

FORM 1

603148

REGULATION 9

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

APPLICATION FOR A STANDARD PATENT

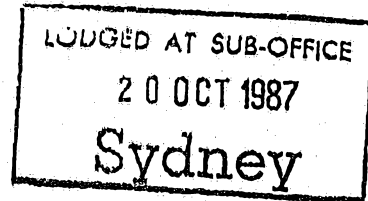
We, FUJI ELECTRIC CO., LTD of 1-1 Tanabeshinden, Kawasaki-ku,  
Kawasaki, 210, Japan, hereby apply for the grant of a Standard  
Patent for an invention entitled:-

"COIN SELECTING APPARATUS"

which is described in the accompanying Complete Specification.

Details of basic application:-

Number: 61-185140  
Country: Japan  
Date: 1st December, 1986

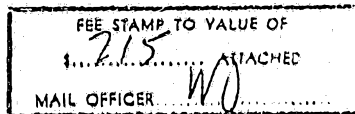


Our address for service is:

SHELSTON WATERS

55 Clarence Street

SYDNEY, N.S.W. 2000.



DATED this 20th day of October, 1987

FUJI ELECTRIC CO., LTD

by

*P. Heathcote*

Fellow Institute of Patent Attorneys of Australia  
of SHELSTON WATERS

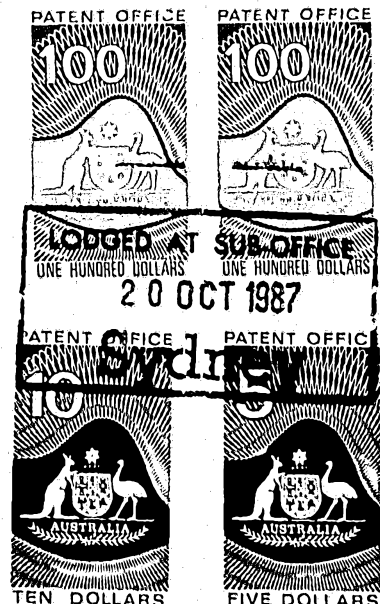
To: The Commissioner of Patents  
WODEN A.C.T. 2606

File: D.B.92J

Fee: \$215.00

REGISTRATION ACCEPTED AND AMENDMENTS

RECEIVED 15-8-90



# CONVENTION APPLICATION BY A COMPANY

FORM 8 - REGULATION 12 (2)

AUSTRALIA  
PATENTS ACT 1952

## DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT

(a) Here Insert (in full)  
Name of Company.

In support of the Convention Application made by.....  
(a) FUJI ELECTRIC CO., LTD.

(b) Here Insert Title of  
Invention.

(hereinafter referred to as "Applicant") for a patent for an invention entitled:

(b) COIN SELECTING APPARATUS

(c) and (d) Here Insert  
Full Name and Address  
of Company Official  
authorised to make  
declaration.

I, (c) Yoshihiko Nakazato, Vice-President  
of (d) FUJI ELECTRIC CO., LTD.  
1-1, Tanabeshinden, Kawasaki-ku, Kawasaki 210 Japan

do solemnly and sincerely declare as follows:

1. I am authorised by Applicant to make this declaration on its behalf.

2. The basic Application(s) as defined by section 141 of the Act was ~~were~~ made

in (e) Japan on the 1st day of December, 1986

by (f) Fuji Electric Co., Ltd.

In ..... on the ..... day of ..... 19

by.....

in ..... on the ..... day of ..... 19

by.....

in ..... on the ..... day of ..... 19

by.....

(e) Here Insert Basic  
Country followed by date  
of Basic Application.

(f) Here Insert Full  
Name(s) of Applicant(s)  
in Basic Country.

(g) Here Insert (in full)  
Name and Address of  
actual Inventor or  
Inventors

3. (g) NORIAKI KIRISAWA, C/o Fuji Electric Co., Ltd,  
1-1, Tanabeshinden, Kawasaki-ku, Kawasaki 210, Japan

is/are

the actual inventor(s) of the invention and the facts upon which Applicant is entitled to make the  
Application are as follows:

See reverse side of this  
form for guidance in  
completing this part.

If a patent were granted to the actual inventor in  
respect of the said invention the applicant would be  
entitled to have the patent assigned to it.

4. The basic Application(s) referred to in paragraph 2 of this Declaration was/were the first  
Application(s) made in a Convention country in respect of the invention, the subject of the  
Application.

DECLARED at Kawasaki

this 30th day of September 1987

(h) Personal Signature  
of Declarant (c) (no seal)

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(12) PATENT ABRIDGMENT      (11) Document No. AU-B-79943/87  
(19) AUSTRALIAN PATENT OFFICE      (10) Acceptance No. 603148

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(54) Title  
COIN SELECTING APPARATUS

International Patent Classification(s)  
(51)<sup>4</sup> G07D 005/08      G07F 001/04

(21) Application No. : 79943/87      (22) Application Date : 20.10.87

(30) Priority Data

(31) Number      (32) Date      (33) Country  
61-185140      01.12.86      JP JAPAN

(43) Publication Date : 09.06.88

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(71) Applicant(s)  
FUJI ELECTRIC CO., LTD.

(72) Inventor(s)  
NORIAKI KIRISAWA

(74) Attorney or Agent  
SHELSTON WATERS, 55 Clarence Street, SYDNEY NSW 2000

(56) Prior Art Documents  
AU 595942 79942/87 G07D 5/08  
AU 35275/71 55.2  
EP 52043

(57) Claim

1. A coin selecting apparatus for judging and selecting the genuineness and kind of a coin while the coin is passing through a substantially vertical passage,

said coin selecting apparatus comprising an entry, characterized: in that said passage has its inner walls slightly inclined with respect to a vertical plane; in that the lower one of said inner walls is equipped with an inductance type coin sensor located on the rear side thereof; in that the lower one of said inner walls has formed on its inner side, and adjacent to said sensor, at least three ridges projecting to have an equal level and extending substantially in parallel with the moving locus of the center of said coin; and in that said at least three ridges are arranged to contact with the central

(11) AU-B-79943/87

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portion, lower end portion and upper end portion of said  
coin, respectively.

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FORM 10

PATENTS ACT 1952

COMPLETE SPECIFICATION

FOR OFFICE USE:

Application Number:  
Lodged:

Class

Int. Class

Complete Specification Lodged:  
Accepted:  
Published:

This document contains the  
amendments made under  
Section 49 and is correct for  
printing.

Priority:

Related Art:

Name of Applicant: FUJI ELECTRIC CO., LTD

Address of Applicant: 1-1 TANABESHINDEN, KAWASAKI-KU, KAWASAKI  
210, JAPAN

Actual Inventor: NORIAKI KIRISAWA

Address for Service: SHELSTON WATERS, 55 Clarence Street, Sydney

Complete Specification for the Invention entitled:

"COIN SELECTING APPARATUS"

The following statement is a full description of this invention,  
including the best method of performing it known to me/us:-

1. Title of the Device

Coin Selecting Apparatus

2. Detailed Description of the Device

(Field of Industrial Application)

The present device relates to an apparatus for judging and selecting the genuineness and kind of a coin while the coin is being rolled to drop along a passage after it has been put and, more particularly, to the apparatus which allows the coin to roll and drop smoothly and a coin sensor to judge the coin accurately.

3. Brief Description of the Drawings

Fig. 1 is a front elevation showing one embodiment of the present device;

Fig. 2 is a sectional side elevation of the same;

Fig. 3 is an enlarged view showing the essential portion of the sectional side elevation of the same;

Fig. 4 explains the operations in case the three ridges are properly arranged on one inner wall of the passage;

Fig. 4(a) is an enlarged sectional side elevation showing the essential portion;

Fig. 4(b) is an enlarged front elevation showing the essential portion;

Fig. 5 explains the operations in another case in which the four ridges are properly arranged on one inner wall of the passage;

Fig. 5(a) is an enlarged sectional side elevation showing the essential portion;

Fig. 5(b) is an enlarged front elevation showing the essential portion;

Fig. 6 explains the operations of one case in which the ridge arrangement of one inner wall of the passage is improper;

Fig. 7 explains the operations of another case in which the ridge arrangement of one inner wall of the passage is improper;

Fig. 8 is a block circuit diagram showing the structures of the coin sensor and the judging unit;

Fig. 9 is a front elevation showing the example of the prior art; and

Fig 10 is an enlarged section side elevation showing the coin passage of the example of the prior art.

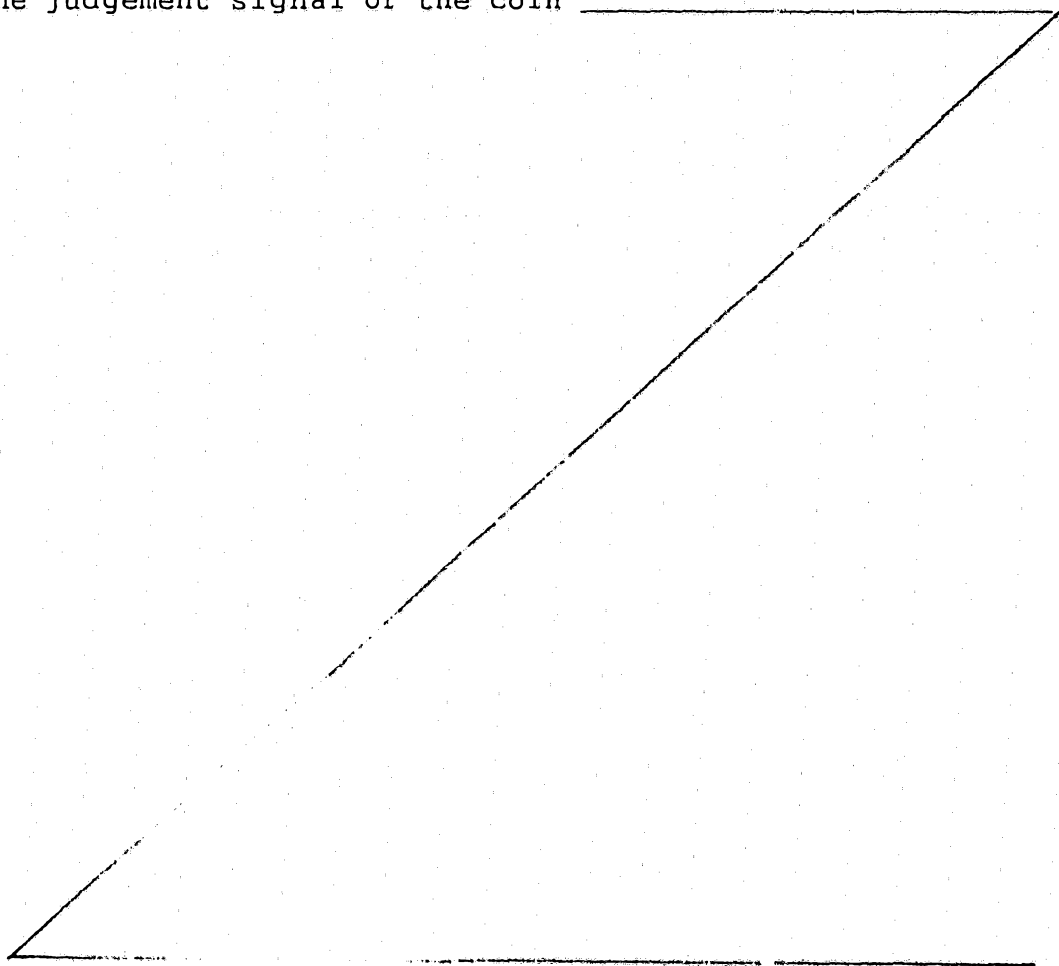
Explanations of Reference Numerals:

1 - - - First Base Plate; 1a - - - Inner Side; 2 - - - Second Base Plate; 3 - - - Passage; 4 - - - Guide Rail; 5 - - - Coin Sensor; 9, 9A and 9D - - - Coins; 10 - - - Coin Selecting Apparatus; and 11 to 14 - - - Ridges.

(Prior Art)

A coin selecting apparatus of the prior art will be described with reference to Figs. 9 and 10.

Fig. 9 is a front elevation showing the coin selecting apparatus 40, in which a coin put into a slot 37 drops while rolling on a guide rail 34 and is sorted by a not-shown gate until it is stacked in its own storage cylinder. Incidentally, the coin is judged as to its genuineness and kind at a predetermined position on the guide rail 34 by means of a coin sensor indicated by a broken line so that a gate is operated in accordance with the judgement signal of the coin





sensor 5. Upstream of the guide rail 34, moreover, a coarse selection is made of counterfeit, forged or deformed abnormal coins such as larger, smaller, thicker or thinner coins or foreign matters. Still moreover, the coins are separated to a proper spacing, because the selection is troubled if a plurality of coins roll and drop in proximity to each other. However, detailed description of these procedures will be omitted because they are apart from the gist of the present device.

Fig. 10 is an enlarged section taken along line B - B of Fig. 9 and showing the surrounding of a coin passage 33 including the guide rail 34. The passage 33 is defined by first and second opposed base plates 31 and 32 which are so arranged in parallel with each other as to correspond to the thickness of the coins. The bottom of the passage 33 is defined by the guide rail 34. The first and second base plates 31 and 32 are slightly inclined with respect to a vertical plane, and the lower base plate 31 is equipped in its inner side 31a with the coin sensor 5. In short, when the coin rolls and drops on the guide rail 34 while contacting with the inner side 31a so that it passes over the front face of the coin sensor 5, its external diameter, thickness and material are detected to

generate corresponding values, which are synthetically considered to judge the genuineness and kind of the coin.

The reason why the first base plate 31 is slightly inclined with respect to the vertical plane is to hold constant the positional relationship between the coin sensor 5 and the coin passing over the front face of the sensor 5.

{Problems to Be Solved by the Device}

10 In the prior art described above, the first base plate 31 to contact with one side of the coin has its surface made flat so that it can advantageously be manufactured with ease but has a large contact area.

This raises the following problems. First of all, if a coin wetted with water is put, it will be caused to stick to the inner side 31a of the first base plate 31 by the surface tension of the water until it is halted. This clogs the passage, and the clogging is a far more serious problem than the selection. Next, the inner side 31a is liable to become dirty to invite a direct cause for the clogging and an indirect cause for shortening the maintenance interval so as to clear the dirt. Moreover, these causes will fluctuate the dropping velocity to increase the possibility of misjudgement although they will not clog the passage.

20

An object of the present device is to solve the aforementioned problems concomitant with the prior art and to provide a coin selecting apparatus has a passage for preventing the wet coin from sticking to the inner side of the passage and itself from becoming dirty and for holding the coin at a constant distance and in a constant position at all times with respect to the coin sensor when the coin passes over the front of the sensor.

(Means for Solving the Problems)

10 Therefore, in accordance with one broad form of the present invention there is disclosed a coin selecting apparatus for judging and selecting the genuineness and kind of a coin while the coin is passing through a substantially vertical passage,

said coin selecting apparatus comprising an entry, characterized: in that said passage has its inner walls slightly inclined with respect to a vertical plane; in that the lower one of said inner walls is equipped with a coin sensor located on the rear side thereof; in that the  
20 lower one of said inner walls has formed on its inner side, and adjacent to said sensor, at least three ridges projecting to have an equal level and extending substantially in parallel with the moving locus of the center of said coin; and in that said at least three ridges are arranged to contact with the central portion,-----



lower end portion and upper end portion of said coin, respectively.

With this structure, the operations of the present device are as follows:

(1) The inner walls of the passage are inclined with respect to the vertical plane so that the coin has one side leaning to contact with the inner side of the lower wall.

(2) What is actually contacted by one side of the coin is limited to the narrow area of the tops of at least three ridges, as it were a line contact.

10 (3) Moreover, the ridges have an equal level to provide a flat plane shared thereamong so that the position of the coin is held constant by that flat plane.

According to the mode of embodiment,

(4) The three ridges are arranged to contact with the central portion, lower end portion and upper end portion of said coin, respectively so that the coin is first positioned at two points which are spaced from each other at a distance substantially equal to the diameter of the coin. As a result, the coin can be positioned most stably

20 relative to its rocking motions



on the axis in its moving direction.

(5) Next, the rocking motions of the coin on the diameter perpendicular to the moving direction so that the coin can be held in a constant position when it drops along the passage.

(Embodiment)

The present device will be described in the following in connection with one embodiment thereof with reference to the accompanying drawings.

10     Incidentally, Fig. 1 is a front elevation showing one embodiment according to the present device; Fig. 2 is a sectional side elevation of the same; and Fig. 3 is an enlarged section showing an essential portion of the side elevation of the same.

       In Fig. 1, a coin put into a slot 7 of a coin selecting apparatus 10 drops, while rolling on a guide rail 4, and is sorted by a not-shown gate until it is stacked in its own storage cylinder. Above the guide rail 4, there are located four thin strips which are  
20     arranged in parallel with one another. These strips are ridges 11, 12, 13 and 14 forming a major portion of the present device. These ridges 11, 12, 13 and 14 will be described in more detail hereinafter.

       In a predetermined portion above the guide rail 4, there is also disposed a coin sensor 5 by which the

coin is judged as to its genuineness and kind to generate a judgement signal to actuate the gate. Incidentally, upstream of the guide rail 4, moreover, a coarse mechanical selection is made of counterfeit, forged or deformed abnormal coins such as larger, smaller, thicker or thinner coins or foreign matters. Still moreover, the coins are separated to a proper spacing, because the selection is troubled if a plurality of coins roll and drop in proximity to each other. However, the presentation and description of these procedures will be  
10 omitted because they are apart from the gist of the present device.

In Fig. 2 (presenting a section taken along line A - A of Fig. 1), a passage 3 is defined by first and second opposed base plates 1 and 2 which are so arranged in parallel with each other as to correspond to the thickness of the coin. The passage 3 has its bottom defined by the guide rail 4. The first and second base plates 1 and 2 are slightly inclined with respect to a vertical plane, and the lower first base plate 1 has its inner side 1a formed with the ridges 11 to 14 which project inward into the passage 3. These ridges 11 to 14 are arranged  
20 generally in parallel with the moving locus of the center of the coin and have an equal level.



On the other hand, the coin sensor 5 is disposed at the outside near the inner side 1a. This coin sensor 5 is made of a coil so that it is of an inductance type. In short, when the coin rolls and drops on the guide rail 34 while contacting with the ridges 11 to 14 of the inner side 31a so that it passes over the front face of the coin sensor 5, its external diameter, thickness and material are detected to generate corresponding values, which are synthetically considered to judge the genuineness and kind of the coin.

The slight inclination of the first and second base plates 1 and 2 with respect to the vertical plane is intended to bring one side of the coin into contact with the tops of the ridges 11 to 14 without fail so that the position of the coin passing over the front face of the coin sensor 5 may always be constant. In other words, it is intended to hold the positional relationship between the coin and the coin sensor 5 constant at all times. This relationship is concerned directly with the detection accuracy.

Fig. 3 is an enlarged sectional side elevation showing the passage 3 including the coin sensor 5. In Fig. 3, the first base plate 1 is formed on its inner side with the ridges 11 to 14 which have a rectangular

section and an equal level. The coin sensor 5 is buried in the opposite face of the first base plate 1. And, the surface of the guide rail 4 defines the bottom of the passage 3. The level of the individual ridges 11 to 14 from the surface of the guide rail 4 is an important factor for determining the positional stability of a rolling and dropping coin 9 (as indicated by a double-dotted line). This factor will be described in detail in the following operations.

Next, with reference to Fig. 4, the manner of and resultant operations of the arrangement of the ridges for properly positioning a specified coin with respect to the coin sensor will be described in the following. Incidentally, Fig. 4 explains the operations in case the three ridges are properly arranged on the inner side of the passage. Fig. 4(a) is an enlarged sectional side elevation showing an essential portion and Fig. 4(b) is an enlarged front elevation showing the essential portion.

In Fig. 4(a), in order to position one side of the coin 9 at a predetermined spacing G from the predetermined front face of the coin sensor 5, the ridges T1, T2 and T3 may be so arranged as to contact with the upper end portion, central portion and lower end portion of the coin 9. More specific



upper and lower end portions of the coin 9 come into contact with the ridges T1 and T2, the coin is restrained from its motions on the axis normal to the paper surface. Next, the ridge T2 contacting with the central portion of the coin 9 blocks the motions of the coin 9 on the diameter containing the paper surface, i.e., the swinging motions.

These operations will be supplemented with reference to Fig. 4(b). When the coin 9 rolls and drops in the direction of arrow along the guide rail 4, its upper end portion, central portion O and lower end portion are supported and supported at the center line positions of the ridges T1, T2 and T3, as indicated by single-dotted lines P, Q and R. In order to restrain the motions on the axis Q, therefore, it is the more effective to make the distance L between the upper and lower end portions of the coin 9 the larger. In order to effectively block the (swinging) motions on a diameter perpendicular to the axis Q, on the other hand, this axis Q should extend through the center of the coin 9. In other words, the distance of the axis Q from the upper side of the guide rail 4 should be at  $D/2$  (wherein D: the diameter of the coin 9).

The aforementioned manner to position the ridges with respect to a specified coin 9 will be supplemented

from another aspect in connection with the following improper example. Fig. 6 shows the case in which the base plate 1 is formed with only two ridges T11 and T12. This structure leaves the motions on a diameter contained in the paper surface, i.e., the swinging motions when the coin 9 rolls and drops. On the other hand, Fig. 7 shows the case in which the spacing between the ridges T11 and T12 exceeds the diameter of the coin 9. This structure allows the upper and lower end portions of the coin 9 to contact with the inner side 1a at the ridge T12 so that the one side of the coin 9 is inclined with respect to the front face of the coin sensor 5 to make the proper detection impossible.

The description described above is directed to the case of the proper ridge arrangement with respect to one specified kind of coin. As a matter of fact, however, four kinds of coins - coins of ¥ 500 Yen, 100 Yen, 50 Yen and 10 Yen to be selected - are current in Japan at present. How to properly arrange the ridges for those coins will be described in the following.

The above-specified coins have diameters of 26.5 mm, 22.6 mm, 21 mm and 23.5 mm, respectively. In order to allow all these coins to satisfy the aforementioned conditions, strictly speaking, the ridges required are

3 pieces x 4 kinds = 12 pieces. As a matter of fact, however, some of them are actually overlapped, and they can be integrated to reduce the number of ridges. And, the manner of this integration is a choice of design.

Fig. 5 shows the case in which the arrangement of the ridges is to be determined with reference to the coins of 500 Yen and 50 Yen having the maximum and minimum diameters of the above-specified four kinds. Incidentally, Fig. 5 explains the operations in case four ridges are properly arranged on the inner side of the passage. Fig. 5(a) is an enlarged sectional side elevation showing an essential portion, and Fig. 5(b) is an enlarged front elevation showing the essential portion.

In Fig. 5(a) the coins of 500 Yen and 50 Yen are denoted at 9A (as indicated by double-dotted lines) and 9D (as indicated by broken lines), respectively. With reference to the case of Fig. 4, for the coin 9A, it is possible to determine the ridges 11, 13 and 14 (which correspond to the upper end, central and lower end portions, respectively). Next, the ridges 12, 13 and 14 (which correspond to the same positions as the aforementioned ones) can also be determined for the coin 9D. In other words, the ridges 13 and 14 are shared between the lower end and central portions of

both the coins 9A and 9D, and the ridges 11 and 12 are shared between the upper end portions of the coins 9A and 9D.

In Fig. 4(b), the levels of the center O1 of the coin 9A and the center O4 of the coin 9D from the upper face of the guide rail 4 are  $D1/2$  and  $D4/2$ , respectively. The position H3 (as shown in Fig. 5(a)) of the aforementioned ridge 13 is an average of those levels. Incidentally, L1 and L4 denote the distance between the upper and lower end portions of the coins 9A and 9D, respectively.

Although not shown specifically, on the other hand, totally five ridges are required if they are provided to correspond to the respective centers O1 and O4 of the aforementioned coins 9A and 9D. Likewise, in another embodiment, six ridges are arranged considering the other two kinds of coins 100 Yen and 10 Yen. This arrangement belongs to the choice of design, as has been described hereinbefore, and its detailed description will be omitted.

Incidentally, it is necessary to accurately determine the position of the coin passing over the front face (or reference plane) of the coin sensor. This is because the coin sensor is constructed majorly of an inductance (coil) so that its value is changed in

accordance with the position of the coin to be detected.

Next, the structures of the coin sensor and the judging unit will be described with reference to the block circuit diagram of Fig. 8. Roughly speaking, these structures are composed of AC bridge circuits, differential amplifiers and comparators.

Reference numeral 25 denotes the inductance (coil) of the coin sensor, which takes respectively specified values corresponding synthetically to the external diameter, thickness and material of a coin to be detected when this coin is in front of the inductance (coil) 25. If the case of three kinds of coins is taken up as an example, three groups of bridge circuits 21, 22 and 23 are formed by making common the side composed of the inductance 25 and an adjoining fixed resistor (although not numbered) and by connecting three kinds of opposite sides each composed of a variable inductance, a variable resistor and a fixed resistor (although all of them are not numbered). Incidentally, numeral 24 denotes a power supply which is exemplified by a sinusoidal wave oscillator having a stable frequency. Each of the AC bridge circuits 21, 22 and 23 has its variable resistor and variable inductance adjusted in advance at such values as to

satisfy a balanced state when each coin is in front of the inductance 25.

As a result, when a specified coin is in front of the inductance 25, the voltages between U - X, U - Y and U - Z are at zero or within a certain allowable range. If a coin other than the specified coin comes to the front, on the other hand, a certain voltage is generated. This voltage is inputted to differential amplifiers 26X, 26Y and 26Z corresponding to the AC bridge circuits, respectively, the outputs of which are sent to comparators 27X, 27Y and 27Z so that they may be compared with a reference value Eo. If a certain AC bridge circuit, e.g., 21 is balanced, the output of the corresponding comparator 27X is ON to indicate that the corresponding coin has passed. And, this output is sent to a not-shown CPU at a subsequent step to output a predetermined judging or processing signal.

(Effects of the Device)

As has been described hereinbefore, according to the present device: ① The inner walls of the passage are inclined with respect to the vertical plane so that the coin is inclined toward the lower inner wall to have its one side contacting therewith; ② As a matter of fact, however, what the one side of the coin contacts with is limited to the narrow area of the tops

of at least three ridges, as it were the line contact;

(3) Moreover, these ridges are at the same level to provide a common flat plane, by which the position of the coin is held constant; (4) According to the mode of embodiment, moreover, the three ridges contact with the central, lower end and upper end portions of the coin so that the coin is first positioned at its two points spaced at a distance substantially equal to the diameter size thereof. As a result, the coin can be positioned in the most stable position relative to its rocking motions on the axis of its moving direction;

(5) The rocking motions of the coin on the diameter perpendicular to the moving direction of the coin are the most effectively blocked by the ridge extending through the central portion of the coin so that the position of the coin is held constant when the coin drops along the passage.

According to the present device, therefore, the following excellent effects can be obtained, as compared with the apparatus of the prior art:

(1) Since the contact area between the coin and the inner walls of the passage is small, their frictional resistance is reduced, and the coin is prevented from sticking to the inner walls even if it is wetted with water when put, so that its smooth rolling and drop

along the passage is ensured.

(2) Thanks to the small contact area of the inner walls, the dirt, if any, is liable to be removed by the contact with the coin so that the smooth rolling and drop of the coin is ensured. At the same time, the maintenance work for removing the dirt can be amplified to elongate the maintenance interval.

10 (3) Since the stable positioning of the coin is effected when the coin rolls and drops along the passage, the direction and spacing of the coin when the coin passes over the front of the coin sensor are held constant. This makes it possible to make an accurate detection and accordingly an accurate judgement.

(4) Although the inner walls of the passage has a rather complicated shape because they are formed with ridges, they can be easily manufactured by a plastic molding without any excessive space.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A coin selecting apparatus for judging and selecting the genuineness and kind of a coin while the coin is passing through a substantially vertical passage,

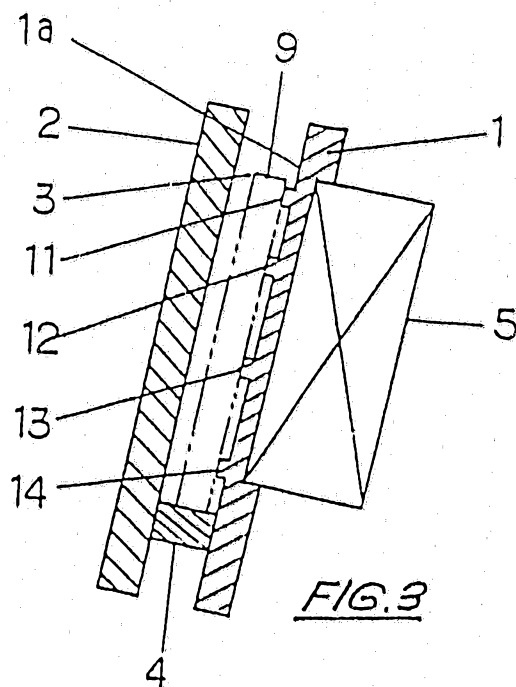
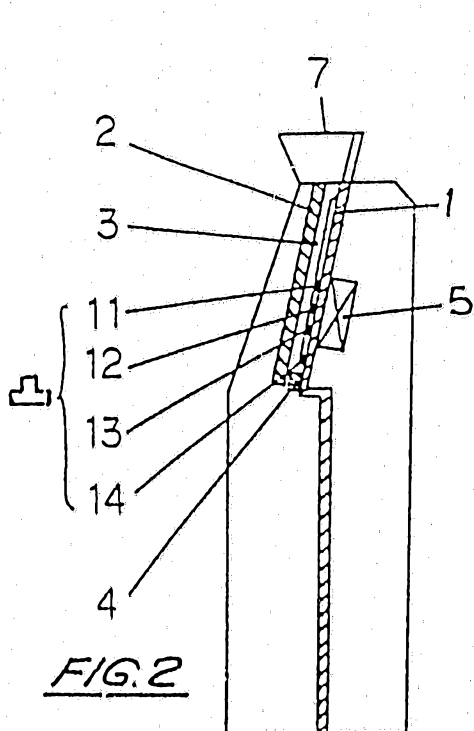
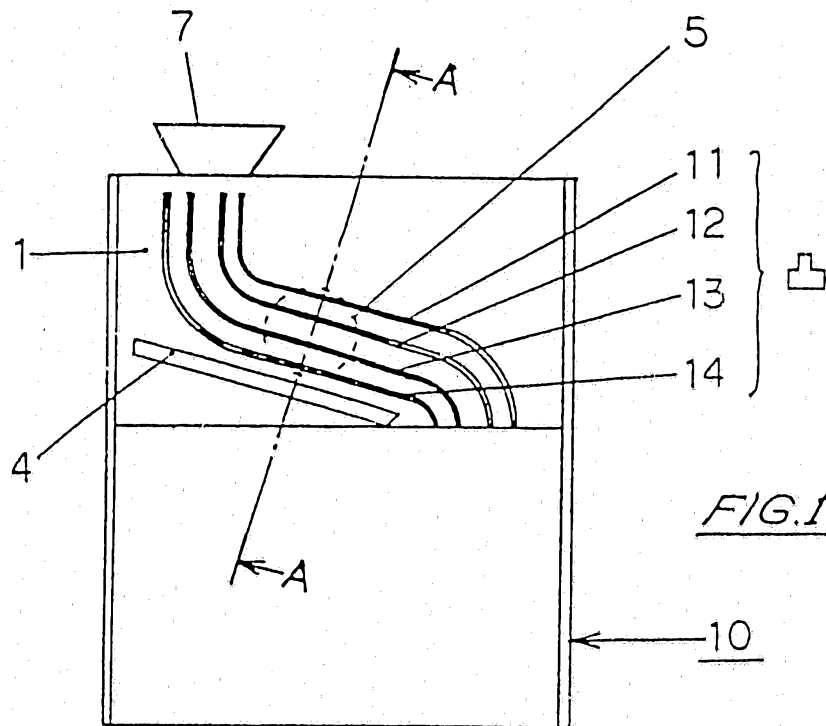
said coin selecting apparatus comprising an entry, characterized: in that said passage has its inner walls slightly inclined with respect to a vertical plane; in that the lower one of said inner walls is equipped with an inductance type coin sensor located on the rear side thereof; in that the lower one of said inner walls has formed on its inner side, and adjacent to said sensor, at least three ridges projecting to have an equal level and extending substantially in parallel with the moving locus of the center of said coin; and in that said at least three ridges are arranged to contact with the central portion, lower end portion and upper end portion of said coin, respectively.

2. A coin selecting apparatus substantially as herein described with reference to Figures 1 to 3 of the accompanying drawings.

DATED this 8th day of August, 1990.  
FUJI ELECTRIC CO., LTD

Attorney: PETER HEATHCOTE  
Fellow Institute of Patent Attorneys of Australia  
of SHELSTON WATERS





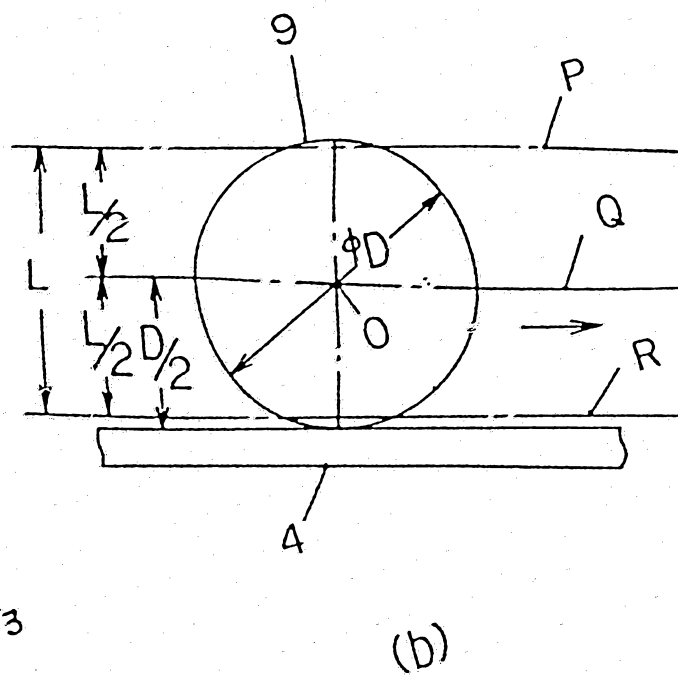
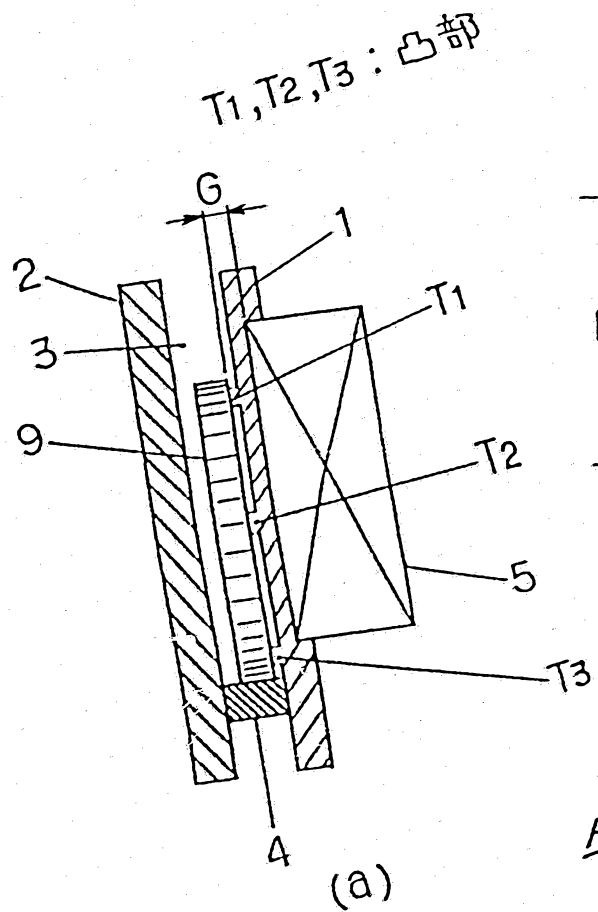


FIG. 4

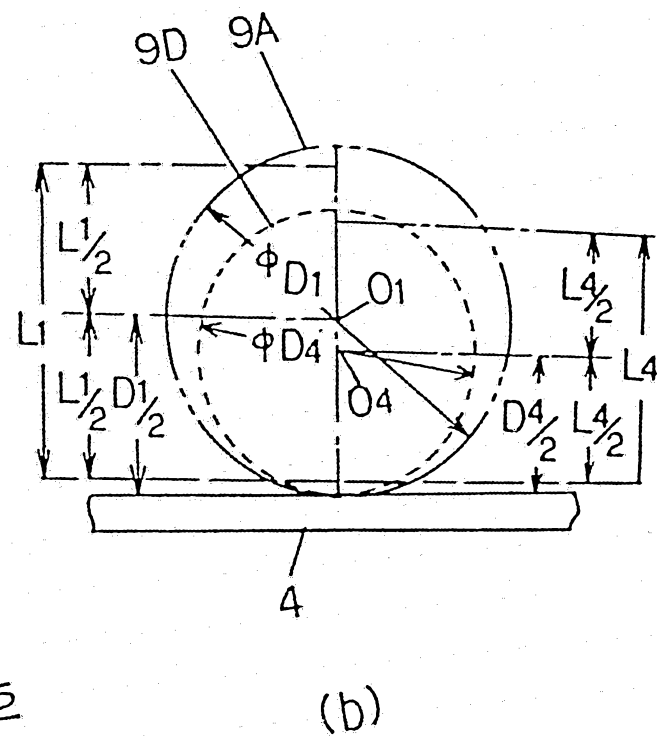
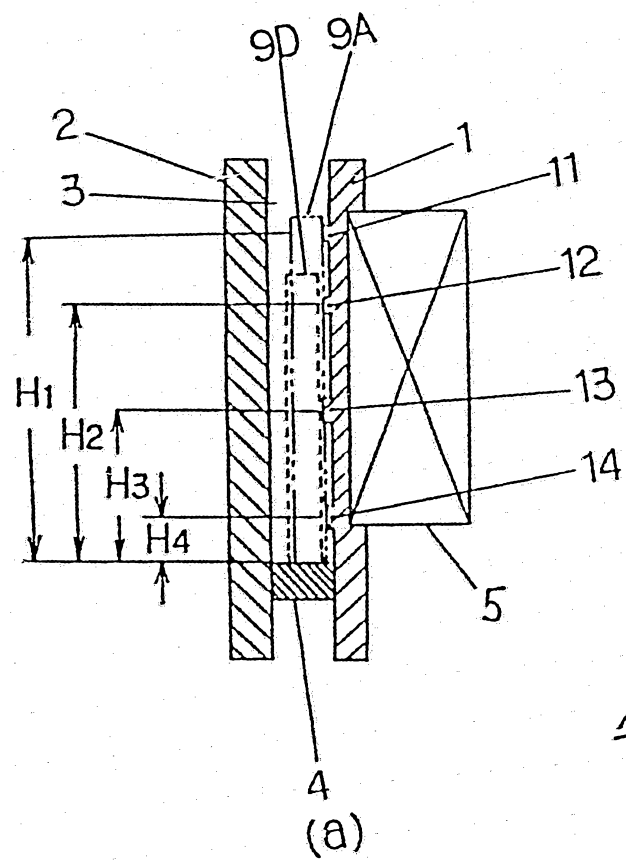


FIG. 5

(b)

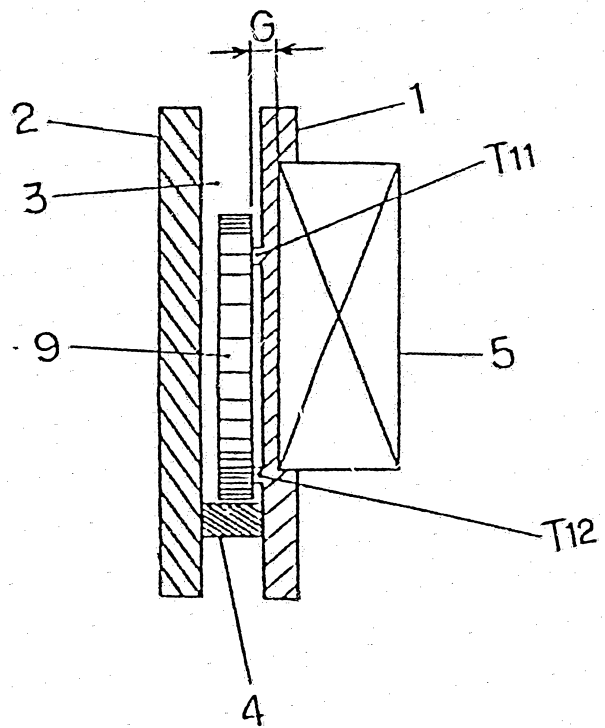


FIG. 6

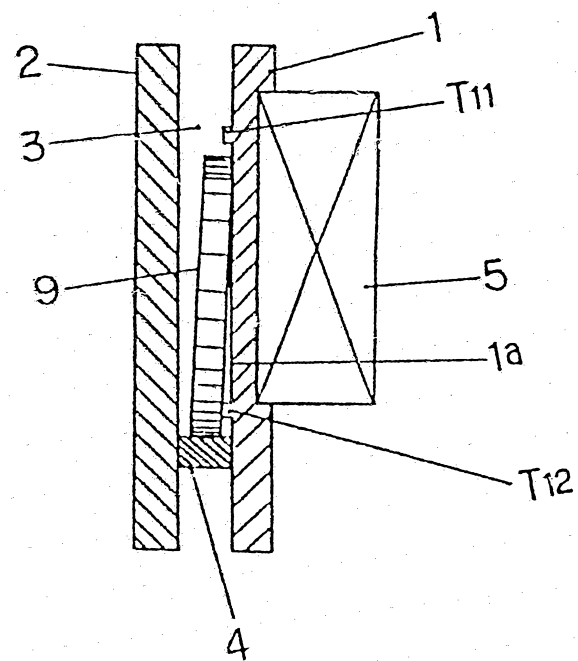


FIG. 7

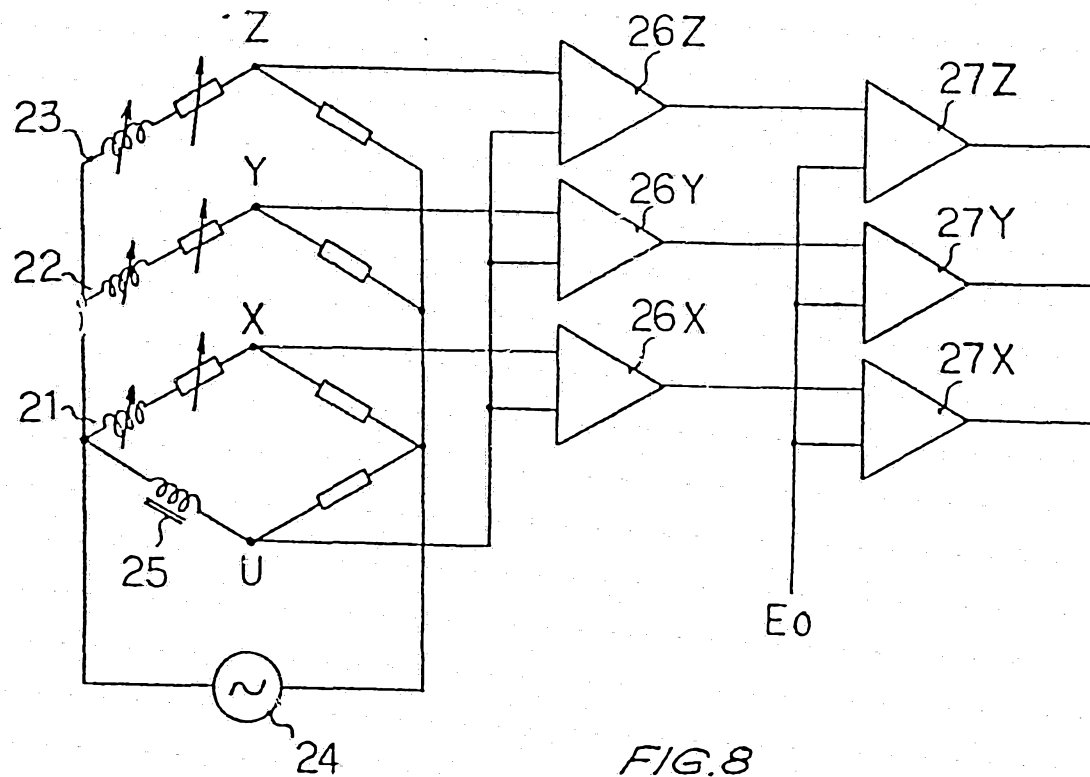


FIG. 8

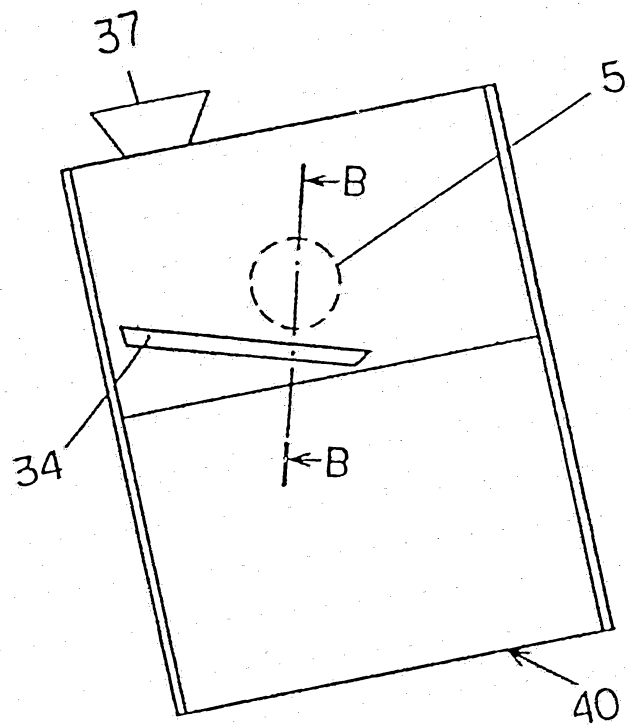


FIG. 9

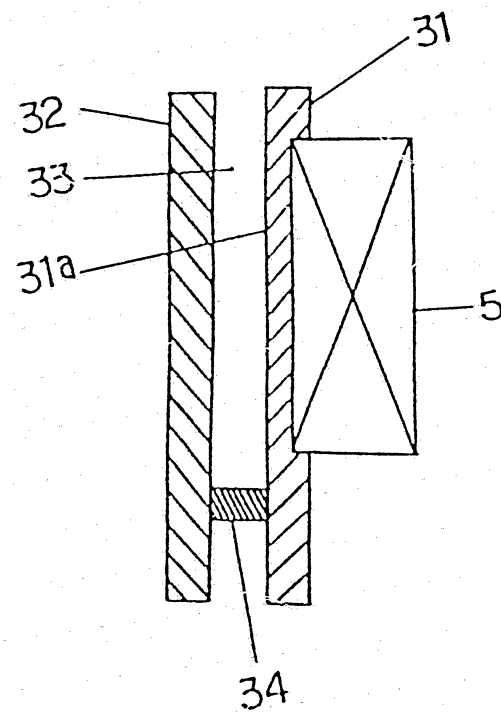


FIG. 10