



(11) **EP 1 659 544 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
13.08.2008 Bulletin 2008/33

(51) Int Cl.:
G07D 5/08 (2006.01) **G07F 1/04** (2006.01)

(21) Application number: **05022913.7**

(22) Date of filing: **20.10.2005**

(54) **Coin selector**

Münzauswahlvorrichtung

Sélecteur de pièces de monnaie

(84) Designated Contracting States:
DE GB

(30) Priority: **17.11.2004 JP 2004332597**

(43) Date of publication of application:
24.05.2006 Bulletin 2006/21

(73) Proprietor: **ASAHI SEIKO CO., LTD.**
Minato-ku
Tokyo 107-0062 (JP)

(72) Inventors:
• **Abe, Hiroshi**
Iwatsuki-shi
Saitama-ken (JP)

• **Yamamiya, Takahito**
Iwatsuki-shi
Saitama-ken (JP)

(74) Representative: **Hofer, Dorothea et al**
Prüfer & Partner GbR
Patentanwälte
Sohnckestrasse 12
81479 München (DE)

(56) References cited:
EP-A- 0 881 606 **DE-A1- 3 806 576**
GB-A- 1 558 948 **US-A- 4 662 501**
US-A- 4 984 670 **US-A- 6 098 778**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 1 659 544 B1

Description

[Technical Field of the Invention]

[0001] The present invention relates to a coin selector comprising coin detecting means that detects plural kinds of coins of currency, and canceling means that eliminates clogs by coins in a coin passage. More particularly, the present invention relates to a coin selector capable of electronically detecting a coin, and of removing clogging coins. More specifically, the present invention relates to a coin selector incorporated into various automatic vending machines, change machines, game machines and the like that start operating in response to insertion of a coin into such machines. The term "coin" used herein refers generically to metal money, medal, token and the like.

[Background Art]

[0002] For example, a coin selector shown in Figs. 26 to Fig. 29 is known as a first conventional art. As shown in Fig. 26, the coin selector is of a box form having at its top a coin slot 64 through which a coin is inserted. On the bottom of the coin selector are formed an exit 69 from which a coin is accommodated into a cashbox in an automatic vending machine or a game machine, and a return slot 70 for canceling a coin.

[0003] As shown in Fig. 26, a body 60 has a trapezoidal door 61 in its upper part. As illustrated in the right end of Fig. 29, the door 61 is mounted to a door pivot 75 so as to allow the door 61 to open/close in the fore-and-aft rotating direction as shown in Fig. 27. The door 61 is normally closed by a door open/close spring 76 shown in Fig. 29.

[0004] In Fig. 28, in an upper part of the body 60 of the coin selector a J-shaped canceling lever 63 formed of resin is provided horizontally, and the canceling lever 63 has in its rear part a canceling lever pivot 65. The canceling lever 63 rotates in the up-and-down direction relative to the body 60 about the canceling lever pivot 65. The J-shaped canceling lever 63 horizontally provided has a shorter end embodied by a resin spring 66 that allows the canceling lever 63 to return to its standby position by way of elasticity of the spring.

[0005] Fig. 27 shows the state where the canceling lever 63 is pushed down and the door 61 is open. More specifically, a projection (not shown) projecting toward the door 61 in the vicinity of the center of the canceling lever 63 is integrally formed with the canceling lever 61, and the door 61 has a slope (not shown) at a position corresponding to the above projection in its inner surface. The slope is longitudinally molded like a recess shape and has a thickness which increases as the slope comes closer to the bottom of the door 61. When the canceling lever 63 is pushed down, the projection in contact with the slope formed in the door 61 slides in the thickness direction, so that the door 61 is revolved about the door

pivot 75 and opened forwardly from the body 60. As a result, a fake coin or the like clogging and stopping in the coin passage 71 will drop and return to the return slot 70 for canceling.

[0006] As to determination of either a real coin or a fake coin, whether the coin is real or fake is determined by a coin detecting coil provided in the passage 71. First, a coin inserted through the coin slot 64 drops the passage 71 while rolling through a slant guide rail 71 as shown in Fig. 28 formed inside the selector. The coin having dropped the passage 71 is detected by a coil 67 and a double coil 68 (coil 68a and coil 68b) provided in an upper part of the body 60 of the coin selector and by a coil 77 and a double coil 78 (coil 78a and coil 78b) provided inside the door 61 as shown in Fig. 29.

[0007] As shown in Fig. 28, on the side of the body 60 of the coin selector is fixed the coil 67 for detecting diameter of a coin, and near the center in the upper part of the body 60 and in a slightly right lower position from the coil 67 is fixed a double coil 68. In the double coil 68, the coil 68a is a coil for detecting thickness of a coin, and the coil 68b is a coil for detecting material of a coin.

[0008] Furthermore, at surface-symmetric positions of the positions where the above coils on the side of the body 60 of the coin selector are provided, a coil 77 and a double coil 78 which are similar to those fixed on the body 60 are fixed on the inner side of the door 61 of the coin selector. On the side of the door 61 of the coin selector is fixed the coil 77 for detecting a diameter of a coin, and near the center in the upper part of the door 61 and in a slightly right lower position from the coil 77 is fixed a double coil 78. In the double coil 78, the coil 78a is a coil for detecting a thickness of a coin, and the coil 78b is a coil for detecting a material of a coin.

Detection of a coin is achieved by the coils 67 and 77 together detecting a diameter, by the coil 68a and 78a integrally detecting a thickness, and by the coils 68b and 78b integrally detecting a material. Thus, whether a particular coin is real or fake is detected by the coin passing through the guide rail 71a between the coils fixed to the body 60 and the coils fixed to the door 61.

[0009] When the coin is determined to be real, a solenoid (not shown) disposed in a lower part inside the selector is turned ON. Upon turning ON of the solenoid, a gate 72 of the passage 71 is opened and the real coin drops downward via the exit 69 formed on the bottom face of the selector. When the coin is determined to be fake, the solenoid is not turned ON, so that the gate 72 remains closed. Accordingly, the fake coin drops through the return slot 70 and cancelled (see for example, Patent document 1).

[0010] As the second prior art, the following is known. In the middle of a slot member of rectangular cylinder, a passage through which a coin drops is formed, and in the middle of outer peripheral wall of the slot member a first coil is wound so as to surround the passage. Each side part of the first coil is covered with a first core and a second core having a U-shaped end surface, respec-

tively.

[0011] In the middle of each of the first and the second cores, a second coil and a third coil are respectively wound. The pair of the first core and the second core are fixed at their longitudinal end edges of U-shaped ends to both sides of wall of the slot member.

[0012] First data obtained from the first coil is mainly data regarding sectional area of a coin. Second data obtained from the second coil is mainly data regarding diameter of a coin. Therefore, by acquiring data for real coins and storing it in a memory in advance, it is possible to determine whether a particular coin passing the first coil and the second coil is real or fake by comparing the first data and the second data for the passing coin with the data stored in the memory.

[0013] When the dropping coin is determined to be real in a signal processing unit, a driving signal is transmitted to a solenoid that opens/closes a gate positioned in the coin passage, and the gate opens so that the coin is taken into a cashbox. When the coin is determined to be fake, no driving signal is transmitted to the solenoid, so that the gate remains closed. Therefore, the fake coin drops through the return slot for canceling (see for example, Patent document 2).

[0014] [Patent document 1] Japanese Patent Application Laid-open Publication JP-A 11-25311 (Page 2, Fig. 1)

[Patent document 2] Japanese Patent Application Laid-open Publication JP-A 10-326368 (Page 2, Fig. 1)

[Disclosure of the Invention]

[Problems to be solved by the Invention]

[0015] The first prior art as described above, however, encounters the following problems. To be more specific, when a fake coin clogging in the coin passage 71 is removed by natural drop, the canceling lever is pushed for opening the door and then the clogging coin is removed. However, as a result of repeated opening/closing operations of the door, abrasion of the bearing for the door 6 attached to the door pivot 75 increases the backlash to lead positional differences between the coin detecting coils coil 67, 68 fixed on the body side, and the detecting coils 77, 78 fixed on the door side so as to be surface-symmetric to these detecting coils. Due to these positional differences, the coil surfaces lose the symmetrical positional relationship, and the change in amplitude of a vibration signal whose amplitude changes with passage of a coin decreases, so that the accuracy of determining real or fake is deteriorated.

[0016] The second prior art encounters the following problems. To be more specific, the coin detecting coil for detecting a coin dropping directly downward from the coin slot is so configured that the coil is wound to surround the passage in the middle of the outer peripheral wall of the cylindrical slot. Accordingly, when a coin dropping directly downward from the coin slot clogs in the passage

of the slot member, it is sometimes impossible to remove the clogging coin because the slot member is cylindrical and no canceling means is provided.

[0017] It is an object of the present invention to prevent a positional difference from occurring between the opposing coin detecting coils even after repeated opening/closing of the door by way of operation of a canceling lever for removing clogging of coin.

It is another object of the present invention to provide a coin selector capable of reliably removing a coin clogging in a coin passage.

[0018] From EP-A-0 881 606 a coin selector is known in which a coin passage is formed by an inclined guide rail and side walls on both sides of the guide rail. When a coin put through a coin slot rolls on the guide rail while guided by the side walls, data for determining whether the coin is real or a fake is acquired by detecting coils attached symmetrically on the both side walls. The guide rail and at least a part of the both side walls are integrated to form a slot member.

[0019] From US-A-4 662 501, a coin acceptor mechanism is known with a coil which is wound on a former having a central opening corresponding to the dimensions of a coin to be checked. If a coin jam in the slot member of the coin selector occurs, a reject lever is pivotally provided comprising one arm which supports a cross member and a second arm which is shaped to define a nose portion. The lever can be turned in a clockwise direction wherein the nose enters the opening of the coin passage to clear the obstruction.

[0020] It is an object of the present invention to provide a coin selector with an improved coin jam resolving mechanism.

[0021] This object is achieved by the features of claim 1. Further advantageous improvements are subject-matters of the dependent claims.

[Means for solving the problems]

[0022] In a coin selector in which a coin passage is formed by a inclined guide rail and side walls on both sides of the guide rail, and when a coin put through a coin slot rolls on the guide rail while guided by the side walls, data for determining whether the coin is real or fake is acquired by detecting coils attached symmetrically on the both side walls, the guide rail and at least a part of the both side walls are integrated to form a slot member; the detecting coils are symmetrically attached on both side walls of the slot member; and a canceller that proceeds in a coin passage of the slot member to remove a coin is provided.

[Effect of the Invention]

[0023] Since the guide rail and at least a part of both side walls are integrated to form a slot member, and detecting coils are symmetrically attached on both side walls of the slot member, symmetrical positions of the

detecting coils only depend on both side walls of the slot member. Therefore, even if opening/closing of the door is frequently repeated, no positional difference occurs between the coin detecting coils.

[0024] Furthermore, even when a coin clogs in the coin passage formed in the slot member, the clogging coin can be securely removed because of provision of the canceller that proceeds in the coin passage of the slot member and removes a coin.

[Best mode for carrying out the Invention]

[0025] A guide rail and at least a part of side walls are integrated to form a slot member, and detecting coils are symmetrically attached to the both side walls of the slot member so that a positional difference between the coin detecting coils will not occur even after frequent repetition of opening/closing of the door. In addition, when coins clog in the coin passage because coins are continuously inserted or coins of different thickness and diameter are inserted, the clogging coins can be securely removed by the canceller that proceeds the coin passage of the slot member and removes coins is provided for removing the inserted coins.

[Embodiment]

[0026] In the following, embodiments of a coin selector of the present invention will be explained with reference to the attached drawings:

Fig. 1 is a left perspective view of an entire coin selector of one example of the present invention;

Fig. 2 is a right perspective view of an entire coin selector of one example of the present invention;

Fig. 3 is a bottom view of a coin selector of one example of the present invention;

Fig. 4 is a back view of a coin selector of one example of the present invention;

Fig. 5 is a plan view of a coin selector of one example of the present invention;

Fig. 6 is a side elevation showing the inside of a coin selector of one example of the present invention;

Fig. 7 is a perspective view of a coin selector of one example of the present invention in a door open state;

Fig. 8 is a perspective view of a coin selector of one example of the present invention in a door open state, viewed from backside;

Fig. 9 is a front view of A-A section of a coin selector of one example of the present invention;

Fig. 10 is an A-A sectional view of a coin selector of one example of the present invention;

Fig. 11 is a front view in which a coin passage of a coin selector of one example of the present invention is indicated by a hidden line;

Fig. 12 is a front view of B-B section of a coin selector of one example of the present invention;

Fig. 13 is a B-B sectional view of a coin selector of one example of the present invention;

Fig. 14 is a perspective view showing an internal structure of a coin selector of one example of the present invention, in which a canceller is in a standby position;

Fig. 15 is a perspective view showing an internal structure of a coin selector of one example of the present invention, in which a canceller is operating;

Fig. 16 is a perspective view showing an internal structure of a coin selector of one example of the present invention, in which a canceller is directly after completion of the operation;

Fig. 17 is a side elevation of C-C section of a coin selector of one example of the present invention;

Fig. 18 is a C-C sectional view showing the inside of a coin selector of one example of the present invention;

Fig. 19 is a side elevation of D-D section of a coin selector of one example of the present invention;

Fig. 20 is a D-D sectional view showing the inside of a coin selector of one example of the present invention;

Fig. 21 is a view of a backside of a door of a coin selector of one example of the present invention, in which a canceller is in a standby position;

Fig. 22 is a view of a backside of a door of a coin selector of one example of the present invention, in which a canceller is directly after completion of the operation;

Fig. 23A is a front view of a cylindrical coin detector in a coin selector of one example of the present invention;

Fig. 23B is a plan view of a cylindrical coin detector in a coin selector of one example of the present invention;

Fig. 24A is a side view of a coil base in a coin selector of one example of the present invention;

Fig. 24B is a view showing an internal condition of a coil C1 and a coil C2 in a coin selector of one example of the present invention; and

Fig. 25 is a block circuit view of a cylindrical coin detector of a coin selector of one example of the present invention.

[0027] As shown in Figs. 1 to 20, a coin selector 1 of the present invention is of a vertical box form and provided on the left side of the top with a coin slot 11 through which a coin is inserted. On the back end of the top is disposed a revolution canceling lever 5 which is revolvably provided in a body 2 and is operated for canceling the coin. Also provided are a door 10 that opens/closes in response to an operation of the canceling lever 5, a door lock 6 for revolving a door to cause the door 10 open, a canceller 7 for removing clogging of coins in a coin passage 22ab of the a slot body 22, and a coin detecting coil.

[0028] As shown in Fig. 5, the door 10 has a door hang-

ing portion 10a and a door hanging portion 10b on both sides of the door lock 6 in the right from the center of the door 10 while interposing the door lock 6 therebetween. The door hanging portion 10a is located on the left side of the back end of the door lock 6, and the door hanging portion 10b is located on the right side of the proximal end of the door lock 6. The door hanging portions 10a and 10b that are formed right from the center of the door 10 are revolvably fitted with a stationary axis 25 that is integrally formed on the upper part of the body 2 as shown in Fig. 6. In a position right from the center of the top of the door 10 and opposite a claw 6c formed near left of the proximal end of the door lock 6 as will be described below, a claw fixing portion 10c is formed as shown in Fig. 5. Therefore, the claw 6c formed in the door lock 6 is inserted into the claw fixing portion 10c formed in the door 10, so that the door 10 and the door lock 6 form a single unit. In the right end of the upper part of the door 10 shown in Fig. 2, a door slope portion 10d is formed having such a thickness that is small in the upper part but increases in the downward direction and inclining toward the body 2. A canceller sliding member 7e which is integrated with the canceller as will be described below slides while pushing the door slope portion 10d of the door, and the canceller 7 slightly moves toward the body 2. Simultaneously, a canceller spring hanging projection 7c slides on a door lock triangle slope portion 6b formed in the door lock 6. Under a coin pushing-out portion 7d of the door 10, an accommodating portion 10f of the coin pushing-out portion 7d is formed in a recess form. The coin pushing-out portion 7d is accommodated in the accommodating portion 10f. Inside the door 10 as will be described below, a coin detecting coil is attached.

[0029] Also provided is the door lock 6 disposed inside the coin selector 1 and operating when the door 10 is open. The door lock 6 has at its tip end a door lock slope portion 6a formed by the tip end of the door lock bending downward so that the door lock 6 has a generally L-shape for allowing a door lock pushing portion 5d having substantially a block C shape disposed toward the door lock 6 in the canceling lever 5 to contact and push in. As shown in Fig. 10, the door lock 6 has at its proximal end on the side of the door 10 a recess notch portion 6e, and the recess notch portion 6e is revolvably fitted into the stationary axis 25 integrally formed on the body 2 of the coin selector 1. Also, as shown in Fig. 2, on the left end of the rear part of the recess notch portion 6e formed in the proximal end of the door lock 6 on the side of the door 10, the claw 6c is formed. On the right side of the proximal end of the door lock, the door lock triangle slope portion 6b is provided. Through an operation of a canceling lever 5 which is revolvably provided while having a canceling lever pivot 21 on its rear portion, the canceller 7 revolvable about a pivot 9 of the canceller 7 on the upper part position on the side of the door 10 revolves, while a canceller spring hanging projection 7c formed in the top of the canceller slides on the door lock triangle slope 6b.

[0030] As shown in Fig. 5, on the right of the door lock

6 is provided the canceller 7 for canceling clogging of coins, and in the top of the canceller 7 are formed a canceller bend portion 7b of C-shape that contacts a distal end 5b of the canceling lever to allow the canceller to revolve, and a projecting portion 7a located right and below the bend portion 7b. Also, in the top of the canceller 7 is formed the canceller spring hanging projection 7c that slides on the door lock triangle slope 6b as described above. As shown in Fig. 14, the canceller 7 is a sheet molded member extending downward from the canceller 7, having a thin part extending from top to the middle part of the canceller 7, a middle part having an increased width, and a tapered and inclined part terminating at the distal end. The middle part having an increased width, and the tapered and inclined part terminating at the distal end constitute the coin pushing-out portion 7d. The coin pushing-out portion 7d proceeds to the coin passage 22ab of the slot member 22 and removes the coins clogging in the coin passage 22ab. Also, the canceller sliding member 7e extending downward from the left of the canceller bend portion 7b in the top of the canceller 7 shown in Fig. 2 is integrally formed. The canceller sliding member 7e slides on the door slope portion 10d disposed on the right end of the door 10 as described above, and the canceller 7 moves toward the body 2.

[0031] Also provided are a door cover 3 which is detachably provided on the left side of the door 10, and a canceling cover 4 of generally a trapezoidal form occupying almost lower half of the body 2. With regard to a coin passing member 13 pending downward on the right of the door 10 and allowing passage of coins in only one direction, a speed regulator 12 provided inside the door cover 3, and a coin passage 14 provided inside the canceling cover 4 and directly linked to a coin exit, a gate 23 is provided as shown in Fig. 11, for separation into an exit 16 for real coin and a return slot 15 for fake coin. The gate 23 is provided within the coin passage. If an inserted coin is determined to be real by comparison of data of a coin passing through the coin passage 22ab with data in a memory of a signal processing unit, a driving signal is transmitted to a solenoid 24 which is mounted left below in a back face part of the body 2 shown in Fig. 18 and the gate 23 is open, so that the real coin drops through the real coin exit 16.

[0032] As shown in Fig. 3, in the bottom face of the coin selector 1 is provided a coin exit through which coins drop while separated into real coins and fake coins as described above after determination of whether the coin is real or fake. Almost in the center of the left side of the bottom face, the real coin exit 16 is provided, and in the front side of the right side of the bottom face, the return slot 15 for the case of canceling of the coin is provided.

[0033] As shown in Fig. 4, on the back face of the body, a square rear cover 20 is detachably attached on the body 2 of the coin selector 1. On the side of the body 2 inside the rear cover 20, the solenoid for opening/closing the gate 23 as described above is attached so that it is in a left below the body 2. A canceling lever spring 19 is

attached between a projecting portion 5c of the canceling lever 5 formed in the lower part of the canceling lever 5 and a frame portion 2b of the rear cover 20 of the body in a position closer to a canceling lever revolving axis 21 from the center of the canceling lever 5. The canceling lever spring 19 is provided for restoring a standby position after revolution of the canceling lever 5 in the counter-clockwise direction viewed from the back side.

[0034] Also as shown in Fig. 21 and Fig. 22, on the side of the body 2 of the door 10 which is generally trap-ezoidal, namely near the center inside the door 10, a cylindrical coin detector 100 which is one example of the present invention is attached. In the cylindrical coin detector 100, the slot member 22 in which the coin passage 22ab is formed, and a coil base 30 on the outer peripheral wall of the slot member 22 are provided, and on both sides of the side wall of the slot member 22, a coil C1 and a coil C2 are attached. The slot member 22 is a rectangular cylinder formed by integrating a guide rail and at least a part of the side wall, and having in the center thereof the passage 22ab through which coins pass, and allowing attachment of a coil.

[0035] In attachment of the cylindrical coin detector 100 to the door 10, the cylindrical coin detector 100 is attached so as to incline downward in the right direction as shown in Fig. 21, so that a guide rail 22aa on the side of the door 10 and a passage 22ac under the coin passage 22ab possessed by the slot member 22 and through which a coin passes while rolling are flush with each other to constitute a continuous coin passage.

[0036] In the following, a constitution of the cylindrical coin detector 100 which is coin detecting means of the coin selector 1 will be explained while referring to Figs. 23A and 23B, and Figs. 24A and 24B. As shown in Fig. 23A, in the cylindrical coin detector 100, the slot member 22 having the coin passage 22ab as described above through which coins pass is provided with the coil base 30 and the coil C1 and the coil C2 disposed surface symmetrically on both sides of the side wall of the slot member 22. In brief, the cylindrical coin detector 100 is an integrated unit of the slot member 22, the coil base 30, the coil C1 and the coil C2. The slot member 22 is a rectangular cylinder which is a molded article of, for example, synthetic resin. The slot member 22 may be formed of rubber or wood, without limited to synthetic resins.

[0037] As shown in Fig. 23B and Fig. 24A, in the coil base 30, on the outer periphery in the position near one end of the slot member 22 in which the coin passage 22ab for allowing passage of coins, a first coil A1 is wound, and a first core 32 and a second core 33 having almost the same height and length with the rectangular U-shaped slot member are provided on both sides such that they stride across the first coil A1. The first core 32 is wound with a second coil B1 and the second core 33 is wound with a third coil B2.

[0038] Furthermore, as shown in Fig. 23B, in a position horizontally near the coil base 30, the coil C1 and the coil C2 are attached symmetrically on both sides of the outer

wall of the slot member 22. As shown in Fig. 24B, the coil C1 has a third core 31a and the coil C2 has a fourth core 31b. Inside the above core 31a of the coil C1, there is a third core (34) which is a rectangular core leading to the middle point of the core from the proximal end of the core, and a fourth coil (31ca1) wound on the third core is provided, and there is a fourth core (35) which is a circular core positioned near the distal end of the core and a fifth coil (31cb1) wound on the fourth core is provided. Likewise, for the coil C1, inside the core 31b, there is a third core (36) which is a rectangular core leading to the middle point of the core from the proximal end of the core, and a fourth coil (31ca2) wound on the third core is provided, and there is a fourth core (37) which is a circular core positioned near the distal end of the core and a fifth coil (31cb2) wound on the fourth core is provided. In the above fourth coil and the fifth coil, although the positional relationship with a real coin depends on the diameter of the coin, the fourth coil detects an upper position from around the center of the coin and the fifth coil detects a lower position from around the center of the coin.

[0039] As described above, since the cylindrical coin detector 100 which is coin detecting means is an integrated unit of the slot member 22, the coil base 30, the coil C1 and the coil C2, any misalignment between the coil base and the coil C1 and coil C2 will not occur after opening/closing the door 10. The coil base 30 detects the material of coin. The fourth coils (31ca1, 31ca2) which are inside coils of the coil C1 and the coil C2 detect the diameter of coin. The fifth coil (31cb1, 31cb2) detects the thickness of coin. And as shown in a block circuit view of Fig. 25 which is a coin detecting and determining circuit in the cylindrical coin detector 100 of Fig. 25 as will be described below, a signal processing unit of a CPU 53 compares data of a coin passing through the coin passage 22ab with data of a real coin stored in advance in a memory of the signal processing unit of a CPU 53, whereby whether the coin is real or fake is determined.

[0040] Now, explanation will be made using Fig. 25 showing a detection circuit of the cylindrical coin detector 100 which is coin selecting means as described above. The first coil A1 of the coil base 30 attached to the slot member 22 of the cylindrical coin detector 100 is connected to an oscillation circuit 40, and the second coil B1 and the third coil B2 are connected in serial and connected to an oscillation circuit 41.

[0041] The fourth coil (31ca1) of the coil C1 and the fourth coil (31ca2) of the coil C2 are connected in serial and connected to an oscillation circuit 42. The fourth coil (31cb1) of the coil C1 and the fifth coil (31cb2) of the coil C2 are also connected in serial and connected to an oscillation circuit 43.

[0042] Furthermore, to the oscillation circuit 40 a detector circuit 44 is connected which is then connected to a rectification circuit 48. The rectification circuit 48 is connected to an A/D converter 52 that converts an analogue signal to a digital signal.

[0043] Likewise, to the oscillation circuits 41, 42 and 43 detector circuits 45, 46 and 47 are connected which are then connected to rectification circuits 49, 50 and 51. The rectification circuits 49, 50 and 51 are connected to the A/D converter 52 that converts an analogue signal to a digital signal. The A/D converter 52 is connected to the signal processing unit 53 such as a CPU, and to this signal processing unit 53, a memory 54 and the gate 23 are connected.

[0044] When the coin laterally passes the coil possessed by the slot member 22 of the cylindrical coin detector 100, the amplitude of an oscillation signal by the oscillation circuit 40 is changed, amplitudes of oscillation signals by the oscillation circuits 41, 42 and 43 are changed. The oscillation signal from the oscillation circuit 40 whose amplitude is changed by passage of coin is detected by the detector circuit 44, rectified by the rectification circuit and then converted into a digital signal by the A/D converter 52, which digital signal is transmitted to the signal processing unit 53. Likewise, the oscillation signals from the oscillation circuits 41, 42 and 43 whose amplitudes are changed by passage of coin are detected by the detector circuits 45, 46 and 47, rectified by the rectification circuits 49, 50 and 51, and converted into digital signals by the A/D converter 52, which digital signals are transmitted to the signal processing unit 53.

[0045] When data for real coin is acquired and stored in advance in the memory 54, the signal processing unit 53 compares coin data acquired from the coin passing through the coin passage 22ab of the cylindrical coin detector 100 with the data for real coin stored in advance in the memory 54. In the signal processing unit 53, when the dropping coin is determined to be real, a driving signal is transmitted to the gate 23 and the coin is taken into the cashbox (not shown). The coin selector is configured as described above.

[0046] The first core 32, the second core 33, the third cores 34 and 36, and the fourth cores 35 and 37 of the cylindrical coin detector 100 may be formed of ferrite, iron, copper and the like materials.

[0047] In the above description, the constitution of the coils of the coin detecting means was explained while taking a cylindrical coin detector as a working example. However, the constitution of the coin detecting means is not limited to the cylindrical coin detector, but a double coil made up of a coil for detecting diameter of coin and a coin for detecting material and thickness of a coin may be mounted symmetrically on both sides of the aforementioned slot member 22 as explained in the conventional art while interposing the slot member 22 therebetween. In another constitution of the coin detecting means, a triplet coil made up of a coil for detecting diameter of coin, a coil for detecting material, and a coil for detecting thickness may be mounted symmetrically on both sides of the slot member 22 while interposing the slot member 22 therebetween.

[0048] With the constitutions as described above, it is possible to achieve a coin detecting coil of an integrated

structure as is the same with the cylindrical coin detector, and the slot member 22 and the coin detecting coil are integrally formed, so that a positional difference between symmetric coin detecting coils will not occur after opening/closing of the door 10 of the coin selector 1.

[0049] Next, an operation of the coin selector 1 will be explained below. First, a coin inserted through the coin slot 11 rolls on the guide rail 22aa formed inside the door 10 of the coin selector 1 and inclining in the direction of the cylindrical coil detecting coil from the inner side wall of the body 2 under the coin slot, and then passes through the coin passage 22ab possessed by the slot member 22 of the cylindrical coin detector 100.

[0050] The coin passing through the above coin passage 22ab is detected for its material, diameter and thickness by the coil base 30, the coil C1 and the fourth coil and the fifth coil which are inner coils of the coil C2 possessed by the cylindrical coin detector 100 provided in the door 10. Then as described above, the signal processing unit compares data of the coin passing through the coin passage 22ab with the data for real coin stored in advance in the memory and determines whether the coin passing through the coin passage 22ab is real or fake. When the coin is determined to be real, the solenoid 24 is turned ON. Upon turning ON of the solenoid 24, the gate 23 of the coin passage 14 is opened, and the real coin drops down through the real coin exit 16 formed in the bottom face of the coin selector 1.

[0051] The real coin dropping through the real coin exit 16 is accommodated into the cashbox (not shown) for real coin provided inside an automatic vending machine or the like.

[0052] On the other hand, when the coin is determined to be fake, the solenoid 24 is not turned ON, so that the coin passage is still closed by the gate 23. Therefore, the fake coin is excluded from the guide rail by the gate 23, and the fake coin is returned outside through the return slot 15 and cancelled.

[0053] When coins clog in the coin passage 22ab of the cylindrical coin detector 100, the coins are removed by the canceling means. To be more specific, the canceling means is revolvably disposed to the body 2, the canceling lever pushing portion 5a of the revolution canceling lever 5 is rotated downwardly for opening the lower part of the door 10 frontward, while the coin pushing-out portion 7d which is a tip end of the canceller 7 proceeds from a direction opposite to the rolling direction of the coin in the coin passage 22ab of the slot member 22 to remove the clogging coins from the coin passage 22ab.

[0054] The above operation together with the mechanism of the coin selector will be explained in more detail with reference to the attached drawings. By operating the canceling lever 5, an operation of the door lock 6, an operation of opening the door 10, and an operation of the coin pushing-out portion 7d of the coin canceller 7 are conducted almost simultaneously.

[0055] In Figs. 5 to 20, as the canceling lever pushing portion 5a is moved downward, the canceling lever 5 ro-

tates downward about the canceling lever pivot 21, as shown in Fig. 7. In the condition that the distal end 5b of the canceling lever contacts the canceller projecting portion 7a, as the canceling lever 5a moves downward, the canceller projecting portion 7a is pushed in downwardly by the canceling lever projecting portion 5b, and the canceller 7 rotates clockwise about the canceller pivot 9. As the canceling lever 5 further moves downward, the tip end 5b of the canceling lever comes into contact with the canceller bend portion 7b from the canceller projecting portion 7a and further rotates the canceller 7 in the same direction.

[0056] Simultaneously with the above operation, the substantially block C-shaped door lock pushing portion 5d of the canceling lever 5 comes into contact with the door lock slope portion 6a and pushes down the door lock 6a. As the substantially block C-shaped door lock pushing portion 5d of the canceling lever 5 further pushes down the door lock 6a, as shown in Fig. 10, the door lock slope portion 6a becomes almost parallel with the rear cover 20. At this time, the door 10 revolves about the stationary axis 25.

[0057] As shown in Fig. 8, when the canceling lever pushing portion 5a has moved until it comes into abutment with the canceling lever stopping portion 2a provided in the body 2 of the coin selector 1, or when the canceling lever 5 has moved to its terminal position, a rear wheel part of the door lock 6 pushes the claw fixing portion 10c on the top of the door 10 in a clockwise direction, and the door hanging portions 10a and 10b revolves about the stationary axis 25, so that the door 10 opens such that a lower part of the door 10 is in a position anterior to the body 2, as shown in Figs. 7 and 10. The canceller 7 slides toward the body 2 relative to the pivot 9.

[0058] In association with the above-described operation, the canceller 7 rotates in a clockwise direction as the tip end 5b of the canceling lever pushes into the canceller bend portion 7b, and when it has rotated by one third, the canceller sliding member 7e slides while it pushes the door slope portion 10d of the door 10. Then the coin pushing-out portion 7d of the canceller 7 moves in the direction of the body 2 from the accommodating portion 10f of the coin pushing-out portion 7d formed on the side of the door 10, and the canceller 7 moves slightly in an inward direction of the body 2. At the same time, the canceller spring hanging projection 7c slides on the door lock triangle slope portion 6b formed in the door lock 6. At this time, the door 10 is slightly open.

[0059] As shown in Fig. 15, the coin pushing-out portion 7d which is the tip end of the canceller 7 moves from the direction opposite to the rolling direction of the coin, into the coin passage 22ab possessed by the slot member 22 of the cylindrical coin detector 100 simultaneously with the above operation.

[0060] As shown in Fig. 8 and Fig. 16, as the canceling lever 5 is moved downward to its terminal position, rotation of the canceller 7 stops, and concurrently with the door opening, the entire coin pushing-out portion 7d

moves into the coin passage 22ab possessed by the slot member 22 from the direction opposite to the rolling direction of the coin, as shown in Figs. 16 and 20, and the tip end slightly protrudes from the coin passage 22ab.

[0061] Therefore, in the above coin canceling means, the coin pushing-out portion 7d at the tip end of the canceller 7 moves into the coin passage 22ab, so that it is possible to remove and cancel the clogging coins.

[0062] When pushing of the canceling lever 5 is stopped, the canceling lever 5 returns to the standby position due to the elasticity of the canceling lever spring 19 shown in Fig. 4, the door lock 6 returns to the standby position due to the elasticity of the spring (not shown) provided inside the door lock slope portion, and the canceller 7 returns to the standby position due to the elasticity of a canceller returning spring 8 shown in Fig. 1.

[Industrial Applicability]

[0063] Since the coin detecting coils which are integrally formed with the slot member are attached inside the door of the coin selector, a positional difference between coil surfaces will not occur. Accordingly, an accuracy of determining whether a coin is real or fake will not deteriorate. In addition, the clogging is securely eliminated even in the case of coin clogging, effective applicability is expected in automatic vending machines, game machines and the like.

[Brief explanation of drawings]

[0064] Fig. 1 is a left perspective view of an entire coin selector of one example of the present invention;

Fig. 2 is a right perspective view of an entire coin selector of one example of the present invention;

Fig. 3 is a bottom view of a coin selector of one example of the present invention;

Fig. 4 is a back view of a coin selector of one example of the present invention;

Fig. 5 is a plan view of a coin selector of one example of the present invention;

Fig. 6 is a side elevation showing the inside of a coin selector of one example of the present invention;

Fig. 7 is a perspective view of a coin selector of one example of the present invention in a door open state;

Fig. 8 is a perspective view of a coin selector of one example of the present invention in a door open state, viewed from backside;

Fig. 9 is a front view of A-A section of a coin selector of one example of the present invention;

Fig. 10 is an A-A sectional view of a coin selector of one example of the present invention;

Fig. 11 is a front view in which a coin passage of a coin selector of one example of the present invention is indicated by a hidden line;

Fig. 12 is a front view of B-B section of a coin selector

of one example of the present invention;
 Fig. 13 is a B-B sectional view of a coin selector of one example of the present invention;
 Fig. 14 is a perspective view showing an internal structure of a coin selector of one example of the present invention, in which a canceller is in a standby position;
 Fig. 15 is a perspective view showing an internal structure of a coin selector of one example of the present invention, in which a canceller is operating;
 Fig. 16 is a perspective view showing an internal structure of a coin selector of one example of the present invention, in which a canceller is directly after completion of the operation;
 Fig. 17 is a side elevation of C-C section of a coin selector of one example of the present invention;
 Fig. 18 is a C-C sectional view showing the inside of a coin selector of one example of the present invention;
 Fig. 19 is a side elevation of D-D section of a coin selector of one example of the present invention;
 Fig. 20 is a D-D sectional view showing the inside of a coin selector of one example of the present invention;
 Fig. 21 is a view of a backside of a door of a coin selector of one example of the present invention, in which a canceller is in a standby position;
 Fig. 22 a view of a backside of a door of a coin selector of one example of the present invention, in which a canceller is directly after completion of the operation;
 Fig. 23A is a front view of a cylindrical coin detector in a coin selector of one example of the present invention;
 Fig. 23B is plan view of a cylindrical coin detector in a coin selector of one example of the present invention;
 Fig. 24A is a side view of a coil base in a coin selector of one example of the present invention;
 Fig. 24B is a view showing an internal condition of a coil C2 and a coil C2 in a coin selector of one example of the present invention;
 Fig. 25 is a block circuit view of a cylindrical coin detector of a coin selector of one example of the present invention.
 Fig. 26 is a perspective view showing an entire conventional coin selector;
 Fig. 27 is a perspective view of a conventional coin selector in a door open state;
 Fig. 28 is a back view showing the inside of a conventional coin selector; and
 Fig. 29 is a front view showing the inside of a conventional coin selector in which a coin passage is indicated by a hidden line.

[Explanation of reference numerals]

[0065]

1	coin selector
2	body
3	door cover
5	canceling lever
5d	tip end
6	door lock
7	canceller
7a	canceller projecting portion
7b	canceller bend portion
10	coin pushing-out portion
9	pivot
10	door
22	slot member
22aa	guide rail
15	22ab coin passage
25	stationary axis
30	coil base
A1	first coil A1
B1	second coil B1
20	B2 third coil B2
C1	coil C1
C2	coil C2
31a	third core of coil C1
31b	fourth core of coil C2
25	31ca1 fourth coil of coil C1
31ca2	fourth coil of coil C2
31cb1	fifth coil of coil C1
31cb2	fifth coil of coil C2
32	first core
30	33 second core
34	third core of coil C1
35	fourth core of coil C1
36	third core of coil C2
37	fourth core of coil C2
35	100 cylindrical coin detector

Claims

- 40 1. A selector is provided in which a coin passage is formed by an inclined guide rail and side walls on both sides of the guide rail, and when a coin put through a coin slot rolls on the guide rail while guided by the side walls, data for determining whether the coin is real or fake is acquired by a detecting coil attached on at least one of the side walls, wherein the guide rail and at least a part of the at least one side wall are integrated to form a slot member (22) ; the detecting coil is attached on the side wall of the slot member (22) ; and a canceller (7) that proceeds in a coin passage (22ab) of the slot member (22) to remove a coin is provided, wherein one of the side walls is a part of a body (2) of the coin selector, the other of the side walls is a part of a door (10) that opens/closes the body (2) of the coin selector, and the slot member (22) is fixed on the door (10).
- 45
- 50
- 55

2. The coin selector according to claim 1, wherein the

canceller (7) is revolvably provided in the door (10), and the door (10) is removable from the body (2) by an operation of a canceling lever (5) that revolves in relation to the body (2), while the canceller (7) proceeds into the coin passage (22ab).

3. The coin selector according to claim 2, wherein the canceller (7) is adapted to proceed to the coin passage (22ab) of the slot member (22) from the direction opposite to the rolling direction of the coin.
4. The coin selector according to claim 2 or 3, wherein the canceller (7) includes a canceller projecting portion (7a) integrally formed in the top of the canceller (7) that is movable while contacting with a tip end (5d) of the canceling lever (5), and a canceller bend portion (7b); the canceller (7) is adapted to revolve about a pivot (9) provided in the door (19) as the door (10) revolves about a stationary axis (25) provided in the body (2) by way of an operation of the canceling lever (5); and a coin pushing-out portion (7d) which is a tip end of the canceller (7) is provided and adapted to proceed in the coin passage (22ab) where the slot member (22) is disposed.

Patentansprüche

1. Eine Münzauswahlvorrichtung ist vorgesehen, bei der ein Münzdurchgang durch eine geneigte Führungsschiene und an beiden Seiten der Führungsschiene befindliche Seitenwände ausgebildet ist, und wenn eine durch einen Münzschlitz eingeschobene Münze auf der Führungsschiene rollt, während sie durch die Seitenwände geführt wird, werden durch eine Erfassungsspule, die an mindestens einer der Seitenwände angebracht ist, Daten zum Ermitteln, ob die Münze echt oder eine Fälschung ist, erworben, wobei die Führungsschiene und mindestens ein Teil der mindestens einen Seitenwand einstückig sind, um ein Schlitzelement (22) auszubilden; die Erfassungsspule an der Seitenwand des Schlitzelements (22) angebracht ist; und ein Entferner (7), der in einem Münzdurchgang (22ab) des Schlitzelements (22) fortschreitet, derart vorgesehen ist, um eine Münze zu entfernen, wobei eine der Seitenwände einem Teil des Körpers (2) der Münzauswahlvorrichtung und die andere Seitenwand einem Teil einer Tür (10) entspricht, die den Körper (2) der Münzauswahlvorrichtung öffnet/schließt, und das Schlitzelement (22) an der Tür (10) befestigt ist.
2. Münzauswahlvorrichtung nach Anspruch 1, wobei der Entferner (7) drehbar in der Tür (10) vorgesehen ist, und die Tür (10) durch einen Betrieb eines Entferners (7), der sich bezüglich des Körpers (2)

dreht, vom Körper (2) abnehmbar ist, während der Entferner (7) im Münzdurchgang (22ab) fortschreitet.

3. Münzauswahlvorrichtung nach Anspruch 2, wobei der Entferner (7) derart angepasst ist, um von der zur Rollrichtung der Münze gegenüberliegenden Richtung zu dem Münzdurchgang (22ab) des Schlitzelements (22) fortzuschreiten.
4. Münzauswahlvorrichtung nach Anspruch 2 oder 3, wobei der Entferner (7) einen vorragenden Entfernerschnitt (7a), der einstückig am oberen Ende des Entferners (7), der während er mit einem spitzen Ende (5d) des Entferners (5) in Kontakt steht, bewegbar ist, ausgebildet ist, und einen gebogenen Entfernerschnitt (7b) beinhaltet; wobei der Entferner (7) derart angepasst ist, um einen in der Tür (19) vorgesehenen Drehpunkt (9) zu drehen, da sich die Tür (10) durch ein Betätigen des Entferners (5) um eine stationäre Achse (25), die in dem Körper (2) vorgesehen ist, dreht; und ein Münzausschiebeabschnitt (7d), der einem spitzen Ende des Entferners (7) entspricht, derart vorgesehen und angepasst ist, um im Münzdurchgang (22ab), bei dem das Schlitzelement (22) angeordnet ist, fortzuschreiten.

Revendications

1. Sélecteur de pièce de monnaie dans lequel un passage de pièce de monnaie est formé par un rail de guidage incliné et des parois latérales sur les deux côtés du rail de guidage, et lorsqu'une pièce de monnaie placée à travers une fente de pièce de monnaie roule sur le rail de guidage tout en étant guidée par les parois latérales, les données destinées à déterminer si la pièce de monnaie est vraie ou fausse sont acquises par une bobine de détection fixée à au moins une des parois latérales, dans lequel le rail de guidage et au moins une partie de la au moins une paroi latérale sont intégrés pour former un élément de fente (22) ; la bobine de détection est fixée sur la paroi latérale de l'élément de fente (22) ; et un annuleur (7) qui avance dans un passage de pièce de monnaie (22ab) de l'élément de fente (22) pour retirer une pièce de monnaie est prévu, dans lequel une des parois latérales est une partie d'un corps (2) du sélecteur de pièce de monnaie, l'autre des parois latérales fait partie d'une porte (10) qui ouvre/ferme le corps (2) du sélecteur de pièce de monnaie (2), et l'élément de fente (22) est fixé sur la porte (10).
2. Sélecteur de pièce de monnaie selon la revendication 1, dans lequel l'annuleur (7) est prévu de manière rotative dans la porte (10), et la porte (10) peut

être retirée du corps (2) en actionnant un levier d'annulation (5) qui tourne par rapport au corps (2), tandis que l'annuleur (7) avance à l'intérieur du passage de pièce de monnaie (22ab).

5

3. Sélecteur de pièce de monnaie selon la revendication 2, dans lequel l'annuleur (7) est adapté pour avancer vers le passage de pièce de monnaie (22ab) de l'élément de fente (22) depuis la direction opposée à la direction de roulement de la pièce de monnaie. 10
4. Sélecteur de pièce de monnaie selon la revendication 2 ou 3, dans lequel l'annuleur (7) comporte une partie de projection d'annuleur (7a) formée d'un seul tenant dans la partie supérieure de l'annuleur (7) qui est mobile tout en étant en contact avec une extrémité en pointe (5d) du levier d'annulation (5), et une partie fléchée d'annuleur (7b) ; l'annuleur (7) est adapté pour tourner autour d'un pivot (9) prévu dans la porte (19) à mesure que la porte (10) tourne autour d'un axe stationnaire (25) prévu dans le corps (2) en actionnant le levier d'annulation (5) ; et une partie de poussée de pièce de monnaie (7d) qui est une extrémité en pointe de l'annuleur (7) est prévue et adaptée pour avancer dans le passage de pièce de monnaie (22ab) dans lequel l'élément de fente (22) est disposé. 15 20 25

30

35

40

45

50

55

Fig. 1

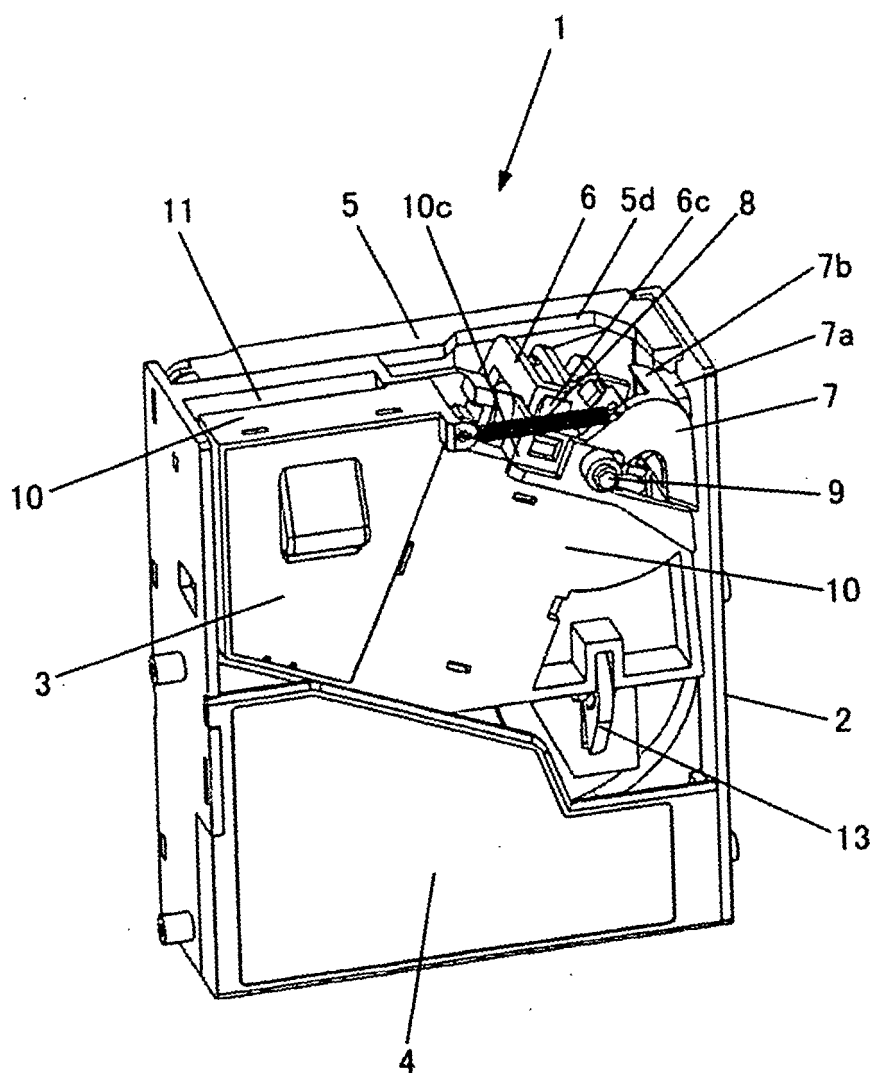


Fig. 2

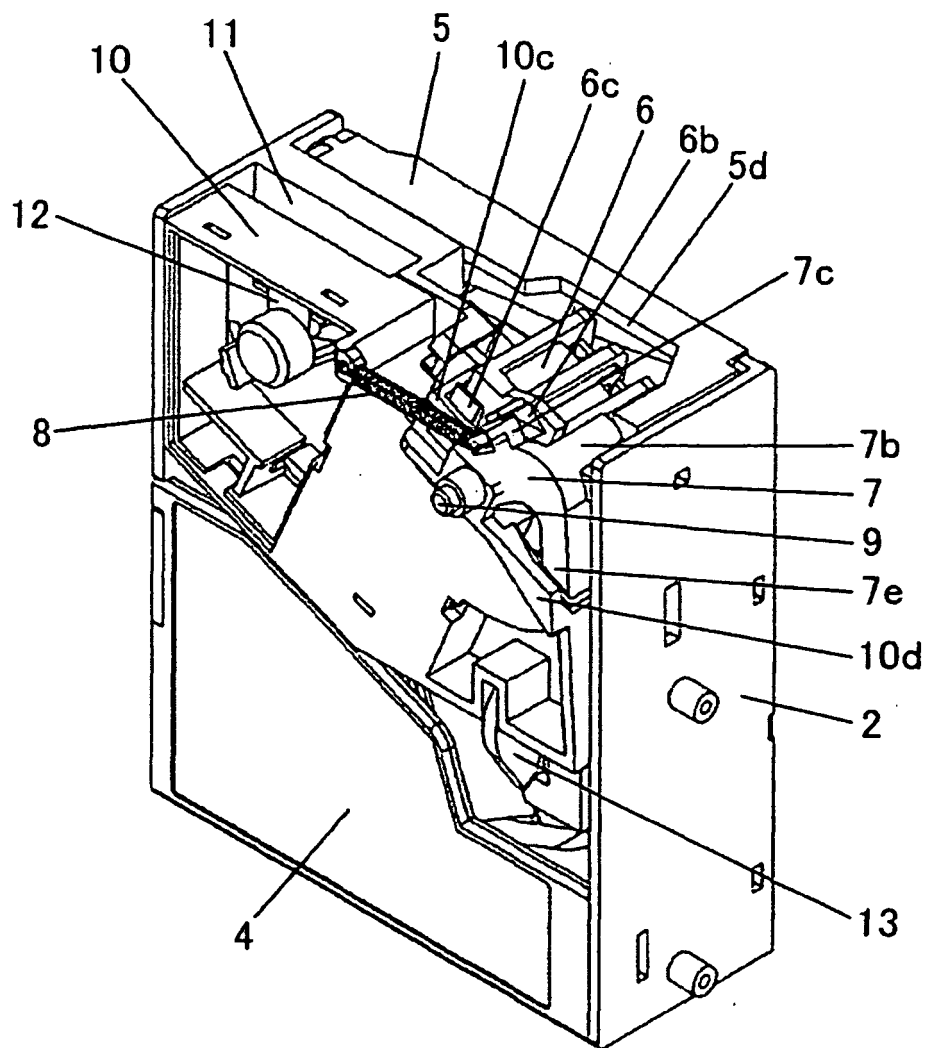


Fig. 3

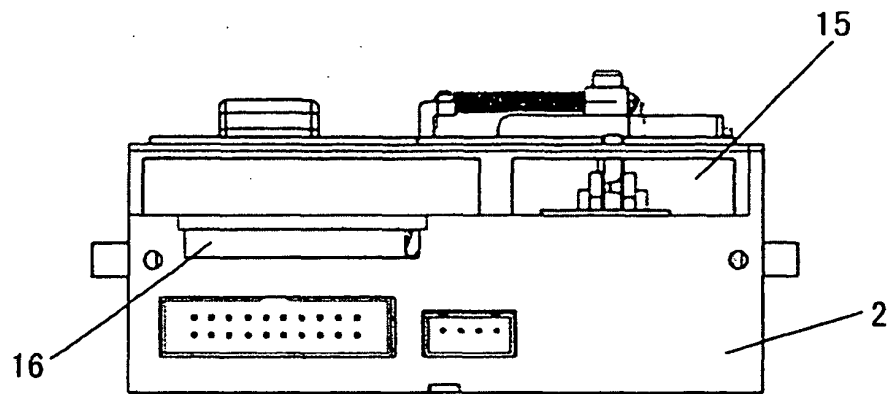


Fig. 4

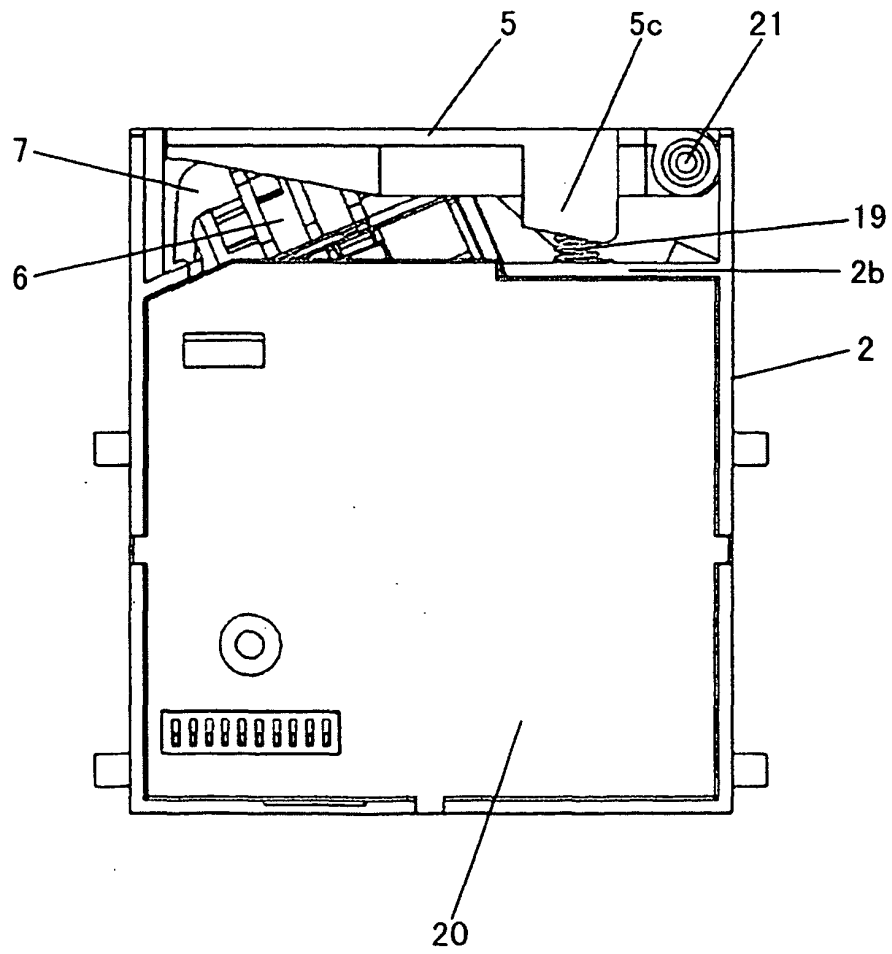


Fig. 5

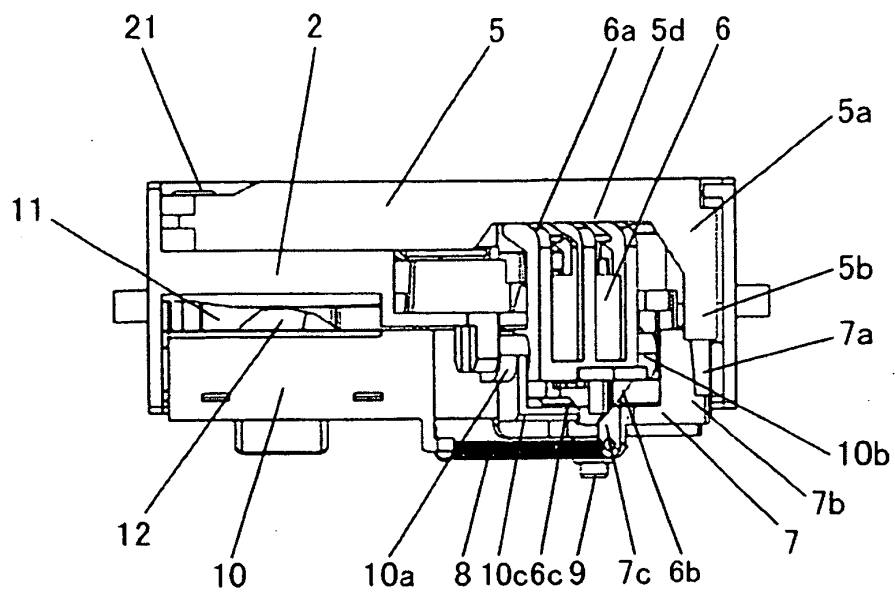


Fig. 6

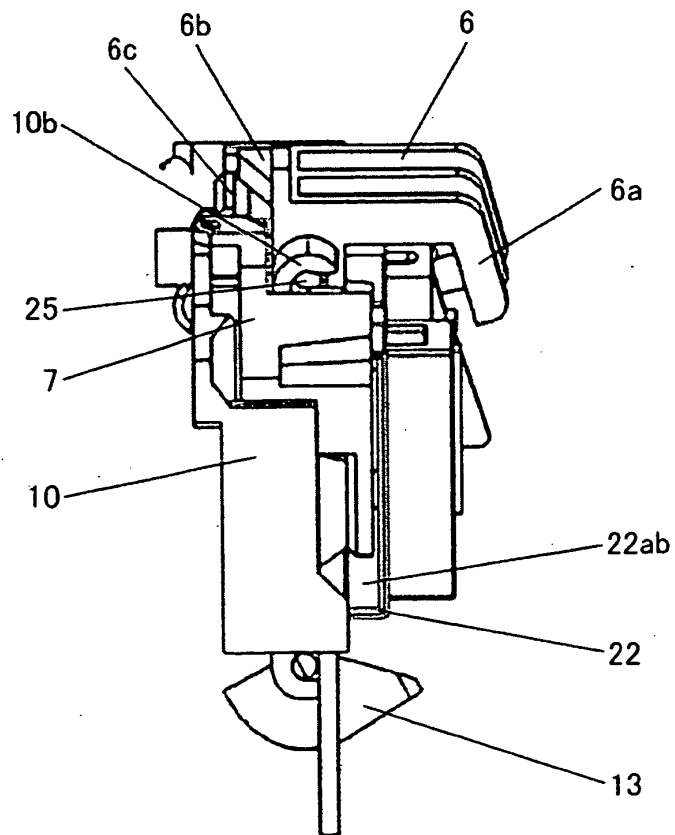


Fig. 7

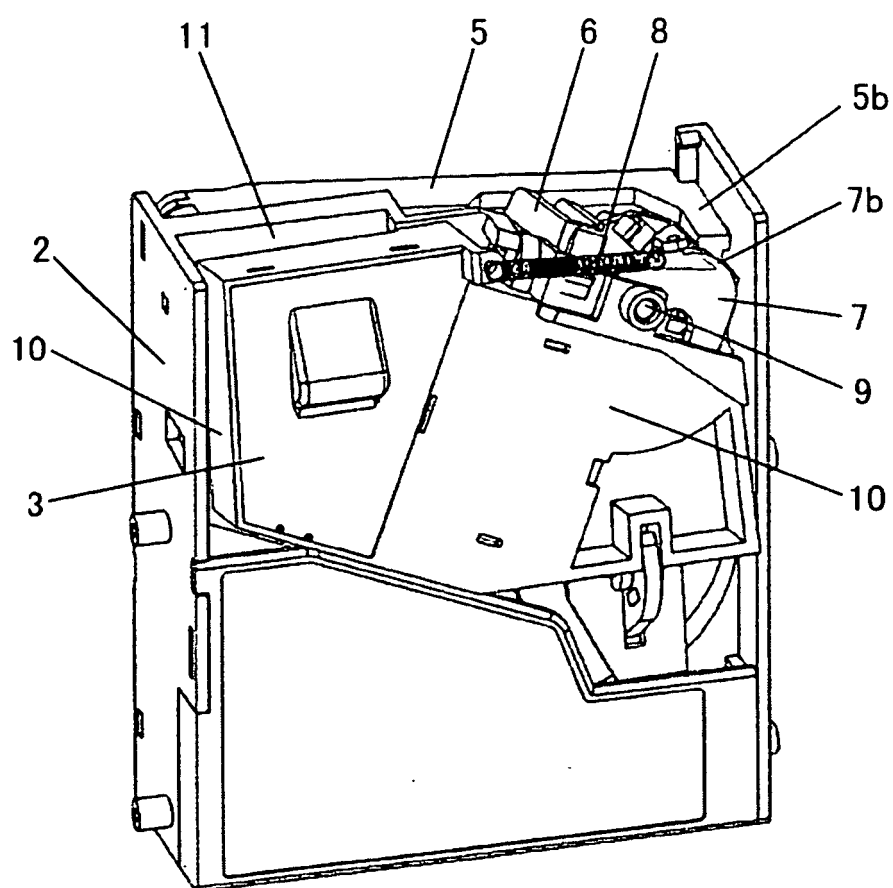


Fig. 8

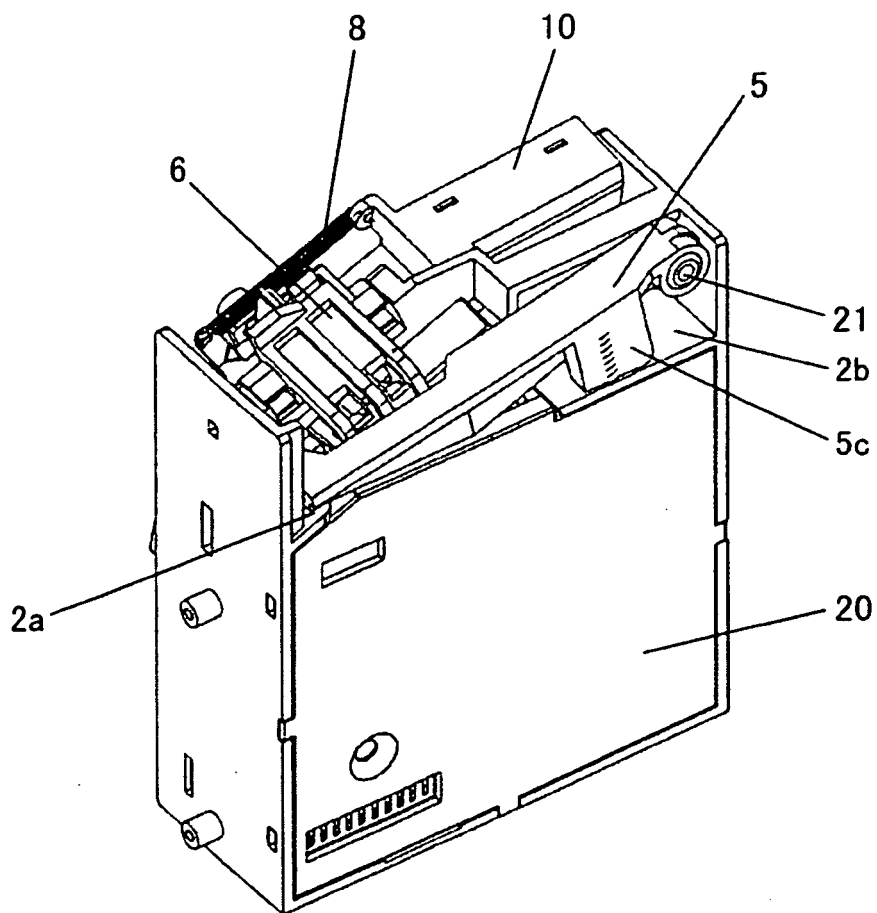


Fig. 9

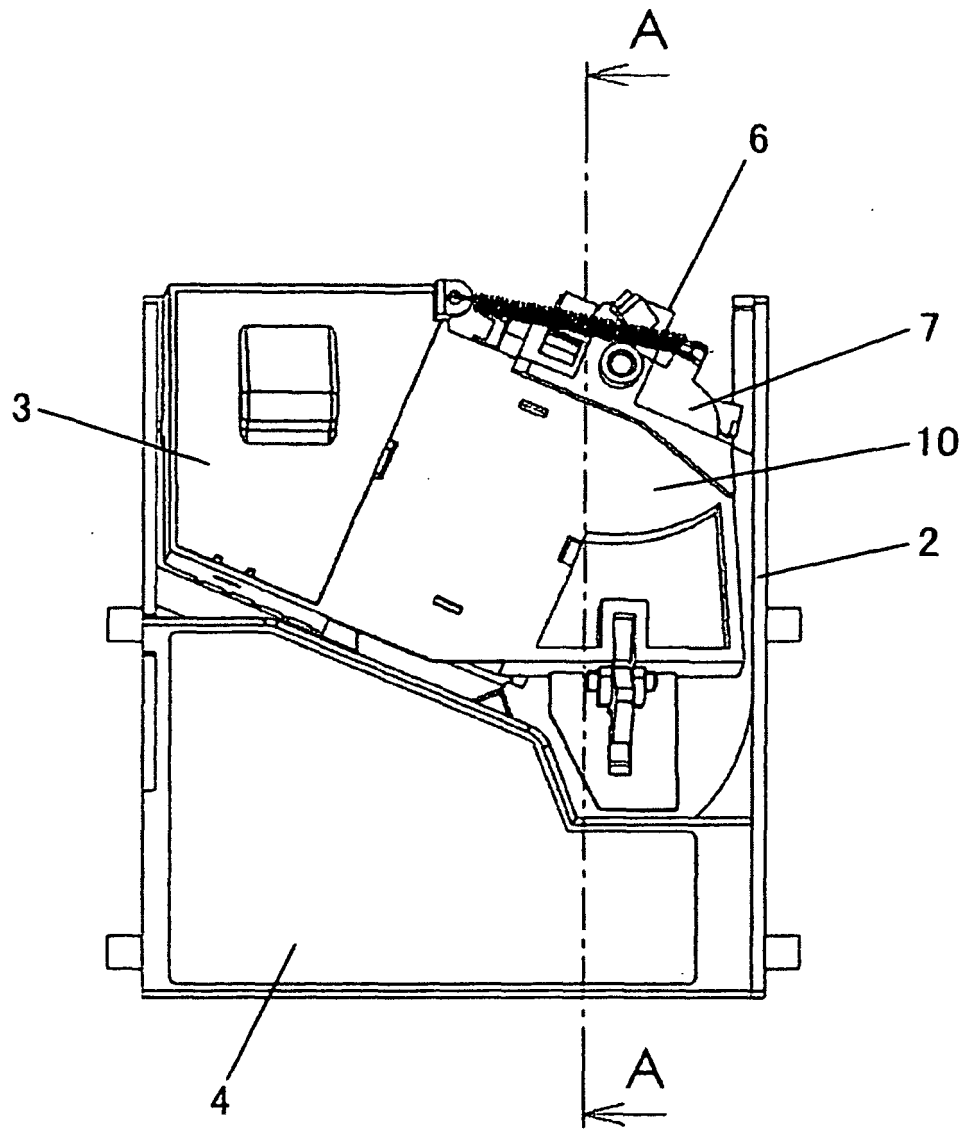


Fig. 10

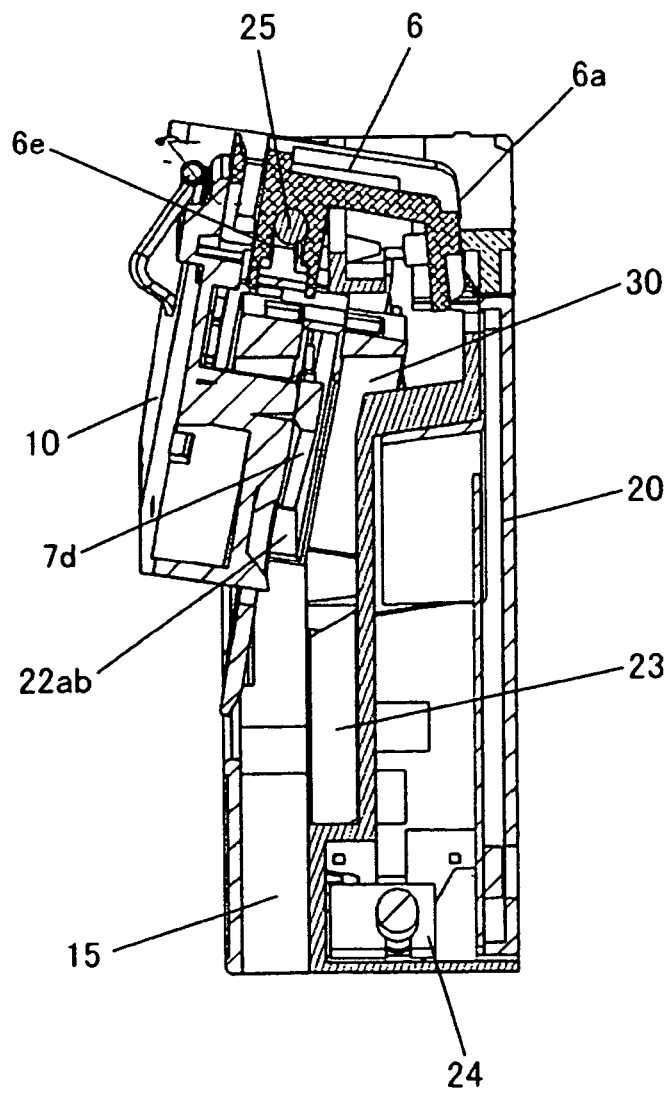


Fig. 11

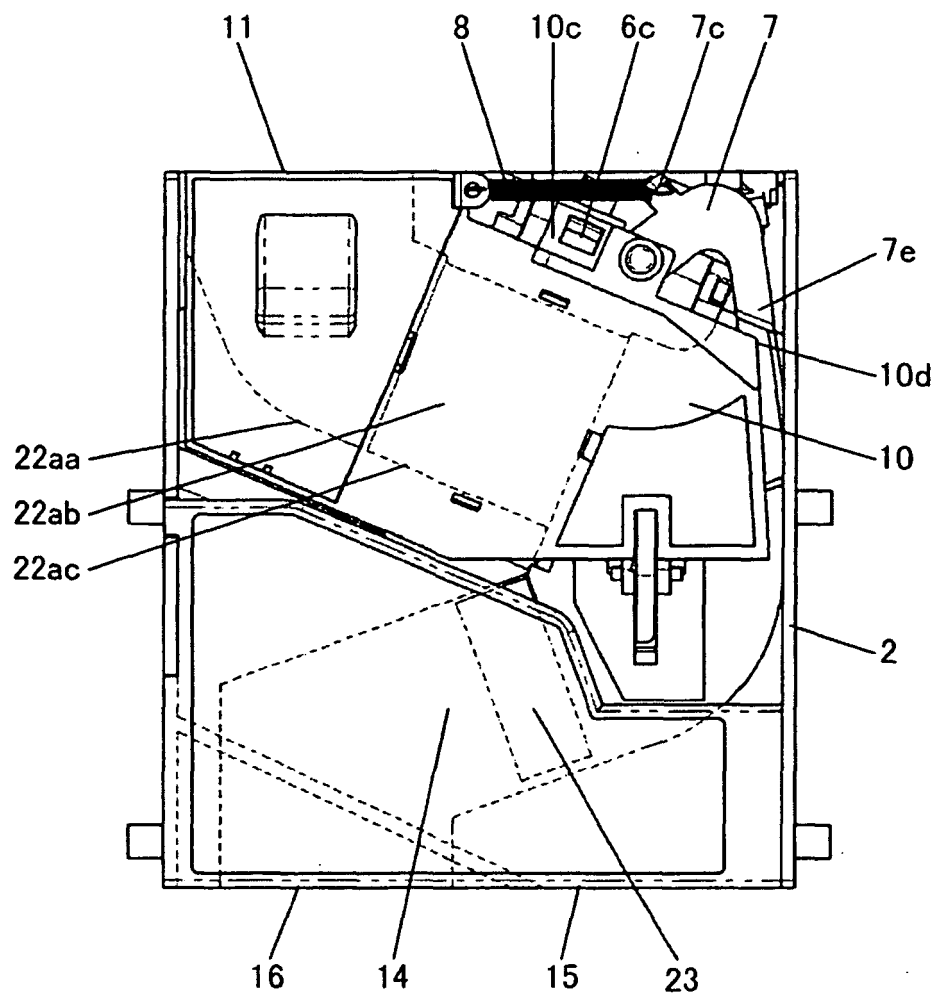


Fig. 12

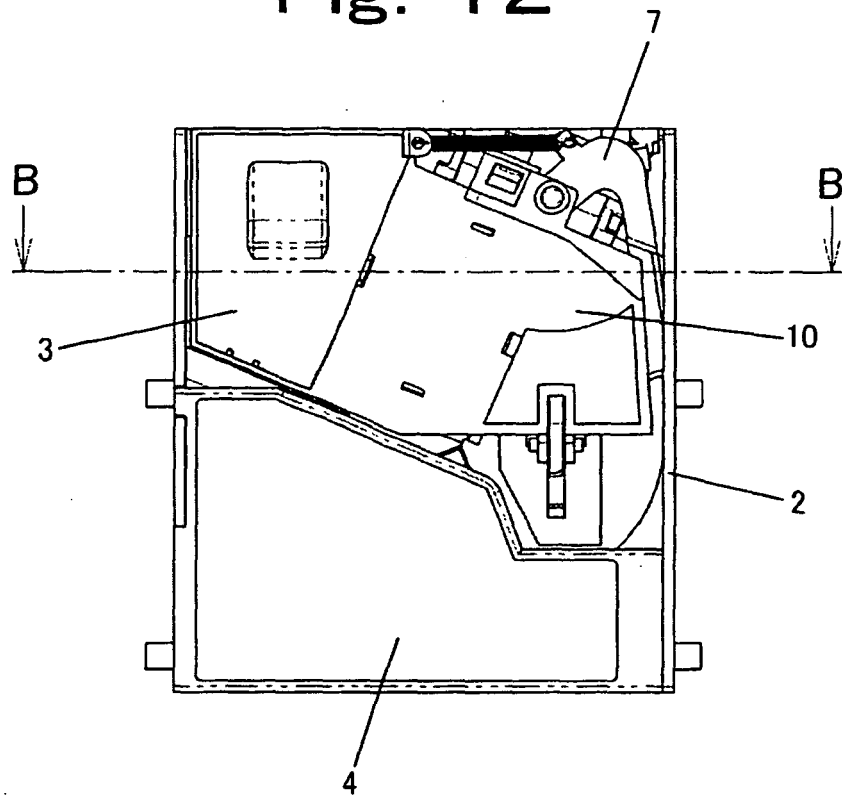


Fig. 13

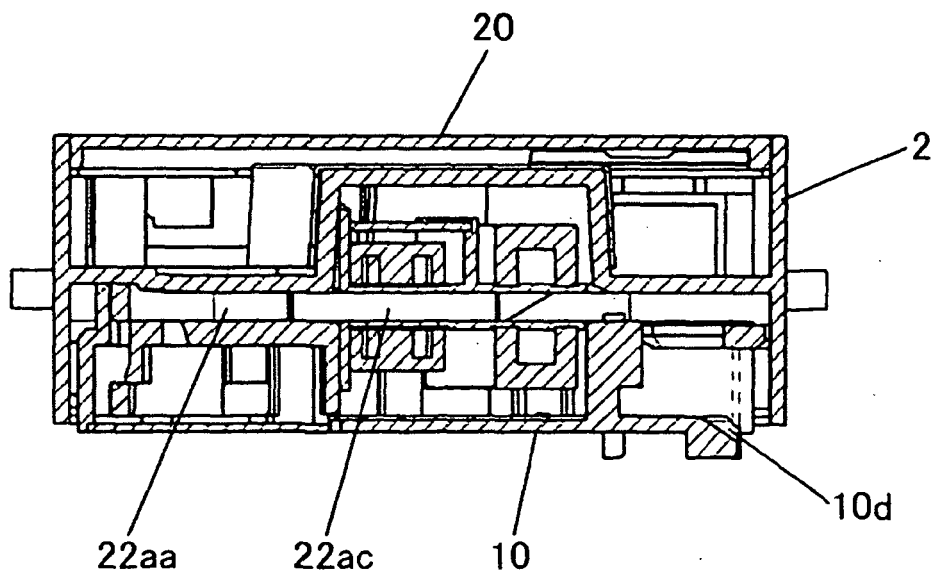


Fig. 14

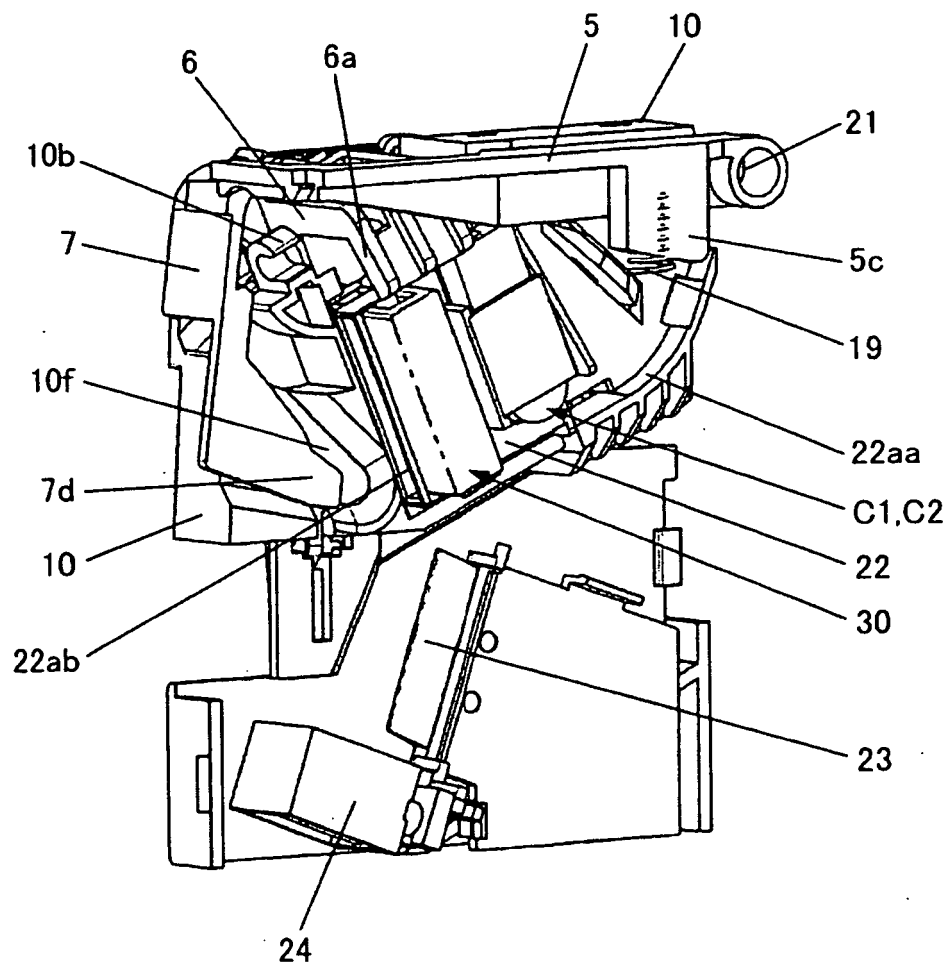


Fig. 15

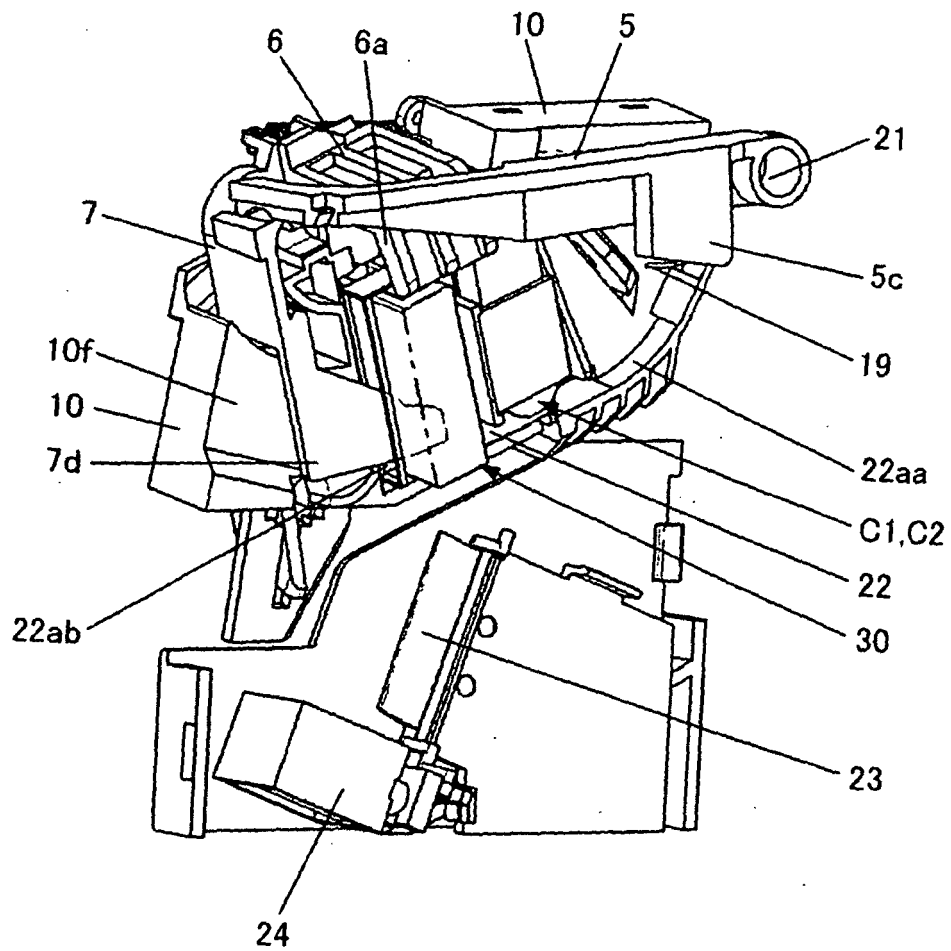


Fig. 16

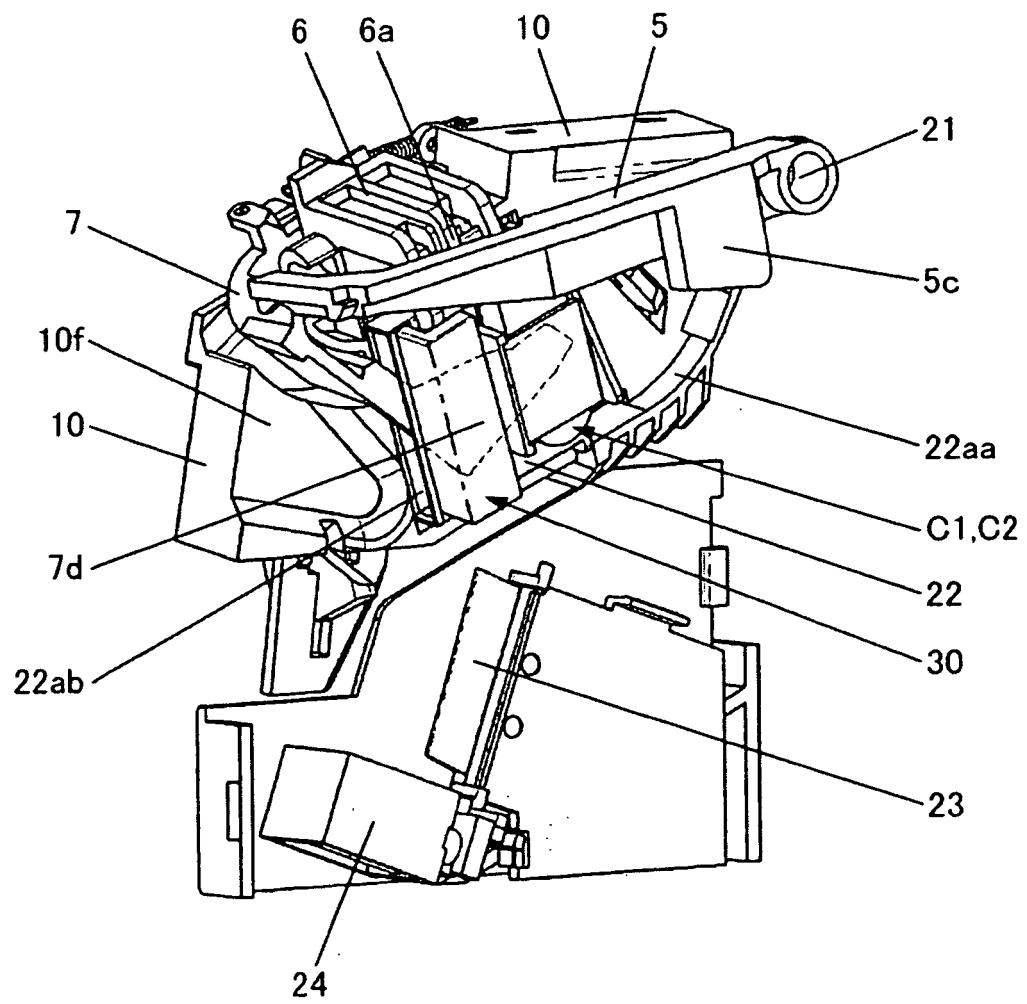


Fig. 17

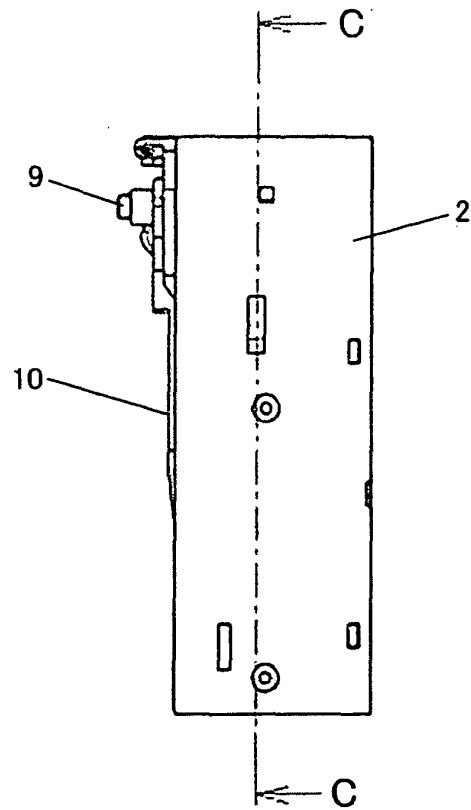


Fig. 18

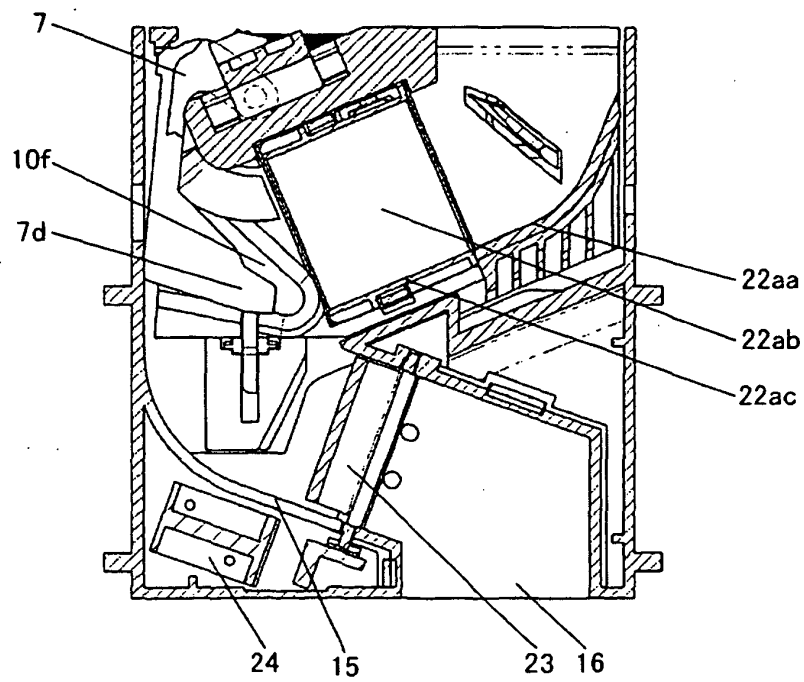


Fig. 19

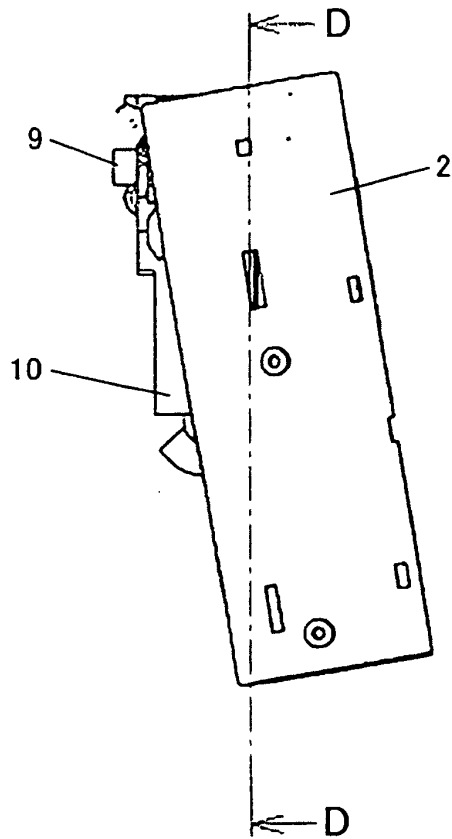


Fig. 20

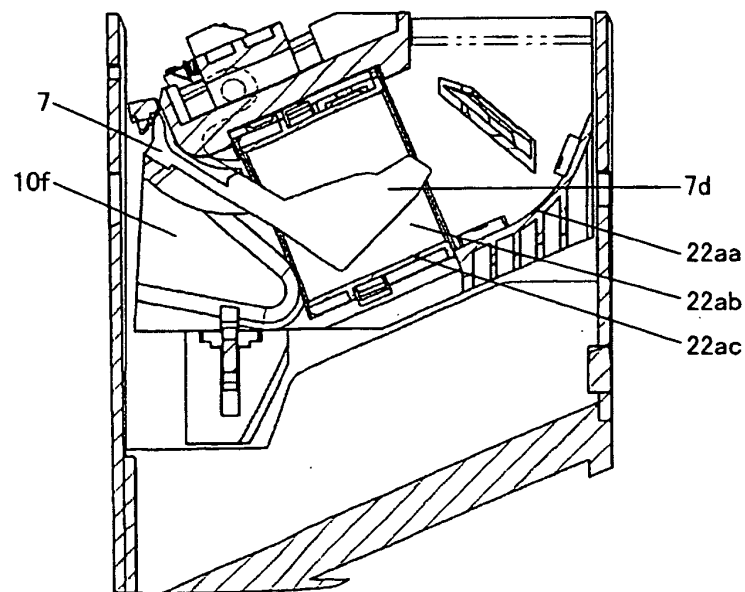


Fig. 21

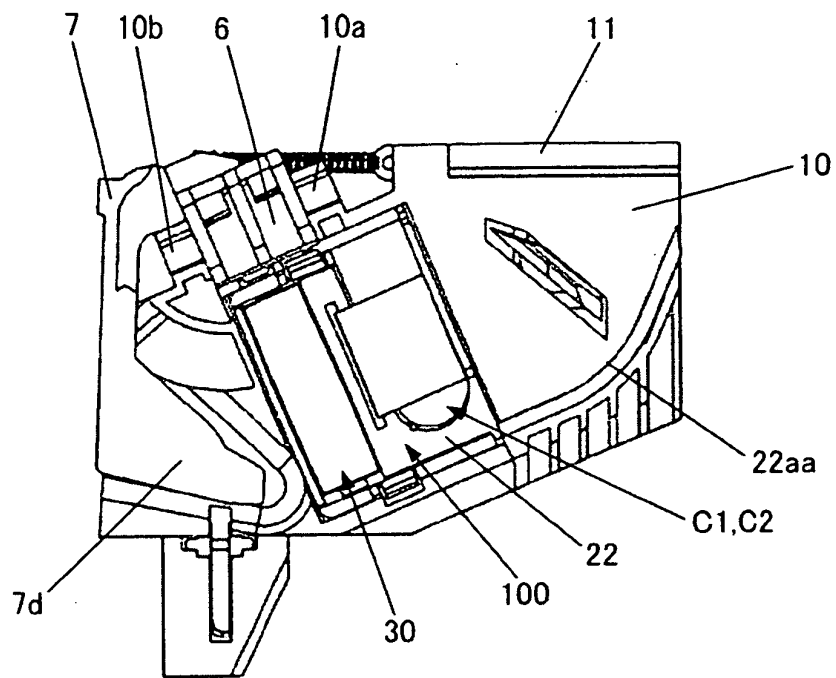


Fig. 22

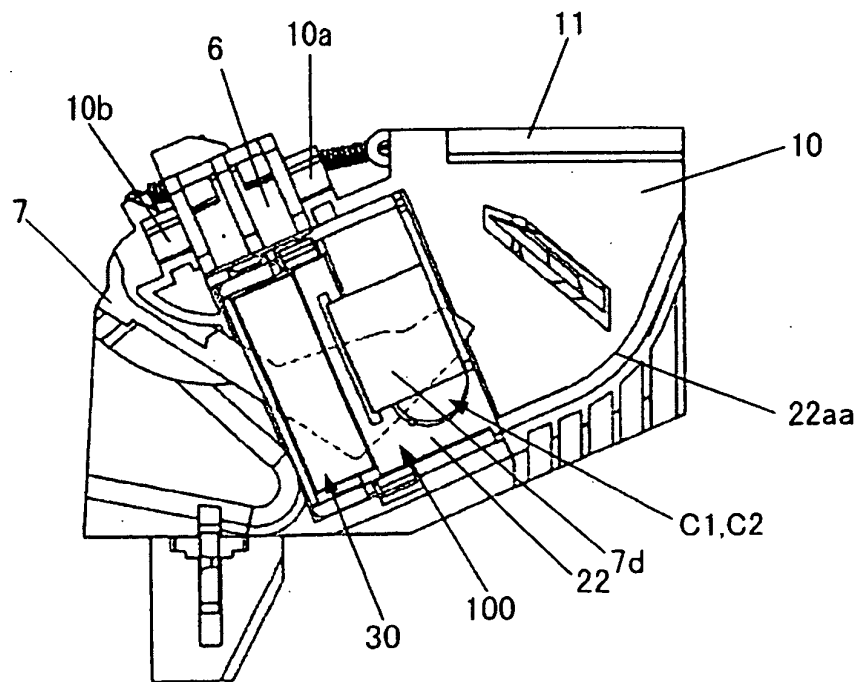
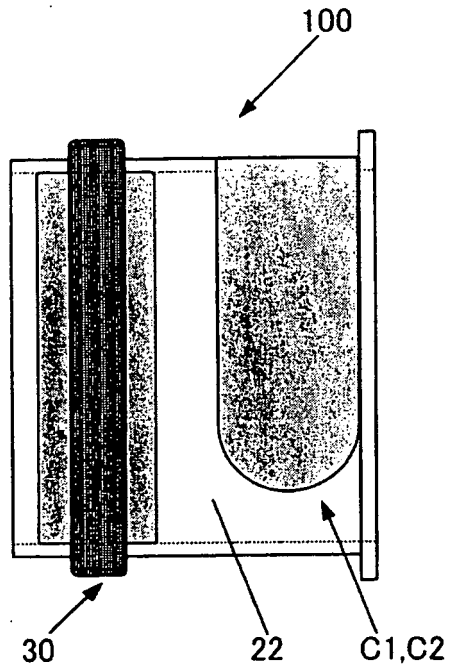


Fig. 23

(A)



(B)

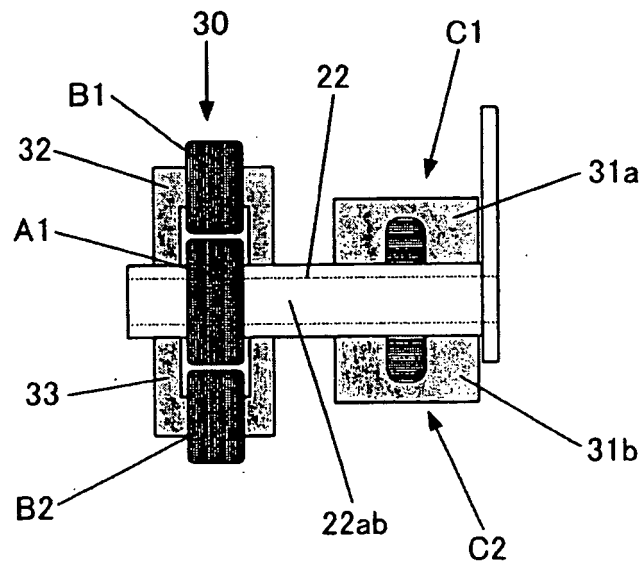
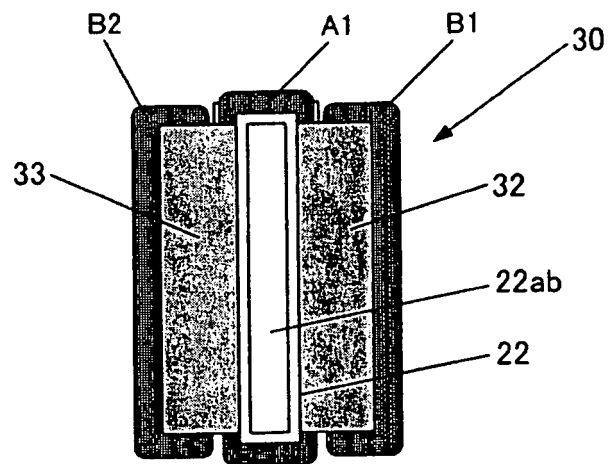


Fig. 24

(A)



(B)

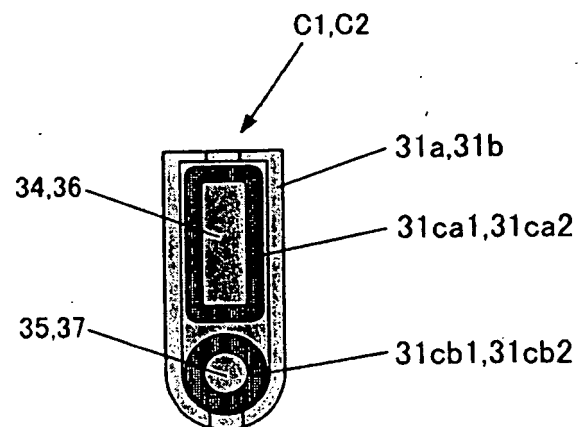


Fig. 25

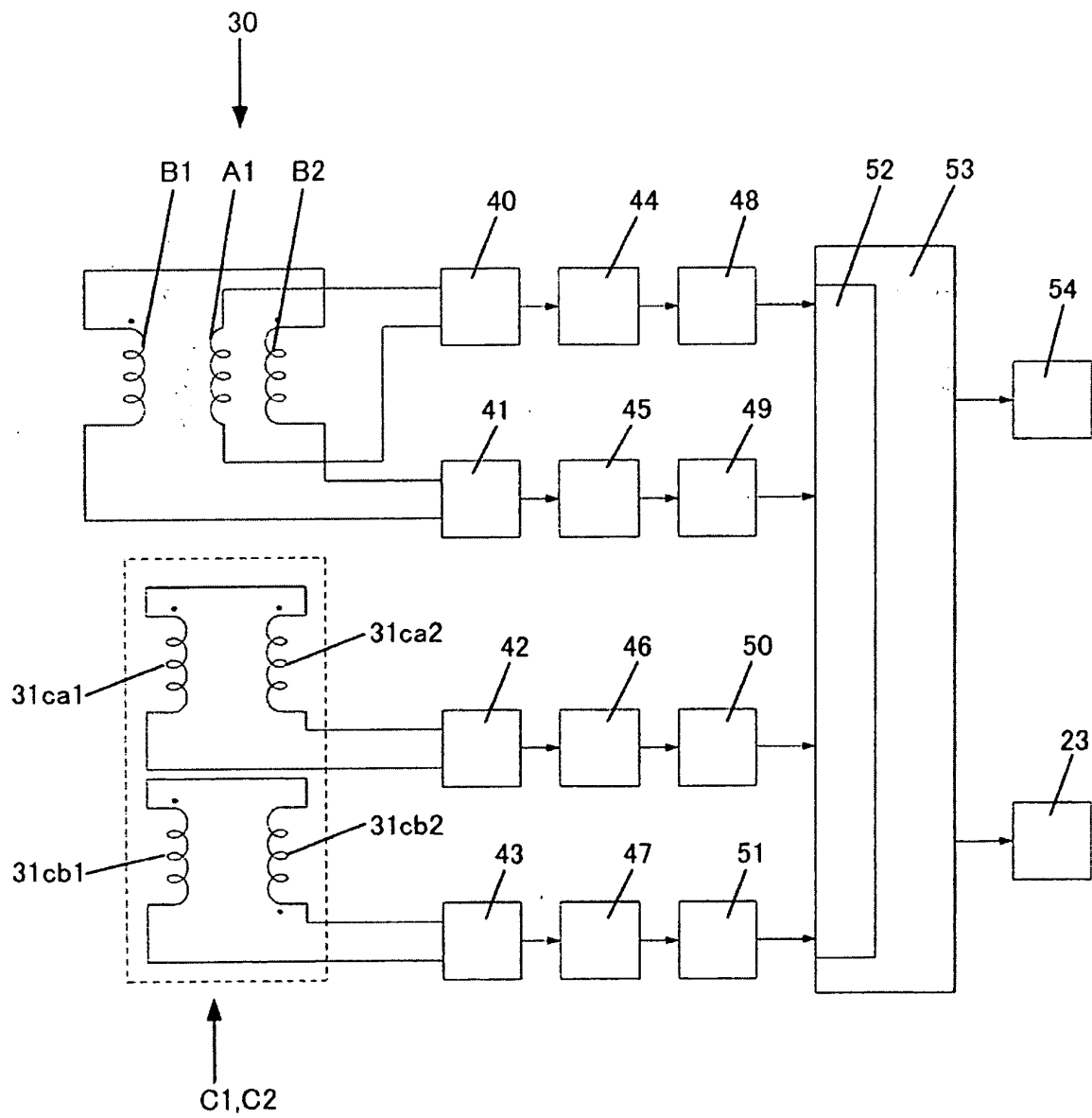


Fig. 26

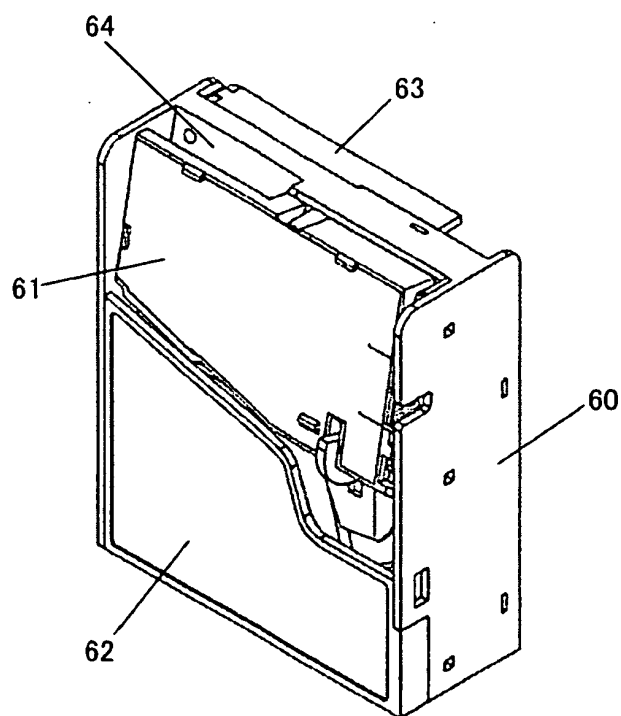


Fig. 27

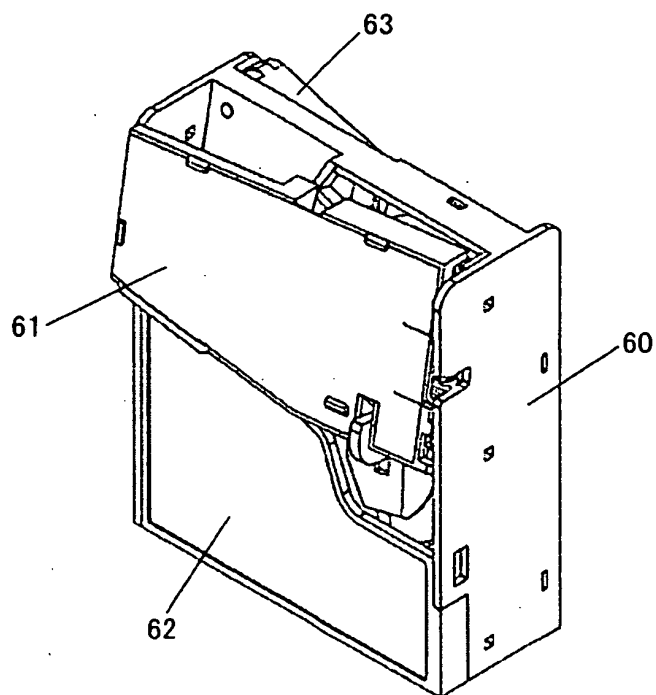


Fig. 28

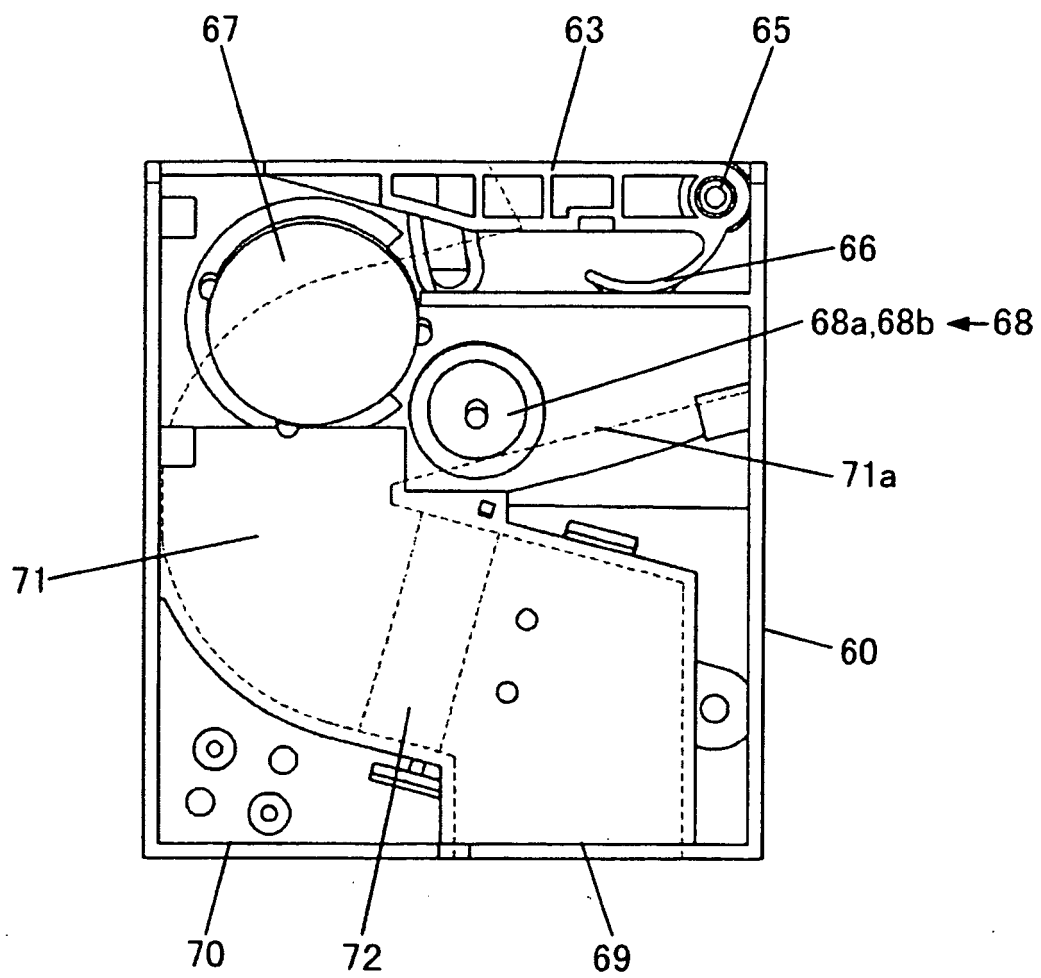
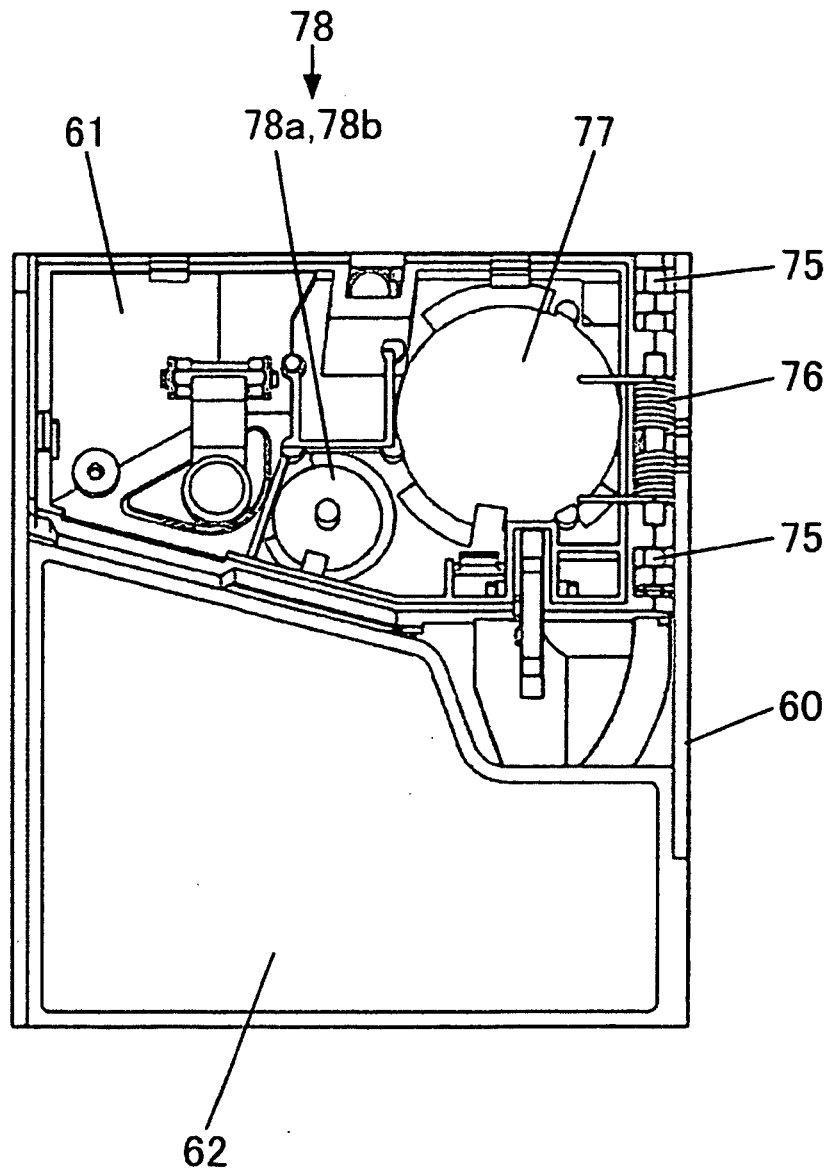


Fig. 29



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 11025311 A [0014]
- JP 10326368 A [0014]
- EP 0881606 A [0018]
- US 4662501 A [0019]