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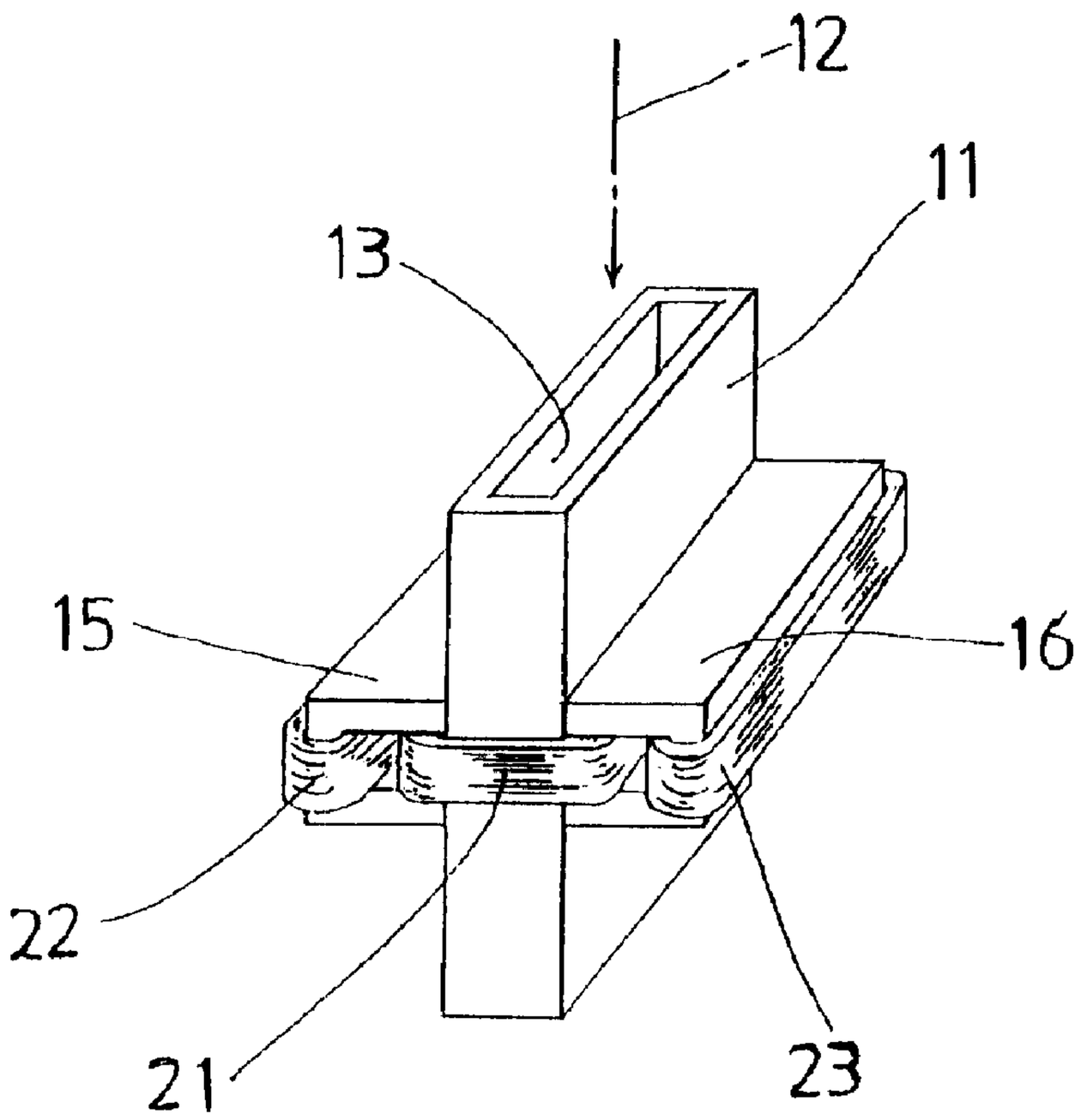
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(54) Titre : DISPOSITIF POUR DISTINGUER UN CORPS PLAT CIRCULAIRE
(54) Title: DEVICE FOR DISCRIMINATING A CIRCULAR PLATE BODY



(57) Abrégé/Abstract:
This invention was developed from the purpose for making a coin fall naturally and for judging the coin momentarily. More particularly, this invention was developed from the purpose of making the constitution of equipment simple and for improving the distinction speed of the coin. The invention is a device for discriminating a circular plate body comprising at least: passage means for making one circular plate body vertical and for making fall naturally; first coil means which is wrapped around the passage of the circular plate body of the passage means; second and third long core means which cover each side part of the first coil means; and second and third coil means which are wrapped around these core means respectively.

ABSTRACT

DEVICE FOR DISCRIMINATING A CIRCULAR PLATE BODY

This invention was developed from the purpose for making a coin fall naturally and for judging the coin momentarily. More particularly, this invention was developed from the purpose of making the constitution of equipment simple and for improving the distinction speed of the coin. The invention is a device for discriminating a circular plate body comprising at least: passage means for making one circular plate body vertical and for making fall naturally; first coil means which is wrapped around the passage of the circular plate body of the passage means; second and third long core means which cover each side part of the first coil means; and second and third coil means which are wrapped around these core means respectively.

DEVICE FOR DISCRIMINATING A CIRCULAR PLATE BODY

This invention relates to a device for discriminating a circular plate body such as a coin with a circular plate form which is a coinage now or a medal with a circular plate form which is used for game machines or a token and so on.

This invention especially relates to a device for discriminating a circular plate body detecting electronic-engineeringly the size and the material and so on of a circular plate body.

This invention concretely relates to a suitable device for being incorporated into the equipment started with coin or medal insertion such as various vending machines or money changing machines or game machines and so on.

As a device for electronic-engineeringly discriminating a circular plate body such as the coin and so on, utilization that the inserted circular plate body changes the magnetic flux which the coil generates is known from the past.

As the electronic type device for discriminating a circular plate body, various one is known.

For example, there is a coin sorting device which was mentioned in the specifications of Japanese Patent Application Number 7-46088.

The device which was mentioned in the above-mentioned specification comprises passage means to pass one sheet of coin;

two coil means of being arranged respectively in each side of this passage means and being cumulatively connected;

two coil means of being arranged respectively in each side in the above-mentioned passage and being differentially connected;

means to oscillate a low frequency to the circuit which contains the said two coil means which are

cumulatively connected; and

means to oscillate a high frequency to the circuit which contains the said two coil means which are differentially connected.

However, there were problems in the above mentioned prior technology. That is, the inserted coin must always move a base in the passage.

When saying in other words, the coin which is sorted out must move a base in the passage which always becomes a standard surface.

When described oppositely, this thing was the fact that the precision to the standard surface must be maintained, passing smoothly when the coin passes among the coils.

There was a problem that the sorting-out speed of the coin is limited for some purpose in the necessity which the more sorted coin moves the inclining aspect of the standard to in the turn by the prudence.

This invention has been developed from the purpose to solve the problem of the above mentioned prior technology.

That is, this invention has been developed from the purpose to improve in the distinction speed of the coin, making device structure simple and making a coin fall naturally.

According to the present invention, there is provided a device for discriminating a circular plate body (12), which device comprises:

a passage means (13) adapted to guide and allow the circular plate body (12) to orient vertically and fall therewithin;

a first coil means (21) wound around the passage means; and second (22) and third (23) coil means,

characterized by first and second core means (15) which each covers the first coil means (21) on a respective opposing side of the passage means (13),

the second (22) and third (23) coil means, each being wound around a respective one of said first and second core means (15) about axes parallel to an axis of the passage means (13).

Preferably, the invention is a device for discriminating a circular plate body characterized in that the magnetic flux by the first coil means and the magnetic flux by the second and third coil means intersect normally in the above-mentioned passage.

Preferably, the invention is a device for discriminating a circular plate body characterized in that the above-mentioned passage means is made from synthetic resin.

Preferred embodiments of the present invention is explained below, without limitative manner referring to attached drawings, wherein:

Figure 1A is a perspective view which shows roughly the subject of an embodiment according to this invention, and Figure 1B is a rough section view on which the concerned subject part is shown from the front.

Figure 2A is a diagram which shows the connection relation in the embodiment of Figures 1A and 1B, and Figure 2B is a diagram to show the magnetic flux in the said subject part.

Figure 3 is a block diagram which is used for the above-mentioned embodiment.

Figure 4A is a section end view of a further embodiment according to the present invention.

Figure 4B is a block diagram which shows embodiment of figure 4A.

Figure 5 is a section end view to show a further embodiment according to this invention.

A rectangular pipe with the plank form which is shown in Figures 1A and 1B is a slot body 11 made of e.g. synthetic resin.

Incidentally, as for the slot body 11, rubber or wood and so on is thought of.

A passage 13 is formed at the center of slot body 11, where a coin 12 which is a circular plate body can be freely passed by nature fall.

A first coil 21 for a sensor is wrapped around the center of out wall of slot body 11 and surrounds the passage 13 as the result.

Each side part of this first coil 21 is covered with little long cores 15 and 16 with end surface U form respectively.

Further, these cores 15 and 16 are made of ferrite or iron or steel sheet and so on, and coils 22 and 23 for the sensor are wrapped around the each center thereof.

Also, the cores 15 and 16 which become one pair are fixed on the each side wall of slot body 11 respectively by the glue, intervening long both edges of U-shaped end surface form.

The first coil 21 wrapped around the passage 13 is connected to a first oscillation circuit 31.

The second and third coils 22 and 23 which were wrapped around each of the cores 15 and 16 are connected in series and are connected with a second oscillation circuit 32 (see Figure 2(A) and figure 3).

A detection circuit 33 is connected to the first oscillation circuit 31, a rectification circuit 35 is connected to the detection circuit 33, and the rectification circuit 35 is connected with an analog signal to digital signal converter 37.

In the same way, a detection circuit 34 is connected with the second oscillation circuit 32, a rectification circuit 36 is connected with the detection circuit 34, and the rectification circuit 36 is connected with an analog to digital signal converter 37.

The converter 37 is connected with a signal processing unit 38 such as CPU and a memory 39 and a gate 41 are connected to the signal processing unit 38.

In the embodiment with the above mentioned constitution, as shown on Figure 2 (B), a first magnetic flux 1 which passes the upper and lower direction of the passage 13 of the fall coin 12 is generated by means of the first oscillation circuit 31.

Also, a second magnetic flux 2 which crosses the passage 13 of the fall coin 12 is generated by means of the second oscillation circuit 32.

Further, these magnetic flux 1 and 2 are intersected normally as shown in the drawings, and there is

no or little interference between thereof.

When the coin 12 passes the fall passage 13 in this condition, the amplitude of a first oscillating signal which depends on the first oscillation circuit 31 is changed, and the amplitude of a second oscillating signal which depends on the second oscillation circuit 32 is also changed.

The first oscillating signal of which the amplitude was changed by the passage of coin 12 is detected with the detection circuit 33 and is rectified by the rectification circuit 35, and is more changed into a first data 3 of digital signal by the converter 37 and is transmitted to the signal processing unit 38.

In the same way, the second oscillating signal of which the amplitude was changed by the passage of coin 12 is detected with the detection circuit 34 and is rectified by the rectification circuit 36, and is more changed into a second data 4 of digital signal by the converter 37 and is transmitted to the signal processing unit 38.

Further, the first data 3 which depends on the first coil 21 mainly relates to the section area of coin 12 and subordinately relates to the material of coin 12.

Therefore, it is possible to judge whether the passing coin 12 is an authentic one or not, when previously getting the data of authentic coin 12 and memorizing it at the memory 39.

Also, the second data 4 which depends on the second coil 22-23 mainly relates to the diameter of coin 12 and subsidiary relates to the material of coin 12.

Therefore, it is possible to judge whether the passing coin 12 is an authentic one or not, when previously getting the data of authentic coin 12 and memorizing it at the memory 39.

Being like mentioning above, the signal processing unit 38 compares the data 3 and 4 of the coin 12 falling in the passage 13 with the data of the authentic coin which was beforehand memorized at the memory 39.

When the fall coin 12 is judged to be authenticity in the signal processing unit 38, a drive signal is sent to gate 41 and the concerned coin 12 is taken in by a safe box (not shown).

Incidentally, using the two sets of sensor coils 21-23 (see Figure 3), when a detection circuit 51 is connected between the latter part of oscillation circuit 31 and the signal processing unit 38, it is possible to improve in the efficiency of the distinction of coin 12.

In this case, since the frequency change of the signal from the first oscillation circuit 31 can be detected, the material of fall coin 12 can be more distinguished.

Therefore, the addition of frequency detection circuit 51 is the second embodiment due to this invention.

Referring now to figures 4A and 4B, there is show a drawing which shows the subject of a further embodiment. Figure 4A shows a section end view of this embodiment and Figure 4B shows a block schematic of this embodiment.

It is wrapped around the peripheral wall of slot body 11 under one pair of the cores 15 and 16, and surrounds the passage 13 that is a forth coil 54 for sensor.

Therefore, the embodiment which is shown in Figures 4A and 4B is equipped with three sets of coils 21-23 and 54.

Incidentally, each side of the forth coil 54 is covered with slightly long cores 52 and 53 with an end surface U form respectively.

A third oscillation circuit 55 is connected with the coil 54 for sensor, a detection circuit 56 is connected with the oscillation circuit 55, a rectification circuit 57 is connected with the detection circuit 56, and the rectification circuit 57 is connected with the converter 37 (see Figure 3).

Further, it is desirable that the third

oscillation circuit 55 generates the signal of the frequency which is lower than the first and second oscillation circuits 31 and 32.

When the fall coin 12 passes the passage 13, the amplitude of third oscillation signal which depends on the third oscillation circuit 55 is changed into.

The third oscillation signal of which the amplitude was changed into by the passage of coin 12 is detected with the detection circuit 55 and is rectified by the rectification circuit 56, and is more changed into the third data of digital signal by the converter 37 and is transmitted to the signal processing unit 38.

Incidentally, the third data which depends on the forth coil 54 relates to the material of coin 12 mainly.

Therefore, when previously getting the third data of authentic coin 12 and memorizing it at the memory 39, it is possible to judge whether the passing coin 12 is an authentic one or not.

As the result, the ability of this equipment to judge coins is improved. Figure 5 is a drawing which shows the pivot part of a further embodiment, Figure 5A showing a section end view which saw this embodiment from the side thereof, and Figure 5B showing a section view which saw this embodiment from the front thereof.

This embodiment is characterized that, as shown by Figure (B) 5, one pair of coils 65-66 are installed in each side of the slot body 11 under the sensor coils 21-23.

Further, the fifth coil 65 is wrapped around a central part 61 with the small pipe form which defines a pot core, and a big flange part 63 is formed on the out end surface of pipe-shaped central part 61, and the coil 65 is approximately surrounded.

Also, the sixth coil 66 is wrapped around a central part 62 with the small pipe form that the 6th coil 66 defines a pot core in the same way, and a big flange part 64 is formed on the out end surface of pipe-shaped

central part 62, and the coil 66 is approximately surrounded. The fifth and sixth coils 65-66 for the sensor are connected in series and further are connected to an oscillation circuit (not shown) as above-mentioned.

A detection circuit (not shown) is connected to the said oscillation circuit, a rectification circuit (not shown) is connected with the said detection circuit, and the said rectification circuit is connected to the converter 37 (see Figure 3).

Incidentally, it is desirable that the oscillation circuit which is connected to the coils 65-66 generates the signal of which the frequency is lower than the first and second oscillation circuits 31-32. As shown on figure 5, when the fall coin 12 passes the passage 13, the amplitude of oscillation signal by the oscillation circuit (not shown) is changed into.

The oscillation signal of which the amplitude was change into by the passage of coin 12 is detected by a detection circuit (not shown), and is rectified by a rectification circuit (not shown), and is further changed into the third data of digital signal by the converter 37, and is transmitted to the signal processing unit 38.

Further, the third data which depends on the fifth and sixth coils 65-66 relates to the material of coin 12 mainly.

Therefore, it is possible to judge whether the passing coin 12 is an authentic one or not, when previously getting the third data of authentic coin 12 and memorizing it at the memory 39.

As the result, the ability of this equipment to distinguish the coins is improved.

Also, in the case of Figure 5, the coils 65-66 must be arranged such that a minimum coin 12 falling in the passage 13 covers always the center pipe-shaped cores 61-62 as shown on the drawing.

Also, the passage 13 is perpendicularly formed out in the embodiment of the drawing, but the fact that the

passage 13 may have a little inclination is of course.

Also, the slot body 11 is defined by the thick plate form, but the fact that, for easily rolling up the coil 21, the end surface of slot body 11 is defined by a long ring form is permitted of course.

Also, the one pair of cores 15-16 have end surfaces with U form, but the fact that H form or C form may be well of course.

As above mentioned, this invention using the simple constitution can momentarily distinguish the kind of the coin and so on, by making the coin which is a circular plate body fall naturally.

Therefore, the invention can small-size the equipment and can get a big effect that it is possible to improve substantially the distinction speed of coin.

Concretely, according to this invention, the first magnetic flux along the direction of the fall coin are generated and the second magnetic flux across the direction of the fall coin are generated, and further these magnetic flux are crossing.

Therefore, according to this invention, distinctions of coins are momentarily done because the coin passes the orthogonal crossing of the magnetic flux which the magnetic flux concentrate crosswise.

In addition, according to this invention, the strong magnetic flux center on the passing coin without influences from outside because there are core means.

WHAT IS CLAIMED IS:

1. A device for discriminating a circular plate body (12), which device comprises:

a passage means (13) adapted to guide and allow the circular plate body (12) to orient vertically and fall therewithin;

a first coil means (21) wound around the passage means (13); and second (22) and third (23) coil means,

characterized by first and second core means (15) which each covers the first coil means (21) on a respective opposing side of the passage means (13),

the second (22) and third (23) coil means, each being wound around a respective one of said first and second core means (15) about axes parallel to an axis of the passage means (13).

2. A device as claimed in claim 1, wherein the first and second core means (15) are each elongate and extend for substantially the full width of a respective side wall of the passage means (13).

3. A device as claimed in claim 1 or 2, wherein a magnetic flux generated by the first coil means (21) and a magnetic flux generated by the second (22) and third (23) coil means intersect normally in the passage means (13).

4. A device as claimed in any one of claims 1 to 3, wherein the passage means (13) is formed of a non metallic material.

5. A device as claimed in claim 4, wherein the passage means (13) is formed of a synthetic resin.

6. A device as claimed in any one of claims 1 to 5 and which comprises a first oscillation circuit (31) to generated an oscillating signal, a

detection circuit (33) to detect frequency changes in the oscillating signal and a detection circuit (34) to detect amplitude changes in the oscillating signal.

7. A device as claimed in any one of claims 1 to 6, which further comprises a fourth coil means (52) wound around the passage means at a level on the passage means above or below the first coils means (21).

8. A device as claimed in any one of claims 1 to 7, which device further comprises a further pair of coil means (65, 66), each of said further pair being on an opposing side of the passage means (13) and wound around a respective one of a further pair of cores (61, 62), which cores extend substantially perpendicularly to the axis of the passage means (13).

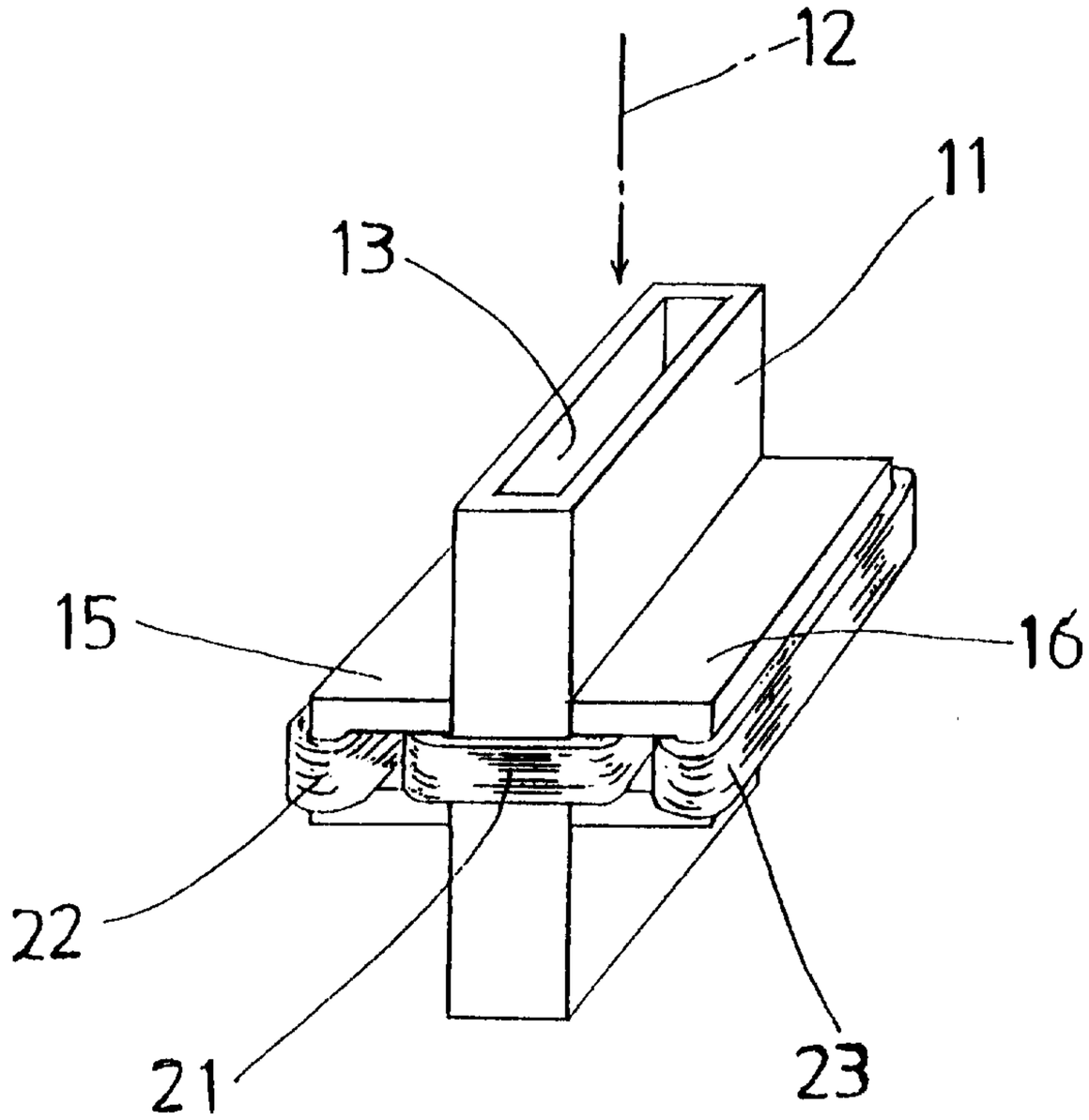


FIG. 1A

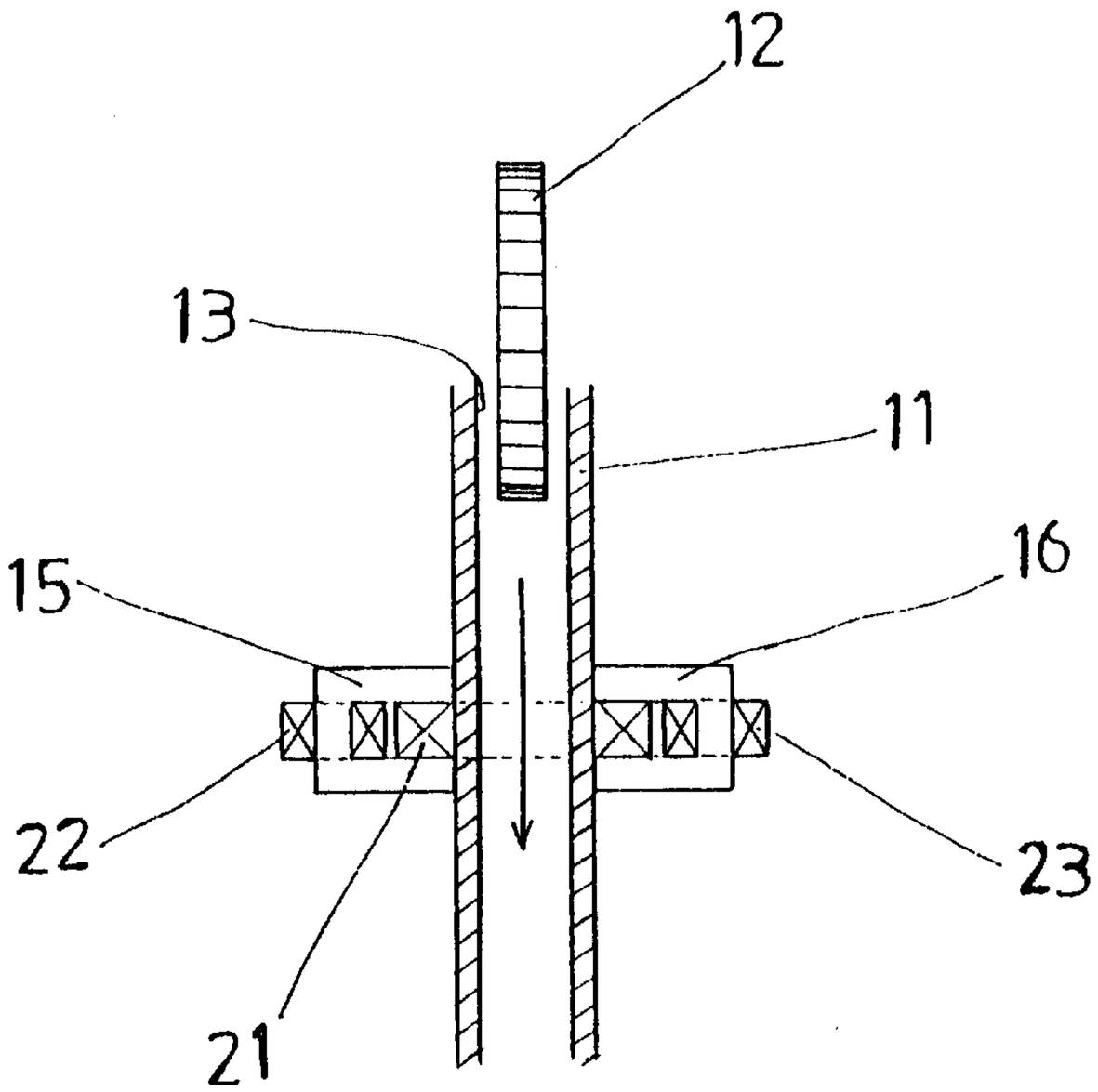


FIG. 1B

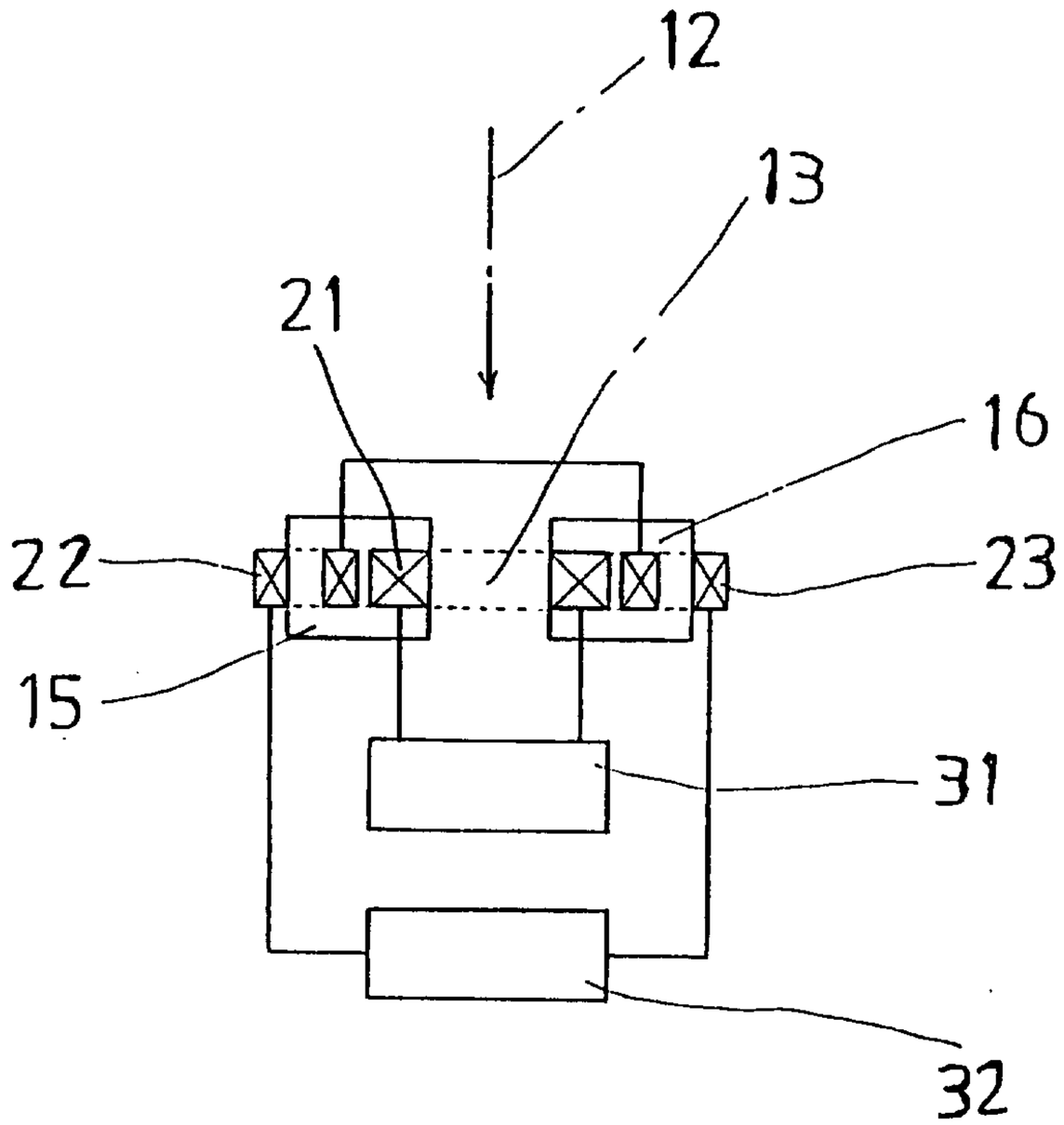


FIG. 2A

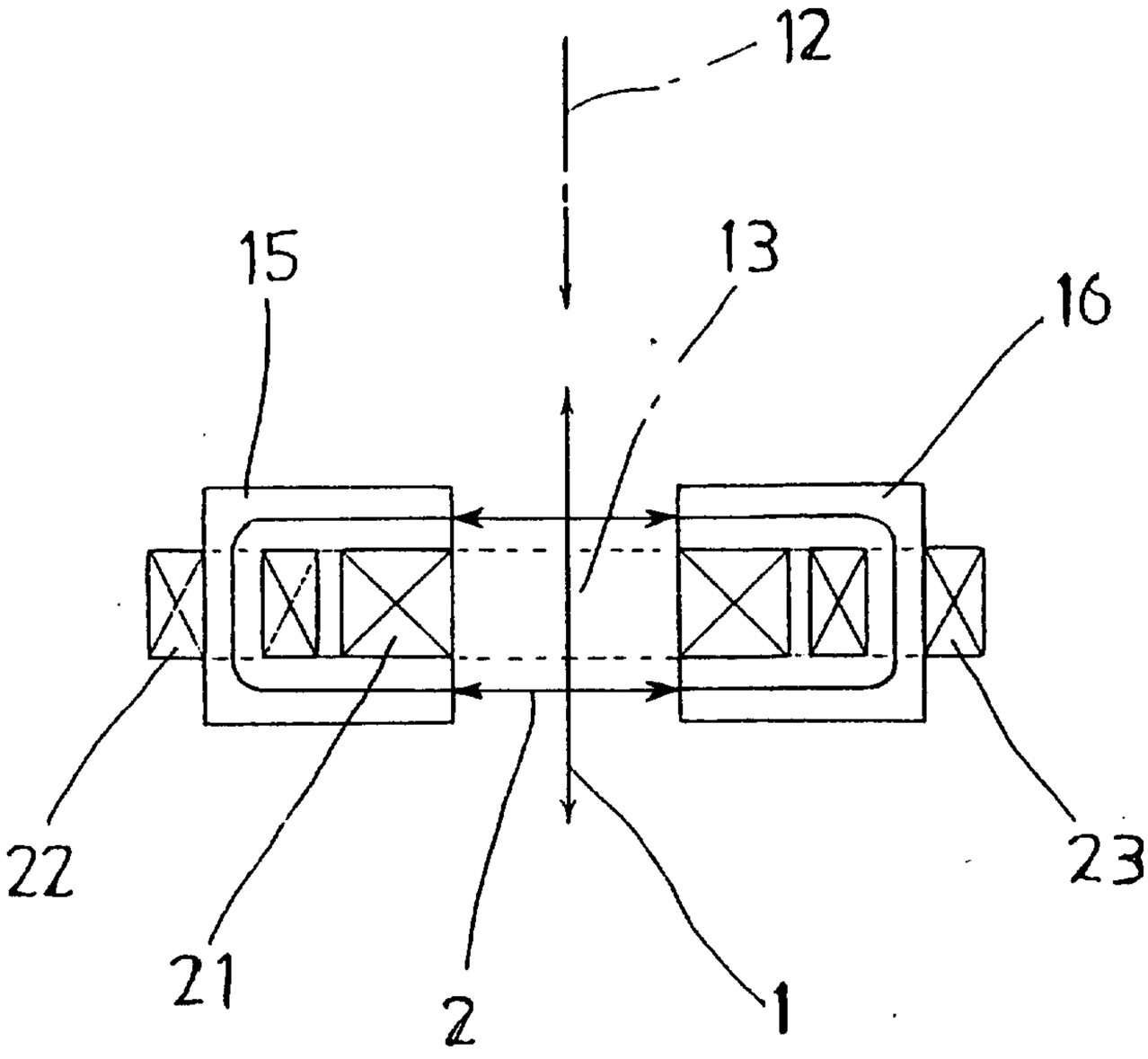


FIG. 2B

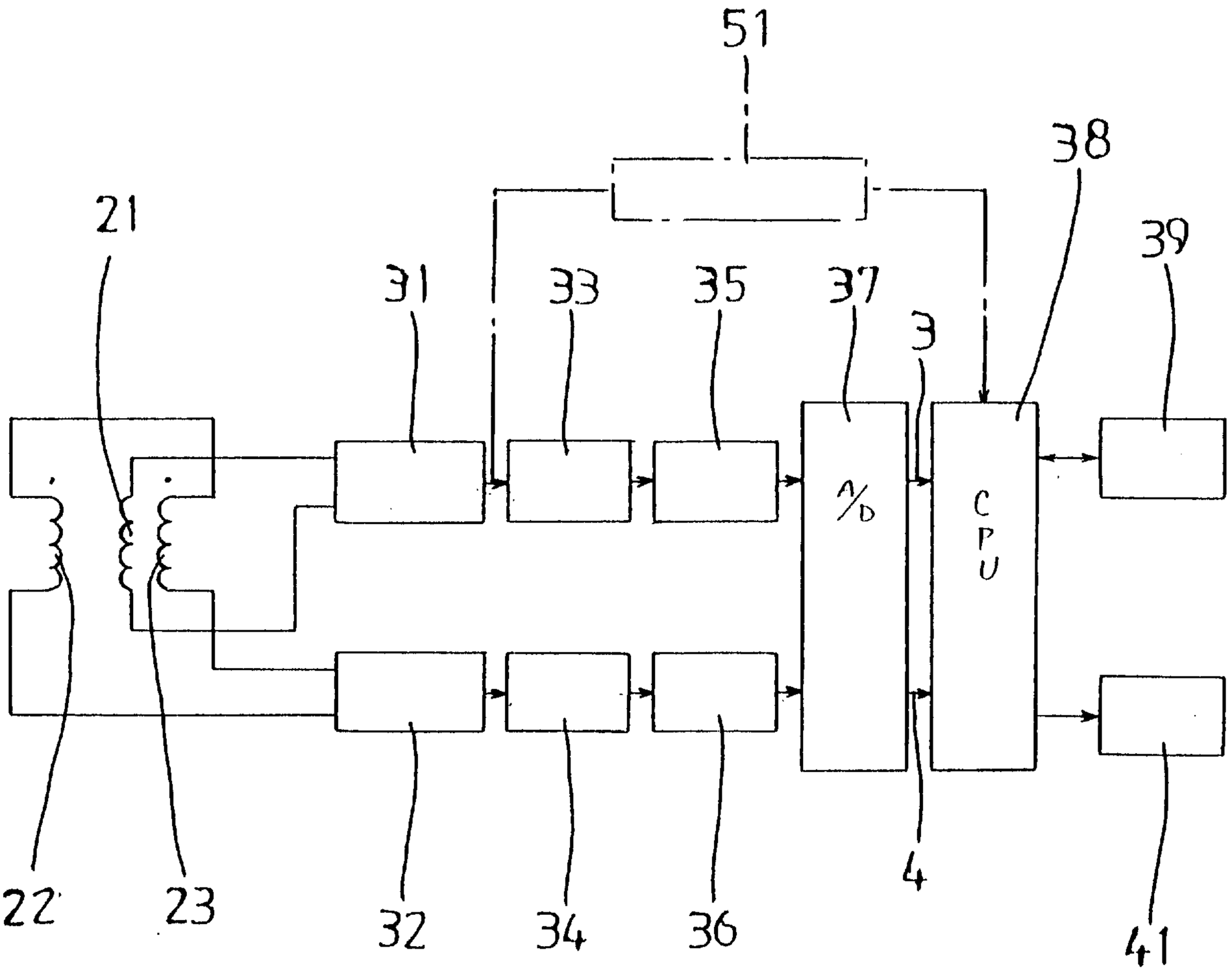


FIG. 3

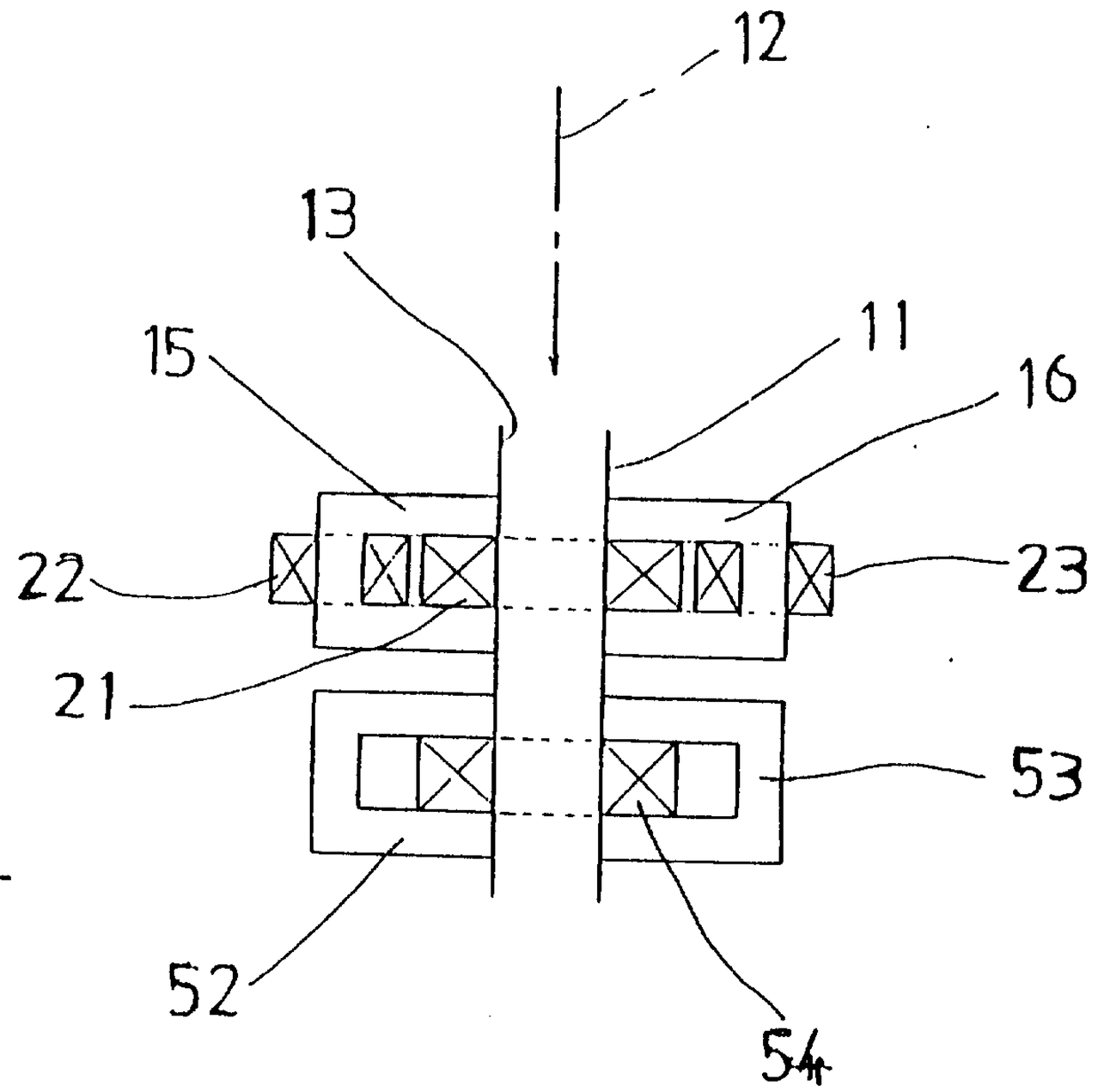


FIG. 4A

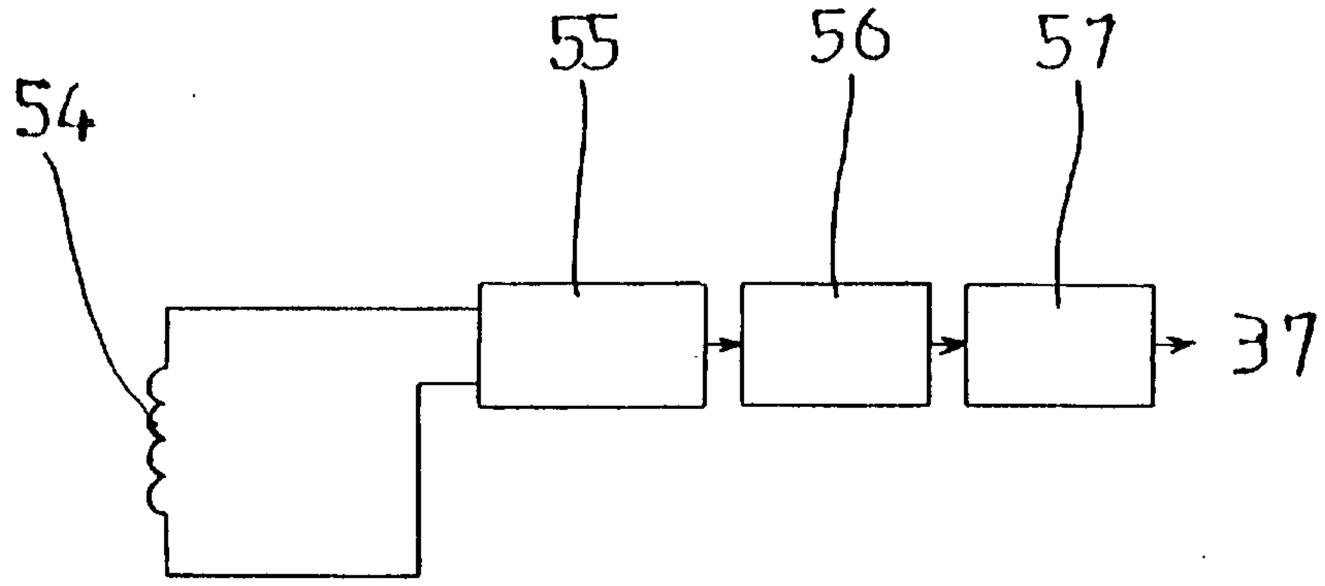


FIG. 4B

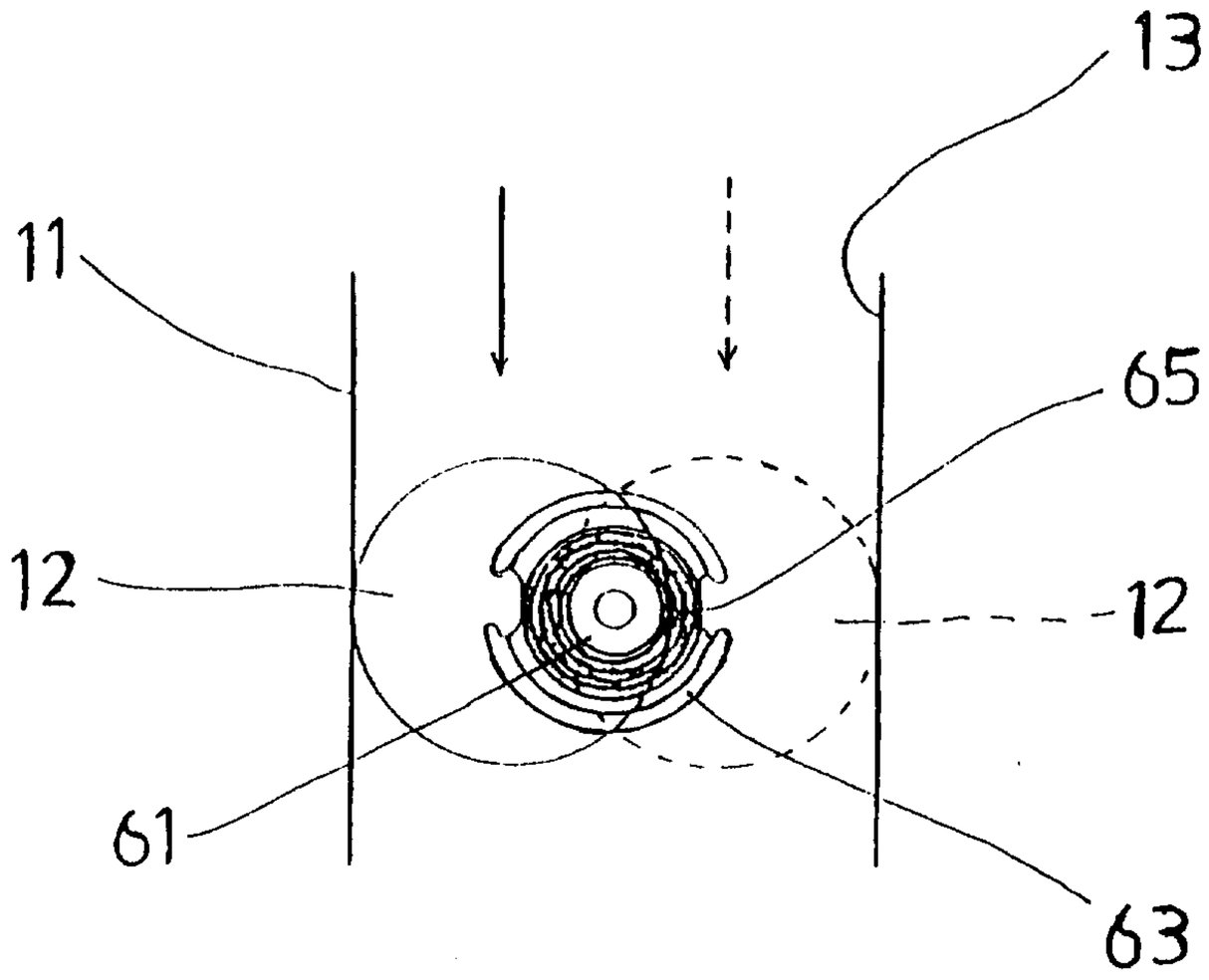


FIG. 5A

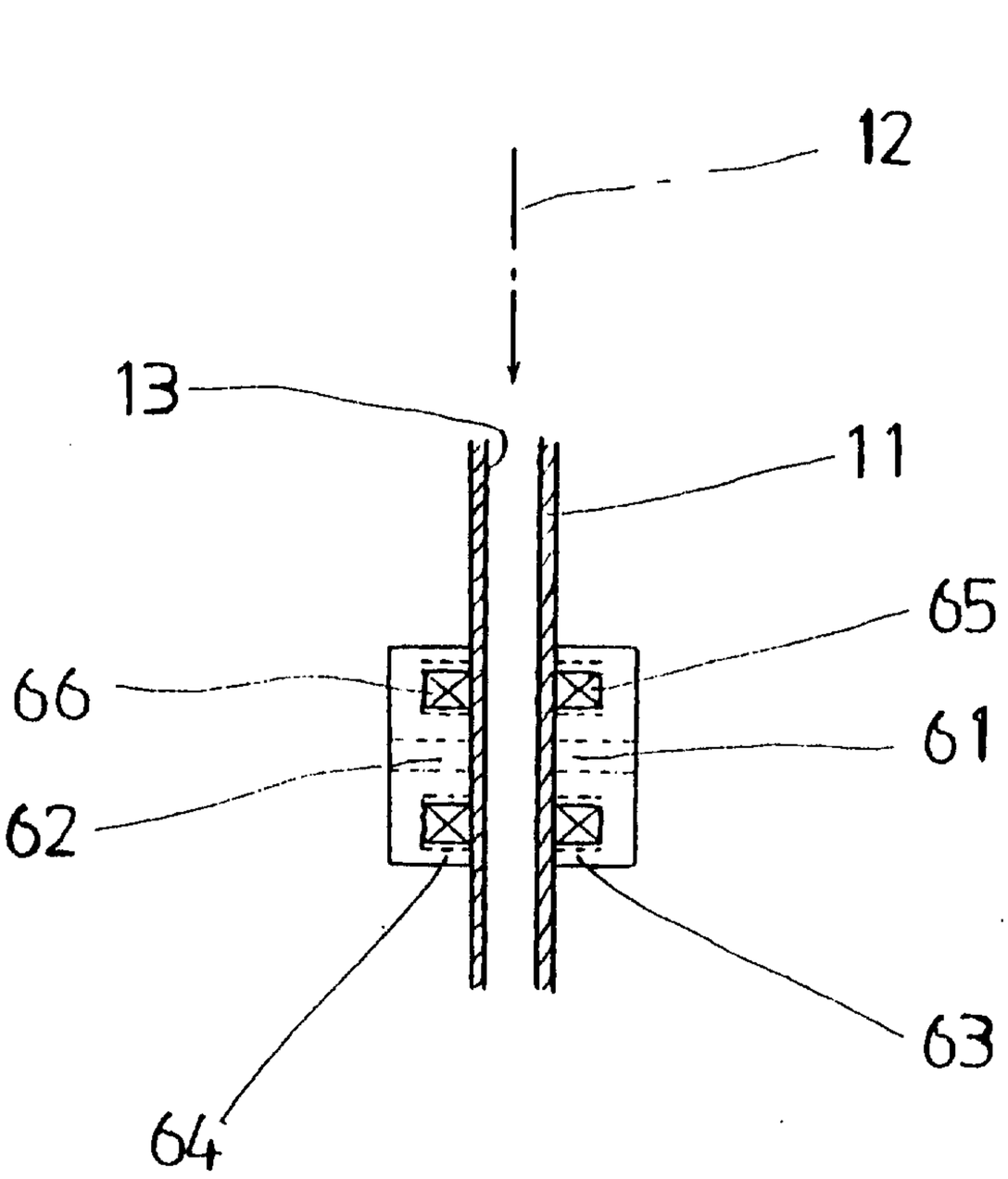
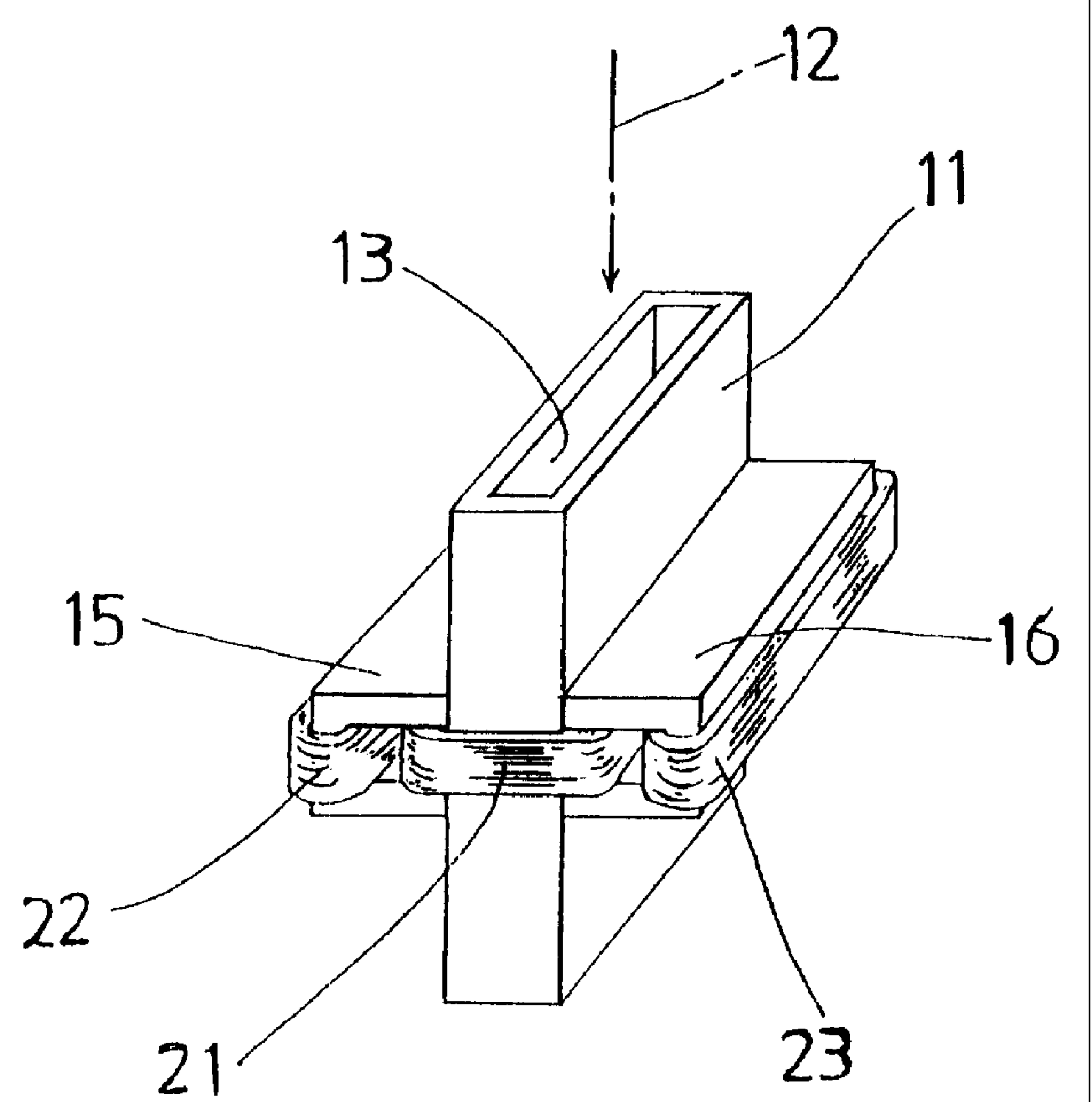


FIG. 5B


12
11
13
15
16
22
21
23