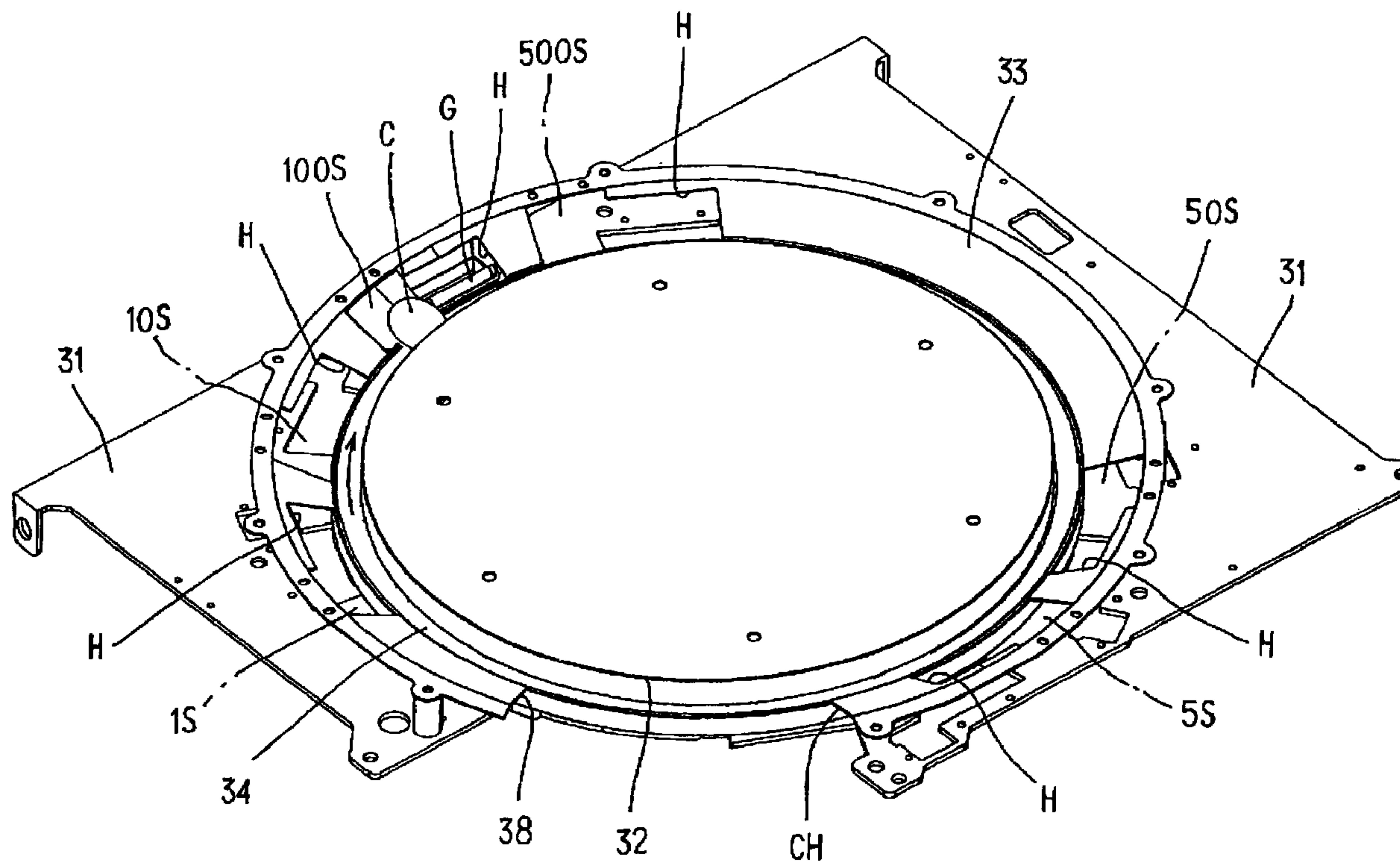




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 (54) Title: COIN DISTRIBUTOR



(57) **Abrégé/Abstract:**

A coin division equipment to secure a shape which is possible to store easily under an equipment, such as a money register. And, a coin division equipment which is able to be applied to many kinds of coins in the European and American various countries. The equipment for dividing a plurality of coins comprises at least: cover means with a low big circular board form; slender ring means for coin conveyance which is rotate ably mounted along the outside periphery of the bottom of the cover means; and coin passage means having approximately a ring-shaped inclination board form, the outside perimeter thereof being high and the inside perimeter thereof being near the outside periphery of the ring means. The coin passage means having a plurality of openings for coin division.

**ABSTRACT**

A coin division equipment to secure a shape which is possible to store easily under an equipment, such as a money register. And, a coin division equipment which is able to be applied to many kinds of coins in the European and American various countries. The equipment for dividing a plurality of coins comprises at least: cover means with a low big circular board form; slender ring means for coin conveyance which is rotate ably mounted along the outside periphery of the bottom of the cover means; and coin passage means having approximately a ring-shaped inclination board form, the outside perimeter thereof being high and the inside perimeter thereof being near the outside periphery of the ring means. The coin passage means having a plurality of openings for coin division.

## COIN DISTRIBUTOR

## TECHNICAL FIELD

The present invention relates to a coin distribution apparatus for dividing several kinds of currencies, i.e., coins, according to every type of monies.

In particular, the present invention relates to an apparatus for distinguishing each coin according to a money  
10 type.

The present invention specifically relates to a coin distribution apparatus which contains coins according to the type of money and is suitable for an apparatus for preparing changes and so on.

The term "coin" which is used in the specification includes disc bodies such as currencies, medals, tokens, etc.

## PRIOR ART

Up to the present invention, various apparatuses  
20 for distributing coins have been developed.

Such an apparatus is disclosed for example, in the Japanese Patent Application 6-123019 filed by this applicant and opened as unexamined Japanese Patent Disclosure 7-306965. It is also disclosed in issued as U.S. Patent 5,562,536.

Such a distribution apparatus is provided with means (83, etc.) to loosely receive various coins and to send out the coins one by one as shown in Fig. 10.

Such an apparatus is provided with a coin guide path (111c) where a plurality of openings (111f-111k) are  
30 formed along the periphery. In addition, the symbol 111 is a gauge means for coin selection having a coin guide path.

Furthermore, such an apparatus is provided with conveying means (130, etc.) for moving the coin along the above-mentioned coin guide path.

The present invention has been developed for simplifying a coin distribution apparatus, and making the height of the entire apparatus low.

Especially, the present invention has been developed for arranging the detecting means of coin, and the opening-closing means of coin receiving hole on the undersurface of the coin path.

Furthermore, the present invention has been developed for increasing the distribution of money and making the distribution order of money, optional.

In other words, the present invention has been developed for providing a shape which can be easily housed under apparatuses, such as a money register.

Moreover, the present invention has been developed for providing a coin distribution apparatus which is enable to apply to the variety of monies of the European and American countries.

#### **SOLUTION OF THE INVENTION**

According to the present invention, there is provided an apparatus for distributing coins according to their types, comprising at least:

cover means (32) with a height;

conveying means (34, 37, 42) for coin conveyance provided along an outside perimeter of the cover means; and

passage means (33, H, 1H - 500H) for coins having a plurality of openings (H, 1H - 500H) for coin distribution and an inclined board (33), an outside perimeter of which is higher than an inside perimeter which is approached to outside of the cover means, characterized in that the

conveying means comprises a slender belt (34, 37, 42), which is provided furnably along an outside perimeter of bottom of the cover means, and in that an inside perimeter of the passage means is approached to outside of the slender belt.

Preferably, this invention is an apparatus for distributing coins into the kinds comprising at least: cover means of large disc type with low height; slender belt means for coin conveyance which is rotatably arranged along the outside periphery of bottom of this cover means; and path  
 10 means of coin being provided a plurality of open holes for coin distribution, wherein the path means is provided with an inclination board of substantial ring shape, the outside periphery is high and the inside periphery is approached to the outside periphery of the belt means.

Also preferably, this invention is an apparatus for distributing coins into the kinds, wherein means for opening-closing the open hole for coin distribution is arranged at the undersurface of open hole.

Preferably, in addition, this invention is an  
 20 apparatus for distributing coins into the kinds, wherein the means for opening-closing the open hole is actuated by means for detecting coin.

#### **Form of Embodiment**

A preferred embodiment will now be described, as example, without limitative manner having reference to the attached drawings, wherein:

Fig. 1 is a schematic perspective view showing one embodiment according to the invention;

30 Fig. 2 is a schematic plan view showing a service condition of Fig. 1;

Fig. 3 is a sketch plan view for showing the drive means of Fig. 1;

Fig. 4 is an expanded front sectional view showing a principal part of Fig. 1;

Fig. 5 is an expanded front sectional view showing another principal part of Fig. 1;

Fig. 6 is a sectional view showing an operating condition of Fig. 5;

Fig. 7 is a plan view which schematically shows another embodiment of the present invention;

Fig. 8 is a perspective view which schematically shows a hopper equipment which is used for the embodiment of Figure 7.

Fig. 9 is a plan view to schematically show roughly driving means in Figure 7.

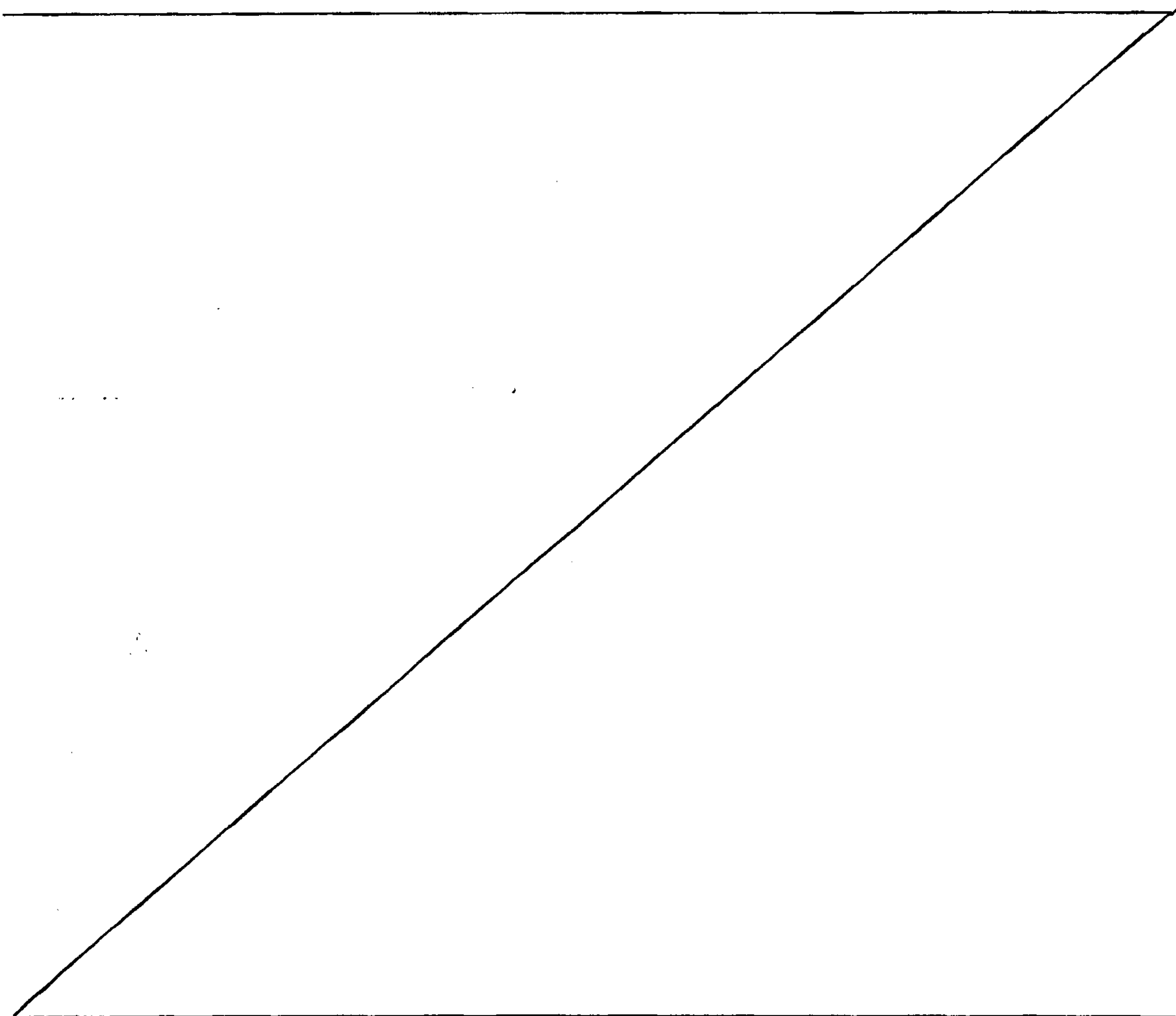


Fig. 10 shows an apparatus which receives and sends out one by one various coins.

A money distribution apparatus for a plurality of coins shown in Fig. 1 is provided with a large rectangle base board 31. On the center entire of the base board 31, a fairly large and low height circular cover board 32 is fixed by screw stop. At the periphery of the circular cover board 32, a path board 33 of circle ring type is fixed to the base board 31 by screw stop. In addition, the path board 33 is  
10 formed so that it may incline toward the bottom of the peripheral wall of cover board 32, as shown in Fig. 5.

Near the bottom of the path board 33 which is inclined downward, a long and slender belt 34 for conveying coin is arranged rotatably. In other words, near the bottom of the peripheral wall of the cover board 32, the long and slender belt 34 for conveying coin is arranged rotatably. This conveying belt 34 is made from rubber etc. and many grooves are formed on the upper surface of the conveying belt 34 (not shown). Thus, a friction surface is formed. The  
20 friction surface is inclined so that it is in one plane with the inclined surface of the path board 33 of metal, as shown in Fig. 5. Coin C on the path board 33 will be slid down, and will contact the perimeter surface of cover board 32.

The coin contacted with the perimeter surface of the cover board 32 will be conveyed clockwise by the conveying belt 34 (see Fig. 1). The conveying belt 34 is provided with the outer edge 39 of a fairly large ring body 37 of plain shape (refer Fig. 4). The ring body 37 is rotatably arranged along the internal-circumferencial surface  
30 of the cover body 32.

Rollers 40 are pivoted on the large ring body 37 at equal intervals (refer Fig. 4), and are rotatably arranged on the base board 31 centering at the center of base board 31.

Internal teeth are formed on the internal-circumference surface of the ring body 37, and are meshed with three gears 41 pivoted by the base board 31 (see Fig. 3). In other words, the rotation of ring body 37 is guided by the gears 41 at three support points. Furthermore, a gear 42 which meshes with the internal teeth of the ring body 37 is pivoted by the base board 31. The gear 42 has geared with a drive gear 43 which penetrates the base board 31. The drive gear 43 is rotated by an electric motor (not shown) of thick-plate shape which is secured to the undersurface of base board 31.

An alignment/discrimination apparatus for coin (see Fig. 2) is mounted at the notch 38 of angular part of distribution apparatus for coin as shown in Fig. 1. By the alignment/discrimination apparatus, coins are aligned and distinguished one by one to be supplied to the path board 33. The coins supplied to the path board 33 are conveyed clockwise by the belt 34.

The outline of the coin alignment/discrimination apparatus is explained as follows:

The apparatus has first means (11, etc.) for putting a plurality of thrown coin in a row. The reference numeral in Fig. 2 represents a hopper for coin injection. The reference numeral 12 represents a low speed belt, and the reference numeral 15 represents a reverse-rotation roller for preventing overlap of two coins.

Moreover, the apparatus is provided with means (16, etc.) for separating a plurality of coins in a row to every piece. In addition, a symbol 16 is a high-speed belt.

In addition, the apparatus has means (18, etc.) for distinguishing the one separated coin. The reference numeral 18 represents a sensor for discriminating coins.

Furthermore, the apparatus is provided with means (21, etc.) for receiving the genuine coin when the one separated coin is genuine. In addition, the reference numeral 21 represents a selection roller of coin, and the reference numeral 24 represents a solenoid for operating the selection roller.

The reference numeral 1S shown in the path board 33 on the left-hand side of Fig. 2 is a sensor for detecting a coin. The sensor 1S is a magnetic sensor, for example, and if  
10 the 1 yen coin is detected, the sensor will output a signal.

A sensor 10S near the sensor 1S detects the 10 yen coin similarly. The reference numeral 100S shown in the path board 33 of the upper side of Fig. 2 detects the 100 yen coin.

A sensor 500S near the sensor 100S detects the 500 yen coin similarly.

The reference numeral 5S shown in the path board 33 of the lower part of Fig. 2 is a sensor for detecting a coin. The sensor 5S will output a signal, if the 5 yen coin is  
20 detected.

A sensor 50S near the sensor 5S detects the 50 yen coin similarly.

In addition, the upper surfaces of each sensor 1S-500S are arranged to be coincide with the upper-surface level of the path board 33 as shown in Fig. 4. In other words, each sensor is arranged so that coins can pass smoothly the ring shape path board 33.

As shown in Fig. 2, on the path board 33 of the down-stream side of each sensor 1S-500S, is formed an oblong  
30 open-hole H through which each coin can drop respectively, these oblong open-holes H are respectively formed on the same shape.

An opening CH which is provided at the most downstream of path board 33 is formed in order to store coins, or cancel coins. Near the inside edge in each oblong open-hole H, a long and slender gate G is openably pivoted respectively (see Fig. 2). The gate G is specifically a long and slender roller which is rotatably arranged.

The upper surface of each gate G is arranged to coincide with the upper-surface level of path board 33 as shown in Fig. 5. That is, each gate G is arranged so that the  
 10 coin can pass through the ring shape path board 33 smoothly.

As shown in Fig. 5 and on the base board 31 near the outside edge in each open-hole H, a solenoid SL is fixed, respectively. Each solenoid SL operates the gate G by the signal from the sensor 1S-500S and opens the open-hole H, respectively (refer Fig. 6). In addition (not shown), the solenoid SL for each coin of 1 yen, 10 yen, 500 yen, 50 yen, and 5 yen is similarly fixed to the base board 31, respectively.

#### **Example**

20 As shown in Fig. 1, a coin C is conveyed on the path board 33 by the belt 34. If the conveyed coin C is for example 100 yen, the sensor 100S will detect the coin C (refer Fig. 4). If the sensor 100S detects the coin C of 100 yen, a current will be flown into the solenoid SL, the gate G will be operated, and the open-hole H will be opened (see Fig. 6). Thus, the 100 yen coin C will drop into the open-hole H by the self-weight.

The base board 31 also is provided with an open-hole H corresponding to the said open-hole H, and 100 yen  
 30 coin C which is dropped is contained in a hopper apparatus (see Fig. 8).

On the other hand, for example, when a 500 yen coin C is conveyed, the coin C is passed through the sensor 100S.

In this case, as the sensor 100S may not detect the 500 yen coin C, a current does not flow to the solenoid SL. Therefore, as shown in Fig. 5, the gate G will have closed the open-hole H and the 500 yen coin C will pass through the open-hole H.

Thus, each coin of 6 type of money, i.e., 1 yen, 10 yen, 100 yen, 500 yen, 50 yen, and 5 yen can be distributed according to the money classification. In addition, if an open-hole H is increased on the right-hand side of the path board 33 in Fig. 2, a coin distribution apparatus for 7 type of money or 8 type of money will be able to be obtained. Moreover, when coin discrimination signals from the coin alignment/discrimination apparatus (see Fig. 2 lower left) are processed statistically, the confirmation of above-mentioned coin distribution may be more exact.

An equipment for dividing a plurality of coins into species according to another embodiment of the present invention is equipped with a big rough rectangular base board 31, as shown in Figure 7.

Approximately, on the entire base board 31, a little small and low height oval cover board 32 is fixed by screws and so on.

At the outskirts of the oval cover board 32, an approximately oval ring-shaped passage board 33 is fixed on the base board 31 by screws and so on. The passage board 33 is formed to incline toward the peripheral bottom wall of cover board 32 (see Figure 4). Near the bottom of passage board 33 which is inclined below, a slender belt 34 for coin conveyance is rotatably mounted. Saying in other words, near the peripheral bottom wall of cover board 32, the slender belt 34 for coin conveyance is rotatably provided.

The belt 34 for conveyance is made from rubber etc., and a lot of ditches (not shown) are formed on the

surface thereof to form a frictional surface. The frictional surface is inclined to approximately become identical to the inclination of passage board 33 made from metal (see Figure 5). Therefore, the coin on the passage board 33 slips and touches the surface around the cover board 32 (see figure 4). Then, a coin C which touches the surface around the cover board 32 is conveyed in a clockwise direction by the friction of belt 34 for conveyance (see Figure 7). Further, the belt 34 for conveyance is attached to prominences 39 of a big oval ring body 37 (see Figure 9). This ring body 37 has a flexibility, consisting of synthetic resin formed article and so on. That is, the section of ring body 37 is formed at vertical length and the whole ring body 37 can be curved. On the underside of ring body 37, a multiplicity of little long prominences 39 are fixed as directing outside. The tip of concerned prominence 39 is formed in square ring shape, for example. Thus, the rubber belt 34 is attached to the ring body 37, intervening the tip ring parts of prominences 39. In addition, the concerned ring body 37 is rotatably mounted along the internal circumference surface of cover body 32.

Small rollers 40 are pivoted at regular intervals in the big ring body 37 (see Figure 4). That is, the ring body 37 is positioned on the surface of base board 31 and is also turnably provided along the internal circumference surface of oval cover body 32. An internal gear is formed along the whole internal circumference surface of ring body 37. A little big gear 42 which meshes with the internal teeth of ring body 37 is pivoted at the base board 31 (see Figure 9).

The whole ring body 37 is guided by a multiplicity of small rollers 41 which are pivoted at the base board 31. That is, the rotation of oval ring body 37 is guided by a plurality of rollers 41.

The gear 42 meshes with a drive gear 43 which is extended through the base board 31. The drive gear 43 is rotated by an electric motor (not shown) of plank form which is fixed at the underside of base board 31.

In the cut 38 at the lower left of passage board 33 which is shown in Figure 1, an equipment for coin alignment and distinction is mounted.

The equipment for coin alignment and distinction is roughly explained hereinbelow.

10           The concerned alignment and distinction equipment has means (mark 11 and so on) to arrange a plurality of thrown coins into one line.

With such an equipment for coin alignment and distinction as above mentioned, coins are aligned and distinguished one by one and further are supplied to the passage board 33 (see Figure 7 on Figure 2). The coin which is supplied to the passage board 33 is conveyed in a clockwise direction by the belt 34.

20           The reference numeral 1S which is shown in the left side of passage board 33 is a sensor for coin detection. The sensor 1S is a magnetic sensor, for example, and outputs a signal when it detects a 1 yen coin.

          In the same way, a sensor 10S which is shown in the passage board 33 at the center of upper side on Figure 7 detects a 10 yen coin. 100S which is shown in the passage board 33 at the right side on Figure 7 detects a 100 yen coin. In the same way, a sensor 500S which is shown in the passage board 33 in the right side of Figure 7 detects a 500 yen coin. The reference numeral 50S which is shown in the  
30           passage board 33 at the lower side right on Figure 7 is also a sensor for coin detection. When the sensor 50S detects a 50 yen coin, it outputs a signal. In the same way, a sensor 5S

which is shown at the lower side left of passage board 33 detects a 5 yen coin.

The surface levels of each sensor 1S - 500S are arranged to be same as the surface level of passage board 33 approximately (Figure 4). In other words, each of sensors 1S - 500S is arranged, so that a coin is able to pass through the oval ring-shaped passage board 33 smoothly. Then, as shown in Figure 7, in the passage board 33 at the downstream side of each sensor 1S - 500S, oblong holes H are formed, respectively, through which each species coins are fallen.

The oblong holes H are formed into approximately same shapes, respectively.

An opening CH in the most downstream of passage board 33 is formed to collect or cancel coins.

Near the inside edge of each oblong hole H, a slender gate G is pivoted to open and shut freely the hole H, respectively. The gate G is a spindle roller and is rotatably provided.

A surface level of each gate G is arranged to become the same as the surface level of passage board 33 approximately (see Figure 5). That is, each gate G is arranged for the coin to be able to pass the oval ring-shaped passage board 33 smoothly.

As shown in Figure 5, a solenoid SL is fixed on the base board 31 near the outside edge of hole H, respectively.

Each gate G is operated by means of each solenoid SL and each signal from the sensors 1S - 500S and thus each hole H is opened (see Figure 6).

In the same way, solenoids SL (not shown in the drawings) for each coin of 1 yen, 10 yen, 500 yen, 50 yen, 5 yen are fixed on the base board 31, respectively.

Each of the hopper equipments 1H - 500H is formed in the same style structure. For illustrating, the hopper equipment 100H for 100 yen coin only, is explained hereinbelow, referring to Figure 8.

When a head-stood electric motor 115 is driven, a disk 141 is turned in the direction of arrow by means of gears (not shown) and a turn axis 126. As the result, a plurality of 100 yen coins in a square pan-shaped hopper 145 is paid out one by one into an outlet 137 with a disk 141.

10 That is, when the electric motor 115 is rotated, the coin is fallen into either of pierced holes 142 of disk 141 which is turned. The most below coin that is fallen into the pierced hole 142 slides on the surface of plate 133 which is made from metal, by means of a nail 143 with the turn of disk 141. The coin slid on the surface of plate 133 is guided to the direction of outlet 137 with the wall of hopper 145 and a guide fragment 136. The coin which is guided in the direction of outlet 137 is pressed out from the position of pierced hole 142 by the nail 143 and one pair of pins (not shown).

20 The coin which is pressed outside is further slipped out by nail 143, resisting each spring (not shown) of one pair of rollers 139. The slipped coin passes a sensor 108 and is thrown out on a belt 9 (see Figure 1) for carrying-out.

The coin which was thrown out on the belt 9 for carrying-out is carried to a box 7 for change (see Figure 1) by the concerned belt. Further, the coin which is pressed out and slipped from the hopper equipment 100H is electronically detected, when passing the sensor 108. Therefore, the sensor 108 is used for the calculation of coin which is released

30 from the hopper equipment 100H.

The reference numeral 112 which is shown in the lower right of Figure 2 is an electric connector.

A gear train (not shown) and so on are stored between a bottom board 111 and a base board 131.

Also, nails 149 which are formed on the base board 131 are bitted into hollows (not shown) which are formed on the hopper 145, using springs (not shown). On the other hand, hooks (not shown) which are formed on the lower edge of hopper 145 are inserted into small holes 147 of base board 131 and become without being extracted. In this way, the hopper 145 is fixed on the base board 131. Each hopper  
10 equipment 1H - 500H has the same size, but hopper equipments about coins of 5 yen, 50 yen, 500 yen the use of which is less frequent may be made smaller.

According to this invention, since coins can be conveyed only by the long and slender conveying belt, the distribution apparatus can be extremely simplified.

Furthermore, according to this invention, since the coin detector means and opening-closing means for coin receiving open-hole are arranged at the undersurface of coin path, the height of entire apparatus can be made lower. In  
20 other words, the distribution apparatus according to this invention can have the height which can be easily housed under apparatuses, such as a money register.

In addition, since this invention apparatus has a simple structure, it has the advantage of having a very simple maintenance.

Furthermore, according to this invention, the distribution of many type of money can be obtained, and there is a large effect that the distribution order of money type can be made at desired.

**CLAIMS**

1. An apparatus for distributing coins according to their types, comprising at least:
  - cover means (32) with a height;
  - conveying means (34, 37, 42) for coin conveyance provided along an outside perimeter of the cover means; and
  - passage means (33, H, 1H - 500H) for coins having a10 plurality of openings (H, 1H - 500H) for coin distribution and an inclined board (33), an outside perimeter of which is higher than an inside perimeter which is approached to outside of the cover means, characterized in that the conveying means comprises a slender belt (34, 37, 42), which is provided furnably along an outside perimeter of bottom of the cover means, and in that an inside perimeter of the passage means is approached to outside of the slender belt.
  
2. An apparatus as described in claim 1, further comprising, at an underside of at least one of the openings,
20 means (G, SL) for opening and closing the opening (H).  
3. An apparatus as described in claim 2, wherein said means for opening and closing is driven in response to means (1S-500S) for detecting a coin.
  
4. An apparatus according to any one of claims 1 to 3, wherein the cover means (32) has the form of a disc, and the passage means (33) has a corresponding ring-shape form.
  
5. An apparatus according to any one of claims 1 to 3, wherein the cover means (32) has the form of an oval

board, and the passage means (33) has a corresponding oval ring-shape form.

6. An apparatus as described in claim 1, further comprising: means for opening and closing the openings (1H-500H).

7. An apparatus as described in claim 6, wherein the means for opening and closing the openings has means (1D-500D) for detecting a diameter of a coin.

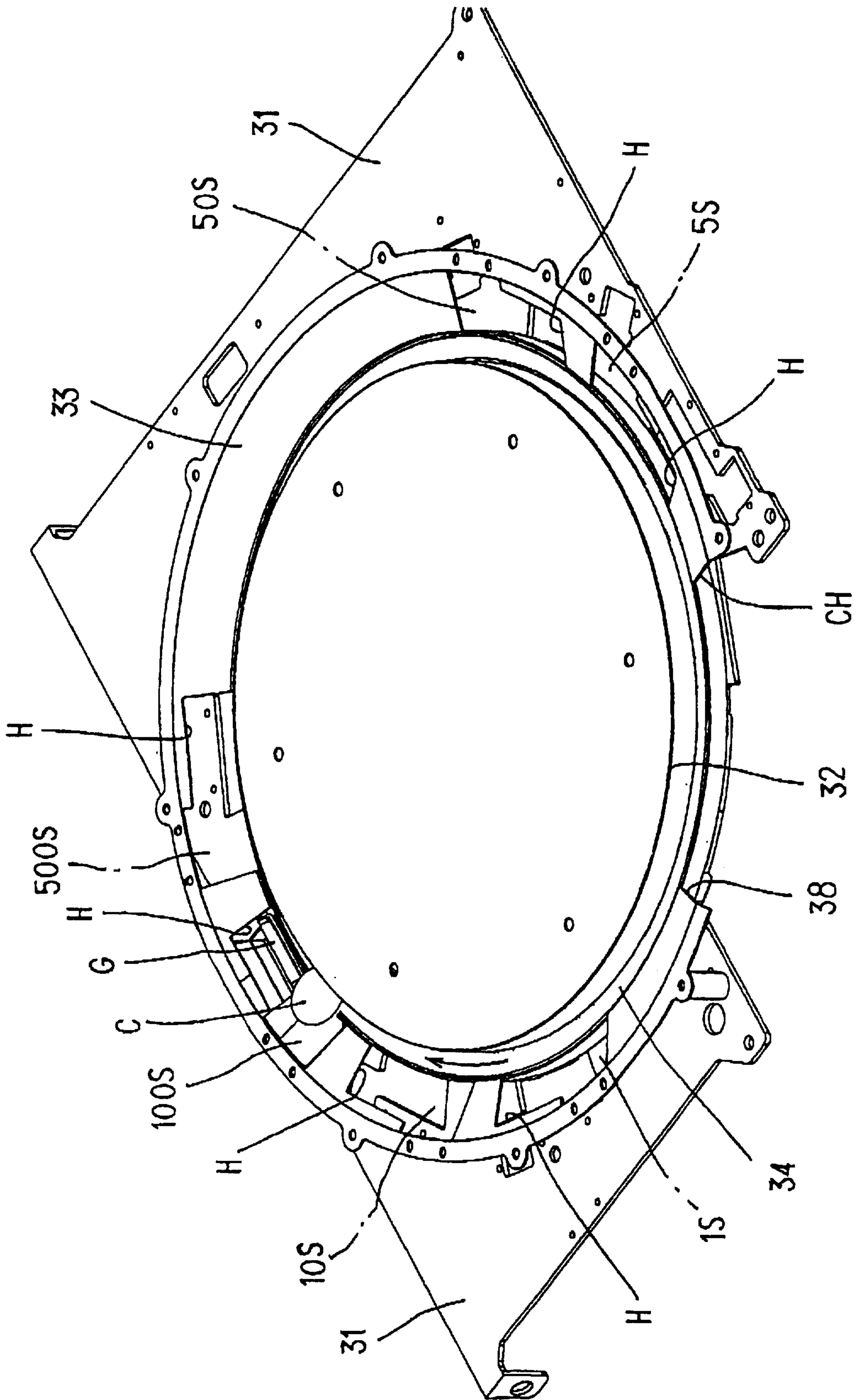
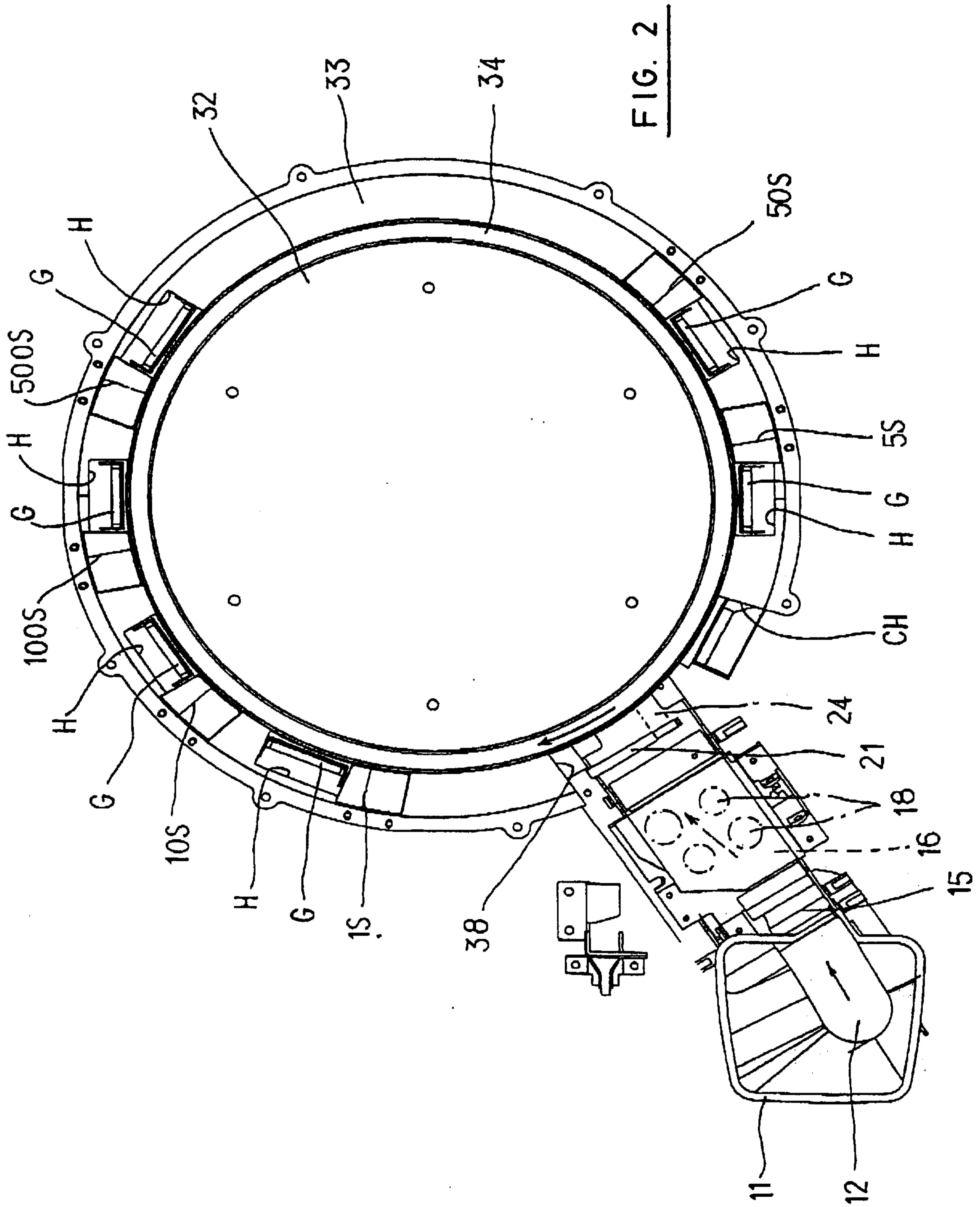


FIG. 1



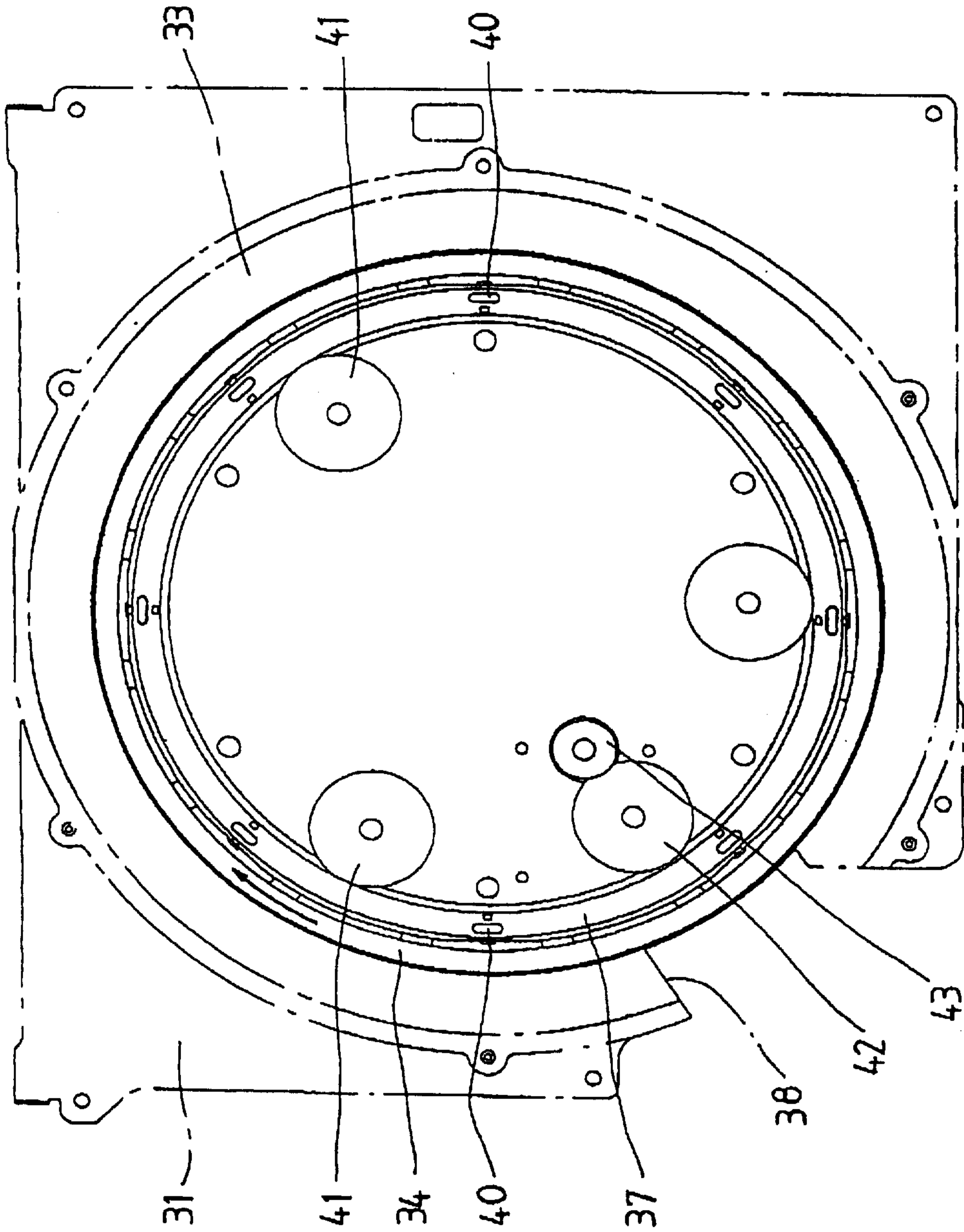


FIG. 3

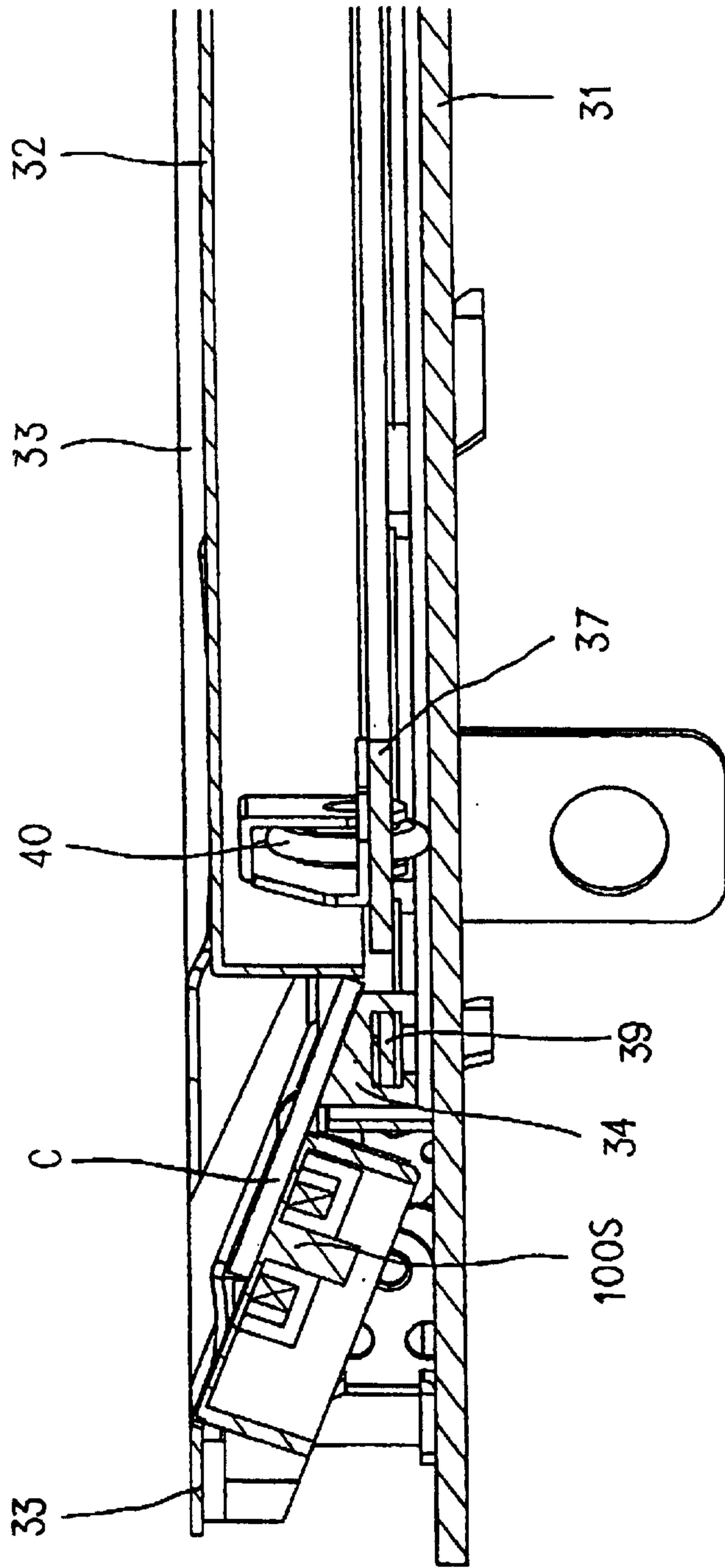


FIG. 4

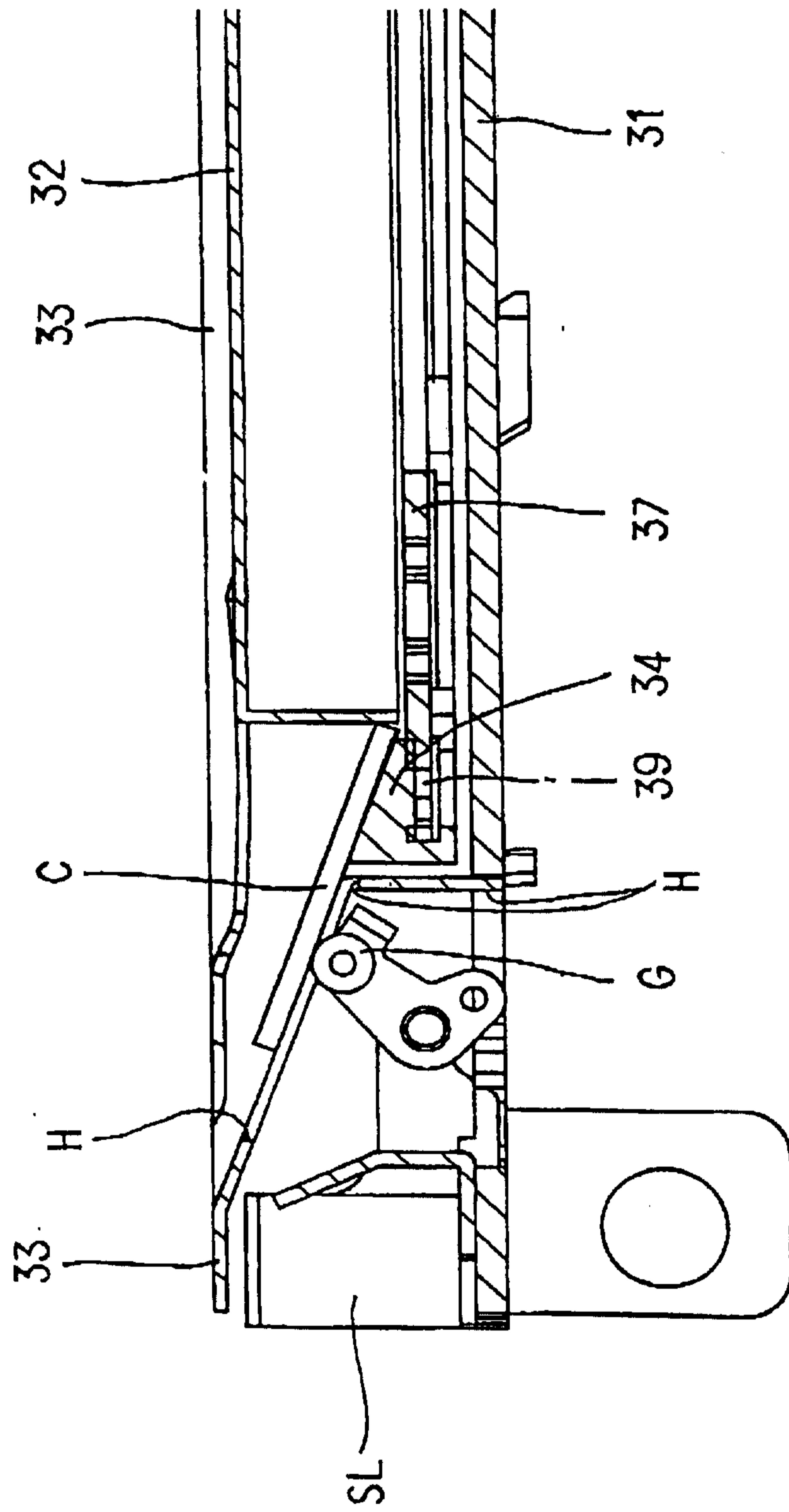


FIG. 5

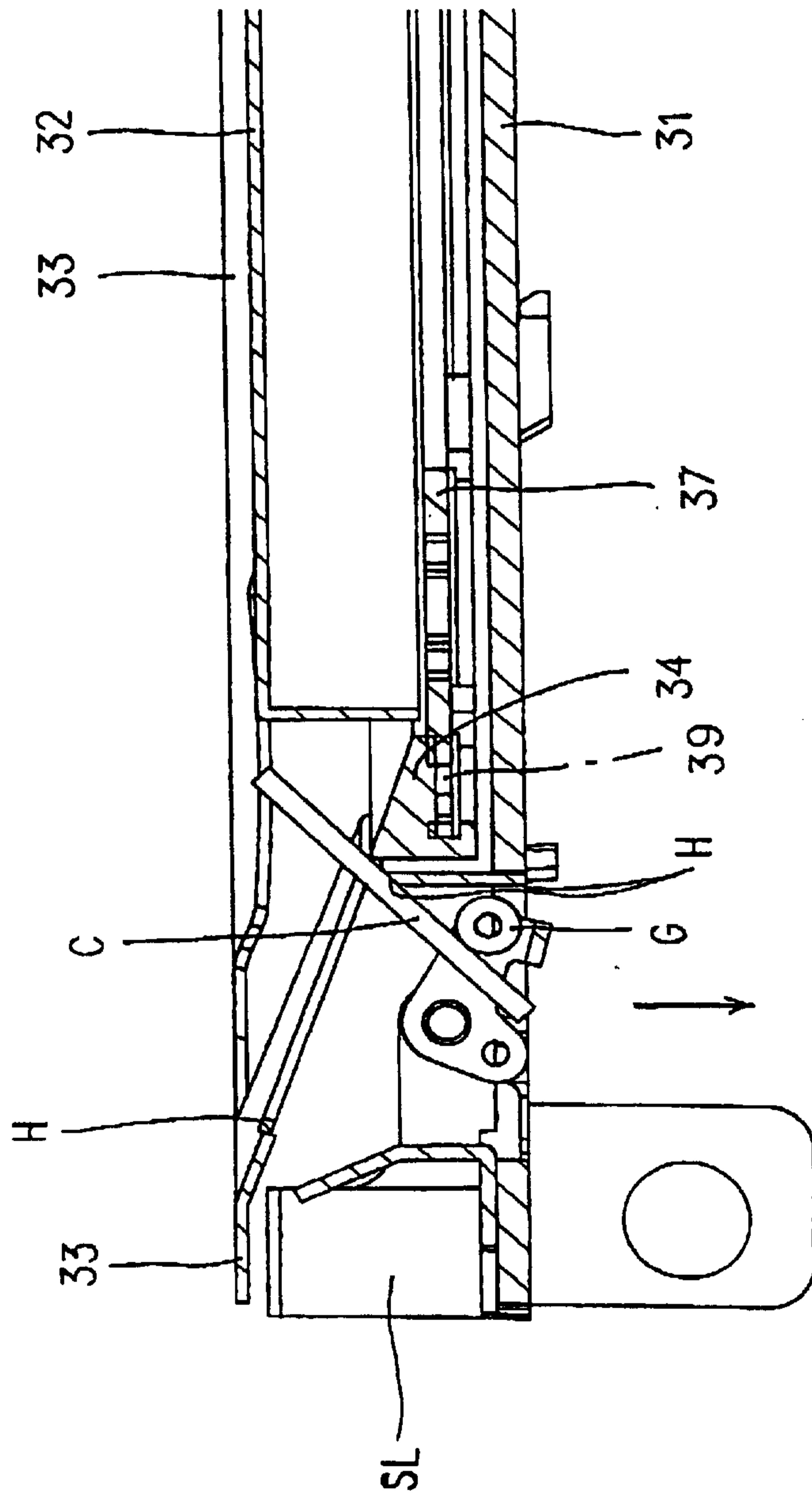


FIG. 6

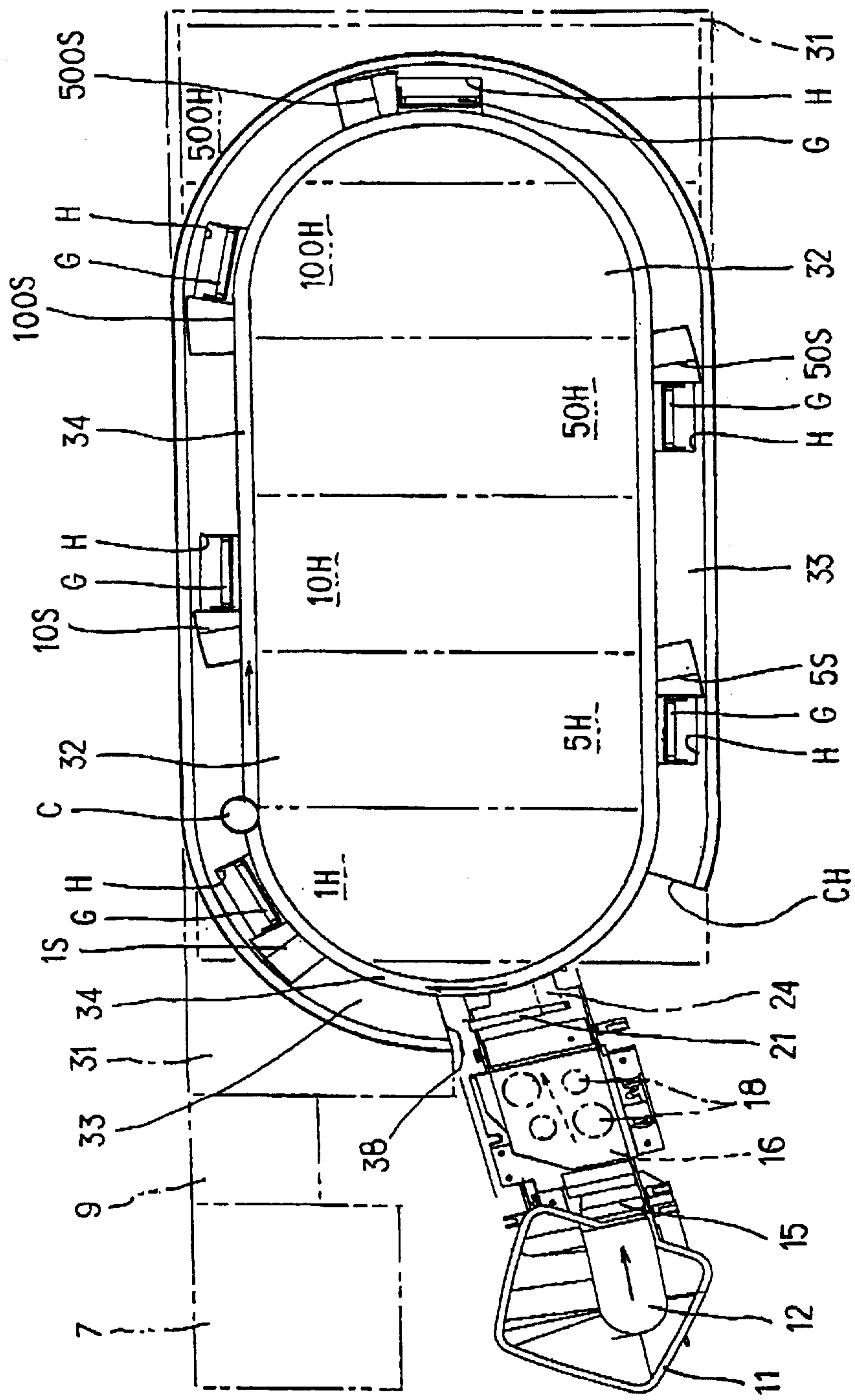


FIG. 7

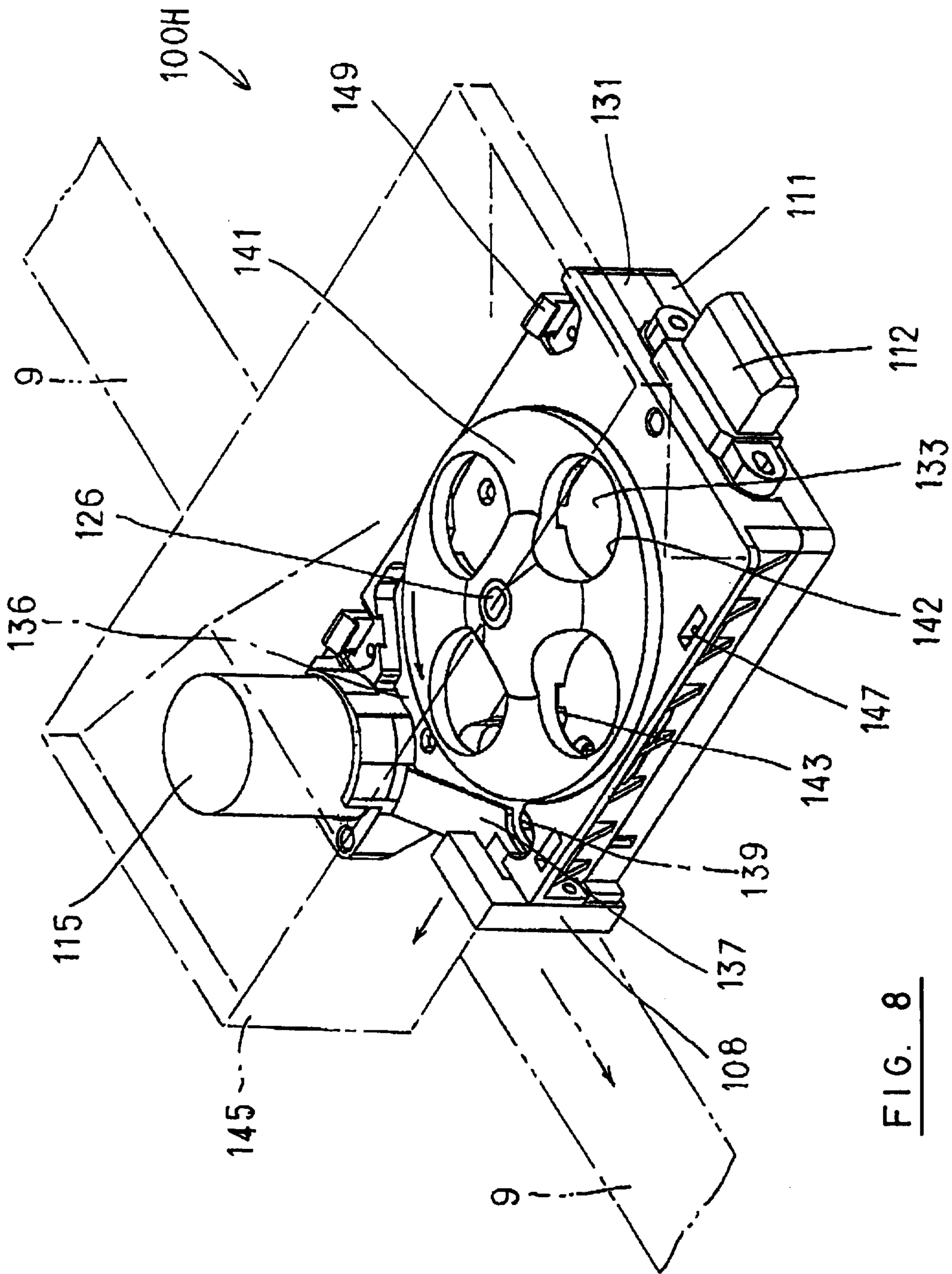


FIG. 8

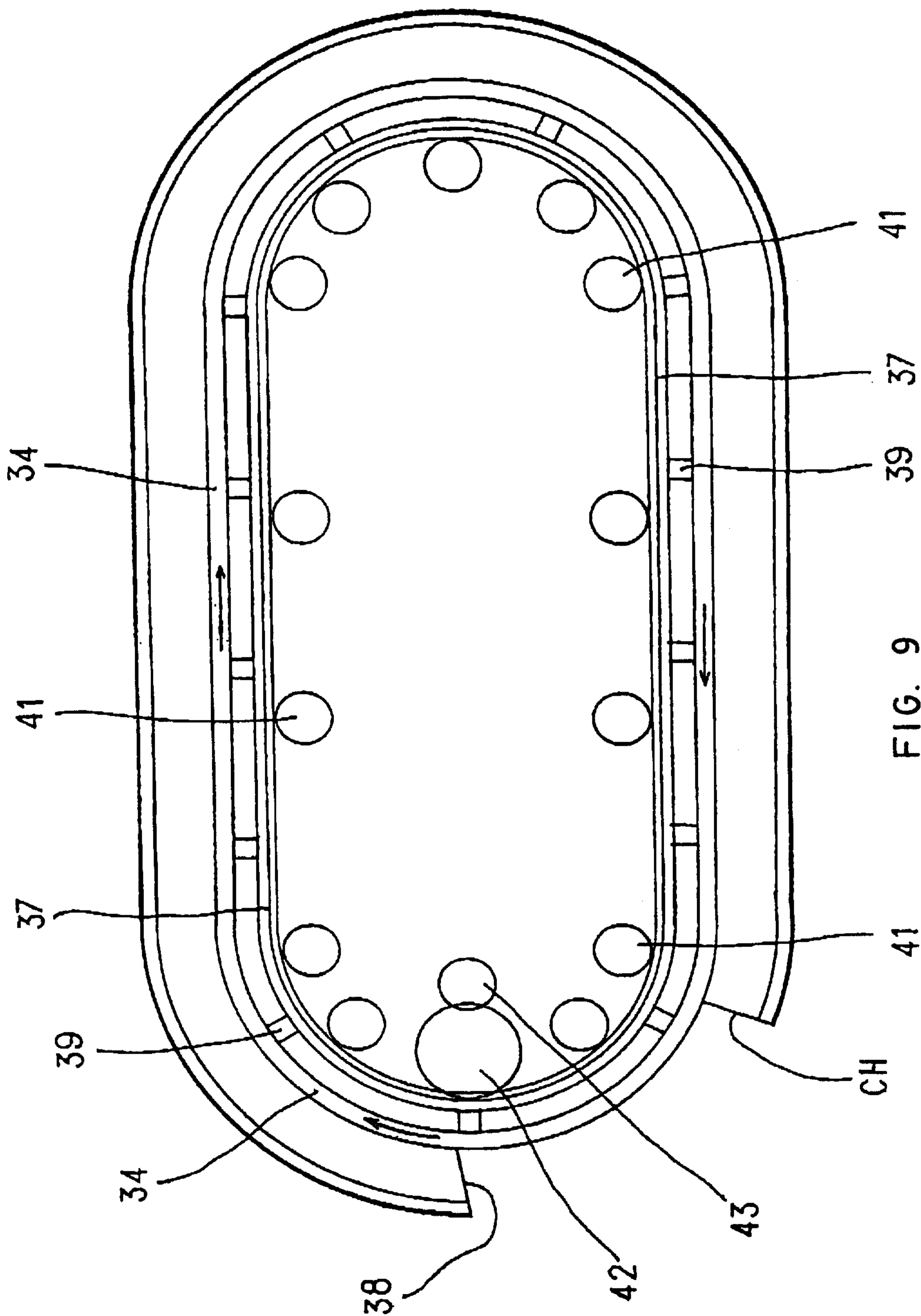


FIG. 9

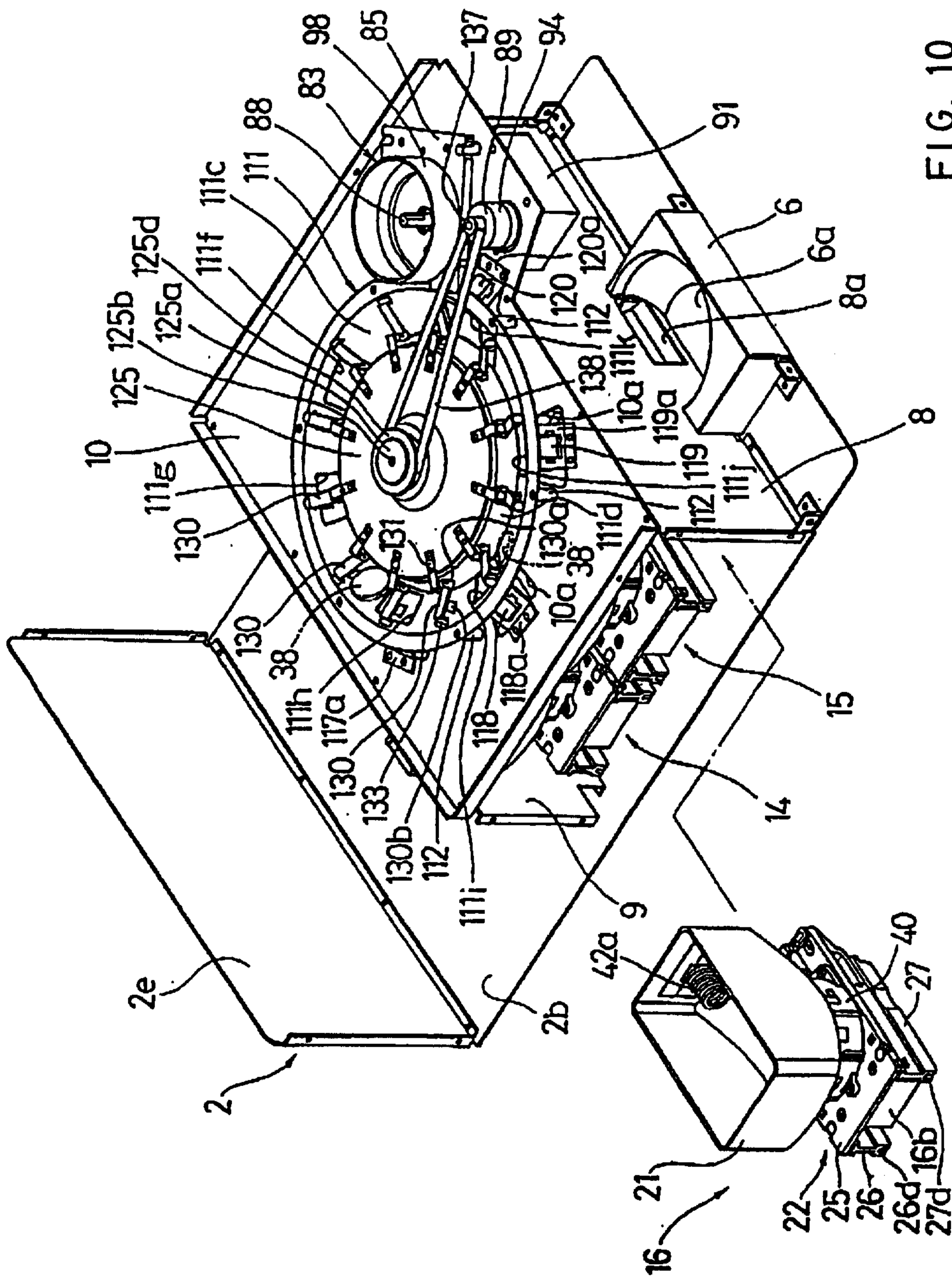


FIG. 10

