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(54) **Coin entry module**

(57) A common problem related to pay phones and other apparatuses having coin entry modules is blocking of the apparatuses by insertion of foreign items such as paper clips or pieces of paper through a coin entry slot on the module.

A coin entry apparatus is provided that comprises a coin runway having a moveable part (15) that can be moved from a coin carrying position to a tilted position at which foreign items fall of the coin runway and thus prevents blocking of the apparatus. A coin input component (12) comprises at least one tooth (19) that interacts with a pawl (21) cooperating with the moveable part of the coin runway (15) such that this part is moved between the coin carrying position and the tilted position when the coin input component (12) is moved between a coin input position and a coin supply position.

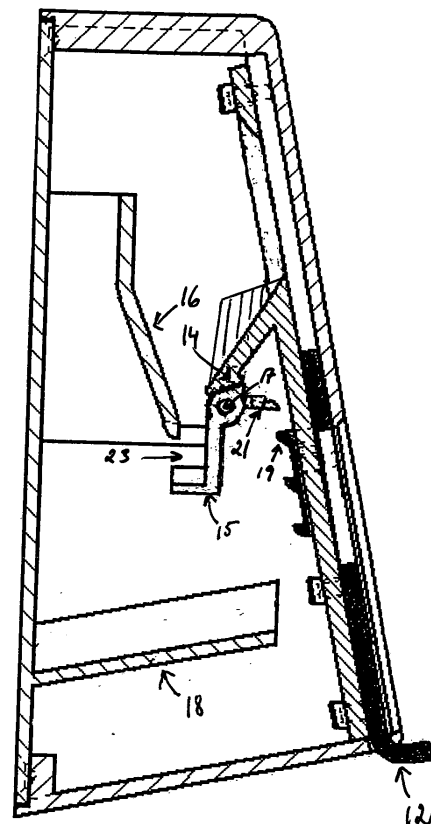


Figure 4a

Description

[0001] This invention relates to a coin entry apparatus and more particularly but not exclusively to a coin entry apparatus for use with a payphone.

[0002] Many devices are coin operated. Coin-operated devices include payphones, parking meters, vending machines, gas meters, pool tables etc. Such devices have a coin insertion slot or coin insertion mechanism often connected to some sort of coin recognition mechanism by a coin runway.

[0003] One method, which is used by criminals to acquire cash inserted in coin handling mechanisms of such devices, is known as "blocking" or "stuffing". In one method the criminal inserts an object into the coin runway so that subsequently inserted coins accumulate behind the block. In some cases the block is forced through the mechanism at a later time so that the accumulated coins drop in to the refund chute and can be collected. In other cases attempts may be made to "fish" coins back through the insertion slot. In either case, the legitimate customer is deprived of the coins inserted without being provided with service and/or the coin operated payphone may be rendered inoperable to cash customers. The provider of the service is also deprived of revenue, which should occur from legitimate usage of the device and may be faced with refunding "lost" coins to customers.

[0004] In order to prevent this fraud payphones have been equipped with coin entry mechanisms which prevent direct access to the coin runway by moving from a coin insertion position in which the coin insertion slot/aperture is open to the user to a coin delivery position in which the insertion slot is hidden from the user and from which the coin is delivered to the coin runway.

[0005] One example of such coin entry mechanism comprises a slider incorporating an aperture into which a coin may be inserted against a backplate, the coin then being pushed along the backplate by the slide mechanism to enter an internal coin runway on which the coin rolls towards a coin recognition mechanism which has exits either to a refund tray or to an internal coin box of the payphone unit.

[0006] Another example of such coin entry mechanism comprises a rotating drum. In this mechanism a coin is inserted in a longitudinal slot in the drum which is then rotated to align the slot with a coin runway.

[0007] Whilst such mechanisms make retrieval of the coins difficult for the criminal they do not prevent the insertion of foreign items rendering the coin-operated device inoperable.

[0008] An example of a coin entry mechanism which addresses this problem is seen in European Patent application 0 252 466. This discloses a coin entry mechanism having a rotatable drum which is integrally formed with an extension which ends in a part having an L-shaped cross-section. When the rotatable drum is in its coin delivery position, the base of the L-shaped part is aligned with the remainder of the coin runway, and forms

the floor of that part of the coin runway, and the wall of the L-shaped part forms one wall of the coin runway. The L-shaped part abuts against a wall which provides the other wall of the coin runway. Hence, in the coin delivery position coins roll down the coin runway and into the coin recognition mechanism. However, when the rotatable drum is in its coin insertion position, L-shaped part is no longer aligned with the remainder of the coin runway and its floor is tilted away from the horizontal. As a result, any foreign object which happens to come to rest on the floor of the L-shaped part is likely to fall off the L-shaped part as the user inserts a coin and thus will no longer block the coin runway when the drum is rotated back to its coin insertion position (as it must be before the inserted coin rolls down the coin runway).

[0009] A disadvantage with this solution is that if the inserted foreign object is a bit sticky or if it is a paper folded in a way that makes it expand when reaching the coin runway it may not fall off when the L-shaped part is tilted away from the horizontal.

[0010] According to the present invention there is provided a coin entry apparatus comprising a coin input component, moveable on insertion of a coin; and a coin runway for carrying coins beyond said coin input component, at least part of said coin runway being moveable between a coin-carrying position in which it carries coins beyond said coin input component and a tilted position; said coin entry apparatus being characterised by a coupling mechanism which translates movement of said coin input component into a more vigorous movement of said part of said coin runway.

[0011] By introducing a coupling mechanism to intervene between the movement of the coin input component and the tilting of at least part of the coin runway, the tilting of the coin runway can be made more vigorous and thus more likely to remove foreign objects from the coin runway. For example, if a rotatable drum is used as coin input component, the tilt angle of the runway can be greater than the rotation of the drum. In addition, or alternatively, the coin runway can be moved between its coin carrying position and its tilted position a plurality of times as the coin input component is moved.

[0012] This latter example has the advantageous effect that the coin runway is rattled, thus further increasing the possibility of removing the foreign object from the runway.

[0013] Preferably said part of the coin runway has a slope of between 8 - 30 degrees and more preferably between 12 - 14 degrees in the direction of a rolling coin. This has the effect that coins on the runway roll towards the coin validation mechanism, whereas foreign objects that cannot roll are more likely to come to rest on the moveable part of the coin runway.

[0014] The coupling mechanism preferably comprises at least one tooth arranged on the coin input component and at least one pawl cooperating with the coin runway. During movement of the coin input component the tooth on the coin input component interacts with the pawl co-

operating with the coin runway such that the moveable part of the coin runway is moved from its coin carrying position to its tilted position and then returns to the coin carrying position when the tooth and pawl stop interacting with each other. This has the effect that the coin runway can be moved between its different positions by the coin input device without being attached to the coin input device.

[0015] Preferably, means are arranged for applying a mechanical shock to said coin runway on movement of the coin runway between said tilted and coin carrying positions. The means for applying a mechanical shock comprises biasing means arranged on an axle on which the moveable part of the coin runway is mounted, said torsion spring forcing said part of the coin runway to return to its coin-carrying position when the interaction between the tooth and the pawl stops. The means further comprises a protruding member arranged on a part of the coin runway that is not moveable and this member abruptly stops the moveable part of the coin runway at its coin carrying position.

The abrupt stopping of the moveable part of the coin runway jolts any foreign object on the runway and thereby increases the likelihood of the object falling off the coin runway.

[0016] Preferably the coin input component comprises a coin carrying aperture that is open to a user in a coin insertion position and hidden from the user in a coin supply position.

[0017] This has the advantage that the same component can carry out two functions, namely to shield the coin runway from the user and to provide movement which drives the tilting of the coin runway.

[0018] A coin entry apparatus in accordance with a first embodiment of the invention will now be described by way of example only with reference to the accompanying drawings of which:

Figure 1 shows a front view of a part of a payphone having a coin entry apparatus according to a first embodiment of the invention;

Figure 2 shows a partial cross-section seen from the right-hand side of the coin entry apparatus;

Figure 3 shows a partial cross-section of the coin entry apparatus seen from the rear of the apparatus. Figures 4a - 4d show a cross-section of the coin entry apparatus seen from the left-hand side of the coin entry apparatus and wherein each figure shows a different position of a slider.

Figure 5a shows a side-view of a slider suitable for the coin entry module.

Figure 5b shows the same slider from the rear.

[0019] Figure 1 shows a perspective view of a payphone (30) having a coin entry apparatus (1). In this embodiment the coin entry apparatus is mounted externally over a coin entry slot in the payphone housing. The coin entry apparatus comprises two vertical side walls (2, Fig.

3:3), a vertical rear wall (Fig.2:4), a front wall (5) which slopes backwardly and upwardly at an angle of ca 75 degrees to the vertical, a base section (Fig.2:6) which extends perpendicularly backwardly from the base of the front wall (5) to the base of the rear wall (4) and a top section (7). The interior of the apparatus is closed to the outside when mounted on the payphone. The apparatus is attached to the payphone by four bolts. The front wall (5) has an n-shaped opening extending from the bottom to almost half the height of the wall and which is almost as wide as the front wall (5).

[0020] Referring now to Figure 2, which shows the coin entry apparatus in partial cross-section along line AA, the side wall (3), which is attached to the pay phone, further comprises a vertical slot (9) of sufficient size to allow coins to pass through, and a larger, square formed, refuse aperture (10) below the coin aperture. The coin aperture (9) is aligned with the coin entry slot on the payphone, leading towards an internal chute (not shown) and a validation system for validating coins, and the refuse aperture (10) is aligned with a second aperture on the payphone, leading to a rubbish collection area in the payphone.

[0021] Mounted in the apparatus ca 3 - 5 mm behind the front wall is a back-plate (8) extending between the side walls (2,3) having an opening (11) at the upper part leading to the interior of the coin entry apparatus. This opening is hidden behind the front wall (5) and thus not visible or accessible from the outside. A slider (12) is slidably mounted between the front wall (5) and the back-plate (8). The slider (12) has a coin carrying aperture (13) into which a user can place a coin against the back-plate, and a handle which the user can then push to slide the slider upwardly from the input position to a coin supply position, in which the coin carrying aperture (13) is aligned with the opening (11) in the back-plate. Since this side of the coin entry apparatus is sloping the coin will, due to gravity, enter through this opening into the internal parts of the coin entry apparatus.

[0022] A coin funnel is situated behind the opening (11). The floor of the coin funnel slopes downwardly towards the coin aperture (9) at an angle of 12 - 14 degrees to the horizontal. Coins falling through the opening (11) tumble or slide into the neck of the funnel and then roll along the floor of the funnel through the coin aperture (9) and into the payphone. The neck of the funnel thus provides a coin runway.

[0023] As will be explained in more detail below, at least part of the coin runway is moveable to allow rejection of items other than coins which fall into the coin funnel.

[0024] The front wall of the funnel is formed by a supporting flange (14) along the width of the back-plate (8) and which descends downwardly at an angle of about 45 degrees from the back-plate (8). A wedge-shaped portion (24) mounted on the flange (14) forms the upper part of the front wall of the funnel. The wedge provides a surface which initially extends backwardly and downwardly at a

shallow angle which then turns more steeply downwardly at a knee.

Mounted on the lower end of the supporting flange (14) is an L-shaped coin ramp (15).

[0025] The rear wall of the funnel is formed by a guiding member (16) attached to the rear wall (4) of the apparatus. This guiding member is shaped as a chimney hood and the top of it is placed at the same height as the lower half of the opening (11) in the back-plate (8) and it ends a short distance above the floor of the coin funnel. The guiding member (16) has an upper vertical section, a central section which slopes forwardly and downwardly therefrom, and a lower section which extends vertically downwardly from the bottom of the central section and which is aligned with the rear edge of the coin exit aperture (9) in the left-hand side wall (3) of the apparatus.

[0026] The lower section of guiding member (16) forms together with the L-shaped coin ramp (15) the neck of the funnel and thus the coin runway.

[0027] In use a coin is inserted in the aperture (13) in slider (12) and the coin is deposited by moving the slider from the input position to the coin supply position. The coin is guided by the wedge (24) and the guiding member (16) to the coin ramp (15). The coin then rolls on the coin ramp floor through the opening (9) towards the internal chute of the pay phone and a validation system for validating the coin.

[0028] Referring to figure 3, the coin ramp (15) extends between the two side walls (2,3) of the coin entry apparatus. The floor of the L-shaped coin ramp is sloping towards the opening (9) in the side wall (3) of the coin entry apparatus, so that a coin can roll on the floor towards said opening.

[0029] The slope of the floor of the ramp (15) has to be sufficiently high to allow a coin to roll towards the internal chute but not so high that foreign object such as a piece of paper or a paper clip slides along the ramp towards the internal chute. If the coin ramp floor is sloping more than 30 degrees foreign objects start to slide and if the ramp floor is sloping less than 8 degrees coins do not roll consistently. The slope of the coin ramp floor therefore should be between 8 and 30 degrees and preferably between 12 and 16 degrees in order to retain foreign objects on the coin ramp floor but allow coins to roll towards the internal chute.

[0030] Hence, if a foreign object such as a piece of paper or a paper clip is inserted in the coin entry apparatus (1) it will fall into the coin runway but it will remain on the coin ramp floor.

[0031] In order to remove the foreign item from this part of the coin ramp the upper part of the wall of the L-shaped ramp, which is attached to the supporting flange (14), is pivotally mounted on an axle (17) so that it is moveable between a coin carrying position, shown in figure 4a, and a tilted position, shown in figure 4b, in which a foreign item on the coin ramp floor will fall off the coin ramp onto a sloping floor (18) positioned beneath the coin runway. The item will slide on the sloping floor (18)

towards the refuse aperture (Fig.2:10) through which it will exit the coin entry apparatus. The supporting flange (14) has two journal bearings at its lower end. Interleaved with these journal bearings are three journal bearings attached to the wall of the coin ramp (15) and the axle (17) passes through all these bearings. A principal torsion spring is arranged on the axle (17) to bias the coin runway towards its coin carrying position from the tilted position. Other biasing means than a torsion spring can of course be used. In order to keep the ramp in its coin runway position the lower section of the guiding member (16) has a protruding member (22) on its right-hand side that prevents further movement of the coin ramp in the direction of the rear wall (4), see figure 4b.

[0032] The mechanism for moving the coin ramp (15) between the coin carrying position and the tilted position will now be described in relation to figures 4a - 4d and 5a - 5b.

[0033] Figures 5a and 5b show that at the back of the upper, right-hand side of the slider, that is the part of the slider that faces the internal part of the coin entry apparatus (1), is a vertical arm (25) having three teeth (19) attached. The teeth have a flat upper surface and a sloping lower surface. Since the vertical arm is attached to the slider it moves with the slider when it moves between the coin input position to the coin supply position. It is not necessary that the vertical arm is provided with three teeth; in other embodiments it can have only one tooth, two teeth or more than three teeth. In order to fit this modified slider onto the back-plate (8) the back-plate has a slit (20) on its right-hand side extending from the top of the coin aperture (11) to a short distance below the coin runway (15), through which slit the vertical arm is inserted, see figure 3. Thus, as the slider moves along the front of the back-plate (8) the vertical arm (25) moves along the rear-side of the back-plate (8).

[0034] Pivotaly mounted on the right-hand end of the axle (17), between the left most journal bearing on the coin ramp (15) and the left most bearing on the supporting flange (14), is a pawl (21), see figure 4a. An auxiliary torsion spring biases the pawl upwardly against an abutment arranged on the leftmost bearing of the coin ramp. As the slider (12) is moved between the two slider positions the three teeth (19) on the slider interact one after the other with the pawl (21) by pressing it upwards. Since the pawl is biased against the abutment on the ramp bearing, the ramp is rotated outwardly away from the rear funnel wall (16) against the action of the principal torsion spring till it reaches its tilted position, see figure 4b.

[0035] The interaction between the pawl (21) and the tooth (19) stops when the slider is moved further upwards towards the coin supply position and the coin ramp (15) returns rapidly from the tilted position to its coin carrying position under the action of the principal torsion spring. Thus the coin ramp is exposed to a mechanical shock when it is abruptly stopped by the protruding member (22) on the guiding member (16).

[0036] A gap (23) is formed between the floor of the

coin ramp in its coin carrying position and the lower end of the guiding member (16) as can be seen in figure 4a. When the movement of the coin ramp is suddenly stopped foreign items that did not fall of the coin ramp when at its tilted position will be ejected through the gap (23).

[0037] If there is more than one tooth (19) on the slider (12) the process is repeated when each of the other teeth (19) contact and interact with the pawl (21).

[0038] When the slider (12) reaches the coin supply position the coin ramp (15) has returned to its coin carrying position, since the teeth do not extend below the coin carrying aperture (13), and thus provides the front wall and floor of the coin runway to guide the coin supplied by the slider, as can be seen in figure 4c.

[0039] The auxiliary torsion spring arranged on the pawl (21) enables the pawl to be pressed downwards by the teeth (19) as the slider is moved back to its coin receiving position thus enabling them to pass the pawl as the slider (12) is moved downwards, even though the principal torsion spring is then holding the ramp (15) against the protruding member (22) on the guiding member (16) which prevents further rotation of the coin ramp (15), see figure 4d.

[0040] In case the coin ramp (15) is moved between its coin carrying position and the tilt position more than once during the movement of the slider (12), that is if the vertical arm on the slider has more than one tooth, the coin ramp will be rattled or jiggled, which further improves the removal of foreign items from the coin runway.

[0041] In a second embodiment a rotatable drum is used in place of the slider. The drum has a coin slot which is then rotated to align the slot with a chute, the slot becoming hidden behind the front wall at the rotation. In this embodiment one or more teeth are arranged on the outside of the drum and when the drum is rotated the teeth interact with at least one pawl arranged on a part of the coin runway in a similar way as described in the first embodiment.

[0042] It will be seen how the above embodiments have the great advantage of improving rubbish removal from coin runways in coin entry modules and also preventing the rubbish from entering the internal chute of the pay phone.

[0043] It would be apparent to one skilled in the art that the invention can be embodied in various ways and implemented in many variations. For example, instead of having more than one tooth arranged on the slider or rotating drum and one pawl on the coin runway, there could be one tooth on the slider or drum and more than one pawl on the coin runway.

[0044] Instead of having protruding member (22) arranged on the guiding member (16) a stopper attached to a wall of the coin entry apparatus (1) could hinder further movement of the coin runway in the direction of the rear wall (4).

The coin entry apparatus could also be an integrated part of the pay phone instead of being mounted externally on

the payphone housing.

[0045] It would also be apparent that the coin entry apparatus can be used with other apparatuses than pay phones such as vending machines, ticket issuing machines or parking meters.

[0046] In summary of the above, a common problem related to pay phones and other apparatuses having coin entry modules is blocking of the apparatuses by insertion of foreign items such as paper clips or pieces of paper through a coin entry slot on the module.

A coin entry apparatus is provided that comprises a coin runway having a moveable part (15) that can be moved from a coin carrying position to a tilted position at which foreign items fall of the coin runway and thus prevents blocking of the apparatus. A coin input component (12) comprises at least one tooth (19) that interacts with a pawl (21) cooperating with the moveable part of the coin runway (15) such that this part is moved between the coin carrying position and the tilted position when the coin input component (12) is moved between a coin input position and a coin supply position.

Claims

1. Coin entry apparatus comprising
a coin input component, moveable on insertion of a coin; and
a coin runway for carrying coins beyond said coin input component, at least part of said coin runway being moveable out of a coin-carrying position or configuration to remove foreign items;
said coin entry apparatus being **characterised by** a coupling mechanism which translates movement of said coin input component into a more vigorous movement of said part of said coin runway.
2. Coin entry apparatus according to claim 1 wherein said moveable part of the coin runway is rotatable and the coin input component is arranged to move said moveable part of the coin runway between a coin-carrying position and a tilted position.
3. Coin entry apparatus according to claim 1 or 2 wherein the coin input component is arranged to move said moveable part of the coin runway more than once as the coin input component moves between a coin input position and a coin supply position.
4. Coin entry apparatus according to claim 1 wherein the coin input component comprises a coin carrying aperture or recess that is open to a user in a coin insertion position and hidden from the user in a coin supply position.
5. Coin entry apparatus according to anyone of claims 2 - 4 wherein the coupling mechanism comprises at least one tooth arranged on the coin input compo-

ment and at least one pawl cooperating with a part of the coin runway, and wherein said tooth and said pawl interact with each other upon movement of the coin input component such that the moveable part of the coin runway is moved between the coin-carrying position and the tilted position.

6. Coin entry apparatus according to claim 5 wherein the coin input component comprises at least two teeth interacting with one pawl co-operating with said part of the coin runway. 10
7. Coin entry apparatus according to claim 5 wherein the coin input component comprises one tooth interacting with at least two pawls co-operating with said part of the coin runway. 15
8. Coin entry apparatus according to any of the preceding claims wherein the coin runway comprises a floor that slopes downwardly between 8 - 30 degrees in a direction of a rolling coin. 20
9. Coin entry apparatus according to claim 8 wherein the floor slopes downwardly between 12 - 14 degrees in a direction of a rolling coin. 25
10. Coin entry apparatus according to any of the preceding claims wherein said coin input component is a slider. 30
11. Coin entry apparatus according to claim 10 wherein said moveable part of the coin runway is rotatable and said coupling mechanism converts linear movement of said slider to rotation of said moveable part. 35
12. Coin entry apparatus according to any of claims 2 - 12 further comprising means for applying a mechanical shock to said part of the coin runway on movement of the coin runway between said tilted position and said coin carrying position. 40
13. Coin entry apparatus according to claim 12 wherein said means for applying a mechanical shock comprises biasing means forcing said part of the coin runway to return to its coin-carrying position before the coin rolls along the coin runway. 45
14. Coin entry apparatus according to claim 13 wherein said biasing means is a spring. 50
15. Coin entry apparatus according to claim 14 wherein said spring is a torsion spring.
16. Coin entry apparatus according to claim 12 wherein a part of the coin runway that is not moveable is arranged such that a gap is formed between the lower end of this part of the coin runway and the floor of the moveable part of the coin runway, through

which gap a foreign item can be discarded from the runway on said mechanical shock being applied to the coin runway.

17. Coin operated apparatus having a coin entry apparatus according to any of the preceding claims.
18. Coin operated apparatus according to claim 19 wherein said apparatus is a payphone.

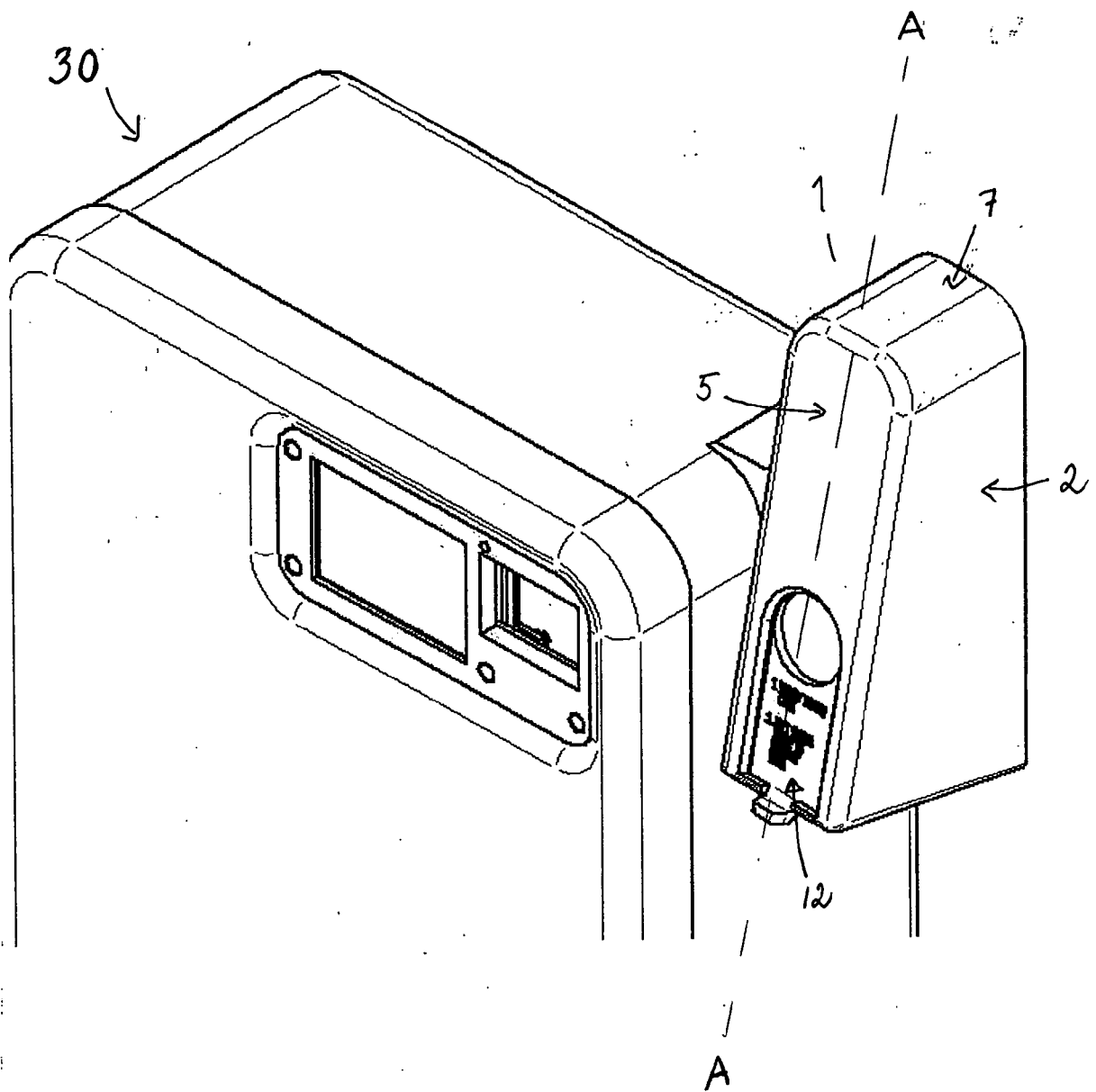


Figure 1

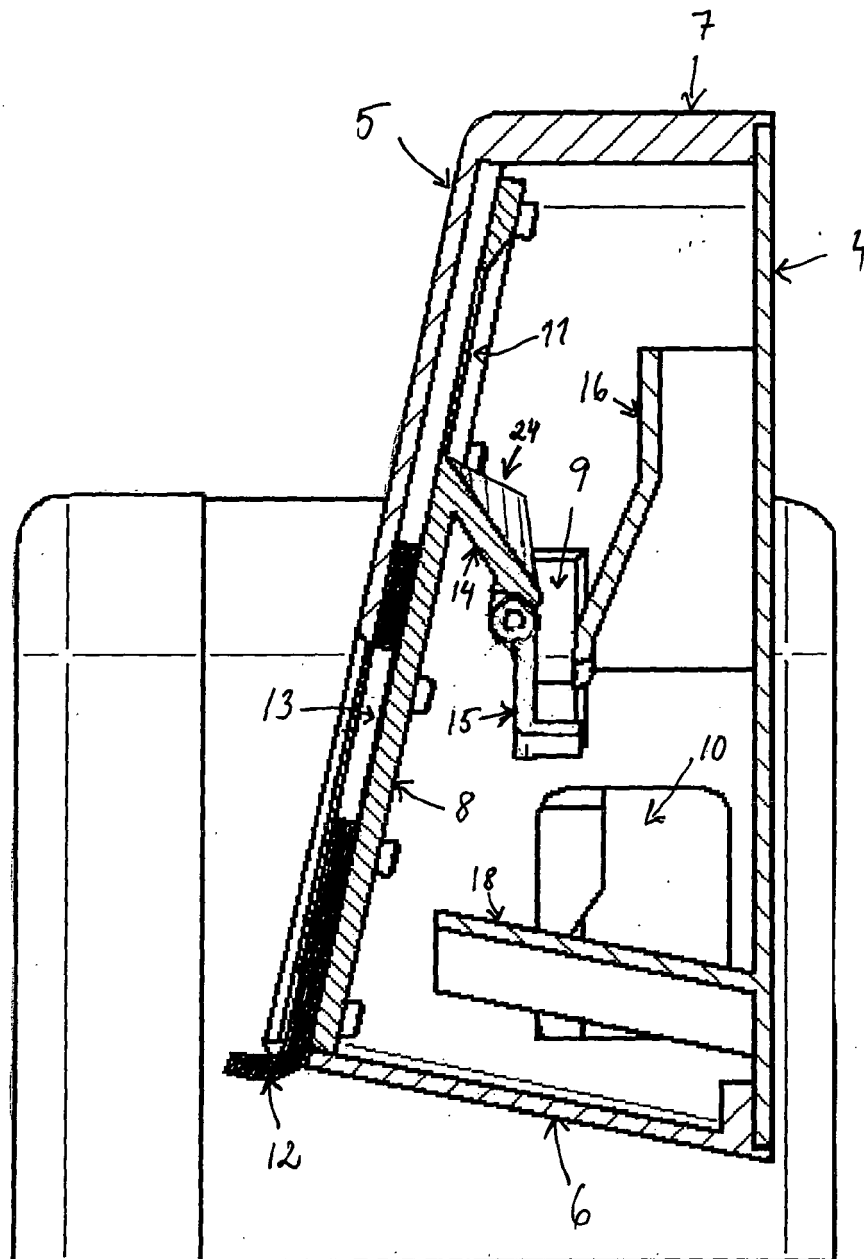


Figure 2

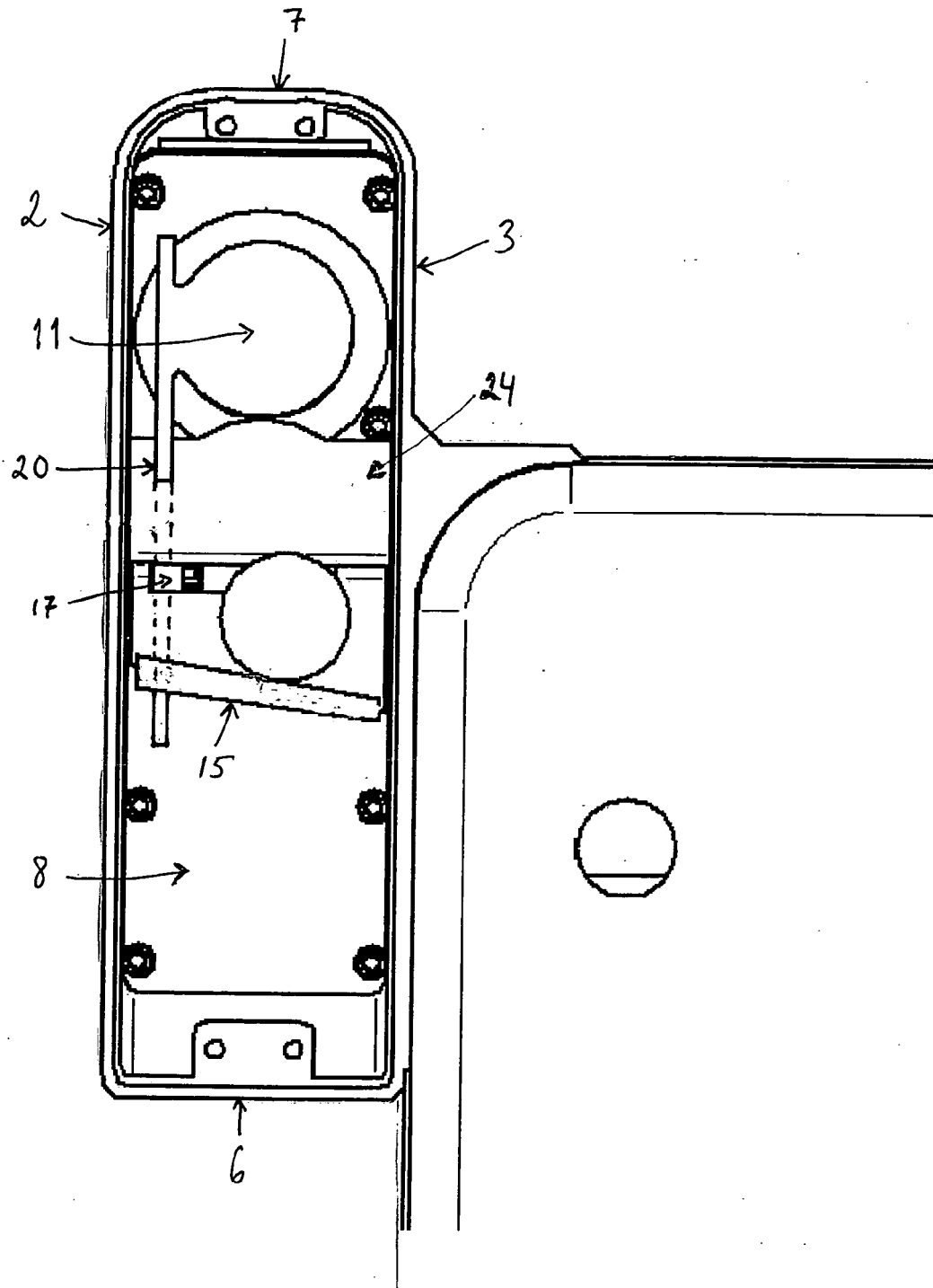


Figure 3

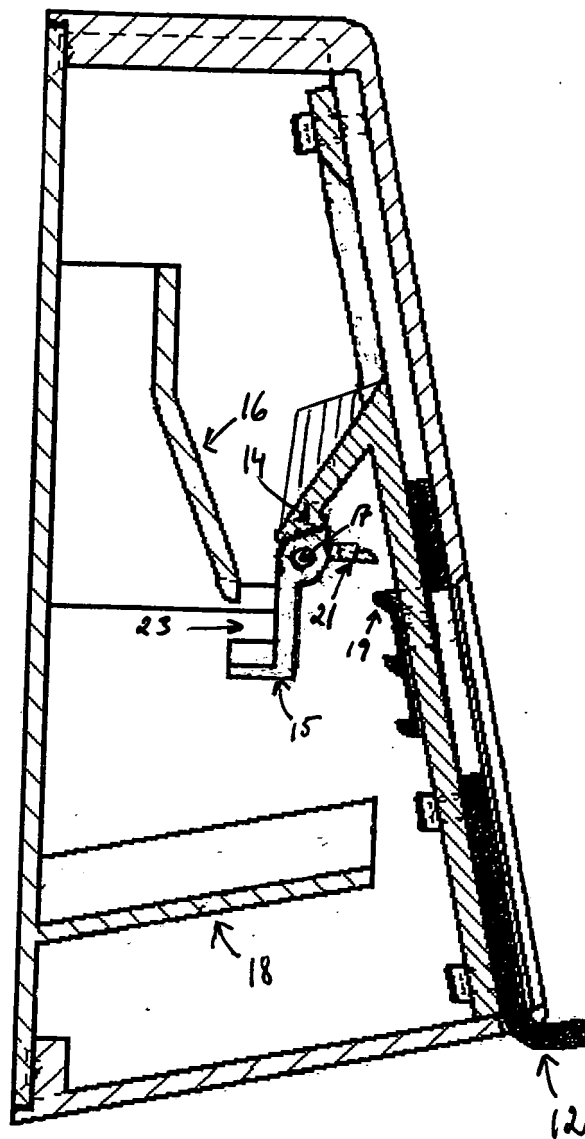


Figure 4a

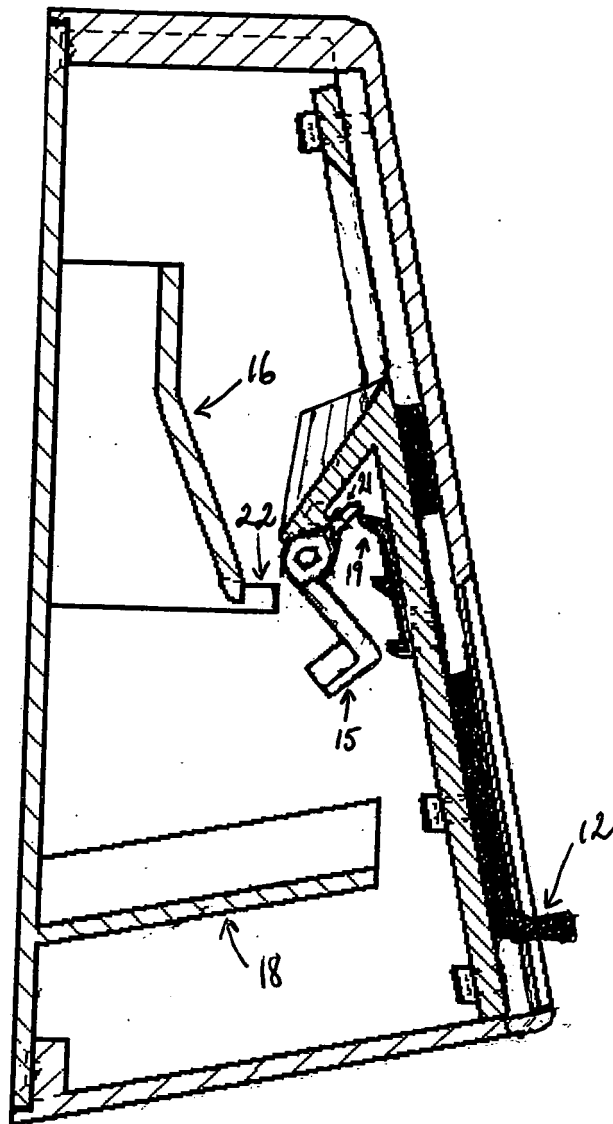


Figure 4b

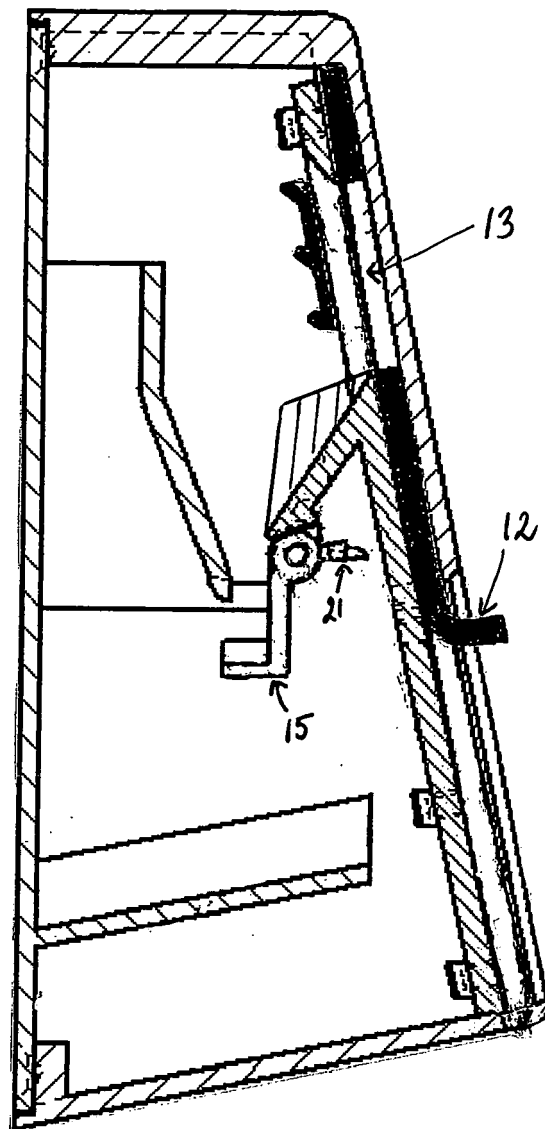


Figure 4C

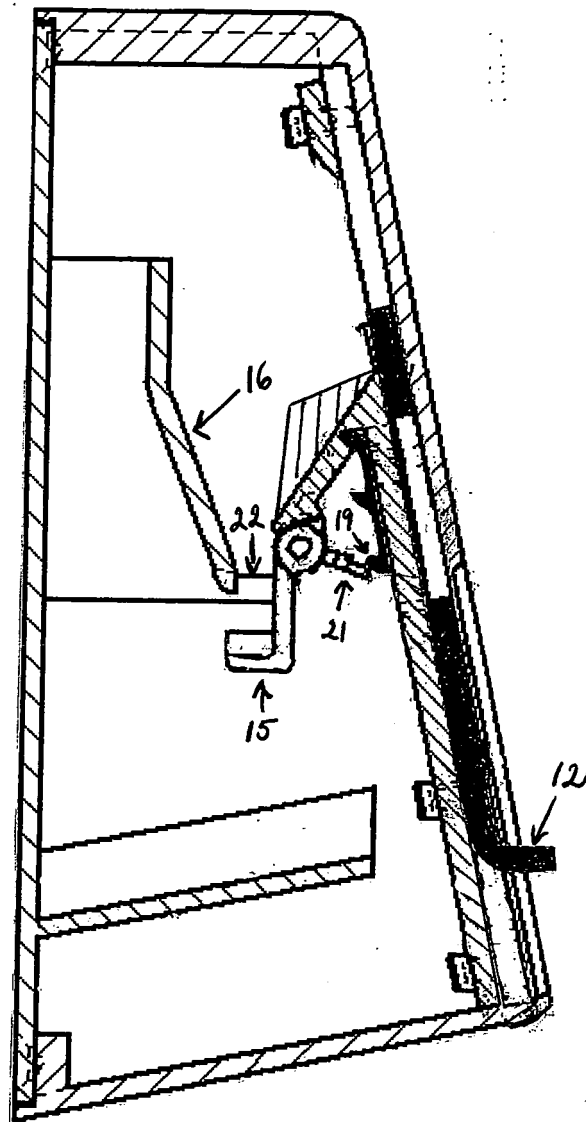


Figure 4d

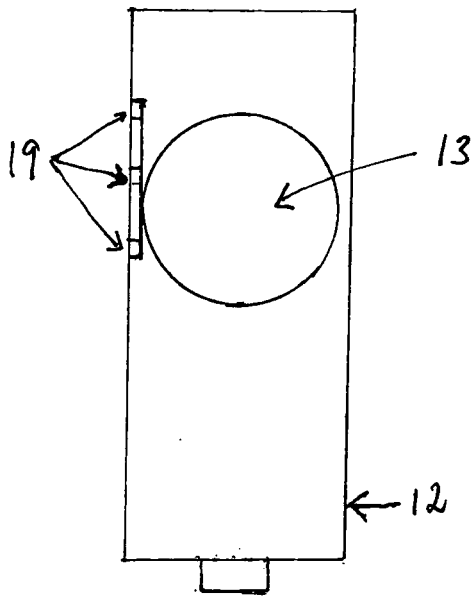


Figure 5b

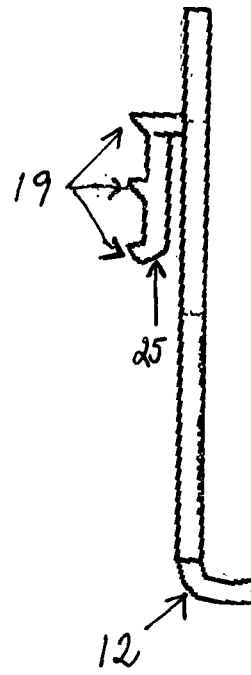


Figure 5a



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 08 25 1593

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 38 06 576 A1 (SODECO SA [CH]) 9 February 1989 (1989-02-09)	1	INV. G07F1/04
Y	* column 2 - column 4 *	2-4	
Y	----- US 1 955 188 A (MCD JOHNS GEORGE) 17 April 1934 (1934-04-17) * figures 1,2 *	2-4	
A	----- US 3 111 213 A (HALL MITCHELL A) 19 November 1963 (1963-11-19) * column 1, line 47 - column 2, line 56; figures 1-3 *	1-18	
A	----- US 7 270 225 B1 (CHANG KIL JAE [KR]) 18 September 2007 (2007-09-18) * abstract; figures 1-4 *	1-18	
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			TECHNICAL FIELDS SEARCHED (IPC)
			G07F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 4 September 2008	Examiner Lavin Liermo, Jesus
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