(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 774 146 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
30.09.1998 Bulletin 1998/40

(21) Application number: **95923484.0**

(22) Date of filing: **03.07.1995**

(51) Int Cl.[6]: **G07F 3/00**, G07F 1/04

(86) International application number:
PCT/GB95/01565

(87) International publication number:
WO 96/04616 (15.02.1996 Gazette 1996/08)

(54) **COIN VALIDATOR WITH COIN STABLIZER**

MÜNZPRÜFER MIT MÜNZENBEWEGUNGSDÄMPFUNGSVORRICHTUNG

DISPOSITIF DE VALIDATION DE PIECES DE MONNAIE A STABILISATEUR DE PIECES

(84) Designated Contracting States:
DE ES FR GB IT

(30) Priority: **03.08.1994 GB 9415717**

(43) Date of publication of application:
21.05.1997 Bulletin 1997/21

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(56) References cited:
EP-A- 0 500 366
FR-A- 2 158 224
US-A- 2 734 680

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EP 0 774 146 B1

Printed by Jouve, 75001 PARIS (FR)

Description

Field of Invention

The present invention relates to a coin validator.

Background to Invention

Coin validators are used in vending machines and the like to test coins and may also determine their values. Such validators often include a coin path comprising a vertical initial portion, a middle portion where input coins roll down a slope and a vertical exit portion. Various forms of sensor are located to sense coins as they roll along the middle portion of the coin path. It has been found that coins travelling along the coin path are prone to wobble and bounce. This is undesirable as it affects the sensor readings. Consequently there is a need for a way of stabilizing a coin "on the fly".

EP-A-0 500 366 discloses a coin validation mechanism comprising a passageway and a rounded mass gravitationally biased to protrude into the passageway to bring an arriving coin to a rest position at a sensor station.

From FR-A-2 158 224 a gravitationally biased rounded mass is known being arranged such that the induced bias force increases non-linearly as the mass is moved out of the coin path.

A cup-like support means defining a sloping path up for a rounded mass is defined in US-A-2 734 680.

It is an aim of the present invention to solve this problem.

Summary of Invention

According to the present invention, there is provided a coin validator comprising an coin path and a rounded mass gravitationally biased to protrude into the path for causing coins, in the coin path, to lie flat against a wall facing the mass across the coin path, characterised in that the mass is arranged so as to act on a coin, dropping in the coin path, to deflect it on the fly against the wall .

Preferably, the validator includes support means to support the mass arranged such that the gravitationally induced bias force increases non-linearly as the mass is moved out of the coin path. Thus, relatively light coins would be able to move the mass, without excessive movement thereof being caused by larger coins.

Preferably, the support means comprises a member defining a sloping path up which the mass can be displaced by a passing coin. The sloping path may be progressively steeper for increasing displacement of the mass out of the coin path thereby causing the gravitationally induced bias force to increase non-linearly as the mass is moved out of the coin path.

The support means may comprise a cup extending outwardly from a wall of the coin path. The cup may be defined by an open frame. Another embodiment of the support means comprises a pair of converging rails.

Preferably, the mass is press-fitted through a wall of the coin path to be received by the support means.

Conveniently, the mass comprises a ball. However, alternative shapes could be used such a cylinder. Preferably, the mass is free to roll.

Advantageously, the wall opposite the mass is tilted away from a wall through which the mass protrudes.

The term "coin" as used herein includes disc-like tokens, as used in vending, gambling and games machines.

Brief Description of Drawings

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows the general form of a first coin validator according to the present invention;
Figure 2 is a simplified sectional view through AA of the validator of Figure 1;
Figure 3a is a partial sectional view through BB of the validator of Figure 1;
Figure 3b a partial top view of the validator of Figure 1;
Figure 4 is a sectional view through CC in Figure 3b;
Figure 5a is a side sectional view of an alternative ball retaining structure according to the present invention;
Figure 5b is a top sectional view of the structure of Figure 5a;
Figure 6 is a side view of a second validator according to the present invention;
Figure 7 is a partial sectional view of the coin validator of Figure 6 from the other side; and
Figure 8 shows the coin entry slot and surrounding bezel of the validator of Figure 6.

Description of Preferred Embodiments

Referring to Figure 1, a validator 1 has a generally rectangular body. A coin entry opening 2 is provided to one end of the top face of the validator 1. Coin accept and reject openings (not shown) are provided in the bottom face of the validator 1.

A hinged reject gate 3 forms the upper part of one side face of the validator 1. The lower part of this face forms a reject cover 4. The coin accept/reject mechanism is mounted to the reject cover 4.

A sloping rundown 5 (see Figure 2) formed on the reject cover 3 extends from an end wall 6 below the coin entry opening 2 about half way to the opposite end wall of the validator 1. Various sensors 8 (see Figure 3a) are mounted on the side wall 9 (see Figure 3a) of the validator 1 opposite the reject gate 3 where they will be passed by coins on the rundown 5.

A hole 10 is formed through the reject gate 3 at a position between the coin entry opening 2 and the rundown 5. A skeleton cup 11 is mounted over the hole 10 and retains a steel ball 12. The ball 12 is gravitationally biased so that it protrudes into the coin path through the hole 10.

Referring specifically to Figure 2, the position of the ball 12 relative to the coin entry opening 2 and the rundown 5 is shown by the dashed circle. A coin 14 is illustrated on the rundown 5.

Referring to Figures 3a and 3b, the cup 11 comprises an upper horizontal U-shaped member 11a, the legs of which are joined at their ends to the reject gate 3, and a arcuate leg 11b extending from the middle of the U-shaped member 11b to a point on the reject cover 3 immediately below the hole 10. The ball 12 is retained within the cup 11 but is free to move towards and away from the coin path. The arcuate form of the leg 11b means that progressively more force is required to displace the ball 12 further out of the coin path.

Referring additionally to Figure 4, the rim 13 around the hole 10 is bevelled to allow maximum protrusion of the ball 12 into the coin path commensurate with it being retained within the cup 11. The ball 12 is inserted into the cup 11 by pressing it through the hole 10 from the coin path side. This is possible as the rim 13 is able to deform. Once the ball 12 has been inserted the lip 13 returns to its initial configuration and the ball 12 is retained.

The operation of the embodiment of Figures 1, 2, 3a, 3b and 4 will now be described for a relatively large coin, for instance a UK fifty pence piece. The coin 14 enters the coin path through the coin entry opening 2 in the direction of Arrow A in Figure 3a and falls towards the rundown 5. The coin 14 strikes an upper region of the ball 12 causing it to be pushed back out of the coin path in the direction indicated by Arrow B in Figure 3a (this may involve the coin bouncing on the ball a few times). The movement of the ball 12 absorbs the kinetic energy of the coin 16. Then as the coin 16 passes the ball 12, it is deflected by the surface of the ball 12 against the wall 9 of the coin path. The wall 9 is tilted at approximately 5° to the vertical and, consequently, once the coin 16 is lying against the wall 9, it is retained in contact therewith by gravity.

The case for thin light coins, e.g. the UK five pence coin, will now be described. As the ball 12 does not extend fully across the coin path, a thin light coin does not need to move the ball 12 and can pass though the gap between the ball 12 and the wall 9. However, if the coin has an undesirable trajectory, e.g. too near the reject cover 3, it will be deflected by the surface of the ball 12 towards the wall 9.

Referring to Figure 5, a trapezium is formed by a pair of arms 17 extending outwardly from either side of a lower portion of the hole 10, a cross-piece 15 which joins the outer ends of the arms 17 where they are closest together and the reject gate 3. The ball 12 rests on the inner, upper edges of the arms 17. Thus, when the ball 12 is displaced by a passing coin, it is caused to ride up as the distance between its points of contact with the arms 17 decreases. In order to stop the ball 12 becoming free, a knob 16 is provided on the cross-piece 15. The knob 16 is dimensioned such that the gap between it and the top of the hole 10 is less than the diameter of the ball 12.

This embodiment operates in substantially the same manner as that described above although the displacement force for the ball is a substantially linear function, due to the linear arrangement of the arms 17. The displacement force required can if required be made non-linear by arranging for the arms 17 to curve towards each other.

A further embodiment of the present invention, in which coins enter the validator substantially horizontally, will now be described with reference to Figure 6 to 8.

A validator comprises a validator body 20 which is removably attached to a face plate 21. A coin entry slot 22 is provided in an insert 23, received in an aperture in the face plate 21. An upper portion of a side wall of the validator body 20 comprises a reject gate 24. A first coin rundown is defined between the reject gate 24 and the opposite wall 25 of the validator body 20. The floor of the run down is provided by a ledge 26 on the reject gate 24 which slopes down from a point below the coin entry slot 22.

The reject gate 24 and the opposite wall 25 have portions 24a,25a which extend upwardly in a region adjacent the coin entry slot 22 to define a space for receiving entering coins 27.

An upwardly inclined cylindrical cup 28 is provided on the reject gate 24. The cup 28 is located across the root of the upwardly extending portion 24a of the reject gate 24 and retains a ball-29 which protrudes towards the opposite wall 25 almost fully across the width of the rundown. The cup 28 is positioned such that part of a quadrant of the ball 29 is just visible through the coin slot 22 (see Figure 8).

The operation of the stabilizer of the present embodiment will now be described.

When a small coin, for example a United Kingdom 5 pence piece, is inserted through the coin entry slot 22, it contacts the ball 29 with its edge and drops towards the ledge 26 between the ball 29 and the front plate 21. Once the coin contacts the ledge 26 is begins to roll down in. As the coin begins to roll, the ball 29 guides it to lie flat against opposite wall 25 of the rundown, without being moved itself.

On the other hand, when a large coin, for example a United Kingdom 50 pence piece, is inserted, it contacts the ball 29 with its edge and forces it to move out of its path into the cup 28, which allows it to drop towards the ledge 26. However, the gravitational bias acting on the ball 29 ensures that it is only moved by an amount sufficient to allow the coin to pass.

Consequently, the coin is guided to lie flat against the

wall 25 of the rundown opposite the ball 29.

Intermediately sized coins will be guided towards the wall 25, opposite the ball 29, by the ball's surface as they fall towards the ledge 26. Then if the space available between the ball 29 and the opposite wall 25 is insufficient to allow the coin to pass, the coin will force the ball 29 back into the cup 28 by the amount necessary to allow it to pass.

Thus, it can be seen that the stabilizer according to the present embodiment ensures that both large and small coins proceed along the run down, lying flat against a wall thereof.

The present invention has been described with reference to validators having a sloping rundowns. However, the present invention can be usefully applied to other forms of validators. A plurality of the stabilizing structures of the present invention can be employed in a single validator if a plurality of spaced sensors are present and, particularly, if the wall of the coin path does not slope to retain coins in the correct position. A plurality of the stabilizing structures may also be found advantageous where a coin to be tested passes sensors in a vertical coin path.

Three embodiments of supports for a stabilizing ball have been described. However, alternatives may be desirable in some cases. For instance, the cup of the first embodiment can have a solid wall, the skeleton structure being convenient if the reject gate and cup are to be moulded as a single unit.

In addition to being moulded in one piece with the reject gate, the cup or other support means may be formed separately and attached to the reject gate by many different techniques including gluing, welding and using fasteners such a screws.

The ability to press-fit the ball is not essential and the ball or other mass may be placed in its support by other means. For instance, the hole could be sufficient to allow the ball to pass and a retainer attached at the coin path side of the hole after insertion of the ball. If the support means is formed separately from the reject gate, the mass may be placed in the support before it is attached to the validator.

The ball may be made from any convenient dense material, e.g. stainless steel, glass or ceramic material. The ball may be solid or hollow to obtain the necessary weight ratio. A large ball can reach across a larger coin path but may be too heavy unless it is hollow.

It will be seen that in the described embodiments, the ball is rotatable, and the contact of coins entering the validator may produce rotation of the ball. The ball may not be spherical, but can be of some other shape e.g. elliptical.

Masses other than balls may be used, for example a generally cylindrical roller, in which case it may be advantageous to taper or dome its ends to minimize the risk of it becoming stuck in a position so as to occlude the coin path.

It is to be noted that, in the embodiments described, the mass is biased solely gravitationally without the aid of a spring, although a spring may additionally be used. The spring may provide a light bias to augment the gravitational bias.

Claims

1. A coin validator comprising an coin path and a rounded mass (12) gravitationally biased to protrude into the path for causing coins, in the coin path, to lie flat against a wall (9) facing the mass across the coin path, characterised in that the mass is arranged so as to act on a coin (14), dropping in the coin path, to deflect it on the fly against the wall .

2. A validator according to claim 1 wherein the gravitationally induced bias force increases substantially linearly as the mass is moved out of the coin path.

3. A validator according to claim 1, comprising support means (11;17) to support the mass, arranged such that the gravitationally induced bias force increases non-linearly as the mass is moved out of the coin path.

4. A validator according to claim 3, including support means comprising a member (11b;17) defining a sloping path up which the mass can be displaced by a passing coin.

5. A validator according to claim 4, wherein the sloping path is progressively steeper for increasing displacement of the mass out of the coin path.

6. A validator according to claim 4 or 5, wherein the support means comprises a cup extending outwardly from a wall of the coin path.

7. A validator according to claim 6, wherein the cup is defined by an open frame (11a,11b).

8. A validator according to claim 3, 4 or 5, wherein the support means comprises a pair of converging rails (17).

9. A validator according to any one of claims 3 to 7, wherein the mass is press-fitted through a wall (3) of the coin path to be received by the support means.

10. A validator according to any preceding claim, wherein the mass comprises a ball.

11. A validator according to any preceding claim 1, wherein said wall is tilted away from the mass.

12. A method of stabilizing a coin entering coin handling

apparatus, comprising dropping the coin in a path onto a mass, which has a rounded periphery and is gravitationally biased to protrude into the path, such that the coin is deflected on the fly by the mass to lie flat against a side wall of the path that is opposite the mass.

Patentansprüche

1. Münzannahmevorrichtung mit einem Münzweg und einer abgerundeten Masse (12), die durch die Schwerkraft so vorgespannt ist, daß sie in den Weg hinein vorsteht, um zu bewirken, daß Münzen auf dem Münzweg flach gegen eine Wand (9) zu liegen kommen, die der Masse auf dem Münzweg gegenüberliegt,
   dadurch gekennzeichnet, daß
   die Masse so angeordnet ist, daß sie auf eine in den Münzweg fallende Münze (14) einwirken kann, um diese bei ihrem Fall gegen die Wand abzulenken.

2. Annahmevorrichtung nach Anspruch 1, bei der die schwerkraftinduzierte Vorspannungskraft im wesentlichen linear ansteigt, während die Masse aus dem Münzweg hinausbewegt wird.

3. Annahmevorrichtung nach Anspruch 1, die eine Trageeinrichtung (11; 17) zum Tragen der Masse umfaßt, welche so angeordnet ist, daß die schwerkraftinduzierte Vorspannungskraft nichtlinear ansteigt, während die Masse aus dem Münzweg hinausbewegt wird.

4. Annahmevorrichtung nach Anspruch 3, die eine Trageeinrichtung mit einem Glied (11b; 17) aufweist, das einen abfallenden Weg definiert, auf dem hinauf die Masse durch eine vorbeilaufende Münze verlagert werden kann.

5. Annahmevorrichtung nach Anspruch 4, bei der der abfallende Weg bei größer werdender Verlagerung der Masse aus dem Münzweg heraus zunehmend steiler wird.

6. Annahmevorrichtung nach Anspruch 4 oder 5, bei der die Trageeinrichtung eine Schale umfaßt, die sich von einer Wand des Münzwegs nach außen hin erstreckt.

7. Annahmevorrichtung nach Anspruch 6, bei der die Schale durch einen offenen Rahmen (11a, 11b) definiert ist.

8. Annahmevorrichtung nach Anspruch 3, 4 oder 5, bei der die Trageeinrichtung ein Paar konvergierender Schienen (17) umfaßt.

9. Annahmevorrichtung nach einem der Ansprüche 3 bis 7, bei der die Masse durch Einpressen durch eine Wand (3) des Münzwegs hindurch eingesetzt wird, um von der Trageeinrichtung aufgenommen zu werden.

10. Annahmevorrichtung nach einem der vorhergehenden Ansprüche, bei der die Masse eine Kugel umfaßt.

11. Annahmevorrichtung nach einem der vorhergehenden Ansprüche, bei der die Wand von der Masse weggeneigt ist.

12. Verfahren zum Stabilisieren einer in eine Münzannahmevorrichtung eintretende Münze, das das Fallen der Münze in einem Münzweg auf eine Masse umfaßt, die einen abgerundeten Umfang aufweist und durch die Schwerkraft vorgespannt ist, um in den Weg hinein vorzustehen, so daß die Münze bei ihrem Fall von der Masse abgelenkt wird und flach gegen eine der Masse gegenüberliegende Seitenwand zu liegen kommt.

Revendications

1. Dispositif de validation de pièces de monnaie, comprenant une voie de pièce de monnaie et une masse arrondie (12) soumise à la force de la gravitation de manière à être saillante dans la voie pour mettre les pièces, dans la voie de pièce, à plat contre une paroi (9) qui est en face de la masse en travers de la voie de pièce, caractérisé en ce que la masse est disposée de manière à agir sur une pièce (14) en cours de chute dans la voie de pièce, de manière à la dévier contre la paroi lors de son passage.

2. Dispositif de validation selon la revendication 1, dans lequel la force de poussée induite par gravitation augmente de manière sensiblement linéaire avec le déplacement de la masse vers l'extérieur de la voie à pièce.

3. Dispositif de validation selon la revendication 1, comprenant un moyen de support (11 ; 17) destiné à supporter la masse et disposé de manière que la force de poussée induite par gravitation augmente non linéairement avec le déplacement de la masse vers l'extérieur de la voie à pièce.

4. Dispositif de validation selon la revendication 3, comprenant un moyen de support comportant un élément (11b ; 17) délimitant une voie en pente vers le haut de laquelle la masse peut être déplacée par la pièce en cours de passage.

5. Dispositif de validation selon la revendication 4,

dans lequel la voie en pente devient progressivement plus raide de manière à accroître le déplacement de la masse vers l'extérieur de la voie à pièce.

6. Dispositif de validation selon la revendication 4 ou 5, dans lequel le moyen de support consiste en une coupelle orientée vers l'extérieur d'une paroi de la voie à pièce.

7. Dispositif de validation selon la revendication 6, dans lequel la coupelle est délimitée par un cadre ouvert (11a, 11b).

8. Dispositif de validation selon la revendication 3, 4 ou 5, dans lequel le moyen de support comprend deux barres convergentes (17).

9. Dispositif de validation selon l'une quelconque des revendications 3 à 7, dans lequel la masse est ajustée à serrage dans une paroi (3) de la voie à pièce pour être réceptionnée par le moyen de support.

10. Dispositif de validation selon l'une quelconque des revendications précédentes, dans lequel la masse consiste en une bille.

11. Dispositif de validation selon l'une quelconque des revendications précédentes, dans lequel ladite paroi subit un basculement l'éloignant de la masse.

12. Procédé de stabilisation d'une pièce de monnaie entrant dans une machine de manipulation de pièces, consistant à laisser tomber la pièce dans une voie sur une masse qui présente une périphérie arrondie et qui subit la force de la gravitation de manière qu'elle soit saillante dans la voie, de façon que la pièce soit déviée par la masse lors de son passage de manière à être mise à plat contre une paroi latérale de la voie, qui est en face de la masse.

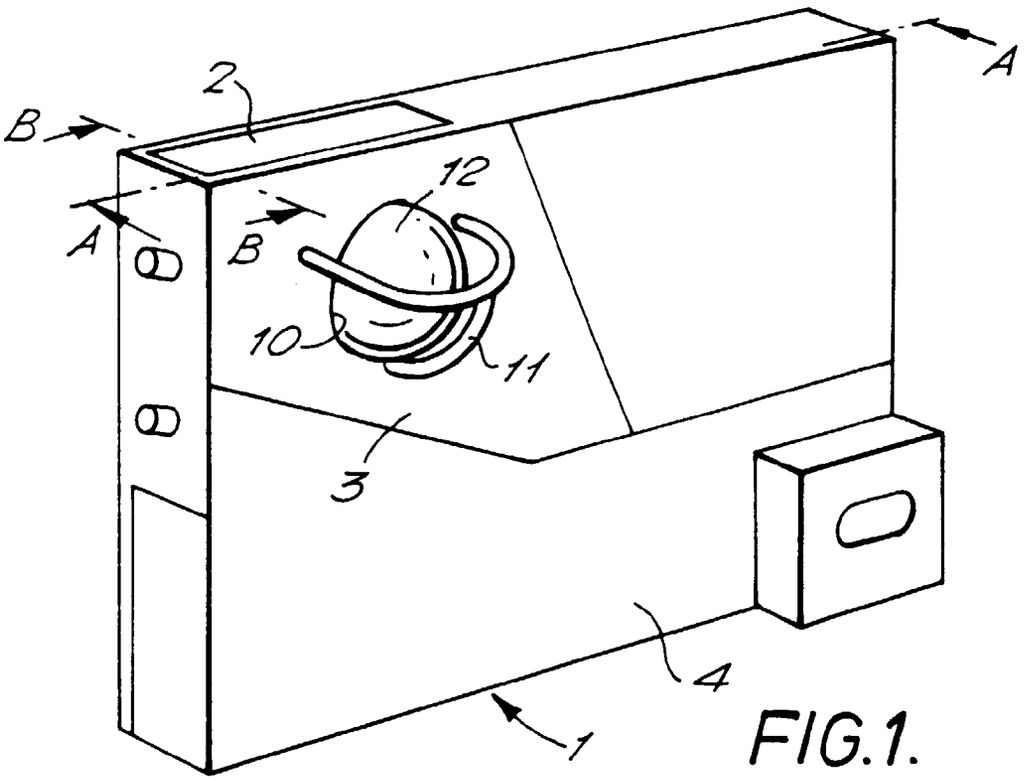


FIG.1.

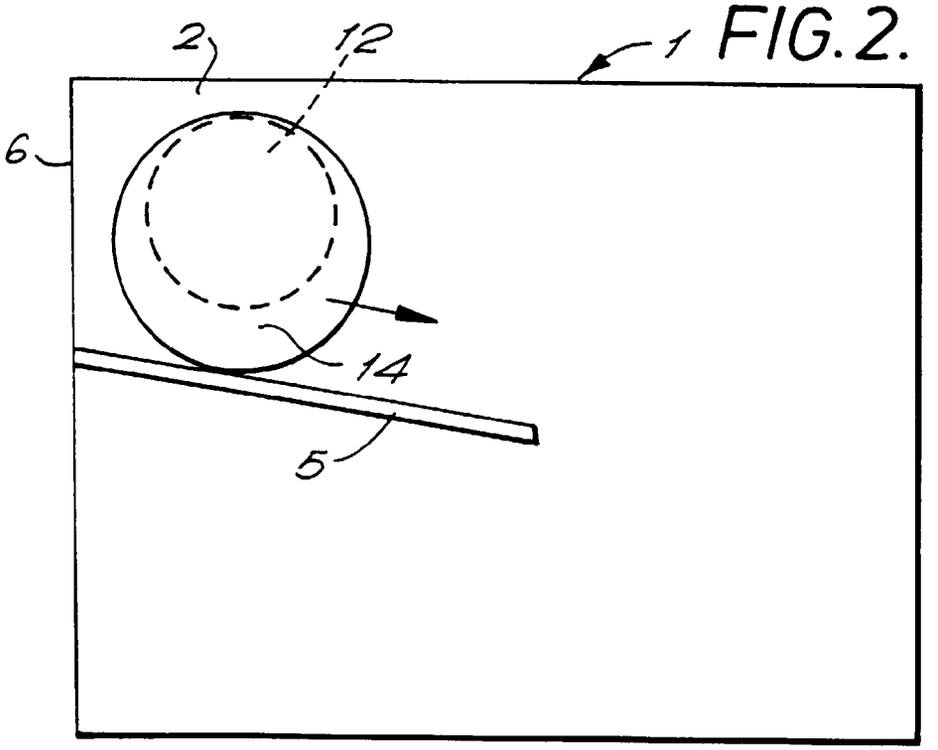
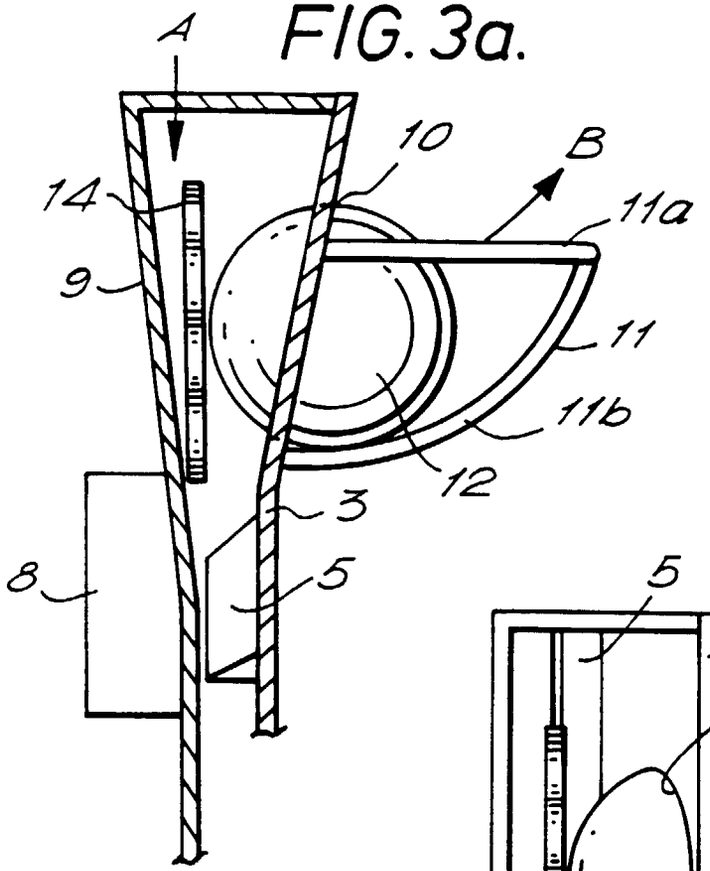


FIG.2.

FIG. 3a.



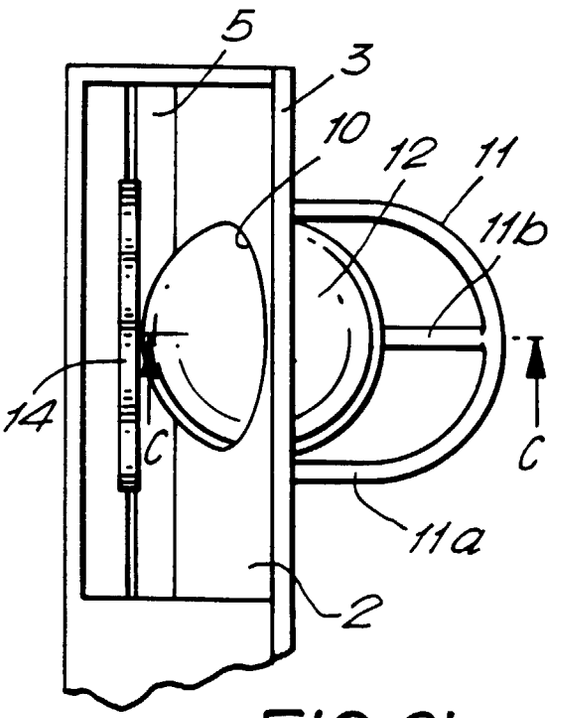


FIG. 3b.

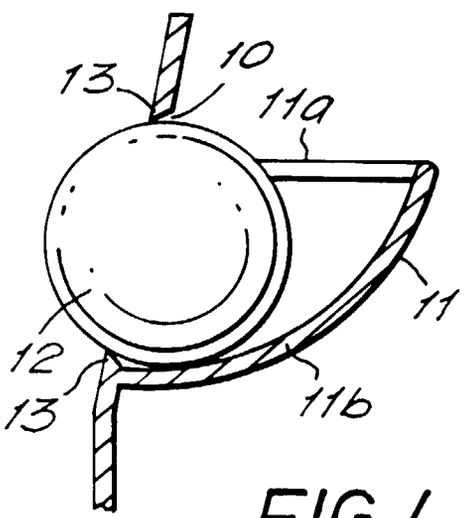
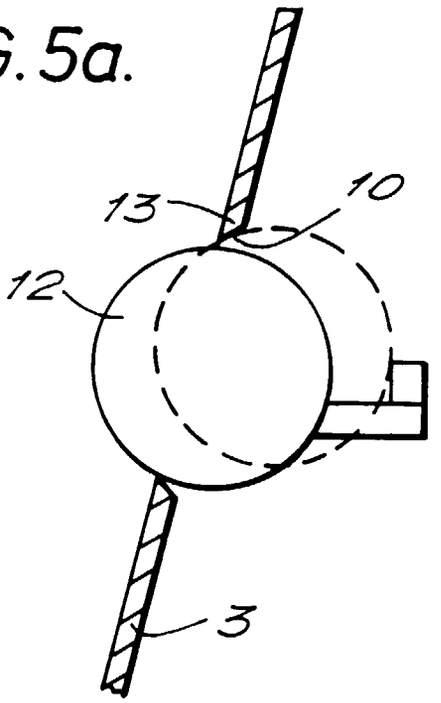


FIG. 4.

FIG. 5a.



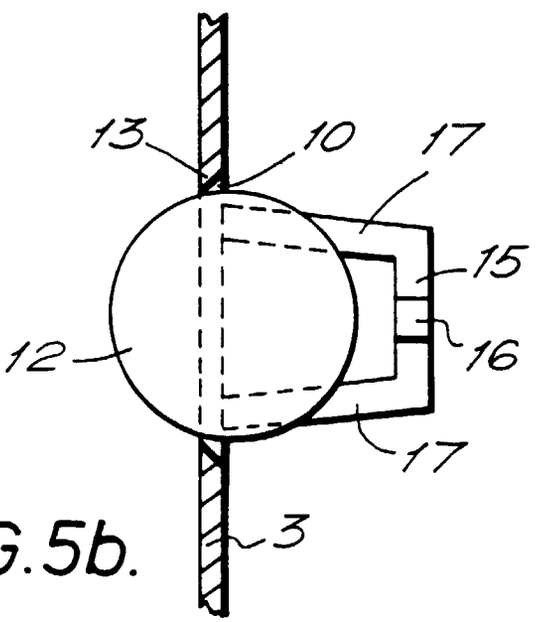


FIG. 5b.

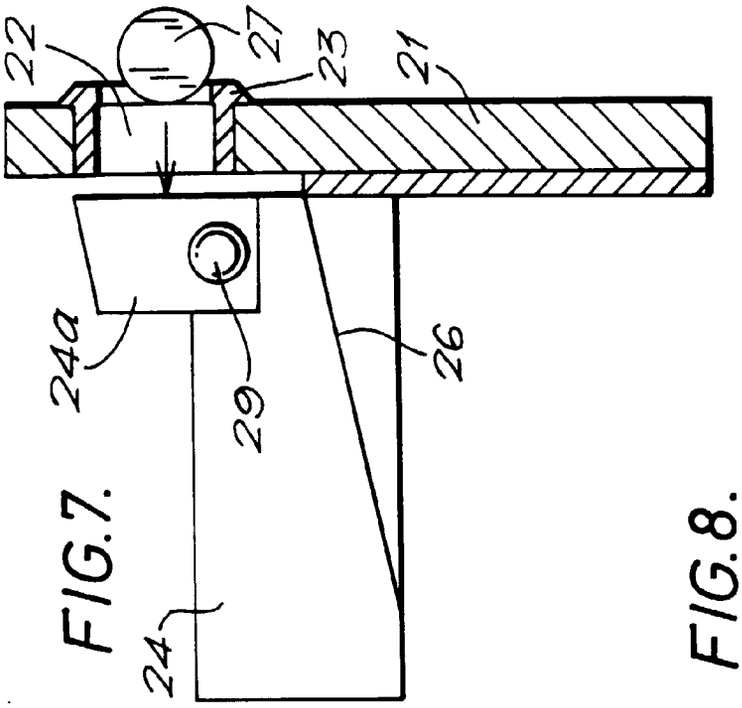


FIG.7.

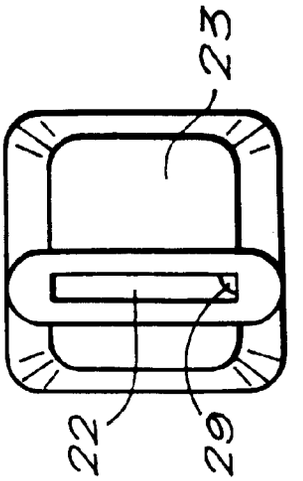


FIG.8.

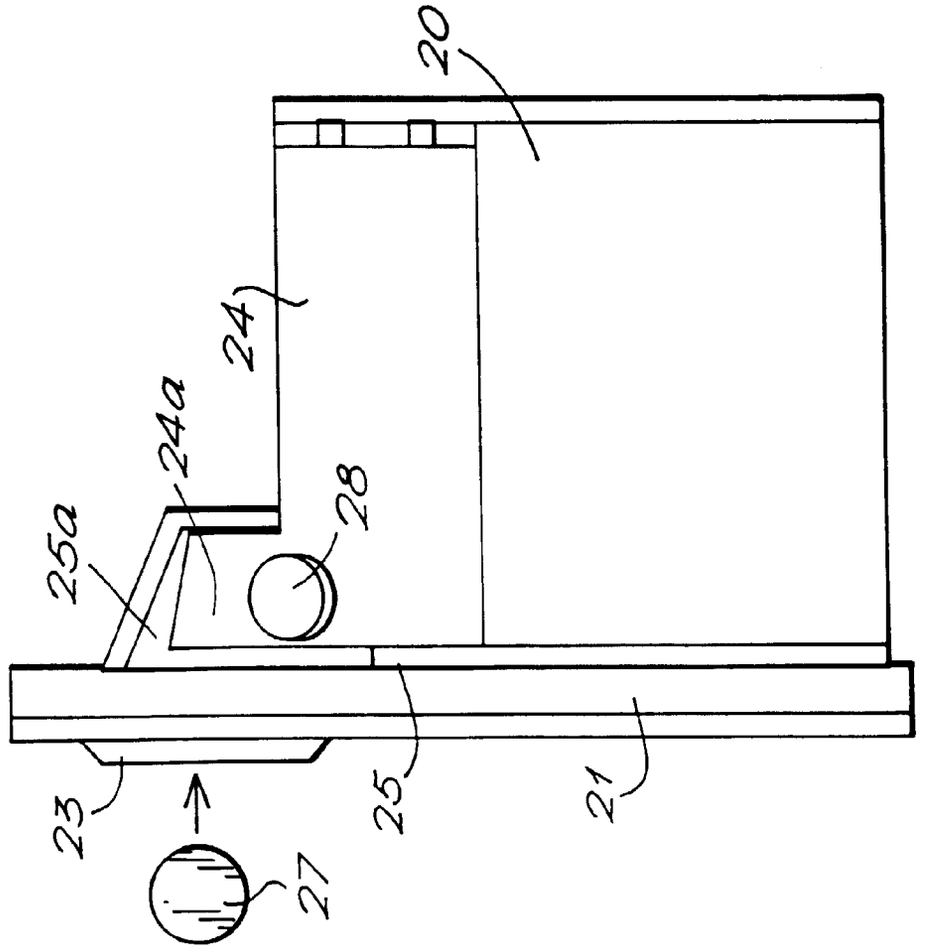


FIG.6.