Coin-freed apparatus for a vending machine,
comprising an electrical circuit controlling a part
of the apparatus which permits or prevents the
apparatus to be freed and goods to be dispensed
5 from the machine, and coin-sensing means, character-
ised in that said coin-sensing means are electrical
and form part of said circuit; and that the said
circuit is normally open across said sensing means,
the insertion of a predetermined number and size
10 of coins being effective to establish a conductive
path across said sensing means to close and energize
the circuit and to free said part.
2. Apparatus according to claim 1, character-
ised in that said sensing means are contact elements
15 positioned and arranged to engage the edges of
coin(s) of correct denomination(s) and diameters.
3. Apparatus according to claim 1 or claim 2,
characterised in that the coin-sensing means are
contact elements one of which is formed at the
20 base of a coin chute and the other at a position
spaced above the said one contact element at a height
which is adjustable to enable the coin or com-
bination of coins which causes release of the
mechanism to be varied.
- 25 4. Apparatus according to claim 3, characterised
in that the coin chute is inclined slightly to the

vertical, the lower (one) contact element being inclined both with respect to the coin chute and to the horizontal so that the first coin inserted is caused to occupy a predetermined position with
5 its edge resting on the lower (one) contact element and against one side of the coin chute; the upper (other) contact element is pivotally mounted on or adjacent the coin chute, the inserted coins engaging and pivotally displacing the said other
10 contact element as they pass down the chute, the said other contact element returning to its normal position in which it projects into the coin chute to make engagement with the coin(s).

5. Apparatus according to claim 4, characterised
15 in that said other contact element projects into the chute at a position offset from the diametral line passing through the uppermost coin and parallel to the chute.

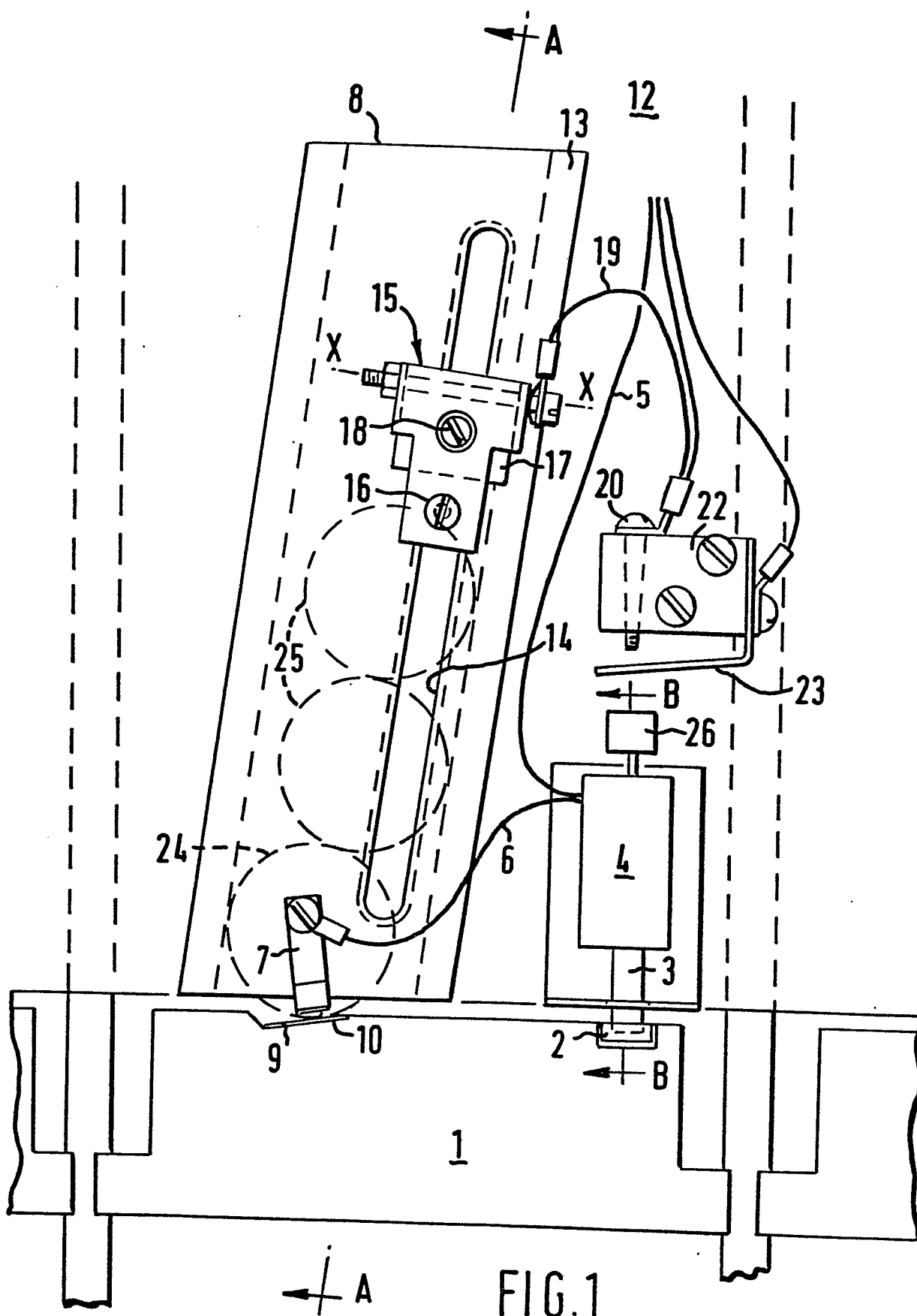
6. Apparatus according to claim 3, characterised
20 in that the lower (one) contact element is mounted on a slidable drawer which dispenses products from an automatic vending machine and which is retained in a retracted locked position by the coin-freed mechanism until the latter is freed on the insertion
25 of the correct combination of coins.

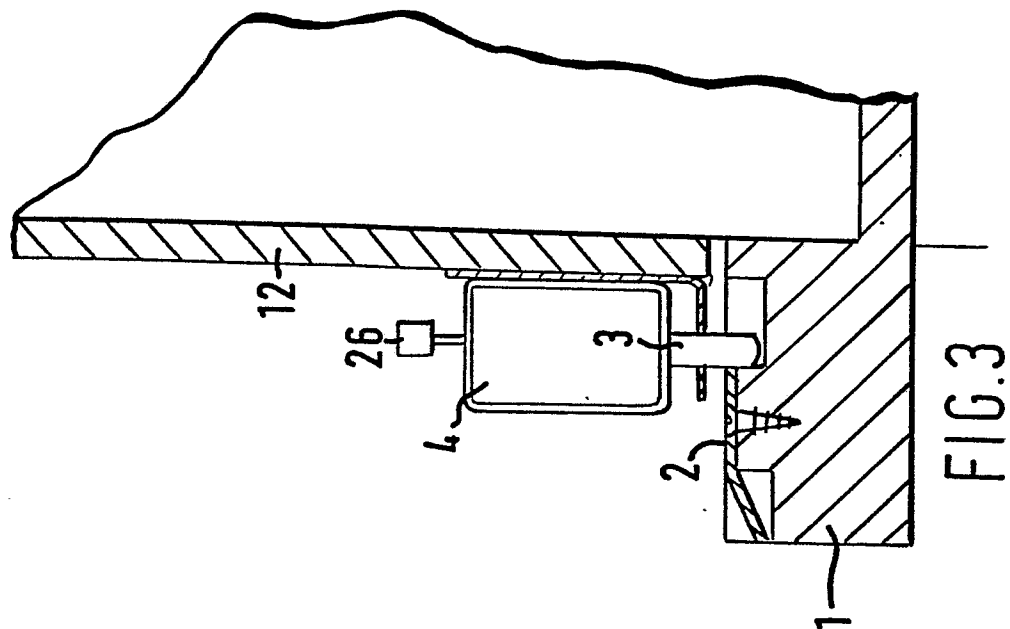
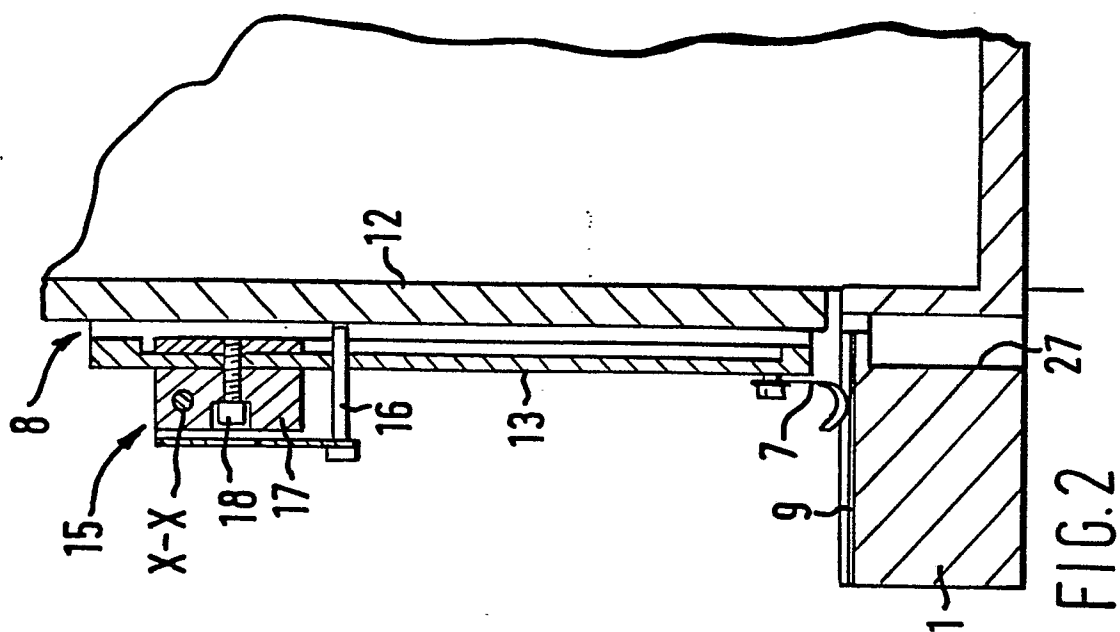
7. Apparatus according to any preceding claim, wherein the electrical sensing means includes a solenoid which, when the electrical contact element(s) are electrically interconnected through the coin(s), is energised to release a locking bolt engageable in a latch plate attached to the drawer or other lockable member of the vending machine.
8. Apparatus according to claim 3, characterised in that said other contact element is disposed adjacent to and movable with an insulated feeler member, the latter being effective to gauge the height of coins and to hold the said other contact element away from undesired coins.
9. Apparatus according to claim 8, wherein there is a plurality of series-connected other contacts.

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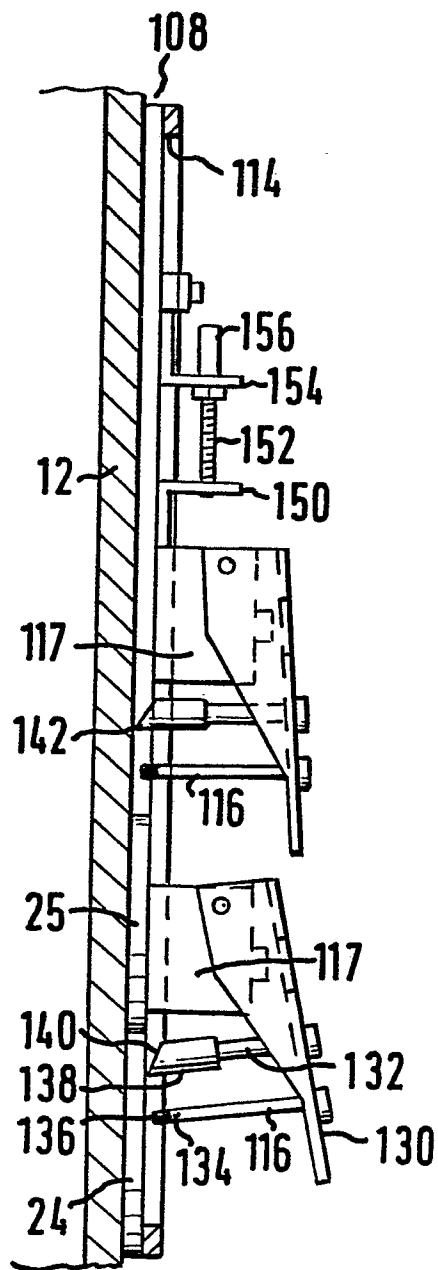


FIG. 5

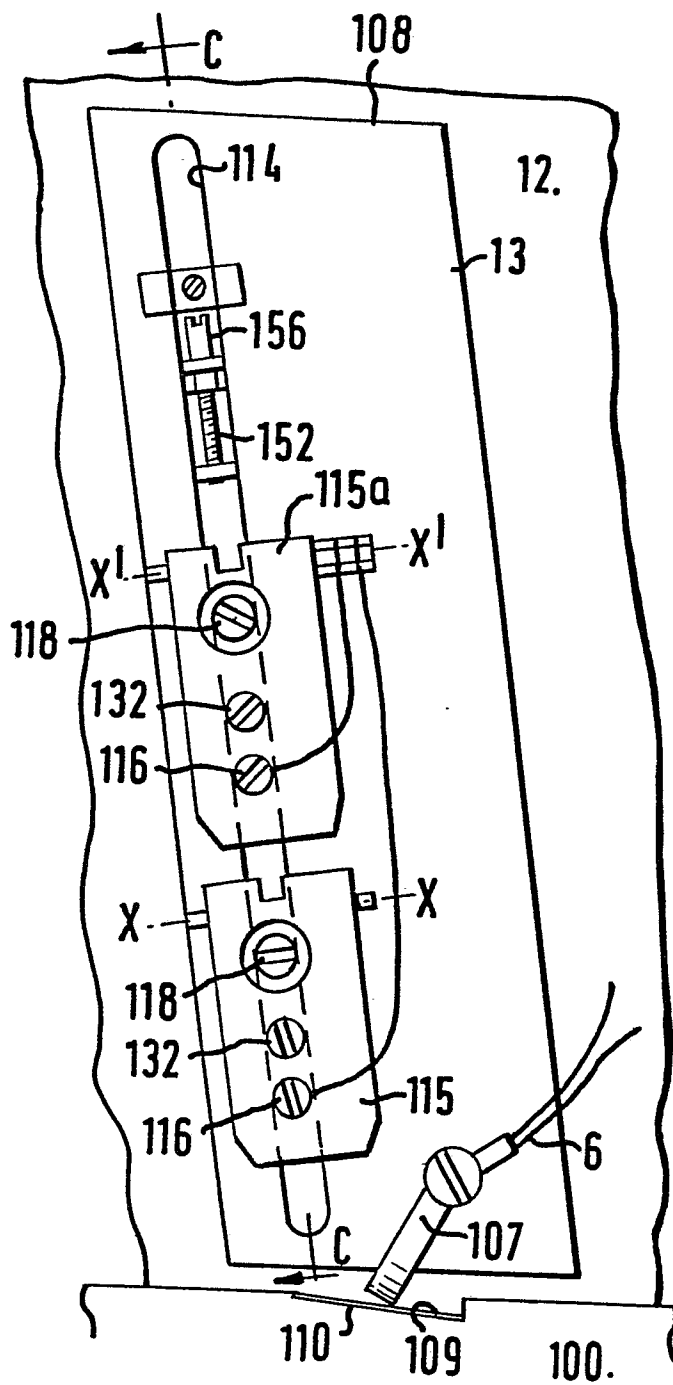


FIG. 4

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EUROPEAN SEARCH REPORT

Application number

Ep 81 30 3993

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>US - A - 1 498 548 (J.W. HUGHES)</u> * Page 1, line 9 - page 2, line 56; figures 1, 2 * --	1,2, 4-7	G 07 F 5/14 G 07 F 5/10
X	<u>FR - A - 1 460 027 (S.E.F.M.A.)</u> * Page 1, column 1, paragraph 5- page 2, column 2, paragraph 3; page 2, column 2, paragraph 5- page 3, column 1, paragraph 4; figures 1-3 * --	1-3,5	TECHNICAL FIELDS SEARCHED (Int. Cl. ³) --
	<u>BE - A - 426 637 (M.A. BASILE)</u> * Page 2, paragraph 6 - page 5, paragraph 3; page 6, paragraph 4 - page 8, para- graph 4; figures 1,2,7,8 * --	1,2,4	G 07 F 5/00 5/10 5/12 5/14 5/16
	<u>DE - C - 905 685 (Fa.H.KLUSSEN-DORF)</u> * Page 2, lines 1-66; figures 1,2 * --	1-3	
	<u>DE - A - 2 718 656 (H.H. TRAUTWEIN)</u> * Page 4, paragraph 5 - page 5, paragraph 4; figures 1-3 * --	1,2	CATEGORY OF CITED DOCUMENTS X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
	<u>GB - A - 586 269 (J. PETERSEN)</u> * Page 1, lines 28-46; page 2, lines 23-100; figures 1-5 * -- ./.	1,2	
☒ The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search		Date of completion of the search	Examiner
The Hague		16-11-1981	RUDOLPH



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EUROPEAN SEARCH REPORT

0047172

Application number

EP 81 30 3993

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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>CH - A - 225 073</u> (VALORIS S.A.) * Page 1, line 1 - page 2, line 40; figures * ----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.3)