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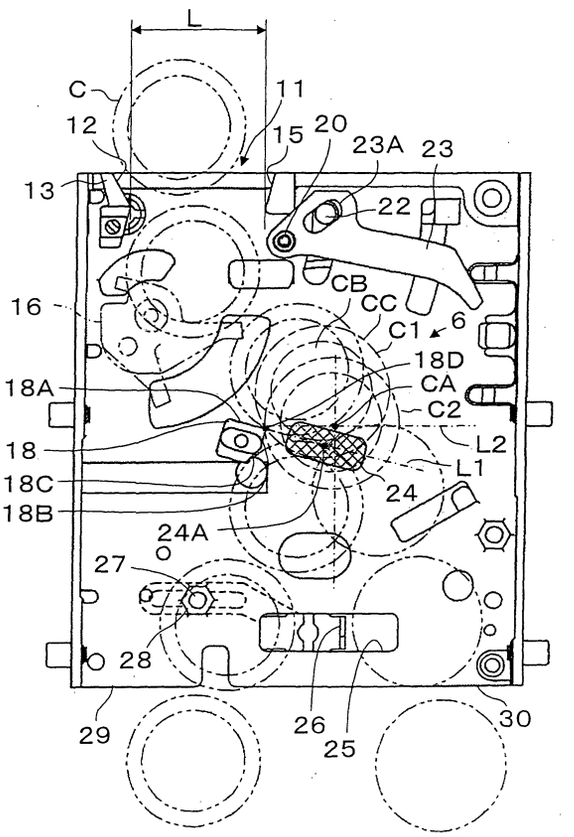
## (54) Coin selector for a bimetal coin

(57) This present invention relates to the improvement of a selector which is used in a vending machine or a game machine etc.. A coin selector for a bimetal coin which selects either genuine or false coins which have a magnetism center section (CB) and a un-magnetism rim section (CC) in the process of guiding the coin through the coin passageway (6) comprising: a guide (18) which is located in the coin passageway (6) and guides the periphery surface of coin (C), a magnet (24) which is located downstream and beside the guide (18) and is located beside the coin passageway (6).

Fig.4




EP 1 376 483 A2

## Description

**[0001]** This present invention relates to the improvement of a selector which is used in a vending machine or a game machine etc. Especially this present invention relates to a selector which distinguishes bimetal coins which have the center section made up of a magnetic material and the rim section made up of a non-magnetic material.

More especially this present invention relates to a selector which distinguishes bimetal coins where the center section is made up of a low magnetic material.

"Coin" which is used on this specification embraces medals or tokens like a coin.

**[0002]** A bimetal coin is superior as it helps preventing counterfeits. The bimetal coin has a center section which is circular and a rim section which is a circular ring. However the process of making the bimetal coin is separate.

An example of bimetal coins are the one Euro coin and two Euro coin.

The Euro coins have the center section which is made up of a magnetic material and the rim section which is made up of a non-magnetic material.

**[0003]** Also, the center section of the Euro coins are made of a low magnetic material, but it is lower than iron.

In this technical field, some prior art use a permanent magnet to distinguish the coins which are magnetic, for example, Koukoku publication 63-29308 (U.S. Patent 4376480), Japanese Patent 2620740 (U.S. Patent 5291980) and Japanese Utility Model 2583005.

**[0004]** The purpose of Koukoku publication 63-29308 (first prior art) is to select non magnetic material.

In the structure, a magnet is located at the side of the passageway on which the coin rolls onto a slanting guide.

When the coin passes through the side of the magnet, eddy currents occur inside of the coin.

Therefore, the coin receives a braking force by the eddy currents and the rolling speed is reduced.

As a result, the material of the coin is distinguished.

**[0005]** The magnet has enough facing area and has a magnetism which uses the inside of the coin to help to distinguish between genuine and false coins.

In other words, the magnet for braking the coin is located at the side of coin passageway and faces the center section of coin in the selector of first prior art.

**[0006]** The selector which is disclosed in Japanese Patent 2620740 (second prior art) includes a magnet for braking the coin and a guiding magnet which is cylindrical and is located downstream of a slanting guide.

The purpose of second prior art is to select a coin which has a magnetic rim section.

In other words, the peripheral of the magnetic rim section is adsorbed by the guiding magnet and is turned around by the guiding magnet.

Accordingly, the coin which has the magnetic rim section is selected.

**[0007]** The selector which is disclosed in Japanese Utility Model 2583005 (third prior art) includes a first magnet which has a lower magnet and is located upstream and a second higher magnet which is located downstream.

Therefore, only ferromagnetic coins are changed in their direction by the first magnet, where to see if it is a genuine or false coin.

A lower magnetic coin is not gravitated by the first magnet, therefore, the coin changes its direction by the second magnet, also to distinguish between genuine and false coin.

Also, the non-magnetic coin passes through the second magnet, therefore also to distinguish between genuine and false coin.

**[0008]** When the Euro coins enter into the first prior art, they are supported on the guide, at the same time the center sections are attracted with the magnet and are held.

Accordingly the first prior art cannot distinguish Euro coins. When Euro coins enter into the second prior art, they aren't turned around by the guiding magnet because the rim of Euro coins are made up of the non-magnetism material.

Therefore, the second prior art cannot distinguish Euro coins. When the Euro coins enter into the third prior art, they aren't turned around by the magnet as the second prior art because the rim of Euro coins is made up of the non-magnetism material.

As a result, the third prior art cannot distinguish the Euro coins.

**[0009]** The purpose of this present invention is to solve the problems. The first purpose of the present invention is to provide the selector which can distinguish bimetal coins which are made up of magnetic center sections and are made up of non-magnetic rim sections.

The second purpose of the present invention is to improve on a less expensive scale.

The third purpose of the present invention is to improve adjustability of the machine.

**[0010]** This object is achieved by the features of claims 1 and 4. Further advantageous features are the subject-matters of the dependent claims.

**[0011]** According to one aspect of this present first invention, the following structure is provided:

> A coin selector for a bimetal coin which selects either genuine or false coins which have a magnetism center section and a un-magnetism rim section in the process of guiding the coin through the coin passageway which comprises of:
>
> > a guide which is located in the coin passageway and guides the periphery surface of the coin,
> > a magnet which is located downstream and beside the guide and is located beside the coin passageway.

**[0012]** In this structure, the bimetal coin is guided by the guide and tumbles down.
The bimetal coin rolls on the guide, afterwards, it falls down from the guide.
The side face of the center section faces the magnet, and it is attracted to the magnet.
By this adsorbability, the bimetal coin goes down along the side face of the guide, and it is turned around.
Afterwards, the bimetal coin goes out the effecting area by the magnetism of the magnet, and it falls down.
As a result the bimetal coin goes to the genuine exit.

**[0013]** When the coin is the non-magnetic coin, the coin doesn't receive the adsorbability of the magnet.
Therefore, the non-magnetic coin doesn't move along the side face of the guide.

**[0014]** As a result, the non-magnetic coin is guided to the guiding direction by the guide, and it goes to the false exit.
When the coin is a ferromagnetic coin, the coin is held by the magnet, therefore it cannot fall down.
When the coin is a low magnetic coin, it is held by the magnet, because it faces to the magnet on the guide, therefore it is held by the magnet.
Therefore the low magnetic coin is distinguished.
Also, the structure is made up of the guide and the magnet, therefore it is simple and inexpensive.
In this present invention, an electric power source isn't used. As a result, this present invention can be used without an electric-power-source.

**[0015]** The present invention is desirable because the magnet is located downstream and beside the guide and is located below the upper surface of the guide.
In this structure, when the center section faces approximately the whole area of the magnet, the periphery surface of the bimetal coin cannot be supported on the guide.
When the coin is a low magnetic coin, it faces approximately the whole area of the magnet and is supported on the guide, therefore it is held by the magnet.
As a result, the low magnetic coin is distinguished.

**[0016]** The present invention is desirable, because the magnet faces the guide's side rather than the center of the bimetal coin when the diameter section of the bimetal coin has contact with the guide.
In this structure, the center section of bimetal coin is located further from the center of magnetic force than the guide.
The bimetal coin is guided by the guide, because it receives the adsorbability of the magnet towards the guide.
Therefore, the coin's selection operation is correct because the coin's position is stabilized.

**[0017]** According to a second aspect, this present invention includes the following structure:
A coin selector for a bimetal coin selects either genuine or false coins which have a low magnetism center section and a un-magnetism rim section in the process of guiding the coin through the coin passageway and comprises:

a cradle which distinguishes the diameter and the weight and is located downstream by the entry,
a guide which guides the bimetal coin is located downstream from the cradle,
a magnet which is located downstream and beside the guide is located at the side of the coin passageway,
an auxiliary guide which guides genuine and false coins is located downstream and below the magnet.

**[0018]** In this second aspect, when a bimetal coin is used, the coin is selected by the cradle, therefore the diameter and weight are distinguished.
When the diameter and weights are genuine, the coin's center is distinguished by either the magnetic material or the non-magnetic material by the guide and the magnet.
In other words, the center of a genuine bimetal coin gravitates by the magnet which is located at the side of the coin passageway and is guided along the guide and goes to the genuine exit.

**[0019]** When a non-magnetic coin is used, the coin doesn't gravitate and isn't guided by the guide, and goes to the false exit.
When an all magnetic coin is used, it gravitates by the magnet, therefore it is held by the magnet.
Because the magnet faces the whole area of the coin.
As a result, the genuine coin is only guided to the genuine exit.

**[0020]** When the coin isn't diverted enough, the coin falls on the auxiliary guide which is fixed.
The coin is guided to either the genuine exit or the false exit which depends on the lower curve of the coin by the auxiliary guide.
This invention includes a cradle, a guide, a magnet and an auxiliary guide, and the structure is simple, therefore it is inexpensive.
And it can be used without an electric-power-source.

**[0021]** This first and second aspects are desirable, because the magnet has a maximum-energy-product which is from 17.5 to 20 MGOe, a residual magnetization which is from 8.4 to 9.0 KG and a coercive force which is from 8.2 to 8.8 KOe.
In this experiment, mentioned above, the magnet is at its best and is less expensive.

**[0022]** This first and second aspects are desirable, because the magnet's width is approximately 6.6 mm and the length is approximately 15.4 mm, and the longitudinal axis is located along the extending line of the upper surface of the guide.
The diameter of a two Euro coin is approximately 25.75 mm and the diameter of magnetic center section is approximately 18.25 mm.
When the peripheral surface of the bimetal coin has contact with the guide, the magnet faces more to the guide's side than the center of the coin.

As a result, the magnet size is suitable.

Fig. 1 is a perspective view from the upper front right direction of an embodiment.
Fig. 2 is a front view of the embodiment.
Fig. 3 is a cross section view of A-A line in Fig. 2.
Fig. 4 is an operating explanation drawing of the embodiment.

**[0023]** The embodiment is suitable for a two Euro coin.
Fixed guiding board 1 includes: back board 1A which is plain and vertical and has side boards 1B, 1C.
The side boards 1B and 1C are bent perpendicular to the side section of the fixed guiding board 1 and faces forwards.
Fixed shaft 3 is fixed perpendicular at the U grooves of brackets 2A, 2B which are bent horizontally towards side board 1B from side board 1C.
The right end of the movable guide board 4 pivots at fixed shaft 3.
**[0024]** Movable guide board 4 can pivot on the level and is urged towards the fixed guiding board 1 by spring 5.
L section 4A of the movable guide board 4 is stopped by back board 1A.
Therefore the distance between the back board 1A and the movable guide board 4 is slightly thicker than a coin's thickness and is parallel.
Therefore the structure of the coin passageway 6 extends perpendicular.
**[0025]** Bracket 7 can pivot on fixed shaft 3 and is urged towards guiding board 4 side by spring 5.
Guide section 8 has a block shape and is located at bracket 7 and can go in or out of opening 4C.
The side face 8A faces to coin passageway 6.
**[0026]** The distance between the side face 8A and back board 1A is slightly thicker than the thickness of a coin.
Because screw 9 screws in the end section of bracket 7, it's end has contact with pin 10 which penetrates in guiding board 4.
In other words, the space between side face 8A and back board 1A is coin passageway 6.
**[0027]** Coin entry 11 is located near the left side board 1B.
Entry 11 distinguishes the thickness and the diameter of a coin.
In other words, as shown in figure 4, diameter limiter 13 has guiding face 12 which slants upwards to the left which is located adjacent L shape section 4A and is fixed at movable board 4 by screw 14 which penetrates elongate hole 4B which extends to the side of movable board 4.
Diameter limiter 13 is adjustable to the distance between limiter 13 and limiting surface 15 of movable board 4 and can be changed in the range of elongate hole 4B.
The shortest distance between diameter limiter 13 and limit surface 15, in other words, length L is slightly larger than that of the diameter of coin.
And the thickness of coin entry 11 is slightly larger than that of the coin's thickness.
**[0028]** When the diameter of the coin is larger than the diameter of length L of entry 11, and the thickness of a coin is thicker than the entry 11, the coin cannot pass through entry 11.
Known cradle 16 is located under the coin entry 11 and has claws 16A, 16B which are located away at predetermined distances.
Cradle 16 can pivot on fixed shaft 17 which extends towards the lateral from the movable guiding board 4.
**[0029]** Guiding rail 18 is located under cradle 16 to one side as shown in figure 4.
Guiding rail 18 can slide in elongate hole 19 of moving guiding board 4 and is fixed at a predetermined position of moving guiding board 4 by screw 20.
Elongate hole 19 slants downwards away from cradle 16.
Guiding rail 18 is made up of resin which has wear resistance. For example, guiding rail 18 can be made up of polyacetal or metal.
**[0030]** The upper surface 18A of guiding rail 18 is straight and slants downwards away from cradle 16.
Side surface 18B continues to the upper surface and is at a right angle to upper surface 18.
Under side surface 18C has a blunt angle to side surface 18B. Side surface 18B and under side surface 18C can be changed to an arc shape or only side surface 18B which can move along it. And, upper surface 18A, side surface 18B and under side surface 18C are made up separately from the guide and can be detachable to the guide surface.
In this structure, when a surface member wears, it can be changed separately rather than a whole unit.
**[0031]** Canceling lever 21 can pivot on shaft (not shown) which is fixed at the rear of back board 1A.
Pin 22 is fixed at canceling lever 21.
A cam-surface (not shown) is located inside of the moving guiding board 4.
When the canceling lever 21 is pushed downwards (in the counter clockwise direction in the figure 4), pin 22 pushes to the cam-surface of the moving guiding board 4.
Therefore the moving guiding board 4 pivots at fixed shaft 3 and is away from back board 1A.
**[0032]** Wiper 23 which is a lever is fixed at shaft 20 and is located between back board 1A and moving guiding board 4 and can move into coin passageway 6.
Pin 22 penetrates elongate hole 23A which is made up at wiper 23.
In other words, when pin 22 moves downwards in elongate hole 23A, wiper 23 pivots in the clockwise direction and moves nearer to magnet 24 at coin passage 6.
**[0033]** Fixed magnet 24 is rectangle and is a permanent magnet and is located at the side of the passage-

way 6 and is located downstream of guiding rail 18.
Fixed magnet 24 is fixed at the attaching section 27 of attaching piece 25 which has an angle shape and is fixed at the under surface of guide 8 by screw 26 or by an adhesive bond. Passage surface 24A of magnet 24 is located flat to guiding surface 8A of guide 8 and faces coin passageway 6.
Magnet 24 is located on extending line L1 of upper surface 18A of guiding rail 18 as shown in figure 4.
In other words, magnet 24 slants downwards away from the direction of cradle 16.

**[0034]** When the diameter section of a 2 Euro coin has contact with edge section 18D which is a conjunction section between upper surface 18A and side surface 18B at coin position C2 as shown in figure 4, center section 24A of magnet 24 (the center of gravity of magnet 24) is located at guiding rail's 18 side rather than the coin center CA at coin position C2.
In other words, magnet 24 faces the coin's face of guiding rail's 18 side rather than the coin center CA.
In this situation, the attraction of magnet 24 attracts the coin to guiding rail 18.
Accordingly, the coin has contact with side surface 18B and under side surface 18C and moves along them.

**[0035]** The upper end of guiding rail 18 side's magnet 24 is located approximately on line L2 which extends horizontal from corner 18D.
In other words, when the weight of coin comes on to corner 18D (coin position C1 as shown in figure 4), the upper section of magnet 24 faces approximately to the boundary between center section CB and rim section CC.
Accordingly, magnet 24 doesn't substantially face to the

**[0036]** In this layout, the coin is made up of a magnetic material as the same as the center section CB, the lower section of the coin faces large portion of the magnet, when the weight of coin come on corner 18D.
Therefore the coin is attracted by magnet 24 and is held in coin passageway 6.

**[0037]** Magnet 24 is ferritic and is a permanent magnet and is a cube which is approximately 6.6 mm in length, approximately 15.4 mm in width and approximately 2.7 mm in thickness.
The magnetic property is a maximum-energy-product which is from 17.5 to 20 MGOe, a residual magnetization which is from 8.4 to 9.0 KOe and a coercive force which is from 8.2 to 8.8 KG.
The magnet property is best for a two Euro coin in this experiment.
Magnet 24 can be changed to another magnet which has a different shape and material which has the same function, for example electromagnet.
The permanent magnet is inexpensive and doesn't use electric power source.

**[0038]** Elongate hole 25 extend towards the lateral and is located under magnet 24 at back board 1A.
Auxiliary guide 26 is made up of plate metal and extends to approximately vertical and penetrates elongate hole 25 and coin passageway 6 and is attached to elongate hole 25 by screws 27 and nuts 28 and is adjustable to either the left and the right. Genuine exit 29 is the left side of guiding piece 26 and false exit 30 is the right side.

**[0039]** Coin passageway 6 for genuine coin C is the route which is entry 11, cradle 16, guiding rail 18 and genuine exit 29.
Coin passageway 6 for false coin C is the route which is guiding rail 18 and false exit 30.
When coin C jams either in entry 11 or cradle 16, canceling lever 21 is pushed down, and movable guiding board 4 moves away from back board 1A.
Accordingly, the jamming coin falls down to second false exit (not shown) which overlaps to false exit 30, afterwards it is returned.

**[0040]** Next, the case that a two Euro coin is genuine, is explained. After entry, the coin C falls down vertically in entry 11, afterwards it is supported between claws 16A and 16B.
Cradle 16 pivots in the clockwise direction which is the side of guide rail 18 shown in figure 4 on fixed shaft 17.
When cradle 16 pivots at a predetermined angle, coin C falls on guiding rail 18.

**[0041]** Fallen coin C rolls on the upper surface 18A of guiding rail 18, afterwards it falls down from corner section 18D. Afterwards, coin C moves into the parabolic situation towards the side of false exit 30 by rolling force of inertia and gravity.
However, the lower section of center section CB (which is low magnetic) faces approximately the whole magnet 24 at coin position C2 which doesn't ride on corner 18D.

**[0042]** Coin C is pulled towards the side of guiding rail 18 by magnet 24 because magnet 24 faces the larger center section CB. Accordingly, the peripheral surface of coin C has contact with side surface 18B and under side surface 18C or moves around them.
As a result, the coin C falls down to genuine exit 29 which is located at the left side of auxiliary guide 26.

**[0043]** Next, the case that a false coin as a ferromagnetic coin C2 is used at the center section CB is now explained.
The false coin is guided by the cradle 16 and the guiding rail 18 and arrives to the side of magnet 24.
The coin CF is held by magnet 24 because the magnetic pull force to the ferromagnetic coin is large enough despite the coin position C2 which isn't supported on guiding rail 18. Therefore coin CF is kept in the coin passageway 6.

**[0044]** Next, the case of a low-magnetic coin being used is explained. When coin is supported on corner 18D of guiding rail 18 at coin position C1, the lower section of coin CF faces approximately the whole magnet 24.
Therefore, a part weight of the false coin is supported on corner 18D, and the false coin is held by the magnet 24.
As a result, the low-magnetic coin is held in coin passageway 6.

**[0045]** When canceling lever 21 is pushed down, guide section 8 keeps the position, only movable guiding board 4 pivots on fixed shaft 3.
At the same time, wiper 23 pivots in the clockwise direction shown in figure 4.
As a result, the coin which is held by magnet 24 falls by wiper 23 and goes to second false exit and is returned.
**[0046]** Next, the case that a non-magnetic coin is used, is explained. The coin is guided to cradle 16 and guiding rail 18, it reaches at the side of magnet 24.
The coin isn't pulled by the magnet 24 and passes through the side of the magnet 24 and falls into false exit 30 because the coin is non-magnetic.
**[0047]** The coin sometimes falls down on auxiliary guide 26 because the coin's speed differs.
In this situation, when the lower right hand surface of coin has contact with auxiliary guide 26, it is guided to the left shown in figure 4, and it goes to genuine exit 29.
**[0048]** When the lower left hand surface of coin has contact with auxiliary guide 26, it is guided to the right shown in figure 4, and it goes to false exit 30.
Auxiliary guide 26 helps for diverting the coin by magnet 24.
**[0049]** This invention can be changed to some variation.
Magnet 24 can be changed with respect to the magnetic force and/or the size to suit for the center section's CB size and/or rim section's CC size.
Also, the magnet can be made in different shapes.

## Claims

1. A coin selector for a bimetal coin which selects either genuine or false coins which have a magnetism center section (CB) and a un-magnetism rim section (CC) in the process of guiding the coin through the coin passageway (6) comprising:

   a guide (18) which is located in the coin passageway (6) and guides the periphery surface of coin (C),
   a magnet (24) which is located downstream and beside the guide (18) and is located beside the coin passageway (6).

2. The coin selector for a bimetal coin claimed in claim 1, wherein
   the magnet (24) is located downstream and beside the guide (18) and is located below the upper surface of the guide (18).

3. The coin selector for a bimetal coin claimed in claim 2, the magnet (24) faces to the guide's (18) side rather the center of bimetal coin when the diameter section of the bimetal coin (C) has contact with the guide (18).

4. A coin selector for a bimetal coin selects either genuine or false coins which have a low magnetism center section (CB) and a un-magnetism rim section (CC) in the process of guiding the coin through the coin passageway (6) comprising:

   a cradle (16) which distinguishes the diameter and the weight and is located downstream from a entry (11),
   a guide (18) which guides the bimetal coin being located downstream from the cradle (16),
   a magnet (24) which is located downstream and beside the guide (18) is located at the side of the coin passageway (6),
   an auxiliary guide (26) which guides genuine and false coins is located downstream and below the magnet (24).

5. The coin selector for a bimetal coin claimed in any of claims 1 to 4, wherein
   the magnet (24) has a maximum energy product which is from 17.5 to 20 MGOe, a residual magnetization which is from 8.4 to 9.0 KG and a coercive force which is from 8.2 to 8.8 KOe.

6. The coin selector for a bimetal coin as claimed in any of claims 1 to 4, wherein
   the magnet's (24) width is approximately 6.6 mm and the length is approximately 15.4 mm, and the longitudinal axis is located along the extending line (L1) of the upper surface (18A) of the guide (18).

Fig.1

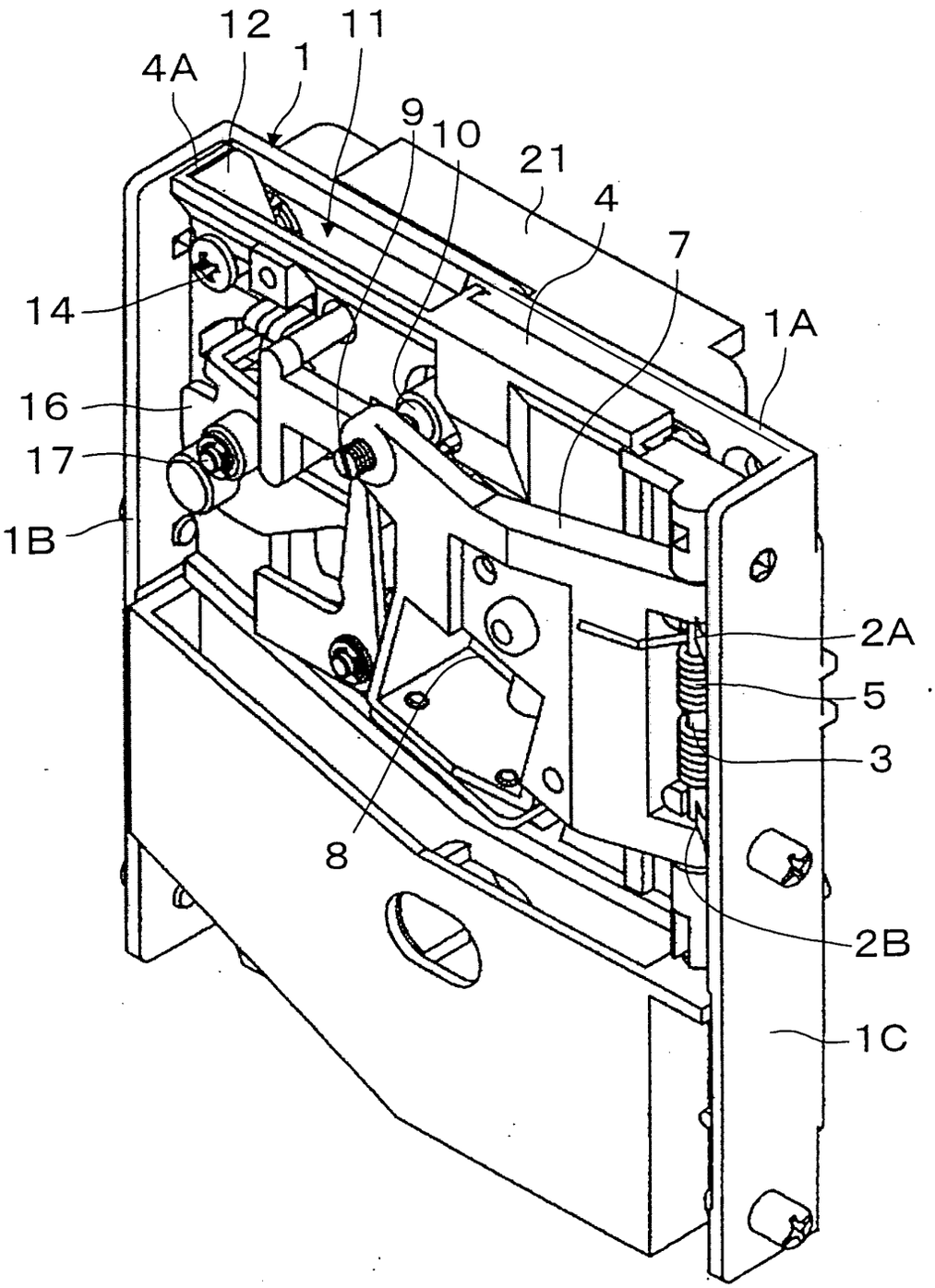


Fig.2

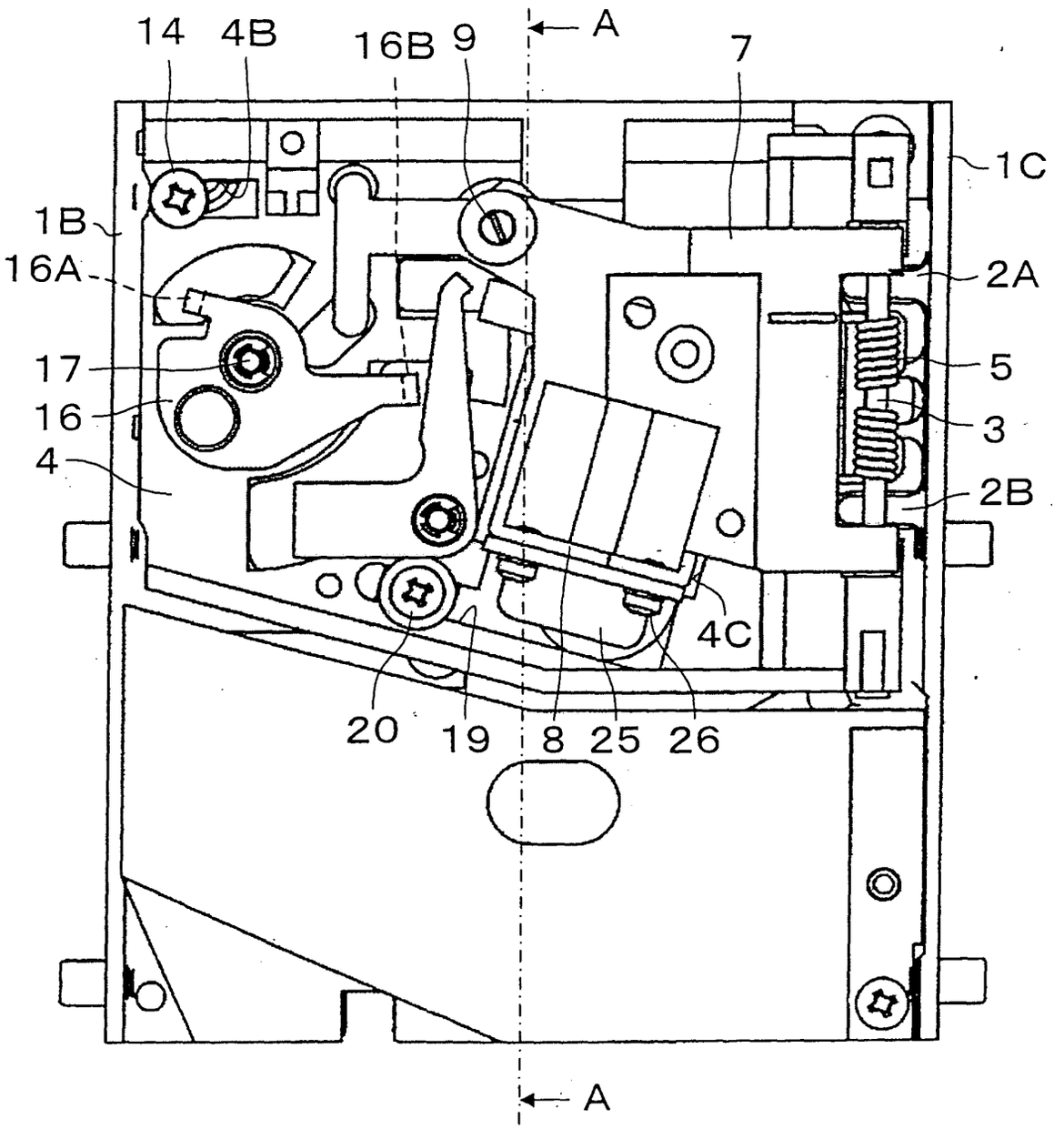


Fig.3

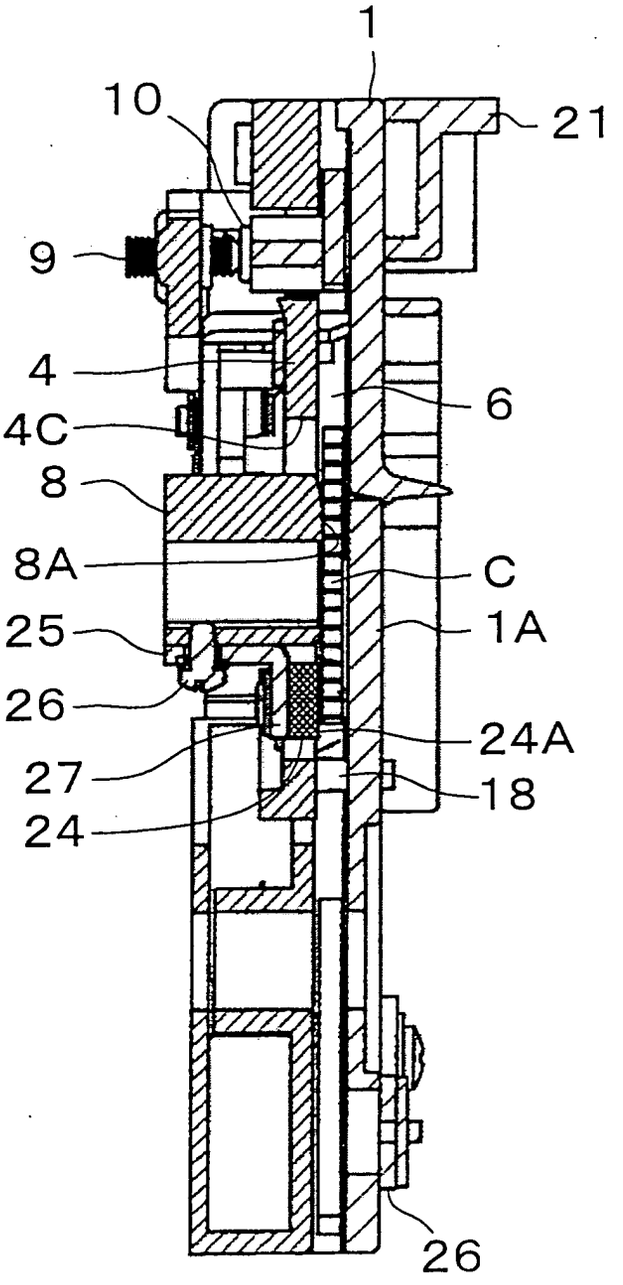
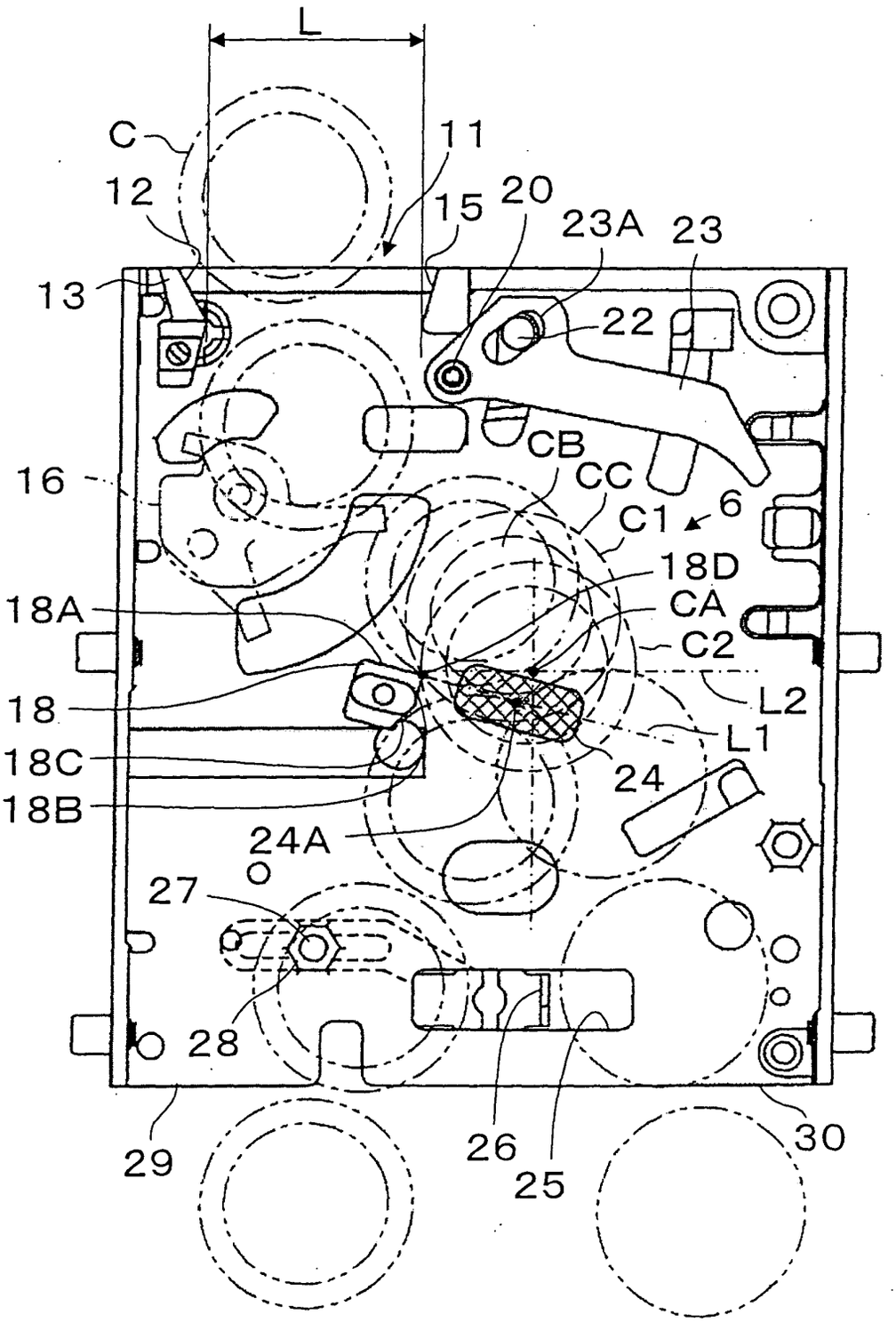


Fig.4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