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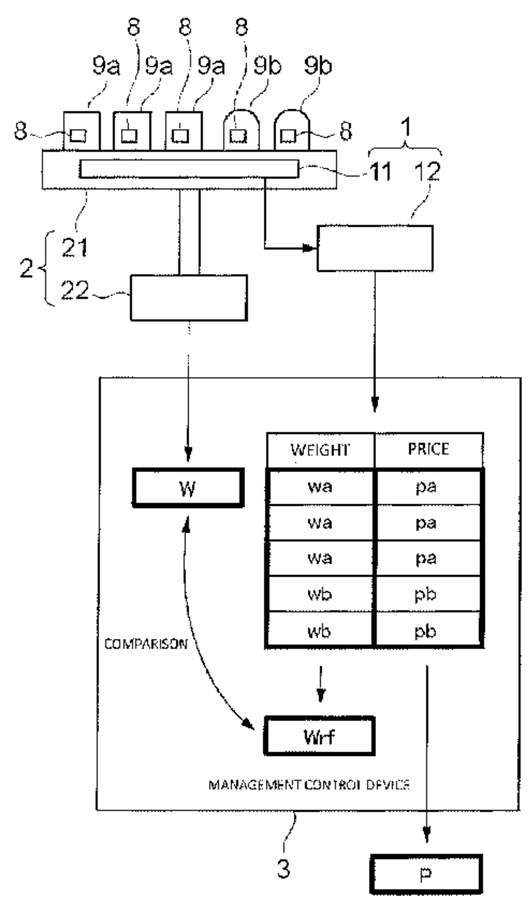
Fig. 4



(57) Abrégé/Abstract:
Provided is an inspection system which uses RFIDs to inspect articles such as valuables, and which is capable of detecting that an article having an RF tag which cannot be read is present. This inspection system, which has, as objects to be inspected thereby, products (9) having categories capable of being identified by a weight difference, and which inspects products (9) provided with RF tags (8) having information related to the products (9) recorded therein, is provided with: an RF reading device (1) which reads the information related to the products (9) from the RF tags (8) of the products (9) placed on a placement platform (22); a weight measuring device (2) which measures and records the weights of the products (9); and a management control device (3) which uses measurement results from the weight measuring device (2) to ascertain the total weight of the products (9) on the placement platform (22). The management control device (3) is provided with a function for ascertaining the weight of the products (9) on the placement platform (22) on the basis of standard weights of the products (9) from the information obtained from the RF reading device (1), and measuring the total weight of the products (9) on the placement platform (22) using the measurement results from the weight measuring device (2), and comparing the total weight of the products (9) obtained from the measurement results from the weight measuring device (2) and the calculated weight of the products (9) obtained from the RF reading device (1), to estimate whether the totals for the number of products (9) correspond.

ABSTRACT

Provided is an inspection system that uses RFIDs to inspect articles such as valuables, and is capable of detecting that articles are present with an RF tag that cannot be read. An inspection system where products (9) with types capable of being specified by a weight difference are set as an inspection target, the inspection system for inspecting the products (9) provided with RF tags (8) on which information of the products (9) is recorded, and provided with: an RF reading device (1) for reading the information of the products (9) from the RF tags (8) of the products (9) placed on a placement platform (22); a weight measuring device (2) for measuring and recording weights of the products (9); and a management control device (3) for using measurement results of the weight measuring device (2) to ascertain a total weight of the products (9) on the placement platform (22). The management control device (3) is provided with a function for ascertaining the weights of the products (9) on the placement platform (22) based on standard weights of the products (9) from the information obtained from the RF reading device (1), measuring the total weight of the products (9) on the placement platform (22) by using the measurement results of the weight measuring device (2), performing a comparison between a calculated

weight of the products (9) obtained from the RF reading device (1) and a total weight of the products (9) obtained from the measurement results of the weight measuring device (2), and estimating whether or not the totals of the number of the products (9) are matching.

DESCRIPTION

INSPECTION SYSTEM AND CASH REGISTER SYSTEM

Technical Field

[0001]

The present invention relates to an inspection system for inspecting articles such as valuables, and a cash register system including this inspection system.

Background Art

[0002]

Conventionally, a cash register system using RFIDs has been proposed. In this cash register system, an RF tag is included in a product as a valuable, and an RF reader is included in an accounting table. Information specifying the product or information of a price is stored in the RF tag, and a money amount (price) of the product can be specified by reading the RF tag of the product by the RF reader of the accounting table. Moreover, by using RFIDs, in the case where there are a plurality of products, these RF tags can be collectively read by the RF reader, and therefore a total money amount can be specified in a particularly fast manner compared to a conventional method that specifies the price of each product by reading a barcode of each product.

Summary of Invention

Technical Problem

[0003]

However, in the case where an RF tag attached to a product is damaged, in the case where information within an RF tag has been illegally rewritten, or in the case where an RF tag is not attached to the product for some reason, the price of the product to be purchased by a purchaser cannot be ascertained by the RF reader. Moreover, in the case where there are a plurality of products collectively read by the RF reader, there will be cases where a store clerk cannot ascertain that products are present with an RF tag that cannot be read by the RF reader. Accordingly, in the case where there are products with an RF tag that cannot be read, when attempting to specify a total money amount by relying only on RFIDs, an amount less than the original total money amount will be specified, and will be a loss on the store side.

[0004]

The present invention provides an inspection system that uses RFIDs to inspect articles such as valuables, and is capable of detecting that an article is present with an RF tag that cannot be read.

Solution to Problem

[0005]

Accordingly, in the present invention, an inspection device is provided that determines whether or not weights of valuables calculated from information read from RF tags and the actual weights of the valuables are matching.

[0006]

An inspection system according to one aspect of the present invention is an inspection system having valuables where types capable of being specified by a weight difference are set as an inspection target, the inspection system for inspecting the valuables provided with RF tags on which information of the valuables is recorded, and including: an RF reading device for reading the information of the valuables from the RF tags of the valuables placed on a platform; a weight measuring device for measuring and recording weights of the valuables; and a management control device for using measurement results of the weight measuring device to ascertain a total weight of the valuables on the platform, in which the management control device includes a function for ascertaining the weights of the valuables on the platform based on standard weights of the valuables from the information obtained from the RF reading device, measuring the total weight of the valuables on the platform by using the measurement

results of the weight measuring device, performing a comparison between a calculated weight of the valuables obtained from the RF reading device and a total weight of the valuables obtained from the measurement results of the weight measuring device, and estimating whether or not the totals of the number of the valuables are matching.

[0007]

According to this configuration, since the weights ascertained based on the information of the RF tags and the actual weights measured by the weight measuring device are compared, these weights will not match in the case where there are valuables with an RF tag that cannot be read. Therefore, in the case where there are valuables with an RF tag that cannot be read, the presence of this can be detected.

[0008]

In the above inspection system, the information of the RF tags may include weight information of the valuables, and the management control device may include a function for ascertaining the weights of the valuables on the platform from the weight information obtained from the RF reading device.

[0009]

According to this configuration, the management control device can ascertain standard weights of the

valuables directly from the RF tags.

[0010]

In the above inspection system, the management control device may include a function for ascertaining the weight for each type of the valuables on the platform from the information from the RF reading device, specifying a total weight of the valuables on the platform by using the measurement results of the weight measuring device, and ascertaining an excess weight of the total weight of the valuables obtained from the measurement results of the weight measuring device with respect to a sum total of the weights of each type of the valuables obtained from the RF reading device.

[0011]

According to this configuration, in the case where the weights ascertained based on the information of the RF tags and the actual weights measured by the weight measuring device are not matching, an excess amount of the actual weights measured by the weight measuring device can be ascertained.

[0012]

In the above inspection system, the management control device may include a function for specifying types of the valuables that are a cause of a mismatch between the sum total of the weights for each type of the

valuables obtained from the RF reading device and the total weight of the valuables obtained from the measurement results of the weight measuring device, or types of the valuables not a cause of a mismatch, based on the excess weight.

[0013]

According to this configuration, since the management control device ascertains the weight for each of the types of the valuables, it can specify whether the RF tags of the valuables of some type can be read, or the RF tags of the valuables of some type cannot be read, by ascertaining the excess weight of the total weight measured by the weight measuring device.

[0014]

In the above inspection system, the management control device may include a function for ascertaining a total money amount of the valuables on the platform from the RF reading device.

[0015]

According to this configuration, since the total money amount of the valuables on the platform can be ascertained, this total money amount can be used to perform an accounting process.

[0016]

An inspection system according to another aspect of

the present invention is an inspection system for inspecting valuables including RF tags, the inspection system including: an RF reading device for reading information of the valuables from the RF tags provided in the valuables; a weight measuring device for measuring weights of the valuables; and a management control device for ascertaining a total weight of the valuables by using measurement results of the weight measuring device, in which the management control device obtains the weights of the valuables based on the information read by the RF reading device, and compares the obtained weights and the weights measured by the weight measuring device to determine whether or not both are matching.

[0017]

According to this configuration, since the weights obtained from the RF tags and the weights measured by the weight measuring device are compared, it can be ascertained that valuables are present with an RF tag that cannot be read in the case where both are not matching.

[0018]

In the above inspection system, the management control device may obtain prices of the valuables based on the information read by the RF reading device, and may output information of the obtained prices.

[0019]

According to this configuration, since information of the prices is output, the output information of the prices can be used to perform an accounting process of the valuables.

[0020]

In the above inspection system, the information of the price of the valuable may be stored in the RF tag of the valuable, and the management control device may obtain the prices of the valuables in accordance with the information read by the RF reading device.

[0021]

According to this configuration, information of the prices can be read directly from the RF tags.

[0022]

In the above inspection system, information for specifying a type of the valuable may be stored in the RF tag of the valuable, the inspection system may further include a storage device for storing the information specifying the types of the valuables and prices of the types in association with each other, and the management control device may refer to the storage device to obtain the prices of the valuables by reading the prices associated with the information read by the RF reading device.

[0023]

According to this configuration, the prices of the valuables can be obtained, by referring to the storage device based on the information stored in the RF tags.

[0024]

Another aspect of the present invention is a cash register system, this cash register system including: the above inspection system; and a cash register device for performing an accounting process based on the information of the prices output by the management control device.

[0025]

According to this configuration, the RFIDs and the weight measuring device can be used to inspect that an effective RF tag is included in all the valuables, and information of the prices stored in the RF tags can be used to perform an accounting process.

[0026]

An inspection system of another aspect of the present invention includes: an RF reading means for reading RF tags of objects placed at a prescribed location; a detecting means for detecting at least a number of the objects placed at the prescribed location by a method other than an RFID; and an alarm means for generating an alarm in the case where the number of the objects with an RF tag that can be read by the RF reading means does not match the number detected by the detecting

means.

[0027]

According to this configuration, an alarm can be generated in the case where articles not having an effective RF tag are placed at a prescribed position.

[0028]

In the above inspection system, the detecting means may be a weight measuring device for measuring weights of the objects placed at the prescribed location, and may detect at least the number of the objects placed at the prescribed location by the weights.

[0029]

According to this configuration, the number of the objects can be detected based on the weights.

[0030]

In the above inspection system, the alarm means may determine whether or not the number of the objects with an RF tag that can be read by the RF reading means matches the number detected by the detecting means by ascertaining the weights of each of the objects placed at the prescribed location and comparing the ascertained weights and the weights measured by the weight measuring device based on the information of the RF tags read by the RF reading means.

[0031]

According to this configuration, an alarm can be generated by determining a mismatch of the numbers based on the weights.

Brief Description of Drawings

[0032]

Figure 1 is a diagram showing a cash register in a store to which a cash register system in a first embodiment of the present invention has been applied.

Figure 2 is a block diagram showing a configuration of the cash register system including an inspection system in the first embodiment of the present invention.

Figure 3 is a diagram showing information stored in an RF tag in the first embodiment of the present invention.

Figure 4 is a diagram for explaining processes in a management control device in the first embodiment of the present invention.

Figure 5 is a diagram showing information stored in an RF tag in a second embodiment of the present invention.

Figure 6 is a diagram for explaining processes of a management control device in the second embodiment of the present invention.

Figure 7 is a diagram showing a configuration of an inspection system in a third embodiment.

Figure 8 is a perspective view of a gaming currency in the third embodiment.

Figure 9 is a side view of the gaming currency in the third embodiment.

Figure 10 is a diagram showing an example of an image obtained by shooting the plural gaming currencies in the third embodiment.

Figure 11 is a diagram for explaining a configuration of code information in the third embodiment.

Figure 12 is a block diagram showing a configuration of the inspection device in the third embodiment.

Figure 13 is a perspective view of a case in the third embodiment.

Figure 14 is a perspective view of a case in a modification example in the third embodiment.

Figure 15 is a plan view of the case in the modification example in the third embodiment.

Figure 16 is a diagram for explaining an example of a usage aspect of an inspection system together with distribution of gaming currencies in the third embodiment.

Figure 17 is a diagram showing an example of contents of information stored in a use management device in the third embodiment.

Figure 18 is a diagram showing an example of

contents of information to be read out in the third embodiment.

Figure 19 is a diagram for explaining a first method of determining pass or fail in the third embodiment.

Figure 20 is a diagram for explaining a second method of determining pass or fail in the third embodiment.

Figure 21 is a diagram for explaining a third method of determining pass or fail in the third embodiment.

Figure 22 is a diagram for explaining a third method of determining pass or fail in the third embodiment.

Figure 23 is a diagram for explaining a fifth method of determining pass or fail in the third embodiment.

Figure 24 is a diagram indicating an example of a good/bad results display screen for displaying pass/fail results (pass results) in the third embodiment.

Figure 25 is a diagram indicating an example of a good/bad results display screen for displaying pass/fail results (fail results) in the third embodiment.

Figure 26 is a diagram indicating a modification example of an RFID antenna of an inspection device in the

third embodiment.

Figure 27 is a side view of a gaming currency in a modification example in the third embodiment.

Figure 28 is a side sectional view of a gaming currency in a modification example in the third embodiment.

Figure 29 is a perspective view of a gaming currency in the modification example in the third embodiment.

Figure 30 is a side view of a gaming currency in the modification example in the third embodiment.

Figure 31 is a plan view of a gaming currency in the modification example in the third embodiment.

Figure 32 is a diagram indicating an example of an image obtained by shooting the stacked gaming currencies in the third embodiment.

Figure 33 is a diagram indicating a configuration of an inspection system in the modification example in the third embodiment.

Figure 34 is a diagram indicating a configuration of an inspection system in the modification example in the third embodiment.

Figure 35 is a diagram indicating a configuration of an inspection system in a fourth embodiment.

Figure 36 is a block diagram indicating a

configuration of an inspection device in the fourth embodiment.

Figure 37 is a perspective view of a case in the fourth embodiment.

Figure 38 is a perspective view of the case in the modification example in the fourth embodiment.

Figure 39 is a plan view of the case in the modification example in the fourth embodiment.

Figure 40 is a side sectional view of a gaming currency in the fourth embodiment.

Figure 41 is a diagram indicating an example of an image obtained by shooting the stacked gaming currencies in the fourth embodiment.

Figure 42 is a diagram indicating an example of a good/bad results display screen for displaying pass/fail results (pass results) in the fourth embodiment.

Figure 43 a diagram indicating an example of a good/bad results display screen for displaying pass/fail results (fail results) in the fourth embodiment.

Figure 44 is a diagram for explaining an example of a usage aspect of an inspection system together with distribution of the gaming currencies in the fourth embodiment.

Figure 45 is a diagram indicating a configuration of an inspection device in another embodiment in the

fourth embodiment.

Figure 46 is a plan view of a gaming currency tray for housing the gaming currency in a fifth embodiment.

Figure 47 is a diagram indicating an antenna of an RF reader in the fifth embodiment.

Figure 48 is an enlarged plan view and a front-direction cross section view of a groove in the fifth embodiment.

Figure 49 is a diagram indicating an entire configuration of the inspection system in the fifth embodiment.

Figure 50 is a plan view indicating another example of a gaming currency tray in the fifth embodiment.

Figure 51 is a plan view indicating a further example of a gaming currency tray in the fifth embodiment.

Figure 52 is a plan view indicating a further example of a gaming currency tray in the fifth embodiment.

Figure 53 is a diagram indicating another configuration of an RF antenna in the fifth embodiment.

Figure 54 is a diagram indicating one groove of the gaming currency tray using a line sensor as a detection means in the fifth embodiment.

Figure 55 is a diagram indicating an entire configuration of an inspection system 600 in the example of Figure 54.

Figure 56 is a diagram indicating one groove of the gaming currency tray using a scanner as the detection means in the fifth embodiment.

Figure 57 is a diagram indicating an entire configuration of the inspection system 600 in the example of Figure 56.

Figure 58 is a diagram indicating one groove of the gaming currency tray using a laser distance meter as the detection means in the fifth embodiment.

Figure 59 is a diagram indicating the entire configuration of the inspection system 600 in the example of Figure 58.

Figure 60 is a diagram indicating one groove of the gaming tray using a weight meter as the detection means in the fifth embodiment.

Figure 61 is a diagram indicating the entire configuration of the inspection system 600 in the example of Figure 60.

Figure 62 is a diagram indicating a status that a vacant space of the groove is filled by a spacer in the fifth embodiment.

Figure 63 is a diagram indicating the entire configuration of the inspection system 600 in the example of Figure 62.

Figure 64 is a diagram of the entire configuration

of the inspection system for inspecting an object, in which an RF tag is built, in the fifth embodiment.

Description of Embodiments

[0033]

Hereinafter, embodiments of the present invention will be described by referring to the drawings. Note that, the embodiments described hereinafter show examples of the case where executing the present invention, and the present invention is not limited to the specific configurations described hereinafter. Specific configurations corresponding to the embodiments may be appropriately applied when executing the present invention.

[0034]

<< First Embodiment >>

Figure 1 is a diagram showing a cash register in a store to which a cash register system in a first embodiment of the present invention has been applied. In the cash register of the store, a store clerk S and a customer C face each other, with an accounting table T in between. The customer C requests an accounting process to the store clerk S, by placing a product 9 as a valuable to be purchased on a placement platform 21 of the accounting table T. Note that, by adopting the cash register system

of the present embodiment, it will be possible to implement an unmanned self-register, which enables the presence of the store clerk S to be unnecessary.

[0035]

On the accounting table T, a weight measuring device 2 is embedded in the accounting table T so that the placement platform 21 is on almost the same surface as the surface of the accounting table T. An RF antenna 11 of the RF reader 1 is embedded as an RF reading device inside the placement platform 21. Note that, the RF antenna 11 may be provided under the placement platform 21, or at another location, and may be installed so that the RF tags 8 of the products 9 on the placement platform 21 can be read.

[0036]

A cash register device 5 is installed on the accounting table T. The RF reader 1 that includes the RF antenna 11, the weight measuring device 2 that includes the placement platform 21, and the cash register device 5 are respectively connected to the management control device 3. The management control device 3 is a computer, which receives information from the RF reader 1 and the weight measuring device 2, and outputs information with respect to the cash register device 5. Moreover, the storage device 4 is connected to the management control

device 3.

[0037]

The management control device 3 obtains the prices of the products placed on the placement platform 21 to be output to the cash register device 5, based on the information from the RF reader 1 and the weight measuring device 2. The cash register device 5 performs an accounting process in accordance with the information of the prices obtained from the management control device 3. Accordingly, the cash register device 5 is provided with a total money amount of the products even if the store clerk S does not scan barcodes or the like of the products 9 one by one.

[0038]

Figure 2 is a block diagram showing a configuration of the cash register system including an inspection system in the first embodiment of the present invention. A cash register system 100 includes an inspection system 10 and a cash register device 5. Moreover, the inspection system 10 includes an RF reader 1, a weight measuring device 2, a management control device 3, and a storage device 4. As described above, the RF reader 1, the weight measuring device 2, and the storage device 4 are respectively connected to the management control device 3. The inspection system 10 is a system for performing an

inspection by setting a product 9 as an inspection target. It is possible for the type of the product 9 to be specified by a weight difference. Moreover, the product 9 includes an RF tag 8 recording information of the product 9.

[0039]

The RF reader 1 reads the information of the product 9 from the RF tag 8 of the product 9 placed on the placement platform 21. In the case where there are a plurality of the products 9 placed on the placement platform 21, the RF reader 1 can collectively read the RF tags 8 of the plurality of these products. The RF reader 1 includes an RF antenna 11 and a reader body 12, such as shown in Figure 4.

[0040]

The RF antenna 11 transmits electric waves or magnetic fields to the RF tags 8, and receives electric waves or magnetic fields from the RF tags 8. The reader body 12 reads information stored in the RF tags 8, by extracting information from the electric waves or magnetic fields received from the RF tags 8 by the RF antenna 11. The reader body 12 outputs the read information to the management control device 3, and records to the storage device 4.

[0041]

The weight measuring device 2 includes a placement platform 21 and a measurement processing device 22. When the products 9 are placed on the placement platform 21 and the placement platform 21 is pushed down or deformed by the weights of the products 9 themselves, the measurement processing device 22 measures this pushed-down amount or deformation amount as the weights of the products 9. The measurement processing device 22 outputs measurement results (information of the weights) to the management control device 3 to be recorded in the storage device 4.

[0042]

The management control device 3 obtains the weight of the product 9 based on the information read by the RF reader 1, and compares the obtained weight and the weight measured by the weight measuring device 2 to determine whether or not both are matching. In order to perform this, the management control device 3 first ascertains the total weight of the products 9 on the placement platform 21, by using the measurement results of the weight measuring device 2. Moreover, the management control device 3 ascertains the weights of the products 9 on the placement platform 21 based on standard weights of the products 9 from the information obtained from the RF reader 1.

[0043]

Figure 3 is a diagram showing information stored in the RF tag in the first embodiment of the present invention. Information of the standard weight of the product 9 to which the RF tag 8 is attached, and information of the price of the product 9, are stored in the RF tag 8. Note that, other information related to the product, for example, information showing the type of the product, information showing a best-before date or the like may be stored in the RF tag 8.

[0044]

Figure 4 is a diagram for explaining processes in the management control device in the first embodiment of the present invention. In the example of Figure 4, a total of 5 products 9, which are 3 products 9a of a type a and 2 products 9b of a type b, are placed on the placement platform 21. Each of the products 9a and 9b include a respective RF tag 8. Information of a weight wa and a price pa are stored in the RF tags 8 of the products 9a, and information of a weight wb and a price pb are stored in the RF tags 8 of the products 9b. Note that, the weight wa and the weight wb are different.

[0045]

The management control device 3 ascertains the weights for each of the types of the products 9 on the placement platform 21 and a sum total Wrf of these based

on the standard weights of the products 9 from the information obtained from the RF reader 1. In the case of the example of Figure 4, information of the 3 weights wa and the 2 weights wb from the 5 products 9 is obtained, in the RF reader 1, and the management control device 3 acquires these pieces of information to obtain the total weight of these (Wrf=3xwa+2xwb). Moreover, the management control device 3 uses measurement results of the weight measuring device 2 to measure the total weight of the products 9 on the platform. In the example of Figure 4, a total weight W of the 5 products 9 is obtained, in the measurement processing device 22, and the management control device 3 acquires this information to ascertain the total weight W of the products 9.

[0046]

The management control device compares the calculated weights Wrf of the products 9 obtained from the RF reader 1 and the total weight W of the products 9 obtained from the measurement results of the weight measuring device 2 to obtain an excess weight (W-Wrf) of the total weight W. In the case where this excess weight of the total weight W is zero or within a prescribed allowable error from zero, the management control device 3 estimates that the totals of the number of products 9 are matching. Note that, the allowable error is set to be

sufficiently smaller than a minimum weight of the product.

[0047]

On the other hand, in the case where there are products that do not have an effective RF tag 8 from among the products 9, the calculated weights Wrf of the products 9 obtained from the RF reader 1 and the total weight W of the products 9 obtained from the measurement results of the weight measuring device 2 will not match (the excess weight of the total weight W will exceed the allowable error), and the management control device 3 will estimate that the total number of the products 9 with an RF tag 8 that cannot be read by the RF reader 1, and the total number of the products 9 with a weight measured by the weight measuring device 2, are not matching.

[0048]

Moreover, in the case where the excess weight exceeds the allowable error, the management control device 3 specifies the types of the products 9 that are a cause of a mismatch between the sum total of the weights for each of the types of the products 9 obtained from the RF reader 1 and the total weight W of the products 9 obtained from the measurement results of the weight measuring device 2, or the types of the products 9 that are not a cause of a mismatch on the basis of the excess weight (W-Wrf).

[0049]

In the case of the example of Figure 4, for example, in the case where the excess weight (W-Wrf) is wa, it will be understood that an effective RF tag 8 is not attached to one of the products 9a of the type a. Moreover, for example, in the case where the excess weight (W-Wrf) is (wa+wb), it will be understood that an effective RF tag 8 is not attached to one of the products 9a of the type a, and one of the products 9b of the type b.

[0050]

The management control device 3 further ascertains a total money amount of the products 9 on the placement platform 21 from the information of the prices acquired from the RF reader 1. As described above, the information of the price of the product 9 is stored in the RF tag 8 attached to each of the products 9, and since the management control device 3 acquires the information of the price of each of the products 9 from the RF reader 1, it can ascertain the total money amount by obtaining a sum total of these. In the case of the example of Figure 4, information of 3 prices pa and 2 prices pb from the 5 products 9 is obtained, in the RF reader 1, and the management control device 3 acquires these pieces of information to obtain a sum total (P=3xpa+2xpb) of these.

[0051]

In the case where the total number of the products 9 with an RF tag 8 read by the RF reader 1, and the total number of the products 9 with a weight measured by the weight measuring device 2, are matching, the management control device 3 outputs an obtained total money amount P to the cash register device 5. In the case where the total number of the products 9 with an RF tag 8 read by the RF reader 1, and the total number of the products 9 with a weight measured by the weight measuring device 2, are not matching, the management control device 3 outputs an alarm, instead of outputting the total money amount P, to the cash register device 5. At this time, the management control device 3 functions as an alarm means. The alarm is output by a method that can be perceived visually, audibly or the like. The alarm means may be, for example, a lamp, a buzzer or the like.

[0052]

In the case where the information of the total money amount P is acquired from the management control device 3, the cash register device 5 performs an accounting process in accordance with this money amount. Note that, in the case where a conventional barcode reader is connected to the cash register device 5, and a product 9 with a price that cannot be ascertained by an RFID is

included, an accounting process may be performed for all of the products 9 by reading a barcode, such as performed conventionally.

[0053]

As described above, according to the cash register system 100 of the present embodiment, by having the RF tags 8 in the products 9, the prices of products can be ascertained collectively by using RFIDs in the accounting table T, measurements of the actual weights of the products can be performed at the same time along with recording information for specifying the weights of the products 9 in the RF tags 8, and the presence of products not having an effective RF tag 8 can be ascertained by comparing a theoretical total weight obtained from the RF tags 8 and a total weight obtained by an actual measurement. Accordingly, losses of a commodity seller due to a calculation omission of a price of a product 9 not having an effective RF tag 8 can be avoided.

[0054]

<< Second Embodiment >>

In the first embodiment, information of a standard weight and price of the product 9 are stored in the RF tag 8 attached to the product 9. However, information of a standard weight and price of the product 9 may not be stored in the RF tag 8. Figure 5 is a diagram showing

information stored in the RF tag in a second embodiment of the present invention. In the present embodiment, information specifying the type of the product is stored in the RF tag 8 attached to the product 9. In the following explanation, explanations for portions the same as those of the first embodiment will be appropriately omitted.

[0055]

Figure 6 is a diagram for explaining processes of the management control device in the second embodiment of the present invention. In the example of Figure 6, similar to the example of Figure 4, a total of 5 products 9, which are 3 products 9a of a type a and 2 products 9b of a type b, are placed on the placement platform 21. Each of the products 9a and 9b include a respective RF tag 8. Information of the type a is stored in the RF tags 8 of the products 9a, and information of the type b is stored in the RF tags 8 of the products 9b.

[0056]

As shown in Figure 6, in the present embodiment, information of the type, information of the weight, and information of the price of each of the products 9 are stored in association with each other in the storage device 4. In the case of the example of Figure 6, a type a, a weight wa, and a price pa are stored in association

with each other for the products 9a of the type a, and a type b, a weight wb, and a price pb are stored in association with each other for the products 9b of the type b, in the storage device 4.

[0057]

The RF reader 1 collectively reads the RF tags 8 for the products 9 placed on the placement platform 21. In the example of Figure 6, information of 3 products of the type a and 2 products of the type b is read from the 5 products 9. The management control device 3 acquires these pieces of information to read out the weights and prices associated with the information read by the RF reader 1, by referring to the storage device 4. In the case of the example of Figure 6, the management control device 3 acquires the weight wa and the price pa for the products 9a of the type a, and acquires the weight wb and the price pb for the products 9b of the type b, by referring to the storage device 4.

[0058]

The management control device 3 obtains information that there are 3 products of the type a from the RF reader 1 for the products 9a, and therefore sets the weight wa and the price pa of the type a to three times, obtains information that there are 2 products of the type b from the RF reader 1 for the products 9b, and therefore sets

the weight wb and the price pb of the type b to two times, and obtains respective sum totals, namely, a total weight Wrf and a total money amount P, for each of the weights and the prices.

[0059]

Similar to the first embodiment, the management control device 3 compares the total weight Wf ascertained based on the reading of the RF tags 8 and the actual total weight W of the products acquired from the weight measuring device 2, and in the case where matching, estimates that the total number of the products 9 detected by the RF reader 1 and the total number of the products 9 measured by the weight measuring device 2 are matching, and effective RF tags 8 are attached to all of the products 9, and outputs the total money amount P to the cash register device 5. On the other hand, in the case where not matching, it estimates that there are present effective RF tags 8 not attached to the products 9, and an alarm is output. The details of this are the same as in the first embodiment.

[0060]

As described above, in the cash register system 100 of the present embodiment, similar to the first embodiment, by having the RF tags 8 in the products 9, the prices of products can be ascertained collectively by

using RFIDs in the accounting table T, measurements of the actual weights of the products can be performed at the same time along with recording information for specifying the weights of the products 9 in the RF tags 8, and the presence of products not having an effective RF tag 8 can be ascertained by comparing a theoretical total weight obtained from the RF tags 8 and a total weight obtained by actual measurements. Accordingly, losses of a commodity seller due to a calculation omission of a price of a product 9 not having an effective RF tag 8 can be avoided.

[0061]

(Modified Examples of the First and Second Embodiments)

In the above embodiments, while a product sold in a store is exemplified as an example of a valuable, the valuable is not limited to this, and may be, for example, substitute currency for gaming passed to a customer in exchange for cash in a casino facility. Moreover, the inspection system of the present invention is also applied by setting a general article other than a valuable as an inspection target.

[0062]

Moreover, in the above embodiments, while information of a weight or price (the first embodiment) or information specifying a type (the second embodiment) is

stored in the RF tag 8 attached to the product 9, both information of a weight and price and information specifying a type may be stored, information of a weight and information specifying a type may be stored along with information specifying a type and information of a price stored in association with each other in the storage device 4, or information of a price and information specifying a type may be stored along with information specifying a type and information of a weight stored in association with each other in the storage device 4.

[0063]

Moreover, in the above embodiments, while the weight measuring device 2 for measuring weights of the products 9 is adopted, as a means for detecting the presence of articles by a means other than RFIDs, in order to detect articles not having an effective RF tag, the means for detecting the presence of articles by a means other than RFIDs is not limited to the weight measuring device 2.

[0064]

For example, an article may be detected by using a camera and an image recognition device. In this case, the camera photographs an article placed on a reading position of an RFID, and the image recognition device determines the type of the article by performing image recognition

with respect to the photographed image. On the other hand, information specifying the type of the article is stored in an RF tag. The management control device 3 detects the presence of an article not having an effective RF tag, by whether or not the type of the article determined by the image recognition device and the type of the article detected by the RFID are matching (in the case where there are a plurality of articles, a combination of these articles).

[0065]

(Third Embodiment)

The third embodiment relates to an inspection system and an inspection device for inspecting a gaming currency, and more specifically, to an inspection system and an inspection device for inspecting plural gaming currencies housed in a case.

[0066]

Gaming currencies used in a gaming house such as a casino are manufactured in a factory, are carried to the gaming house to be stored in a repository, and moved from the repository to a cashier or a game table in the house, it is necessary to prevent the gaming currencies from being stolen or replaced with a fake during carrying, storing, and moving. Therefore, the case housing the gaming currencies is used. Since the case is stamped

after housing the plural gaming currencies, it is possible to discover a situation in which the gaming currencies are extracted from the case after stamping.

[0067]

As the gaming currency, it is known the one in which a radio tag storing identification information or information on kinds is built and a optically readable code information indicating the identification information or the information on kinds is given on a side surface (for example, Japanese Patent Laid-Open No. 2009-66172).

[0068]

In Japanese Patent Laid-Open No. 2009-66172, a system using a gaming currency is disclosed. The system calculates, for the gaming currencies placed on a betting board on a game table, the number of the gaming currencies based on the identification information stored in the radio tag, calculates the number of the gaming currencies based on the identification information given to the side surface, and compares them. Thereby, if unfair gaming currencies are used on the game table, it can be detected.

[0069]

However, since the system disclosed in Japanese Patent Laid-Open No. 2009-66172 detects injustice by calculating the number of the gaming currencies betted (placed on the betting board), even with this system, it

is impossible to detect unfair gaming currencies by inspecting the plural gaming currencies housed in the case while being housed in the case.

[0070]

Then, the purpose of the third embodiment is to provide an inspection system and an inspection device capable of inspecting plural gaming currencies housed in a case while being housed in the case.

[0071]

An inspection system according to a first aspect of the third embodiment is an inspection system for inspecting a gaming currency having at least first currency information and second currency information, the second currency information being provided on a side surface of the gaming currency in a form which can be optically read, including: a case which stacks and houses plural gaming currencies; and an inspection device which inspects the gaming currencies housed in the case, in which the inspection device includes: a first reading device which obtains the first currency information of the gaming currencies housed in the case; a second reading device which optically reads the side surfaces of the gaming currencies housed in the case and obtains the second currency information; and a determination part which determines authenticity/damage or a number for each

value of all gaming currencies existing in the case to determine pass or fail of the plural gaming currencies housed in the case by using the first currency information obtained by the first reading device and the second currency information obtained by the second reading device.

[0072]

According to this configuration, since a first reading part and a second reading part obtain the first currency information and the second currency information from the gaming currencies housed in the case respectively, it is possible to perform inspection with respect to the gaming currencies while being housed in the case. Also, since the inspection is performed by obtaining two pieces of information, the first currency information and the second currency information from the gaming currencies, it is possible to certainly perform the determination of the pass or fail.

[0073]

In an inspection system according to a second aspect of the third embodiment, in the inspection system according to the first aspect, the first currency information and the second currency information on the common gaming currencies include common information, and if a common information part of the plural pieces of the

first currency information obtained by the first reading device is not equal to that of the plural pieces of the second currency information obtained by the second reading device, the determination part determines the plural gaming currencies housed in the case are as fail.

[0074]

According to this configuration, when unfair gaming currencies in which the common information part of the first currency information is not equal to that of the second currency information exist, the determination part can reject the gaming currencies housed in the case.

[0075]

For example, if common identification information is recorded on the radio tag and the side surface, it is rejected, if plural pieces of identification information read out from the plural radio tags are not perfectly equal to plural pieces of identification information read out from the plural side surface.

[0076]

In an inspection system according to a third aspect of the third embodiment, in the inspection system of the first aspect, both or either one of the first currency information or the second currency information includes individual identification information for individually identifying the gaming currencies.

[0077]

In an inspection system according to a third aspect of the third embodiment, in the inspection system of the first aspect, the second currency information includes information expressed by a specific color representing a value of the gaming currency, and is information indicating the value of the gaming currency with the specific color.

[0078]

In an inspection system according to a fifth aspect of the third embodiment, in the inspection system of the third aspect, both of the first currency information and the second currency information include individual identification information, and if the individual identification information of the plural pieces of the first currency information obtained by the first reading device is not equal to that of the plural pieces of the second currency information obtained by the second reading device, the inspection system determines the plural gaming currencies housed in the case as rejection.

[0079]

According to this configuration, when unfair gaming currencies in which the individual identification information of the first currency information is not equal to that of the second currency information exist, the

determination part can reject the gaming currencies housed in the case.

[0080]

An inspection system according to a sixth aspect of the third embodiment, the inspection system of the first embodiment, further includes a storage part which stores the individual identification information of at least the first currency information or the second currency information of the plural gaming currencies which should be housed in the case, and the determination part determines the plural gaming currencies housed in the case as rejection, if the individual identification information of the plural pieces of the first currency information obtained by the first reading device or the individual identification information of the plural pieces of the second currency information obtained by the second reading device are not equal to the individual identification information of the first currency information or the second currency information stored in the storage part.

[0081]

According to this configuration, when unfair gaming currencies in which the first currency information and the second currency information are incorrect exist in the case, the determination part can reject the gaming currencies housed in the case.

[0082]

For example, if individual identification information expressed by characters is recorded in the radio tag and individual identification information expressed by numbers is recorded on the side surface, also in the storage part, for each case, plural pieces of individual identification information expressed by characters for the radio tag are stored, and plural pieces of individual identification information expressed by numbers for the side surface is stored. If the plural pieces of the individual identification information read out from the plural radio tags are not equal to the plural pieces of the individual identification information stored in the storage part for the radio tags of the case, or if the plural pieces of the individual identification information read out from the plural side surfaces are not equal to the plural pieces of the individual identification information for the side surfaces of the case, it is possible to reject them.

[0083]

An inspection system according to a seventh aspect of the fourth embodiment, the inspection system of the first aspect, further includes a storage part which stores a correspondence relationship between the first currency information and the second currency information, and the

determination part, if the plural pieces of the first currency information obtained by the first reading device and the plural pieces of the second currency information obtained by the second reading device are not equal to the correspondence relationship stored in the storage part, determines that the plural gaming currencies housed in the case as rejection.

[0084]

According to this configuration, when the gaming currencies with the incorrect correspondence relationship between the first currency information and the second currency information exist in the case, it is possible to reject them.

[0085]

For example, if the identification information is recorded in the radio tag and the value is recorded on the side surface, the storage part stores each identification information to which any value is assigned. For the plural pieces of the identification information read out from the plural radio tags, the number of values is obtained by referring to the storage part, and if the number of values read out from the side surfaces is not equal to that, it is rejected. On the contrary, it is also the same as a case when the value is recorded in the radio tag and the identification information is recorded

on the side surface. In these cases, it is unnecessary that the storage part stores in which case the gaming currencies of which identification information are included.

[0086]

In an inspection system according to an eighth aspect of the third embodiment, in the inspection system of any one of the first to the seventh aspects, the determination part, if the number of pieces of the first currency information obtained by the first reading device and the second currency information obtained by the second reading device is not a predetermined number, determines the plural gaming currencies housed in the case as rejection.

[0087]

According to this configuration, when the gaming currencies are extracted from the case or the gaming currencies are added to the case, the determination part can reject the gaming currencies housed in the case.

[0088]

For example, if the number of housing in the case is 100, when either one of the first currency information read out from the radio tag or the second currency information read out from the side surface is not 100 pieces, they are rejected.

[0089]

In an inspection system according to a ninth aspect of the third embodiment, in the inspection system of any one of the first to the eighth aspects, the gaming currency includes color information for indicating a value of the gaming currency in the second currency information and includes value information for identifying the value of the gaming currency in the first currency information, and the determination part, if the color information is not equal to the value information of the first currency information, determines the plural gaming currencies housed in the case as rejection.

[0090]

In an inspection system according to a tenth aspect of the third embodiment, in the inspection of the ninth aspect, the second currency information further includes value information of the gaming currency in addition to the color information, and the determination part, if the value of the gaming currency according to the color information in the second currency information is not equal to both or either one of the value information of the second currency information or the value information of the first currency information, determines the plural gaming currencies housed in the case as rejection.

[0091]

In an inspection system of an eleventh aspect of the third embodiment, in the inspection system of any one of the first to the tenth aspects, the gaming currency has the radio tag including the first currency information.

[0092]

In an inspection system of a twelfth aspect of the third embodiment, in the inspection system of any one of the first to the eleventh aspects, at least one or both of the first currency information and the second currency information includes group information indicating a group to which the gaming currency belongs, and the group is classified according to the value, manufacturing time, manufacturer, and/or usage gaming house of the gaming currency.

[0093]

In an inspection system of a thirteenth aspect of the third embodiment, in the inspection system of the tenth aspect, the determination part, if the color information is not equal to at least one of the value information, the common information, or the individual identification information of the first currency information and the second currency information, determines the plural gaming currencies housed in the case as rejection.

[0094]

In an inspection system of a fourteenth aspect of the third embodiment, in the inspection of the tenth aspect, the determination part determines the number for each value of the plural gaming currencies housed in the case or the total value of all gaming currencies, based on the color information or the value information of the first currency information or the second currency information.

[0095]

In an inspection system of a fifteenth aspect of the third embodiment, in the inspection system of the first aspect, the second currency information includes information expressed by the specific color representing the value of the gaming currency on the side surface of the gaming currency and is the information indicating the value of the gaming currency with the specific color, and the second reading device includes a camera for shooting the side surfaces of the plural gaming currencies housed in the case, and an identification part which analyses an image shot by the camera to specify each specific color of the plural gaming currencies, and specifies the values of the plural gaming currencies according to the specified specific color.

[0096]

According to this configuration, the determination

part can determines pass or fail using the information on the value of the gaming currency.

[0097]

An inspection system of a sixteenth aspect of the third embodiment, in the inspection system of the fifteenth aspect, the specific color expressing the second currency information, on the side surface of the gaming currency, is sandwiched between common colors commonly given on the gaming currencies having different values in a thickness direction of the gaming currency.

[0098]

According to this configuration, even if the plural gaming currencies are stacked in the case, by extracting the specific color sandwiched by the common colors from the image of the side surface, the identification part can specify the kinds of the plural gaming currencies in the case.

[0099]

In an inspection system according to a seventeenth aspect of the third embodiment, in the inspection system of the first aspect, the second currency information is indication information indicated on the side surface so as to be optically readable, and the second reading device includes a camera for shooting the side surfaces of the plural gaming currencies stacked and housed in the case,

and an identification part which analyses an image shot by the camera to specify indication information of each of the plural gaming currencies, and specifies the second currency information of each of the plural gaming currencies according to the specified indication information.

[0100]

According to this configuration, the determination part can determine the pass or fail using the indication information of the gaming currency.

[0101]

In an inspection system of an eighteenth aspect of the third embodiment, in the inspection system of the seventeenth aspect, the indication information is indicated with an infrared-ray responsive ink that emits light in response to infrared rays or an infrared-ray absorbing ink that absorbs the infrared rays, and the camera is an infrared-ray camera.

[0102]

According to this configuration, the identification information given on the side surface can be prevented from being visually recognized under natural light.

[0103]

In an inspection system according to a nineteenth aspect of the third embodiment, in the inspection system

of the seventeenth aspect, the indication information is indicated with an ink that emits light in response to an ultraviolet rays, and the inspection device is further includes an ultraviolet-ray irradiation part that irradiates the ultraviolet rays to the side surfaces of the gaming currencies housed in the case.

[0104]

Also according to this configuration, the identification information given on the side surface can be prevented from being visually recognized under natural light.

[0105]

In an inspection system according to a twentieth aspect of the fourth embodiment, in the inspection system of the first aspect, the stamp which is broken if it is opened so as to take out the gaming currencies housed is made on the case, the inspection device further includes a detection part for detecting the unbroken stamp, and the determination part, if the unbroken stamp is not detected by the detection part, determines the plural gaming currencies housed in the case as rejection.

[0106]

According to this configuration, when the stamp is broken, the determination part can reject the gaming currencies housed in the case.

[0107]

In an inspection system of a twenty-first aspect of the fourth embodiment, in the inspection system of the first aspect, the case has a light transmission part, and the second reading device optically reads the side surfaces of the gaming currencies housed in the case through the light transmission part.

[0108]

According to this configuration, it is possible to read the second currency information while the case is closed.

[0109]

In an inspection system of a twenty-second aspect of the fourth embodiment, in the inspection system of the twenty-first aspect, the light transmission part is configured of a transparent member.

[0110]

According to this configuration, a sealed structure including the light transmission part is formed in the case.

[0111]

In an inspection system of a twenty-third aspect of the third embodiment, in the inspection system of the first embodiment, the inspection device includes a case receiving part for receiving the case.

[0112]

According to this configuration, by disposing the case in the case receiving part, the first currency information and the second currency information can be read.

[0113]

In an inspection system of a twenty-fourth aspect of the third embodiment, in the inspection system of the twenty-first aspect, the case is portable.

[0114]

According to this configuration, it is possible to inspect the gaming currencies in the case at any point in a moving process from the factory to the table or the cashier.

[0115]

In an inspection system of a twenty-fifth aspect of the fourth embodiment, in the inspection system of the first aspect, the case is a two-stage chip float or chip tray for holding the gaming currencies on a game table.

[0116]

An inspection system according to a twenty-sixth aspect of the fourth embodiment is an inspection system for inspecting a gaming currency given a specific color representing a value thereof and indication information indicated so as to be optically readable on a side

surface, the inspection system including: a case which stacks and houses plural gaming currencies; and an inspection device inspecting the gaming currencies housed in the case, the inspection device having a configuration including a camera for shooting the side surfaces of the gaming currencies housed in the case; an identification part which analyses an image shot by the camera to specify the specific color and the indication information of each of the plural gaming currencies; and a determination part which determines pass or fail of the gaming currencies for each case, based on the specific color and the indication information specified by the identification part.

[0117]

According to this configuration, since the identification part specifies the specific color and the indication information about the gaming currencies housed in the case, it is possible to perform inspection with respect to the gaming currencies while being housed in the case. Also, since two pieces of information, the specific color and the indication information are specified from the side surface of the gaming currency to perform the inspection, it is possible to certainly perform the determination of pass or fail.

[0118]

An inspection system according to a twenty-seventh

aspect of the third embodiment is an inspection system for inspecting a gaming currency in which a radio tag storing currency information is built and a specific color representing a value is given to a side surface, the inspection system including: a case which stacks and houses plural gaming currencies; and an inspection device for inspecting the gaming currencies housed in the case, the inspection device having a configuration including a reading part which reads the radio tags of the gaming currencies housed in the case to obtain the currency information; a camera for shooting the side surfaces of the gaming currencies housed in the case; an identification part which analyzes an image shot by the camera to specify the specific color of each of the plural gaming currencies; and a determination part which determines pass or fail of the gaming currencies for each case, based of the currency information obtained by the reading part and the specific color specified by the identification part.

[0119]

According to this configuration, since the reading part obtains the currency information from the gaming currencies housed in the case and the identification part specifies the specific color for the gaming currencies housed in the case, it is possible to perform inspection

with respect to the gaming currencies while being housed in the case. Also, since two pieces of information, the currency information and the specific color are specified from the side surface of the gaming currency to perform the inspection, it is possible to certainly perform the determination of pass or fail.

[0120]

An inspection device according to a twenty-eighth aspect of the thirdfourth embodiment is an inspection device for inspecting plural gaming currencies in which radio tags storing first currency information are built and optically readable second currency information is given to side surfaces, and which are stacked and stored in the case, the inspection device including a configuration including a first reading device which reads the radio tags of the plural gaming currencies housed in the case to obtain the first currency information; a second reading device which optically reads the side surfaces of the plural gaming currencies housed in the case to obtain the second currency information; and a determination part which determines pass or fail of the gaming currencies for each case, based on the first currency information obtained by the first reading device and the second currency information obtained by the second reading device.

[0121]

According to this configuration, since a first reading part and a second reading part obtain the first currency information and the second currency information from the gaming currencies housed in the case respectively, it is possible to perform inspection with respect to the gaming currencies while being housed in the case. Also, since the inspection is performed by obtaining two pieces of information, the first currency information and the second currency information from the gaming currencies, it is possible to certainly perform the determination of the pass or fail.

[0122]

An inspection device of a twenty-ninth aspect of the third embodiment is an inspection device for inspecting plural gaming currencies in which a specific color representing values and an optically readable indication information are given to side surfaces, and which are stacked and housed in a case, the inspection device including a configuration including a camera for shooting the side surfaces of the plural gaming currencies housed in the case; an identification part which analyzes an image shot by the camera to specify the specific color and the indication information of each of the plural gaming currencies; and a determination part which

determines pass or fail of the gaming currencies for each case, based on the specific color and the indication information specified by the identification part.

[0123]

An inspection device of a thirtieth aspect of the third embodiment is an inspection device for inspecting plural gaming currencies in which radio tags storing currency information are built and a specific color representing values is given to side surfaces, and which are stacked and housed in the case, the inspection device including a configuration including a reading part which reads the radio tags of the plural gaming currencies housed in the case to obtain the currency information; a camera for shooting the side surfaces of the plural gaming currencies housed in the case; an identification part which analyzes an image shot by the camera to specify the specific color of each of the plural gaming currencies; and a determination part which determines pass or fail of the gaming currencies for each case, based on the currency information obtained by the reading part and the specific color specified by the identification part.

[0124]

An inspection system of a thirty-first aspect of the third embodiment is an inspection system for inspecting a gaming currency in which a radio tag storing

currency information is built, the inspection system including a case which stacks and houses plural gaming currencies; and an inspection device which inspects the gaming currencies housed in the case, the inspection device including a reading part which reads the radio tags of the gaming currencies housed in the case to obtain the currency information; a determination part which determines pass or fail of the gaming currencies for each case, based on the currency information obtained by the reading part; and a storage part which stores the currency information of the plural gaming currencies that should be housed in the case, the determination part, if the plural pieces of the currency information obtained by the reading part are not equal to the currency information stored in the storage part, determining the plural gaming currencies housed in the case as rejection.

[0125]

An inspection device according to a thirty-second aspect of the third embodiment is an inspection device for inspecting plural gaming currencies stacked and housed in a case, the inspection device including a configuration including a reading part which reads the radio tags of the plural gaming currencies housed in the case to obtain the currency information; and a determination part which determines pass or fail of the gaming currencies for each

case, based on the currency information obtained by the reading part.

[0126]

According to the third embodiment, since the first reading part and the second reading part obtain the first currency information and the second currency information from the gaming currencies housed in the case respectively, it is possible to perform inspection with respect to the gaming currencies while being housed in the case. Also, since the inspection is performed by obtaining two pieces of information, the first currency information and the second currency information from the gaming currencies, it is possible to certainly perform the determination of the pass or fail.

[0127]

Hereinafter, referring to the drawings, the third embodiment will be described.

[0128]

<Configuration of Inspection System>

Figure 7 is a diagram showing a configuration of an inspection system in the third embodiment. An inspection system 41 is composed of a case 4100 for housing gaming currencies in stacked state, and an inspection device 4200 which inspects the plural gaming currencies stacked and housed in the case 4100 while being housed in the case

4100.

[0129]

The case 4100 has a generally rectangular parallelepiped shape, and is made of a transparent resin. In the case 4100, disc-shaped gaming currencies C are housed while being stacked. In the case 4100, five columns, each for housing 20 gaming currencies C, are formed, and 100 gaming currencies C in total can be housed. The case 4100 can be carried (portable) while housing the gaming currencies C. The case 4100 is composed of a top part 4101 and a lower part 4102 which are separable, and by separating the top part 4101 and the lower part 4102, it becomes possible to house the gaming currencies C in the case 4100 and take out the gaming currencies C from the case 4100.

[0130]

An inspection device 4200 is composed of a receiving part 4210 and a main body part 4220. The inspection device 4200 can receive the case 4100 with the receiving part 4210. The receiving part 4210 has a rectangular parallelepiped shape where an approximate top surface and a front surface are opened as a whole, is formed of right and left side walls 4211, a bottom part 4212, and a deep wall 4213, and has a width, a height, and a depth in which the case 4100 is just fitted.

[0131]

The main body part 4220 is provided on a back side of the deep wall 4213 of the receiving part 4210, and comprises an RFID reader 4221, a computer 4222, and a display part 4223. The main body part 4220 is further provided with an infrared-ray camera 4225 and a visible-light camera 4226. The infrared-ray camera 4225 and the visible-light camera 4226 are attached to a tip of an arm 4227 so as to shoot side surfaces of the gaming currencies C housed in the case 4100 from a top surface side of the case 4100 housed in the receiving part 4210.

[0132]

To the computer 4222, the RFID reader 4221, the display part 4223, the infrared-ray camera 4225, and the visible-light camera 4226 are connected. To the RFID reader 4221, an RFID antenna 4224 is connected. The RFID antenna 4224 extends from the RFID reader 4221, and spirally extends in the right and left side walls 4211. That is, in the inside of each of the right and left side walls 4211, the spiral RFID antenna 4224 is laid, and each RFID antenna 4224 is connected to the RFID reader 4221.

[0133]

The display part 4223 is configured by a liquid crystal panel. Note that the liquid crystal panel may be provided with a touch sensor, and the display part 4223

may be configured as a touch panel.

[0134]

<Configuration of Gaming Currency>

Figure 8 is a perspective view of the gaming currency C in the third embodiment, and Figure 9 is a side view of the gaming currency C in the third embodiment. The gaming currency C includes a specific coloring layer 4501 characterized by a specific color at a middle part. On both side (upper and lower sides in Figure 9) in a thickness direction of the middle specific coloring layer 4501, common coloring layers 4502 characterized by a common color are included, thereby forming a striped pattern (in the thickness direction) on the side surface.

[0135]

Between the specific coloring layer 4501 and the one common coloring layer 4502 of the gaming currency C, the RFID tag 4503 is inserted as a radio tag. The RFID tag 4503 stores, for example, individual identification information for individually identifying (uniquely specifying) the gaming currency C and information on values (kinds), as currency information of the gaming currency C. A transparent layer 4504 is provided at the most outer layer of the gaming currency C. That is, the gaming currency C has the specific coloring layer 4501 that is the middle layer, the common coloring layers 4502

sandwiching the specific coloring layer 4501 from both surfaces, and transparent layers 4504 which are the most outer layers of both sides.

[0136]

The gaming currency C is formed by long and thin elongated five layers (in the order of the transparent layer 4504, the common coloring layer 4502, the specific coloring layer 4501, the common coloring layer 4502, and the transparent layer 4504) of plastic material, disposing the RFID tags 4503 at predetermined intervals between the specific coloring layer 4501 and the one common coloring layer 4502 at that time, thermocompression bonding the five layers of the plastic material, and then punching that in a circular or rectangular shape by pressing and the like so that one gaming currency C includes one RFID tag 4503. When punching by pressing, R machining (a rounded corner) is applied at an edge of the most outer transparent layer 4504 by designing the dimensions of die and punch for a mold for punching.

[0137]

Three layers composed of the specific coloring layer 4501 and two layers of the common coloring layers 4502 are thermocompression bonded, then varnish is applied on surfaces, and thus the transparent layers 4504 may be formed. Also, the specific coloring layer 4501 and the

two common coloring layers 4502 need not be separate members, and after being integrally formed, the specific color (and the common color) may be applied on the side surface by inkjet printing and the like, thereby forming the specific coloring layer 4501 and the common coloring layers 4502.

[0138]

The specific coloring layer 4501 expresses values (kinds) of the gaming currencies C with a color (the specific color). That is, since the color of the specific coloring layer 4501 is made to be different colors (red, green, yellow, blue, etc.) for the respective values of the gaming currencies C, by checking the color of a specific coloring layer 501 that can be optically read from the side surface of the gaming currency C, the value (such as 10 points, 20 points, 100 points, 1000 points, etc.) of the gaming currency C can be specified. On the common coloring layers 4502, the common color (common color) is applied on the gaming currencies C having different values. The common color is preferably lighter than any specific color, and it is white in the present embodiment.

[0139]

On the side surface of the gaming currency C, furthermore, on the side surface (specifically, on the

common coloring layers 4502 of the side surface), code information 4505 representing the currency information of the gaming currency C is indicated. The code information 4505 expresses the information according to the layout of plural labels (they may be referred to as marks and are square labels in the present embodiment). The specific coloring layer 4501 represents the information (the value of the gaming currency C) with the color, whereas, the code information 4505 expresses the information with the label indicated on the side surface, so that it may be referred to as indication information. Other examples of the indication information include plural character strings, number strings, bar codes, and the like.

[0140]

The code information 4505 of the present embodiment is repeatedly indicated at a cycle of 60 degrees in a circumferential direction of the gaming currency C. Thereby, when the side surface of the gaming currency C is observed in the circumferential direction from any direction, the complete code information 4505 is included in a range of 120 degrees in the circumferential direction. Note that the repeating cycle of the gaming currency C is not limited to 60 degrees, and the code information 4505 may be repeatedly indicated at equal intervals in the circumferential direction at least three

times.

[0141]

The code information 4505 is indicated by invisible ink. In the present embodiment, by using the infrared-ray absorbing ink for absorbing infrared rays (specifically, carbon black) as the invisible ink, the code information 4505 is printed by inkjet printing. Since only the printed part of the code information 4505 does not reflect infrared rays, by shooting the side surface of the gaming currency C with the infrared-ray camera 4225, the code information 4505 will emerge. Note that in order to make the printed part clearly emerge, the infrared-ray camera 4225 may include an infrared-ray lamp and irradiates infrared rays to the side surface of the gaming currency C to be shot.

[0142]

Note that the invisible ink is not limited to the infrared-ray absorbing ink, but may be an infrared-ray responsive ink that fluoresces in response to infrared rays or a UV ink that fluoresces in response to ultraviolet rays. In the case of using the UV ink, an ultraviolet-ray camera is used instead of the infrared-ray camera 4225, and in order to cause the UV ink to fluoresce, a black light irradiating ultraviolet rays to the side surface of the gaming currency C is used.

[0143]

Furthermore, the gaming currency C is provided with a label (mark) m' by the UV ink or the carbon black ink on a surface X of the common coloring layer 4502. The label m' represents the authenticity of the gaming currency C, and upon irradiation with ultraviolet rays (or infrared rays), the label m' becomes visible and represents a genuine one by the combination of its shapes or numbers. In order to cover printing 4506 (100 points and the like) for specifying a gaming house or the label m' on the surface, although the transparent layer 4504 is thermocompression bonded or coated (applied) on the outermost layer, embossing or varnishing is performed on the transparent layer 4504, thereby preventing the gaming currencies from adhering to each other and improving slippage.

[0144]

R machining (R) is performed on an edge of the transparent layer 4504 of the outermost layer which has been subjected to the printing 4506 (100 points and the like), thereby preventing the surface of the common coloring layer 4502 from deforming and appearing on the side surface, in a punching process of the gaming currency C. Also, a sharp edge of the gaming currency C is prevented from damaging a remaining hand or other gaming

currencies C. The specific coloring layer 4501 may be formed by one or more colored layers. Furthermore, metals and ceramics for increasing weight may be interiorized in the layer in the specific coloring layer 4501. Also, the RFID tag 4503 may be built by hollowing out a part of the specific coloring layer 4501, or in a space provided between the specific coloring layer 4501 and the common coloring layer 4502.

[0145]

Figure 10 is a diagram showing an example of an image obtained by shooting the plural gaming currencies C housed in the case 4100 with the infrared-ray camera 4225 and the visible-light camera 4226. The case 4100 in this case may be a two-stage chip float (especially a movable upper tray part in a two-stage chip tray) or a chip tray for holding the gaming currencies C on a game table. Even if the gaming currencies C are vertically stacked in the case 4100 as shown in Figure 10, the infrared-ray camera 4225 and the visible-light camera 4226 can shoot the code information 4505. Also, by vertically counting the specific coloring layers 4501, it is possible to count the number of the gaming currencies C. Even in a two-stage system, by developing each stage, it is possible to shoot the side surfaces of all gaming currencies C housed in the case 4100 with the infrared-ray camera 4225 and the

visible-light camera 4226.

[0146]

In the present embodiment, the code information 4505 is expressed by the layout of the labels m with multiple rows and multiple columns. Figure 11 is a diagram for explaining a configuration of the code information 4505. As shown in Figure 11, the upper and lower labels m make a pair to form one code element. In the example of Figure 11, one piece of the code information 4505 is composed of ten-digit code elements. As shown in Figure 11, there are four patterns in the one code element formed by the upper and lower labels m making the pair, and one code element can express four types of information, so that the code information 4505 composed of the ten-digit code element can express 4 to the tenth power kinds of information. A letter Y next to the ten-digit code element is an orientation discrimination mark Y for discriminating the orientation of the code information 4505.

[0147]

<Configuration of Inspection Device>

Figure 12 is a block diagram showing a configuration of the inspection device 4200. The inspection device 4200 includes a barcode reader 4228 and a communication part 4229, in addition to the RFID reader

4221, the computer 4222, the display part 4223, the RFID antenna 4224, the infrared-ray camera 4225, and the visible-light camera 4226 which are shown in Figure 7. Also, the computer 4222 is composed of a processor, a memory, and the like which are not shown, and the processor executes an inspection program to configure an identification part 4230 and the determination part 4231.

[0148]

An RFID system is composed of the RFID reader 4221, the RFID antenna 4224, and the RFID tag 4503 embedded in the gaming currency C. The currency information of the gaming currency C stored in the RFID tag 4503 embedded in the gaming currency C is read out by the RFID reader 4221 without contacting, and used for processing in the computer 4222.

[0149]

The infrared-ray camera 4225 includes an infrared-ray transmission filter transmitting infrared rays only, and picks up an infrared-ray image. The infrared-ray image produced by the shooting of the infrared-ray camera 4225 is sent to the computer 4222, and is subjected to the processing of the identification part 4230. The visible-light camera 4226 picks up an image of light in a visible area. Also, the visible-light image produced by the visible-light camera 4226 is sent to the computer 4222,

and is subjected to the processing of the identification part 4230. As shown in Figure 7, the infrared-ray camera 4225 and the visible-light camera 4226 are oriented to the case 4100 from an upper part of the case 4100, and shoot the side surfaces of the plural gaming currencies C in the case 4100 over the top part 4101 of the case 4100.

[0150]

The barcode reader 4228 reads a barcode BC attached to the case 4100 to obtain case identification information described below. The display part 4223 displays a determination result of the determination part 4231 of the computer 4222. The communication part 4229 performs data communication with a manufacture management device 4302 installed in a factory F or a use management device 4303 installed in a gaming house P.

[0151]

<Configuration of Case>

Figure 13 is a perspective view of the case 4100. The case 4100 is formed by joining the top part 4101 and the lower part 4102. In the present embodiment, the top part 4101 and the lower part 4102 are made of a transparent resin. As described above, in inspection device 4200 of the present embodiment, since the infrared-ray camera 4225 and the visible-light camera 4226 (hereinafter, simply referred to as a camera) are

installed above the receiving part 210, it is necessary that at least the upper surface of the case 4100 transmits light. That is, in the case 4100, it is necessary that a part positioned between the case 4100 and the camera when being received in the receiving part 4210 of the inspection device 4200 is a light transmission part which transmits light. Note that in the present embodiment, although the case 4100 is a sealed structure composed of the top part 4101 and the lower part 4102, the light transmission part may be in a perforated state.

[0152]

The case 4100, as described above, has a shape formed with five columns in which respective 20 gaming currencies C are stacked and housed, in parallel, and in an example of Figure 13, a cross section of each column is polygon (octagon) so that the top part 4101 and the lower part 4102 generally conform the shape of the gaming currencies C to be housed.

[0153]

Figure 14 is a perspective view of the case 4100' of a modification, and Figure 15 is a plan view of the case 4100'. Also, the case 4100' is composed of a top part 4101' and a lower part 4102 which are made of a transparent resin. In the present modification, an upper surface of the top part 4101' facing the camera is formed

by a plane. Thus, by making the surface facing the camera plane, as shown in Figure 15, linear shadows due to corners of the polygonal cross section of the case 4100' do not appear on the camera, and information of the side surface of the gaming currency C can be accurately identified, in an image analysis with respect to a shooting image of the camera.

[0154]

<Usage Aspect of Inspection System>

Figure 16 is a diagram for explaining an example of a usage aspect of the inspection system 41 together with the distribution of the gaming currencies C. The gaming currencies C are manufactured by a manufacturing device 4301 in the factory F (s1), and respective 100 currencies are housed in the case 4100 (s2). The case 4100 is stamped with a stamp seal in the factory F after housing the gaming currencies C. Also, in the case 4100, the barcode BC indicating the case identification information for uniquely specifying the case 4100 is affixed to the side surface (s3).

[0155]

At that time, in the manufacture management device 4302 in the factory F, the case identification information of the barcode BC affixed to the case 4100 is input (s4). Also, the case 4100 housing the gaming currencies C is

subjected to the inspection device 4200 to read currency information (the details will be described below) given to the gaming currencies C, and the inspection of pass or fail is performed. Then, the currency information read from the gaming currencies C housed in the case 4100 is sent to the manufacture management device 4302 (s5), and are associated with the case identification information by the manufacture management device 4302. Note that the manufacture management device 4302 may be a personal computer.

[0156]

The case 4100 which has been passed in the inspection device 4200 in the Factory F is transported from the factory F to the gaming house P (s6). The case 4100 is firstly stored in a repository R in the gaming house P (s7). The inspection device 4200 is installed in the repository R, and the case 4100 delivered from the factory F is inspected by the inspection device 4200.

[0157]

On the other hand, from the manufacture management device 4302 in the factory F, the case identification information and the currency information associated with that are sent to the use management device 4303 in the gaming house P. The use management device 4303 includes a storage part which obtains the case identification

information and the currency information associated with that from the manufacture management device 4302, for each of the plural cases 4100 housing the gaming currencies C, and stores them for each case 4100. Note that the use management device 4303 may be a personal computer.

[0158]

In inspection by the inspection device 4200 in the repository R, the inspection is performed by using the information stored in the use management device 4303. The case 4100 which has been passed in the inspection in the repository R is carried to a game table T (s9), or is carried to a cashier CA (s10). The game table T and the cashier CA respectively comprise the inspection devices 4200, and the case 4100 housing the gaming currencies C is inspected by the inspection devices 4200 while being stamped. In the game table T and the cashier CA, the inspection of the case 4100 housing the gaming currencies C which have been used is also performed, and the inspection devices 4200 are used for the inspection. In inspection in the three inspection devices 4200 in the gaming house P, the case identification information and the currency information associated with that sent from the manufacture management device 4302 and stored in the use management device 4303 are referred to.

[0159]

<Configuration of Information to be stored>

Figure 17 is a diagram showing an example of content of information which is generated by the manufacture management device 4302, is sent to the use management device 4303, and is stored in the use management device 4303. The information is generated for each case 4100, and with each of the case identification information (Ca1, Ca2, Ca3 ...), the currency information of the plural (100 in the present embodiment) gaming currencies C housed in the case 4100 is associated.

[0160]

As the currency information, the RFID tag 4503 stores information made from the combination of individual identification information (aa, ab, ac, ... ,du, and dv) which uniquely specifies the gaming currency C and information (r, r, r, ... , b, and b) which specifies the value (kind) of the gaming currency C. Indication information on the side surface stores information made from the combination of individual identification information (00001, 00002, 00003, ... , 00099, and 00100) which uniquely specifies the gaming currency C and information (1, 1, 1, ... , 2, and 2) which specifies the value (kind) of the gaming currency C. Color information of the side surface stores information (red, red, red, ... , blue, and blue) which specifies the value

(kind) of the gaming currency C.

[0161]

The information stored in the RFID tag 4503 is information that is electromagnetically readable by the RFID reader 4221, and the indication information and the color information corresponding to the first currency information of the present embodiment and given to the side surface are optically readable information and correspond to the second currency information of the present embodiment.

[0162]

<Configuration of Information to be Read>

Figure 18 is a diagram showing an example of contents of information respectively obtained from one case 4100 by the barcode reader 4228, the RFID reader 4221, the infrared-ray camera 4225, and the visible-light camera 4226, in the inspection device 4200. From the RFID reader 4221, English character strings stored in the RFID tags 4503 built in the plural gaming currencies C are read out. From the infrared-ray camera 4225, number stings which are indication information indicated on the side surfaces are read out. Also, from the visible-light camera 4226, colors of the side surfaces are read out. The identification part 4230 analyzes (an image of) the number strings that are read out from the infrared-ray

camera 4225 to identify numbers and specify information made from the number strings, and specifies a specific color from an image of the side surfaces read out from the visible-light camera 4226.

[0163]

Here, although the indication information and the information of the specific color of the side surfaces of the plural gaming currencies C can be obtained according to the aligning order of the gaming currencies C in the case 4100, the information obtained from the plural RFID tags 4503 cannot be obtained according to the aligning order of the gaming currencies C. That is, it is impossible to specify from which gaming currency C the information of the RFID tag 4503 is obtained.

[0164]

<Method of Determining Pass or Fail>

Next, a method of determining pass or fail in the computer 4222 of the inspection device 4200 will be described. As described above, the identification part 4230 specifies the currency information stored in the RFID tags 4503 of the plural gaming currencies C housed in the case 4100, based on the reading result of the RFID reader 4221, analyzes the infrared-ray image obtained by the infrared-ray camera 4225 to specify the currency information indicated by the indication information, and

analyzes the visible-light image obtained by the visible-light camera 4226 to specify the color of the specific coloring layer 4501. The determination part 4231, based on the information, determines authenticity/damage or a number for each value of all of the gaming currencies existing in the case 4100 to determine the pass or fail of the case 4100. In the following description, the currency information stored in the RFID tag 4503 is referred to as the first currency information, and the indication information and the information of the color of the specific coloring layer 4501 given to the side surface of the gaming currency C is referred to as the second currency information.

[0165]

(First Method of Determining Pass or Fail)

In a first method of determining pass or fail, as shown in Figure 19, the first currency information and the second currency information in the same gaming currency C are made to be the same information. In an example of Figure 19, the first currency information is information made from the individual identification information and the value information of each gaming currency C, and the same content as this is indicated on the side surface in a form of the indication information as the second currency information.

[0166]

The RFID reader 4221 reads out the first currency information from the RFID tag 4503 of the gaming currency C to output that to the identification part 4230, the infrared-ray camera 4225 shoots the side surface of the gaming currency C, and the identification part 4230 specifies the second currency information. In this case, in the identification part 4230, the correspondence relationship between the plural pieces of the first currency information and the plural pieces of the second currency information is unknown.

[0167]

The determination part 4231 compares the plural pieces of the first currency information and the plural pieces of the second currency information obtained by the identification part 4230, and if they correspond one by one completely, namely, if all of the first currency information are equal to any one of the second currency information without overlapping, determines the plural gaming currencies C housed in the case as passed. The determination part 4231, if the plural piece of the first currency information and the plural pieces of the second currency information obtained by the identification part 4230 are not completely equal to each other, determines the plural gaming currencies C housed in the case 4100 as

failed.

[0168]

As a case that the plural piece of the first currency information and the plural pieces of the second currency information obtained by the identification part 4230 are not completely equal to each other, it is considerable that any one of the gaming currencies C housed in the case 4100 is forged or that the RFID tag 4503 or the side surface of any one of the gaming currencies C is damaged. That is, the determination part 4231 determines the authenticity/damage of all of the gaming currencies C existing in the case 4100, thereby determining the pass or fail of the plural gaming currencies C housed in the case 4100.

[0169]

(Second Method of Determining Pass or Fail)

Also, in a second method of determining pass or fail, as shown in Figure 20, the first currency information and the second currency information in the same gaming currency C are the same information. In an example of Figure 20, the first currency information is the value information of each gaming currency C, and to each gaming currency C, the specific color is given as the second currency information to the specific coloring layer 4501 on the side surface.

[0170]

The RFID reader 4221 reads out the first currency information from the RFID tag 4503 of the gaming currency C to output that to the identification part 4230, the visible-light camera 4226 shoots the side surface of the gaming currency C, and the identification part 4230 analyzes the image to specify the second currency information (the color of the specific coloring layer 4501).

[0171]

In this case, in the identification part 4230, the correspondence relationship between the plural pieces of the first currency information and the plural pieces of the second currency information is unknown. Some of the plural pieces of the first currency information overlap each other, and some of the plural pieces of the second currency information overlap each other. Also, in the first currency information and the second currency information of Figure 20, "r" represents red, "b" represents blue, "y" represents yellow, and "g" represents green, respectively.

[0172]

The determination part 4231 determines the gaming currencies C as passed if the number of the respective specific colors (red, blue, yellow, and green) in the

plural pieces of the first currency information obtained by the identification part 4230 is equal to the number of the respective specific colors (red, blue, yellow, and green) in the plural pieces of the second currency information, and determines that as failed if the numbers are not equal to each other.

[0173]

As a case that the number of the respective specific colors in the first currency information is not equal to the number of the respective specific colors in the plural pieces of the second currency information, it is considerable that any one of the gaming currencies C housed in the case 4100 is forged or that the side surface of any one of the gaming currencies C is damaged. That is, the determination part 4231 determines a number for each value of all of the gaming currencies C existing in the case 4100, thereby determining the pass or fail of the plural gaming currencies C housed in the case 4100.

[0174]

(Third Method of Determining Pass or Fail)

In the third method of determining pass or fail, as shown in Figure 21, the first currency information and the second currency information in the same gaming currency C are different information. In an example of Figure 21, in the RFID tag 4503 of the gaming currency C, information of

English character strings is stored as the first currency information, and on the side surface of the gaming currency C, the indication information of number strings is indicated as the second currency information.

[0175]

The RFID reader 4221 reads out he first currency information from the RFID tag 4503 of the gaming currency C to output that to the identification part 4230, the infrared-ray camera 4225 shoots the side surface of the gaming currency C, and the identification part 4230 specifies the second currency information. In this case, in the identification part 4230, the correspondence relationship between the plural pieces of the first currency information and the plural pieces of the second currency information is unknown.

[0176]

In the use management device 4303, the first currency information and the second currency information are stored in association with the case identification information of the case 4100. The determination part 4231 compares the plural pieces of the first currency information obtained by the identification part 4230 to the plural pieces of the first currency information associated with the case identification information of the case 4100 stored in the use management device 4303, and

judges whether or not they correspond one by one completely. Also, the determination part 4231 compares the plural pieces of the second currency information obtained by the identification part 4230 to the plural pieces of the second currency information associated with the case identification information of the case 4100 stored in the use management device 4303, and judges whether or not they correspond one by one completely.

[0177]

The determination part 4231 determines the plural gaming currencies C housed in the case 4100 as passed if the plural pieces of the first currency information obtained by the identification part 4230 correspond to the plural pieces of the first currency information associated with the case identification information of the case 4100 stored in the use management device 4303 one by one completely, namely the plural pieces of the first currency information obtained by the identification part 4230 is equal to any one of the plural pieces of the first currency information associated with the case identification information of the case 4100 stored in the use management device 4303 without overlapping, and if the plural pieces of the second currency information obtained by the identification part 4230 correspond to the plural pieces of the second currency information associated with

the case identification information of the case 4100 stored in the use management device 4303 one by one completely, namely, the plural pieces of the second currency information obtained by the identification part 4230 is equal to any one of the plural pieces of the currency information associated with the case identification information of the case 4100 stored in the use management device 4303 without overlapping, and determines the plural gaming currencies C housed in the case 4100 as failed if any one of the plural pieces of the first currency information is not equal to the information stored, or any one of the plural pieces of the second currency information is not equal to the information stored.

[0178]

As a case that any one of the plural pieces of the first currency information is not equal to the information stored, or any one of the plural pieces of the second currency information is not equal to the information stored, it is considerable that any one of the gaming currencies C housed in the case 4100 is forged or that the RFID tag 4503 or the side surface of any one of the gaming currencies C is damaged. That is, the determination part 4231 determines the authenticity/damage of all of the gaming currencies C existing in the case 4100, thereby

determining the pass or fail of the plural gaming currencies C housed in the case 4100.

[0179]

(Third Method of Determining Pass or Fail)

In the third method of determining pass or fail, as shown in Figure 22, the first currency information and the second currency information in the same gaming currency C are different information. In an example of Figure 22, in the RFID tag 4503 of the gaming currency C, information of English character strings is stored as the first currency information, and the specific coloring layer 4501 on the side surface of the gaming currency C is colored in the specific color corresponding to the value as the second currency information.

[0180]

The RFID reader 4221 reads out the first currency information from the RFID tag 4503 of the gaming currency C to output that to the identification part 4230, the visible-light camera 4226 shoots the side surface of the gaming currency C to output that to the identification part 4230, and the identification part 4230 analyzes the shot image to specify the specific color that is the second currency information. In this case, in the identification part 4230, the correspondence relationship between the plural pieces of the first currency

information and the plural pieces of the second currency information is unknown.

[0181]

In the use management device 4303, the first currency information and the second currency information are stored in association with the case identification information of the case 4100. The determination part 4231 compares the plural pieces of the first currency information obtained by the identification part 4230 to the plural pieces of the first currency information associated with the case identification information of the case 4100 stored in the use management device 4303, and judges whether or not they correspond one by one completely. Also, the determination part 4231 compares the number of the respective specific colors in the plural pieces of the second currency information obtained by the identification part 4230 to the number of the respective specific colors in the plural pieces of the second currency information associated with the case identification information of the case 4100 stored in the use management device 4303, and judges whether or not the numbers of the respective specific colors are equal to each other.

[0182]

The determination part 4231 determines the case

4100 as passed, if the plural pieces of the first currency information obtained by the identification part 4230 corresponds to the plural pieces of the first currency information associated with the case identification information of the case 4100 stored in the use management device 4303 one by one completely, and if the number of the respective specific colors in the plural pieces of the first currency information obtained by the identification part 4230 is equal to the number of the respective specific colors in the plural pieces of the second currency information associated with the case identification information of the case 4100 stored in the use management device 4303, and determines the plural gaming currencies C housed in the case 4100 as failed if any one of the plural pieces of the first currency information is not equal to the information stored or the number of any one of the respective specific colors in the plural pieces of the second currency information is not equal to the information stored.

[0183]

As a case that any one of the plural pieces of the first currency information is not equal to the information stored, or the number of any one of the respective specific colors in the second currency information is not equal to the information stored, it is considerable that

any one of the gaming currencies C housed in the case 4100 is forged or that the RFID tag 4503 or the side surface of any one of the gaming currencies C is damaged. That is, the determination part 4231 determines the authenticity/damage and a number for each value of all of the gaming currencies C existing in the case 4100, thereby determining the pass or fail of the plural gaming currencies C housed in the case 4100.

[0184]

(Fifth Method of Determining Pass or Fail)

In the fifth method of determining pass or fail, as shown in Figure 23, the first currency information and the second currency information in the same gaming currency C are different information. In an example of Figure 23, in the RFID tag 4503 of the gaming currency C, individual identification information made from number strings is stored as the first currency information, and to the side surface of the gaming currency C, the value information of the gaming currency C is given in a form of the specific color of the specific coloring layer 4501.

[0185]

The RFID reader 4221 reads out the first currency information from the RFID tag 4503 of the gaming currency C to output that to the identification part 4230, the visible-light camera 4226 shoots the side surface of the

gaming currency C to output that to the identification part 4230, and the identification part 4230 analyzes the shot image to specify the specific color that is the second currency information. In this case, in the identification part 4230, the correspondence relationship between the plural pieces of the first currency information and the plural pieces of the second currency information is unknown.

[0186]

In the use management device 4303, the correspondence relationship between the first currency information and the second currency information is stored. In an example of Figure 23, the individual identification information which uniquely specifies the gaming currency C and the specific color of the specific coloring layer 4501 on the side surface, namely the value information of the gaming currency C are associated with each other, and when specifying the individual identification information, the value of the gaming currency C can be known. Note that, in this example, the use management device 4303 is not necessary to store the combination of the first currency information and the second currency information for each of case identification information. In other words, in this example, the inspection of the gaming currencies C housed in the case 4100 can be performed without using the

case identification information.

[0187]

The determination part 4231 specifies the first currency information corresponding to the first currency information which the identification part 4230 identifies from the first currency information stored in the use management device 4303, and specifies the second currency information associated with the first currency information, namely the value. The determination part 4231 performs this on all of the first currency information identified by the identification part 4230, thereby obtaining the number of the respective values in the plural pieces of the second currency information extracted from the use management device 4303 about one case.

[0188]

The determination part 4231 compares the number of the respective values thus obtained to the number of the respective values in the second currency information identified from the identification part 4230 about the case 4100. The determination part 4231, if all of the number of the respective values are equal to the information stored, determines the plural gaming currencies C housed in the case 4100 as passed, and if the number of any of the values is not equal to the

information stored, determines the plural gaming currencies C housed in the case 4100 as failed.

[0189]

As a case that the number of the respective values in the plural pieces of the second currency information extracted from the use management device 4303 is not equal to the number of the respective values in the second currency information identified from the identification part 4230 about the case 4100, it is considerable that any one of the gaming currencies C housed in the case 4100 is forged or that the RFID tag 4503 or the side surface of any one of the gaming currencies C is damaged. That is, the determination part 4231 determines the authenticity/damage and a number for each value of all of the gaming currencies C existing in the case 4100, thereby determining the pass or fail of the plural gaming currencies C housed in the case 4100.

[0190]

Also, although an illustration is omitted, if the value of the gaming currency is stored as the first currency information and the individual identification information of the gaming currency C is stored as the second currency information, it is possible to determine pass or fail in the same way as above.

[0191]

Although the first to fifth methods of determining pass or fail have been described above, the determination part 4231 may be adopted by combining the above methods of determining pass or fail. Also, the determination part 4231, in addition to the methods of determining pass or fail mentioned above, if the number of both of the first currency information and the second currency information read out from the plural gaming currencies C housed in the case 4100 are not a predetermined number (100 in the present embodiment), may determine the plural gaming currencies C housed in the case 4100 as failed.

[0192]

The first and second methods of determining pass or fail mentioned above are methods of determining pass or fail which can be executed without using information stored in the use management device 4303 installed in the gaming house P, and are suitable for being executed by the inspection device 4200 in the factory F. Although the third to fifth methods of determining pass or fail are methods of determining pass or fail which use information stored in the use management device 4303 installed in the gaming house P, and are suitable for being executed by the inspection device 4200 in the gaming house P, the inspection device 4200 in the gaming house P may adopt the first or second method of determining pass or fail. If

all of the inspection devices 4200 in the gaming house P adopt a method of determining pass or fail which does not use information stored in the use management device 4303 like as the first or second methods of determining pass or fail, the use management device 4303 can be omitted.

[0193]

Although the inspection device 4200 in the gaming house P also performs the inspection of the case 4100 housing the gaming currencies C which have been used, in that case, it is possible to adopt the first, second, or fifth method of determining pass or fail in which it is unnecessary to store the information of the gaming currencies that should be housed in the case.

[0194]

Also, in the embodiment described above, the gaming currency C has the individual identification information and/or the value information as the first currency information and/or the second currency information. Here, the individual identification information is information which uniquely specifies each gaming currency C, whereas the value information is information which can overlap with each other in the plural gaming currencies C and can be also said as information (group information) indicating a group to which each gaming currency belongs. The present embodiment, as the group information for the group

to which each gaming currency belongs, instead of the value, or in addition to the value, may adopt, for example, information on manufacturing time, manufacturer, and/or usage gaming house of the gaming currency.

[0195]

That is, both of the first currency information and the second currency information may include individual identification information which identifies the gaming currency, both of the first currency information and the second currency information may include group information indicating a group to which the gaming currency belongs, the first currency information may include the individual identification information which identifies the gaming currency and the second currency information may include the group information of the group to which the gaming currency belongs, or the first currency information may include the group information of the group to which the gaming currency belongs and the second currency information may include the individual identification information which identifies the gaming currency.

[0196]

<Result Display of Pass or Fail Determination>

Figure 24 and Figure 25 are diagrams showing examples of pass or fail result display screens displaying the result of the pass or fail determination in the

determination part 4231. These pass or fail result display screens are generated by the computer 4222 based on the result of the pass or fail determination in the determination part 4231, and are displayed by the display part 4223. Figure 24 shows an example of the display screen in case of pass, and Figure 25 displays an example of the display screen in case of fail.

[0197]

As shown in Figure 24 and Figure 25, a good/bad results display screen 4800 includes a total detection number 4801 which is the number of the combination of the first currency information and the second currency information which the identification part 4230 reads out from the gaming currencies C, the number of correct gaming currencies C 4802, and the number of unfair gaming currencies C 4803.

[0198]

The computer 4222 sets the larger one of the numbers of pieces of the first currency information and the second currency information as the total detection number 4801. For example, although 100 of the gaming currencies are housed in the case 4100, if the RFID tag 4503 is not built in one of them, the identification part 4230 specifies 100 pieces of the second currency information from the plural gaming currencies C, but can

obtain only 99 pieces of the first currency information. In this case, the computer 4222 sets 100 which is the larger one of pieces of the first currency information and the second currency information as the total detection number 4801.

[0199]

The computer 4222, in the case of the first or second method of determining pass or fail, sets the number of the combination of the first currency information and the second currency information that are determined as equal to each other as the number of the correct gaming currencies C 4802, and sets a number obtained by subtracting the number of the correct gaming currencies C from the total detection number 4801 as the number of the unfair gaming currencies C 4803.

[0200]

The computer 4222, in the case of the third or fourth method of determining pass or fail, sets the smaller one of the numbers of pieces of the first currency information for which the correspondence relationship with the first currency information stored in the use management device 4303 is confirmed, and of the second currency information for which the correspondence relationship with the second currency information stored in the use management device 4304 is confirmed, as the

number of the correct gaming currencies C 4802, and sets the number obtained by subtracting the number of the correct gaming currencies C from the total detection number 4801 as the number of the unfair gaming currencies C 4803.

[0201]

The computer 4222, in the case of the fifth method of determining pass or fail, sets the number of pieces of the second currency information for which the correspondence relationship with the second currency information stored in the use management device 4303 as the number of the correct gaming currencies C 4802, and sets the number obtained by subtracting the number of the correct gaming currencies C from the total detection number 4801 as the number of the unfair gaming currencies C 4803.

[0202]

The good/bad results display screen 4800 includes the currency information display part 4804 displaying the currency information which the identification part 4230 reads out from the gaming currencies C. In the currency information display part 4804, if the currency information stored in the use management device 4303 is read out, or if the first currency information is equal to the second currency information, the currency information is

displayed in color, and the currency information which is stored in the use management device 4303 but is not read out is displayed in white (refer to Figure 25).

[0203]

Also, in the good/bad results display screen 4800, if the currency information which is not stored in the use management device 4303 is read out, or if the first currency information is not equal to the second currency information, the currency information is displayed outside the currency information display part 4804 as unfair currency information 4805.

[0204]

<Modifications>

(RFID ANTENNA OF INSPECTION DEVICE)

Figure 26 is a diagram indicating a modification of an RFID antenna 4224 of an inspection device 4200. Note that illustrations of an arm 4227, infrared-ray camera 4225, and a visible-light camera 4226 are omitted. In the above embodiments, although the RFID antenna 4224 is built in right and left side walls 4211, the RFID antenna 4224 may be built in a bottom part 4213. Also in this case, the RFID antenna 4224 is placed inside the bottom part 4213 in a spiral manner.

[0205]

(Gaming Currency)

Figure 27 is a side view showing a gaming currency C' in a modification. Although in the gaming currency C in the above embodiments, the specific coloring layer 4501 is sandwiched by the common coloring layers 4502, in an example of Figure 27, the gaming currency C' is comprised of the common coloring layers 4502 at the center and the specific coloring layers 4501 at both sides thereof (upper and lower). In an example of Figure 27, individual identification information represented by seven-digits number strings is written (printed) as code information 4505' at the side surface of the gaming currency C'. In an example of Figure 27, the code information 4505' being written information is written in a central common coloring layer 502. The code information 4505' in this case can represent seven kinds of article information among ten kinds of article information.

[0206]

Further, both of the code information 4505 represented by whether there is indication m that is described for the currency for gaming currency C in the above embodiment, and the code information 4505' in the number strings that is illustrated in Figure 27 may be written at the side surface of the gaming currency C. In this case, the code information 4505 with the indication m and the code information 4505' in the number strings may

be printed with different inks. For example, the code information 4505 with the indication m may be printed with infrared-ray responsive inks, and the code information 4505' in the number strings may be printed with ultraviolet-ray responsive inks. In this case, the infrared-ray camera and the ultraviolet-ray camera are prepared in order to shoot the side surface of the gaming currency C, the code information 4505 with the indication m may be read using the infrared-ray camera, and the code information 4505' in the number strings may be read using the ultraviolet-ray camera.

[0207]

Figure 28 is a side sectional view of the gaming currency C'' in another modification. The gaming currency C'' comprises a multi-layer structure where different plastic layers with plural colors are stacked, at least specific coloring layer (colored layer) 4501 is provided at the middle, and common coloring layers (white color or lighter-color layers) 4502 are stacked at both sides of the middle specific coloring layer 4501. Note that it is preferable for colors of the common coloring layers 4502 to be thinner than color of the specific coloring layer 4501. As such, in the gaming currency C'', the multi-layer structure where the specific coloring layer 4501 is provided at the middle, and the common coloring layers

4502 are stacked at both sides of the middle specific coloring layer 4501 can identify a kind of the gaming currency C'' (10 points, 20 points, 100 points, 1000 points, and the like) by forming a striped pattern in a stacking direction at the side surface, and changing the color of the specific coloring layer 4501 (red, green, yellow, blue and the like).

[0208]

Figure 29 is a perspective view of the stacked gaming currencies C'', Figure 30 is a side view of the gaming currency C'', and Figure 31 is a plan view of the gaming currency C''. As shown in Figure 29, in the gaming currencies C'', a printing 4507 (e.g. 100 points) representing a kind (value) of the gaming currency C'' is made at surfaces of the common coloring layers 4502 (top surface and lower surface), a transparent layer 4504 is provided at the most outer layer, and at least five-layer structure is made with thermal compression between layers. These gaming currencies C'' is formed by using long and thin elongated plastic materials, forming a state (e.g. five-layer structure) thermal compressed and attached between the layers (specific coloring layer 4501, common coloring layer 4502, and transparent layer 4504), and then punching them into a circular form, rectangular form, or the like with press etc. When punching by pressing, R

machining (a rounded corner) is applied at an edge of the most outer transparent layer 4504 by designing the dimensions of die and punch for a mold for punching.

[0209]

Further, in the gaming currency C'', the indication m'' is provided with UV inks or carbon black inks at the surface of the common coloring layer 4502. The indication m'' represents the authenticity of the gaming currency C'', becomes visible by radiation of ultraviolet-ray light (or infrared-ray light), and represents correct one with the combination of the shape and number. Although the most outer layer is thermal compressed or coated (applied) with the transparent layer 4504 to cover the printing 4507 and indication m', embossing is made on the transparent layer 4504 to avoid adhesion of the gaming currencies C'' each other.

[0210]

The R machining (R) is performed at the edge of the most outer transparent layer 4504 where the printing 4507 (e.g. 100 points) is made to avoid that the surface of the common coloring layers 4502 is deform to appear in the side surface in the punching process. Also, a sharp edge of the gaming currency C'' is prevented from damaging a remaining hand and other gaming currencies C''.

[0211]

The specific coloring layer 4501 may be formed with plural layers (three layers in Figure 28) colored by a specific color as shown in Figure 28. Since the plural layers colored by the specific color are thermal compressed each other, the three-layer structure is not visible as shown in Figure 28, and Figure 28 represents three layers of the specific coloring layers 4501 for description. Further, the hollowing B is partially provided in the middle layer of the three layers of the specific coloring layers 4501, and the RFID tag 4503 is built therein.

[0212]

As shown in Figure 28, Figure 29, and Figure 30, the gaming currencies C, C' and C'' include a stacked multi-layer structure, form clear striped pattern at the side surface in the stacking direction, and allow easy and accurate measurement of colors (kind of the gaming currency) and numbers with image analysis, comparing to the conventional chip. Figure 32 is a diagram indicating an example of an image obtained by shooting the stacked gaming currencies. As shown in Figure 32, the specific coloring layer 4501 can be clearly identified by shooting the side surface of the gaming currency C with the visible-light camera 4226. Further, the images can be analyzed and determined more accurately by using a

computer or controlling system utilizing an artificial intelligent technique, and a deep learning (structure) technique in the image analysis. Since the computer or controlling system utilizing the artificial intelligent technique, and the deep learning (structure) technique are known and available for one skilled in the art, the detailed description is omitted.

[0213]

(Detection of Stamp)

As stated above, the case 4100 is stamped with a stamp after housing a predetermined number of the gaming currencies C. The stamp is broken if it is opened so as to take out the gaming currencies housed. The detection device 4200 may comprise a detection part for detecting the unbroken stamp attached to the case 4100. The detection part may detect the stamp optically or magnetically. In this case, the determination part 4231 determines that the plural gaming currencies C housed in the case 4100 are failed if the unbroken stamp is not detected by the detection part.

[0214]

(Arrangement of Components of Inspection Device)

In the above embodiment, as shown in Figure 12, all components of the inspection device 4200 are arranged in one device, they may be arranged in a distribution manner.

For example, some or all of the computer 4222, the display part 4223, and the communication part 4224 may be implemented by a personal computer connected to the inspection device 4200. The components arranged in the distribution manner may be communicatively connected with wired or wireless manner, and may be connected via a network such as the Internet.

[0215]

Further, as shown in Figure 33 and Figure 34, the infrared-ray camera 4225 and/or visible-light camera 4226, and the arm 4227 may be connected to the computer 4222 separately from the inspection device 4200. Figure 33 shows an example in which either of the infrared-ray camera 4225 or the visible-light camera 4226 is provided separately from the inspection device 4200, and Figure 34 shows an example in which the infrared-ray camera 4225 is provided separately from the inspection device 4200 and the visible-light camera 4225 is provided integrally with the inspection device 4200. Note that an ultraviolet-ray camera may be provided as a third camera with an ultraviolet-ray lamp in addition to the infrared-ray camera 4225 and the visible-light camera 4226, and any cameras in Figure 33 and Figure 34 may be the ultraviolet-ray camera with the ultraviolet-ray lamp.

[0216]

(Currency Information)

In the above embodiment, the gaming currency C includes the currency information stored in the RFID tag 4503, and the code information 4505 as currency information written at the side surface. Also, although the specific color of the specific coloring layers 4501 at the side surface are considered as the currency information indicating values of the gaming currency C, and one gaming currency C has these three types of the currency information, the present embodiment is not limited to the above, and the gaming currency C may have only two types of the currency information among them. As long as the gaming currency C has two types of the currency information, the first to fifth pass or fail determination methods can be performed.

[0217]

Also, although the first to fifth pass or fail determination methods use two types of the currency information, the determination part 4231 may perform the pass or fail determination using the three types of the currency information if the gaming currency C has the three types of the currency information.

[0218]

(Display Part)

Although the above embodiment describes an example

in which the display part 4223 is configured with the liquid crystal panel, the display part 4223 may be a lamp indicating the pass or fail only, or a lamp displaying digitally the total detection number 4801, the number of correct gaming currencies C 4802, and the number of unfair gaming currencies C 4803 only.

[0219]

(Calculation of Total Amount of Values)

The determination part 4231 in the above embodiment can identify the number of respective values of the plural gaming currencies C housed in the case 4100. Here, the determination part 4231 further may calculate the total amount of values of the plural gaming currencies C housed in the case 4100 based on the number of the respective values. The calculated total amount may be displayed on a good/bad results display screen (reference to Figure 24 and Figure 25) displayed in the display part 4233.

[0220]

(Fourth Embodiment)

A fourth embodiment relates to an inspection system and an inspection device for inspecting a gaming currency, more specifically, relates to the inspection system and the inspection device for inspecting the gaming currency including a built-in radio tag or counting the number of the gaming currencies.

[0221]

The gaming currency including the built-in radio tag for storing identification information and kind information is known (e.g. Japanese Patent Laid-Open No. 2008-246103).

[0222]

Japanese Patent Laid-Open No. 2008-246103 discloses the gaming currency having a configuration for avoiding the radio tag from being brought out easily. This implements a configuration in which fault in the radio tag hardly occurs.

[0223]

However, in the case of reading the number of the gaming currencies with the radio tag disclosed in Japanese Patent Laid-Open No. 2008-246103, the number of the gaming currencies is calculated based on the read radio tag information, and if the radio tag built in the gaming currency is broken or the radio tag is not built in the gaming currency, there is a problem in which the currency information cannot be obtained, and the actual number of the gaming currencies and the number of the gaming currencies calculated by reading the radio tag are different.

[0224]

The present embodiment has the objective for

providing an inspection system and an inspection device for allowing to inform that the radio tag is destroyed.

[0225]

The inspection system in a first aspect of the fourth embodiment is an inspection system for inspecting gaming currencies including a built-in radio tag for storing currency information and having colors or representations representing values at an outer surface, the gaming currencies being housed in a case at a condition on which the maximum housing number is limited,

wherein the gaming currencies are housed in the case capable of housing the gaming currencies stacked in a thickness direction and in a column, the inspection system comprising:

a reading device for reading the radio tag of the gaming currency in the case and obtaining the currency information of the gaming currency; and

a determination part for comparing the currency information obtained by the reading device to a maximum housing number of the case itself, and determining the gaming currency in the case as abnormal when the number of the gaming currencies obtained from the currency information that is obtained by the reading device is different from the maximum housing number.

[0226]

The determination part has functions of comparing a physical feature of the case itself or physical information of the gaming currencies obtained by a physical measurement means other than the reading device to the number of pieces of the physical information of the gaming currency obtained from the currency information that is obtained by the reading device, and determining and outputting, if they are not matched, that there is any abnormal gaming currency of the gaming currencies housed in the case.

[0227]

Further, the physical information is an optically-obtained number or height, or a measured and obtained weight.

[0228]

Further, the inspection system has further an information database of the radio tag that information of the radio tag built in the gaming currency can be referred, and the determination part may have a configuration of checking the currency information of the gaming currency read by the reading device with the information database of the radio tag and capable of detecting the gaming currency to be inspected as abnormal.

[0229]

Further, the determination part may have functions

of, if determining that there is any abnormal gaming currency of the gaming currencies in the case, comparing the information of the radio tags of all gaming currencies in the case to the pre-recorded information database of the radio tag, and identifying that there is the abnormal radio tag not present in the information database of the radio tag.

[0230]

Further, the determination part may have functions of, if determining that there is any abnormal gaming currency of the gaming currencies in the case, identifying that in any gaming currencies in the case, there is the abnormal gaming currency for which the information cannot be obtained from the radio tag.

[0231]

Further, the determination part may have functions of analyzing the information of the radio tag obtained by the reading device, and sending a signal when there are in the case two or more gaming currencies for which the information obtained from the radio tags is the same.

[0232]

Further, the information database of the radio tag is an information database of the radio tag of gaming currencies stored and used in a gaming house, and the determination part may have functions of analyzing the

information of the radio tag obtained by the reading device and sending a signal when the information obtained from the radio tag is the same as the information of the radio tag for the gaming currency that is present in other places in the gaming house.

[0233]

The inspection device in a second aspect of the fourth embodiment is an inspection device for inspecting gaming currencies including a built-in radio tag for storing currency information and having colors or representations representing values at an outer surface, the inspection device comprising:

an inspection table on which the gaming currencies stacked in a thickness direction and in a column can be inspected at a condition on which the maximum stacking number is limited;

a reading device for reading the radio tags of the gaming currencies in the column and obtaining the currency information of the gaming currencies in the column; and

a determination part for comparing the currency information obtained by the reading device to a maximum stacking number of the inspection table itself and determining an abnormal gaming currency present on the inspection table when the number of the gaming currencies obtained from the currency information that is obtained by

the reading device is different from the maximum stacking number.

[0234]

Further, the determination part may have functions of determining and outputting that there is any abnormal gaming currency of the gaming currencies present on the inspection table when the currency information of the gaming currency obtained by the reading device is different from the physical information of the gaming currency.

[0235]

Further, the physical information may be an optically-obtained number or height, or a measured and obtained weight.

[0236]

Further, the inspection device further includes an information database of the radio tag that information of the radio tag built in the gaming currency can be referred, and the determination part may have a configuration of capable of checking the currency information of the gaming currency read by the reading device with the information database of the radio tag and detecting the gaming currency to be inspected on the inspection table as abnormal.

[0237]

Further, the determination part may have functions of, if determining that there is any abnormal gaming currency of the gaming currencies on the inspection table, comparing the information of the radio tags of all gaming currencies on the inspection table to the pre-recorded information database of the radio tag, and identifying that there is the abnormal gaming currency not present in the information database of the radio tag.

[0238]

Further, the determination part may have functions of, if determining that there is any abnormal gaming currency of the gaming currencies in the case, identifying that in any gaming currencies in the case, there is the abnormal gaming currency for which the information cannot be obtained from the radio tag.

[0239]

Further, the determination part may have functions of analyzing the information of the radio tag obtained by the reading device and sending a signal when there are in the case two or more gaming currencies for which the information obtained from the radio tags is the same.

[0240]

Further, the information database of the radio tag is an information database of the radio tag of gaming currencies stored and used in a gaming house, and the

determination part may have functions of analyzing the information of the radio tag obtained by the reading device and sending a signal when the information obtained from the radio tag is the same as the information of the radio tag for the gaming currency that is present in other places in the gaming house.

[0241]

According to the present embodiment, the determination of the number of the gaming currencies housed in one with the fixed housing number is made, allowing the inspection as to inform that the radio tag is destroyed.

[0242]

Hereinafter, referring to the drawings, the fourth embodiment is described.

[0243]

<Configuration of Inspection Device>

Figure 35 is a diagram indicating a configuration of the inspection system in the fourth embodiment. The inspection system 51 is comprised of a case 5100 for housing stacked gaming currencies and an inspection device 200 for inspecting the plural gaming currencies stacked and housed in the case 5100 at a condition of being housed in the case 5100.

[0244]

The case 5100 has a generally rectangular parallelepiped shape and is made of a transparent resin. In the case 5100, disc-shaped gaming currencies are housed while being stacked. In the case 5100, five columns 5100C, each for housing twenty numbers of gaming currencies C, are formed and 100 gaming currencies C in total can be housed. The case 5100 can be carried (portable) while housing the gaming currencies C. The case 5100 is composed of a top part 5101 and a lower part 5102 which are separable, and by separating the top part 5101 and the lower part 5102, it becomes possible to house the gaming currencies C in the case 5100 and take out the gaming currencies C from the case 5100.

[0245]

The inspection device 5200 is composed of a receiving part 5210 and a main body part 5220. The inspection device 5200 can receive the case 5100 with the receiving part 5210. The receiving part 5210 has a rectangular shape where an approximate top surface and a front surface are opened as a whole, is formed of right and left side walls 5211, a bottom part 5212 and a deep wall 5213, and has a width, a height and a depth in which the case 5100 is just fitted.

[0246]

The main body part 5220 is provided at a back side

of the deep wall 5213 of the receiving part 5210, and comprises the reading device 5221, the determination part 5222 and the display part 5223.

[0247]

The reading device 5221 and the display part 5223 are connected to the determination part 5222. A radio tag antenna 5224 is connected to the reading device 5221. The radio tag antenna 5224 extends from the reading device 5221 and spirally extends in the right and left side walls 5211. That is, in the inside of each of the right and left side walls 5211, the spiral radio tag antenna 5224 is laid, and each radio tag antenna 5224 is connected to the reading device 5221.

[0248]

The display part 5223 is configured by a liquid crystal panel. Note that the liquid crystal panel may be provided with a touch sensor, and the display part 5223 may be configured as a touch panel.

[0249]

<Configuration of Inspection Device>

Figure 36 is a block diagram indicating a configuration of the inspection device 5200. The inspection device 5200 comprises the reading device 5221, the determination part 5222, the display part 5223, and the radio tag antenna 5224 shown in Figure 35, as well as

a barcode reader 5228 and a communication part 5229. Also, the determination part 5222 is configured with a processor, a memory, and the like which are not shown, and the processor executes an inspection program to configure an identification part 5230 and an identification contents determination part 5231.

[0250]

A radio tag system is configured with the reading device 5221, the radio tag antenna 5224, and the radio tag 5503 embedded in the gaming currency C. The currency information of the gaming currency C stored in the radio tag 5503 that is embedded in the gaming currency C is read by the reading device 5221 without contacting, and used for processing in the determination part 5222.

[0251]

The barcode reader 5228 reads the barcode BC added to the case 5100 to obtain case identification information. The display part 5223 displays the determined result of the identification contents determination part 5231 in the determination part 222. The communication part 5229 communicates data between a manufacture management device 5302 installed in a factory F and an information database 5303 installed in a gaming house P.

[0252]

<Configuration of Case>

Figure 37 is a perspective view of the case 5100. The case 5100 is formed by joining the top part 5101 and the lower part 5102. In the present embodiment, the top part 5101 and the lower part 5102 are made of a transparent resin. Note that in the present embodiment, the case 5100 has a sealed structure composed of the top part 5101 and the lower part 5102, a light transmission part may be in a perforated state.

[0253]

The case 5100 has a shape where five columns 5100C are formed parallelly, each housing twenty numbers of stacked gaming currencies C, as stated above, and a cross section of each column has polygon shape (octagon shape) so that the top part 5101 and the lower part 5102 approximately conform the shape of the housed gaming currencies C in an example of Figure 37. Each column 5100C has a shape where twenty or more numbers of gaming currencies C cannot be housed.

[0254]

Figure 38 is a perspective view of a case 5100' of a modification, and Figure 39 is a plan view of the case 5100'. The case 5100' is also comprised of a top part 5101' and a lower part 5102 which are made of a transparent resin. In the present modification, an upper

surface of the top part 5101' facing the camera is formed by a plane. Thus, by making the surface facing the camera plane, linear shadows due to corners of the polygonal cross section of the case 5100' does not appear on the camera, and information of the side surface of the gaming currency C can be accurately identified, in an image analysis with respect to a shooting image of the camera.

[0255]

(Gaming Currency)

Figure 40 is a side sectional view of the gaming currency C in the present embodiment. The gaming currency C includes a multi-layer structure where different plastic layers with plural colors are stacked, at least specific coloring layer (colored layer) 5501 is provided at the middle, and common coloring layers (white color or lighter-color layers) 5502 are stacked at both sides of the middle specific coloring layer 5501.

[0256]

The specific coloring layer 5501 may be formed with plural layers (three layers in Figure 40) colored with a specific color as shown in Figure 40. Since the plural layers (three layers in Figure 40) colored with the specific color are thermal compressed each other, the three-layer structure is not visible as shown in Figure 40, and Figure 40 shows three layers of the specific

coloring layer 5501 for description. Further, the hollowing B is partially provided in the middle layer of the three layers of the specific coloring layers 5501, and the radio tag 5503 is built therein.

[0257]

The inspection system 51 includes the built-in radio tag 5503 for storing the currency information, and inspects the gaming currencies C having colors 5501 or representations 5507 representing values at the outer surfaces at a condition of being housed in the case 5100 on which the maximum housing number is limited. The gaming currencies are housed in the case 5100 capable of housing the gaming currencies stacked in a thickness direction and in a column, and the inspection system 51 comprises a reading device for reading the radio tag 5503 of the gaming currency C in the case 5100 and obtaining the currency information of the gaming currency C, and a determination part 222 for comparing the currency information obtained by the reading device 5221 to the maximum housing number of the case 5100 itself (set up to one hundred numbers in the present example) and determining the gaming currency C in the case 5100 as abnormal when the number of the gaming currencies C obtained from the currency information that is obtained by the reading device 5221 is different from the maximum

housing number (one hundred numbers).

[0258]

The inspection system 51 has further an information database 5303 of the radio tag 5503 that information of the radio tag 5503 built in the gaming currency C can be referred, and the determination part 5222 has a configuration of checking the currency information of the gaming currency C read by the reading device 5221 with the information database 5303 of the radio tag 5503 and capable of detecting the gaming currency C to be inspected as abnormal. The information database 5303 pre-stores the information of all radio tags 5503 of the gaming currencies used in a gaming house.

[0259]

The determination part 5222 has functions of, if determining there is any abnormal gaming currency C of the gaming currencies C in the case 5100, comparing the information of the radio tag 5503 of all gaming currencies C in the case 5100 to the pre-recorded information database 5303 of the radio tag 5503, and identifying the abnormal radio tag 5503 not present in the information database of the radio tag 5503.

[0260]

The determination part 5222 have functions of, if determining there is any abnormal gaming currency C of the

gaming currencies C in the case 5100, identifying that in any gaming currencies C in the case 5100, there is the abnormal gaming currency C for which the information cannot be obtained from the radio tag 5503.

[0261]

The display part 5223 displays the abnormality if it is determined that there is the abnormal gaming currency C as stated above.

[0262]

As shown in Figure 42 and Figure 43, a good/bad results display screen 5800 include a total detection number 5801 and a number 5803 of unfair gaming currencies C, the total detection number 5801 is the number of pieces of the information of the radio tags 5503 read by the identification part 5230 from the gaming currencies C.

[0263]

Figure 42 and Figure 43 is a view showing an example of the good/bad results display screen indicating the abnormal determination result of the gaming currencies in the identification contents determination part 5231. The good/bad results display screen is generated by the determination part 5222 based on the abnormal determination result of the gaming currencies in the identification contents determination part 5231, and displayed on the display part 5223. Figure 42 shows an

example of the display screen in the case of being passed, and Figure 43 shows an example of the display screen in the case of being failed.

[0264]

Figure 44 is a diagram showing the inspection device 5400 in another modification. The inspection device 5400 inspects the gaming currencies C including the built-in radio tag 5503 for storing the currency information, and having colors 5501 or representations 5507 representing values at the outer surfaces. The inspection device 5400 comprises an inspection table 5427 that can inspect the gaming currencies C stacked in a thickness direction and in a column at a condition on which a maximum stacking number is limited, a reading device 5421 for reading the radio tags 5531 of the gaming currencies C in the column and obtaining the currency information of the gaming currencies C in the column, and a determination part 5422 for comparing the currency information obtained by the reading device 5421 to the maximum stacking number (set up to twenty numbers in the present example) of the inspection table 5427 itself and determining an abnormal gaming currency C present on the inspection table 5427 when the number of the gaming currencies C obtained from the currency information that is obtained by the reading device 5421 is different from

the maximum stacking number (twenty numbers).

[0265]

The inspection device 5400 comprises a number control plate 5425 for limiting the maximum stacking number of the gaming currencies C in the column.

[0266]

The inspection device 5400 has an optical sensor 5426, and determines the physical number of individual gaming currencies C. The determination part 5422 has functions of determining and outputting that there is any abnormal gaming currency C of the gaming currencies C present on the inspection table 5427 when the currency information of the gaming currency obtained by the reading device 5421 does not match with the physical information of the gaming currency C.

[0267]

<Usage Aspect of Inspection System>

Figure 45 is a diagram for explaining an example of a usage aspect of the inspection system 1 together with the distribution of the gaming currencies C. The gaming currencies C are manufactured by a manufacturing device 5301 in a factory F (s1), and respective 100 currencies are housed in the case 5100 (s2). The case 5100 is stamped with a stamp seal in the factory F after housing the gaming currencies C. Also, in the case 5100, the

barcode BC indicating the case identification information for uniquely specifying the case 5100 is affixed to the side surface (s3).

[0268]

At that time, in the manufacture management device 5302 in the factory F, the case identification information of the barcode BC affixed to the case 5100 is input (s4). Also, the case 5100 housing the gaming currencies C is subjected to the inspection device 5200 to read currency information (the details will be described below) given to the gaming currencies C, and the inspection of pass or fail is performed. Then, the currency information read from the gaming currencies C housed in the case 5100 is sent to the manufacture management device 5302 (s5), and associated with the case identification information by the manufacture management device 5302. Note that the manufacture management device 5302 may be a personal computer.

[0269]

The case 5100 which has been passed in the inspection device 5200 in the Factory F is transported from the factory F to the gaming house P (s6). The case 5100 is firstly stored in a repository R in the gaming house P (s7). The inspection device 5200 is installed in the repository R, and the case 5100 delivered from the

factory F is inspected by the inspection device 5200.

[0270]

On the other hand, the case identification information and the currency information associated therewith are sent from the manufacture management device 5302 in the factory F to the information database 5303 in the gaming house P. The information database 5303 comprises a storage part which obtains the case identification information and the currency information associated with that from the manufacture management device 5302, for each of the plural cases 5100 housing the gaming currencies C, and stores them for each case 5100. Note that the information database 5303 may be a personal computer.

[0271]

In the inspection by the inspection device 5200 in the repository R, the inspection is performed using the information stored in the information database 5303. The case 5100 which has been passed in the inspection in the repository R is carried to a game table T (s9), or is carried to a cashier CA (s10). The game table T and the cashier CA also comprise the inspection device 5200 respectively, and the case 5100 housing the gaming currencies C is inspected by the inspection device 5200 while being stamped. In the game table T and the cashier

CA, the inspection of the case 5100 housing the gaming currencies C which have been used is also performed, and the inspection devices 5200 are used for the inspection. In the inspection by three inspection devices 5200 in the gaming house P, the case identification information and the currency information associated therewith sent from the manufacture management device 5302 and stored in the information database 5303 are referred to.

[0272]

Also, in the above embodiment, the gaming currency C has the identification information and/or the value information as radio tag information. Here, the identification information is information which uniquely specifies each gaming currency C, whereas the value information is information which can overlap with each other in the plural gaming currencies C, and can be also said as information (group information) indicating a group to which each gaming currency belongs. The present embodiment, as the group information for the group to which each gaming currency belongs, instead of the value, or in addition to the value, may adopt, for example, information on manufacturing time, manufacturer, and/or usage gaming house of the gaming currency.

[0273]

That is, the radio tag information may include the

identification information for identifying the gaming currency, and the group information indicating the group to which each gaming currency belongs.

[0274]

(DETECTION OF STAMP)

As stated above, the case 5100 is stamped with the stamp seal after housing a predetermined number of the gaming currencies C. The stamp is broken if it is opened so as to take out the gaming currencies housed. The detection device 5200 may comprise a detection part for detecting the unbroken stamp attached to the case 5100. The detection part may detect the stamp optically or magnetically. In this case, the identification contents determination part 5231 determines that the plural gaming currencies C housed in the case 5100 are failed if the unbroken stamp is not detected by the detection part.

[0275]

(Arrangement of Components of Inspection Device)

In the above embodiment, as shown in Figure 36, all components of the inspection device 5200 are arranged in one device, they may be arranged in a distribution manner. For example, some or all of the determination part 5222, the display part 5223, and the communication part 5224 may be implemented by a personal computer connected to the inspection device 5200. The components arranged in the

distribution manner may be communicatively connected with wired or wireless manner, and may be connected via a network such as the Internet.

[0276]

(Display Part)

In the above-mentioned embodiment, such an example is explained that the display part 5223 is constituted by a liquid display panel. The display part 5223 may be a lamp for simply displaying only pass/fail results, and may be a lamp for digitally displaying only the total detection number 5801, the number 5802 of correct gaming currencies C, and the number 5803 of unfair gaming currencies C.

[0277]

(Total Amount Calculation of Values)

The identification contents determination part 5231 in the above-mentioned embodiment can specify the number of the respective values of the plural gaming currencies C housed in the case 5100, as described above. Furthermore, the identification contents determination part 5231 may calculate a total amount of the values of the plural gaming currencies C housed in the case 5100 based on the number of the respective values. The calculated total amount may be displayed on a pass/fail results display screen displayed at the display part 5233 (see Figures 42

and 43).

[0278]

(Fifth Embodiment)

As described above, conventionally, an inspection system for inspecting authenticity of the gaming currency by embedding an RF tag (radio tag) inside the gaming currency is known. Such an inspection system is configured to record detection in a recording device, or issue alarms by an alarm device, when the gaming currency (typically, a forged gaming currency, or a gaming currency whose RF tag is broken, hereinafter referred to as "unfair gaming currency") whose RF tag cannot be read, or whose information read from the RF tag is not predetermined information, is detected.

[0279]

However, the gaming currencies are circulated between dealers (casino) and players. It is inconvenient that it is unknown when and from which player the unfair gaming currency is delivered to the casino, when the casino inspects the holding gaming currencies and finds the unfair gaming currency.

[0280]

Therefore, in this embodiment, an inspection system that can detect the unfair currency, immediately when or as soonest as the unfair currency is delivered from the

player to the dealer, is provided.

[0281]

Thus, an inspection system according to one aspect of the present embodiment is an inspection system for inspecting a gaming currency in which an RF tag is built, comprising: a housing means for housing gaming currencies of a dealer in a casino game; an RF reading means for reading the RF tags of the plural gaming currencies housed in the housing means; a detection means for detecting at least the number of the plural gaming currencies housed in the housing means by a method other than an RFID at constant time intervals or always; and an alarm means for generating an alarm when the number of the gaming currencies whose RF tags are read by the RF reading means is not equal to the number of the gaming currencies detected by the detection means.

[0282]

By this configuration, the RF reading means detects the number of the gaming currencies housed in the housing means, and the detection means detects the number of the gaming currencies housed in the housing means by a method other than the RFID at constant time intervals or always. When the numbers are not equal to each other, the alarm means generates the alarms. Therefore, immediately when the unfair gaming currencies are housed in the housing

means, or within a constant time from when the unfair gaming currencies are housed in the housing means, the alarm means can generate the alarms. Also, the RF reading means may read the RF tag at constant time intervals or always.

[0283]

The detection means may detect whether or not the number of the gaming currencies housed in the housing means is changed. The alarm means may compare the number of the gaming currencies detected by the detection means to the number of the gaming currencies whose RF tags are read by the RF reading means, and determine whether the numbers are equal to each other, when the change of the number of the gaming currencies is detected by the detection means.

[0284]

When the dealer collects the gaming currencies from players in a casino game, the housing means may be used to house the collected gaming currencies. By this configuration, when the dealer collects the gaming currencies from the players, the unfair currencies can be detected.

[0285]

The detection means may detect existence of each of the plural gaming currencies housed in the housing means

by a method other than the RFID.

[0286]

The housing means may be configured to stack and house the plural gaming currencies in a predetermined stacking direction, and the detection means may have plural photosensors arranged in the stacking direction to detect each of the plural gaming currencies stacked and housed in the housing means.

[0287]

The housing means may have a groove extending in the stacking direction, the plural photosensors may be arranged in plural lines along the stacking direction, and the gaming currencies may be detected by the photosensors arranged in different lines in an order of stacking.

[0288]

The housing means may have plural lines of grooves extending in the stacking direction, and the RF reading means may read the RF tags for one or plural lines of the grooves.

[0289]

The detection means may include plural photosensors for detecting each of the plural gaming currencies housed in the housing means.

[0290]

The detection means may detect the number of the

plural gaming currencies housed in the housing means by optically reading the plural gaming currencies housed in the housing means. Such detection means may be, for example, an optical scanner for scanning the stacked gaming currencies in a stacking direction.

[0291]

The housing means may house the plural gaming currencies such that the plural gaming currencies are stacked from a predetermined reference position, and the detection means may detect the number of the plural gaming currencies housed in the housing means by measuring a distance from a predetermined monitoring position to a gaming currency of the gaming currencies, the gaming currency being furthest away from the predetermined reference position.

[0292]

By this configuration, the number of the plural gaming currencies stacked in the housing means may be detected according to the height (length) in the stacking direction of the plural gaming currencies stacked in the housing means. Such detection means may be, for example, a distance sensor that is installed at a tip in the stacking direction, and measures a distance from a reference position to the furthest away gaming currency.

[0293]

The RF reading means may read RF tags at a first time interval, such that the RF tags of plural gaming currencies are read within the first time interval from when other gaming currencies are housed in the housing means, the plural gaming currencies including the other gaming currencies, and the detection means may detect the number of the plural gaming currencies housed in the housing means at a second time interval, such that the number of the plural gaming currencies are detected within the second time interval from when the other gaming currencies are housed in the housing means, the plural gaming currencies including the other gaming currencies.

[0294]

By this configuration, when new gaming currencies are added to the housing means, the RF tags are read within the first time interval and the number is detected within the second time interval. So, from when the new gaming currencies are added to the housing means at least until any longer one of the first time interval and the second time interval, the reading of the RF tags and the detection of the number by the means other than the RFID are completed, and alarms can be generated when needed. Therefore, the dealer houses the gaming currencies collected from the players according to the results of a game in the housing means, and can inspect the gaming

currencies immediately after the gaming currencies are collected from the players.

[0295]

The inspection system according to another aspect of the present embodiment is an inspection system for inspecting a gaming currency used for a game played on a table, comprising a housing means installed on the table, the housing means housing plural gaming currencies, the number of the plural gaming currencies being increased or decreased for each game, and an inspection means for inspecting the gaming currencies, the number of the gaming currencies being increased or decreased for each game in the housing means.

[0296]

The inspection system according to further another aspect of the present embodiment is an inspection system for inspecting a gaming currency in which an RF tag is built, comprising:a housing means capable of housing a predetermined number of gaming currencies; an RF reading means for reading RF tags of the plural gaming currencies housed in the housing means; and an alarm means for generating an alarm when the number of the gaming currencies whose RF tags are read by the RF reading means is not equal to the predetermined number.

[0297]

By this configuration, while the number of the gaming currencies that can be housed in the housing means are housed, the RF tags are read by the RF reading means and the number of the tags is compared to the number that can be housed, so that the gaming currencies whose RF tags cannot be read are detected and the alarms can be generated.

[0298]

The inspection system may further comprise a dummy currency in which the RF tag is built, the dummy currency being to be housed in the housing means together with the gaming currencies, such that the predetermined number is reached in total with the gaming currencies, when the number of the gaming currencies is below the predetermined number.

[0299]

By this configuration, when the gaming currencies of the number that does not reach the number that can be housed by the housing means (housable number) are inspected, dummy currencies of the shortage number are housed in the housing means, so that the alarms can be generated when an ideal value of the number of the RF tags to be read by the RF reading means is not equal to the housable number.

[0300]

The inspection system in the present embodiment is not limited to an inspection system for inspecting gaming currencies, and can be applied as an inspection system for inspecting an arbitrary valuable, in which an RF tag is built. In this case, an inspection system for a valuable comprises: a valuable to which a unique ID that is individually identifiable is attached; a table on which the valuable is used;

a tray for holding the valuable on the table; a determination means for specifying the number of valuables held on the tray using each unique ID; a detection means for shooting the valuables on the table including at least the tray to create an image, and detecting at least the number of the valuables based on the image; a storage means for storing the number detected by the detection means; and an inspection means for inspecting a relationship between the number determined by the determination means and the number detected by the detection means.

[0301]

The inspection system in the present embodiment is not limited to an inspection system for inspecting gaming currencies, and can be applied as an inspection system for inspecting an arbitrary object, in which an RF tag is built. In this case, the inspection system comprises: an

RF reading means for reading the RF tag of the object located at a predetermined place; a detection means for detecting at least the number of the objects located at the predetermined place in a method other than an RFID; and an alarm means for generating alarms when the number of the objects whose RF tag is read by the RF reading means is not equal to the number detected by the detection means.

[0302]

Hereinafter, with reference to the drawings, specific embodiments will be explained. The following explanation is merely exemplified, and the present embodiments are not limited to the following examples. An RF tag for storing information (tag information) such as its kind and identification information is built in a gaming currency used in the inspection system in the present embodiment. Any of the gaming currencies C that are explained in the first to fourth embodiments can be adopted as a gaming currency used in the present embodiment. By reading the RF tag built in the gaming currency with a below-described RF reader, the tag information stored in the RF tag can be read.

[0303]

Figure 46 is a plan view of a gaming currency tray for housing the gaming currency. Plural grooves 6171 for

stacking and housing the gaming currencies C in its thickness direction are formed on the gaming currency tray 617. The grooves 6171 are formed in a semi-cylindrical shape to house the disc-shaped gaming currencies C. Each groove 6171 can house 40 gaming currencies C, and 14 grooves 6171 are formed on the gaming currency tray 617 in parallel to each other in a vertical direction.

[0304]

Plural photosensors 6173 are embedded on both of right and left sides of an inner wall of each groove 6171. As not shown in Figure 46, an antenna of an RF reader is embedded inside each groove 6171. The gaming currency tray 617 is embedded and utilized in front of a dealer position of a game table of a casino.

[0305]

Figure 47 is a diagram indicating an antenna 6172 of an RF reader (hereinafter referred to as "RF antenna"). The RF antenna 6712 is installed at an inner part or a bottom part of the gaming currency tray 671 corresponding to each groove 6171. Also, Figure 47 shows only four grooves; however, other grooves 6171 are similar.

[0306]

In the example of Figure 47, one RF antenna 6172 is installed to one groove 6171. The RF antenna 6172 is radio-communicated with the RF tag built in the gaming

currency C housed in the corresponding groove 6171, and read the RF information from the RF tag. An electric wave shielding wall may be provided between the adjacent grooves 6171, so that each RF antenna 6172 does not read the RF tag of the gaming currency C housed in the next groove 6171.

[0307]

Figure 48 is an enlarged plane view and a front-direction cross section view of the groove 6171. The gaming currencies C are stacked in a longitudinal direction of the groove 6171 and housed in the groove 6171. In the example of Figure 48, 40 gaming currencies C can be housed in one groove 6171.

[0308]

Plural photosensors 6713 are embedded on the right and left sides of an inner wall with a semicircular cross section, so that sensing faces are flush with the inner wall. The photosensors 6713 are reflection-type photosensors, and detect the gaming currencies C when the sensing faces are blocked with the gaming currencies C by housing the gaming currencies C in the groove 6171.

[0309]

The plural photosensors are aligned on the right and left sides of the inner wall at a pitch of thickness of the 2 gaming currencies C. In this example, as

described above, 40 gaming currencies C can be housed in one groove 6171. So, 20 photosensors 6173 are provided on the right side, and 20 photosensors 6173 are provided on the left side.

[0310]

The line of the plural photosensors 6173 on the right side is displaced from the line of the plural photosensors 6173 on the left side by the thickness of one gaming currency C. Therefore, the plural gaming currencies C stacked and housed in the groove 6171 are detected by the photosensors 6173 arranged in different lines in an order of stacking. Concretely, the gaming currency C housed a lowermost position of the groove 6171 is detected by the photosensor 6173 at a lowermost part on the right side, the second gaming currency C from the bottom is detected by the photosensor at a lowermost part on the left side, the third gaming currency C from the bottom is detected by the second photosensor 6173 from the bottom on the right side, and the third gaming currency C from the bottom is detected by the second photosensor 6173 from the bottom on the left side. In this manner, right side photosensors 6183 and left side photosensors 6173 alternately detect the gaming currencies C sequentially from the bottom.

[0311]

In this manner, the plural photosensors 6173 are alternately arranged in the different lines, so that the plural photosensors 6173 for reading the plural gaming currencies C stacked and housed in the groove 6171 in the thickness direction one by one can be arranged.

[0312]

Figure 49 is a diagram indicating an entire configuration of the inspection system. As shown in Figure 49, an inspection system 600 comprises: an RF reader 6100 having an RF antenna 6172; plural photosensors 6173; an inspection/alarm part 6200 connected to the RF reader 6100 and the plural photosensors 6173; and a record part 6300 connected to the inspection/alarm part 6200. The inspection/alarm part 6200 is configured by a computer including a processor and a memory, and is realized by processor's executing an inspection/alarm program in the present embodiment.

[0313]

The RF reader 6100 receives electric waves from the RF tag of the gaming currency C with the RF antenna 6172, and reads information (tag information) stored in the RF tag. The RF reader outputs the read tag information to the inspection/alarm part 6200. As shown in Figure 47, the inspection system 600 comprises plural RF antennas 6172. The plural RF antennas 6172 may be connected to one

RF reader 6100, and the plural RF readers 6100 may be provided corresponding to the plural RF antennas 6172.

[0314]

The plural photosensors 6173 are respectively connected to the inspection/alarm part 6200, and transmits sensing information to the inspection/alarm part 6200. The sensing information of each photosensor 6173 is information indicating existence of the gaming currency C.

[0315]

The inspection/alarm part 6200 compares the number of the tag information read by the RF reader 6100 with the number of detection information of the gaming currencies C obtained from the plural photosensors 6173. In this case, the inspection/alarm part 6200 determines whether the tag information is true or false, and may compare only the number of the tag information determined as true with the number of the detection information of the photosensors 6173.

[0316]

When the true RF tags are built in all of the plural gaming currencies housed in the gaming currency tray 617, the number of the tag information read by the RF reader 6100 must be equal to the number of the gaming currencies C detected by the photosensors 6173. Thus, the inspection/alarm part 6200 determines whether or not the

numbers are equal to each other, and generates alarms when the numbers are not equal to each other.

[0317]

The generated alarms are outputted in a system that can be sensed by a person with alarm means (not shown). For example, when the alarm means is a loudspeaker, the inspection/alarm part 6200 generates signals for outputting predetermined alarm sounds from the loudspeaker as alarms. When the alarm means is a lamp, the inspection/alarm part 6200 generates signals for lighting the lamp as alarms.

[0318]

The RF reader 6100 reads the tag information at a predetermined time interval (for example, one-second interval). Also, the photosensor 6173 executes detection at a predetermined time interval (for example, 2-second interval). The RF reader 6100 and the photosensor 6173 may always execute reading and detection.

[0319]

Also, the RF reader reads the tag information at a predetermined time interval or always, and the inspection/alarm part 6200 determines whether or not there is a change of the plural pieces of the read tag information. When there is a change, detection may be executed by the photosensor 6173 according to the control

of the inspection/alarm part 6200. On the other hand, the gaming currencies C are detected by the plural photosensors 6173 at a predetermined time interval or always, and the inspection/alarm part 6200 determines whether or not there is a change of the number of the detected gaming currencies C. When there is a change, the tag information may be read by the RF reader 6100 according to the control of the inspection/alarm part 6200.

[0320]

When alarms are generated by the inspection/alarm part 6200, the alarm means immediately outputs alarms. Therefore, within a predetermined time from when and immediately after the unfair gaming currency is housed in the gaming currency tray 617, the alarms are outputted. Thus, it can be grasped from which player playing on the table at that time the unfair currency is delivered. Also, the game is once stopped, so that the unfair gaming currency can be prevented from being used furthermore. In some cases, the player who delivers the unfair gaming currency can be specified among players playing on that table.

[0321]

The inspection/alarm part 6200 records the results of inspection (comparison) and the generated alarms

together with the information of date and time, in the record part 6300.

[0322]

Figure 50 is a plane view indicating the other example of the gaming currency tray. In the example of Figure 50, in addition to plural grooves (stock grooves) 6171 in a vertical direction for housing the gaming currencies C, horizontal grooves (collecting grooves) 6174 used to house the gaming currencies C the dealer collects from the players are provided above them. Also, in the example of Figure 50, the photosensor 6173 is not provided on a stock groove 6171, the photosensors 6173 are embedded in a collection groove 6174 at an arrangement similar to Figure 48, and an RF antenna 6172 (not shown) is embedded under the collection groove 6174.

[0323]

The number of the gaming currencies C housed in the collection groove 6174 is increased or decreased per game. Accordingly, the collection groove 6174 is provided with the photosensor 6173 and the RF antenna 6172, so that an interval of inspection is made sufficiently short. The gaming currencies C immediately after collected from the players can be inspected per game. When the unfair gaming currency is detected, a player holding it can be specified, or a game can be stopped. Also, when the

gaming currencies C of not less than a constant number or a housable number are housed in the collection groove 6174, some or all of them may be transferred to the stock groove 6171.

[0324]

Figure 51 is a plane view indicating the further example of the gaming currency tray. In the example of Figure 51, the collection groove 6175 is provided at a right end in a vertical direction. Then, the photosensor 6173 and the RF antenna 6172 (not shown) are provided on the collection groove 6175.

[0325]

Figure 52 is a plane view indicating the further example of the gaming currency tray. In the example of Figure 52, grooves in the vertical direction are divided into two stages of upper and lower grooves 6176, 6177 that can respectively house 20 gaming currencies C. Each groove 617 can house 20 gaming currencies C. As is similar to the example of Figure 48, photosensors 6173 are alternately provided on each groove 617 on both of right and left sides. In the gaming currency tray 617 in this example, the number of the stacked gaming currencies C is small, so that displacement between the stacked and housed gaming currencies C and the photosensor 6173 can be avoided from being large.

[0326]

In the examples of Figures 51 and 52, the photosensor 6173 and the RF antenna 6172 are provided on the collection groove as well, so the gaming currencies C can be inspected immediately after collection.

[0327]

Figure 53 is a diagram indicating another configuration of an RF antenna. In the above-mentioned fifth embodiment, one RF antenna is provided on one groove 6171. As shown in Figure 53, one RF antenna 6172 may be configured and arranged to read the RF tags of the gaming currencies C housed in the plural grooves 6171.

[0328]

In the above-mentioned fifth embodiment, when inspecting the gaming currencies C, it is determined whether or not the number of the gaming currencies C whose RF tags are read by the RF reader 6100 is equal to the number of the gaming currencies C detected by physical means other than RFID, so as to detect the unfair gaming currency that does not have an RF tag or whose RF tag is broken. Then, the photosensors 6173 for detecting the existence of the gaming currencies one by one is used as means for detecting the number of the gaming currencies C physically with means other than RFID.

[0329]

However, means for physically detecting the number of the gaming currencies C with means other than RFID is not limited to plural photosensors. Hereinafter, the other example of the detection means will be explained.

[0330]

Figure 54 is a diagram indicating one groove of a gaming currency tray using a line sensor as detection means. As shown in Figure 54, a slit 6178 extending in a longitudinal direction of the groove 6171 is formed at a bottom of an inner wall of the groove 6171, and a line sensor 6179 is provided along the slit 6178 below the slit 6178. A pixel pitch in the longitudinal direction of the line sensor 6179 is set smaller than the thickness of the gaming currency C (the pixel number in the longitudinal direction of the line sensor 6179 is set sufficiently larger than the housing number of the gaming currencies C of the groove 6171).

[0331]

Figure 55 is a diagram indicating an entire configuration of an inspection system 600 in the example of Figure 54. The line sensor 6179 is connected to the inspection/alarm part 6200. The line sensor 6179 acquires a line image by picking up an image. The line sensor 6179 outputs the acquired line image to the inspection/alarm part 6200. The inspection/alarm part 6200 detects the

number of the gaming currencies C housed in the groove 6171 by determining to where there are gaming currencies C from the bottom, based on the line image.

[0332]

The RF antenna 6172 and the RF reader 6100 are similar to those in the above-mentioned fifth embodiment. The inspection/alarm part 6200 executes inspection by comparing the number of the tag information read by the RF reader 6100 with the number of the gaming currencies C detected from the line image, and generates alarms when the numbers are not equal to each other. The record part 6300 records the inspection results of the inspection/alarm part 6200 and the generated alarms.

[0333]

Figure 56 is a diagram indicating one groove of the gaming currency tray using a scanner as the detection means. As shown in Figure 56, a slit 6178 extending in a longitudinal direction of the groove 6171 is formed at the bottom of the inner wall of the groove 6171, and a rail 6181 is provided along the slit 6178 under the slit 6178. An imaging element 6180 moves on the rail 6181, so as to constitute a scanner.

[0334]

Figure 57 is a diagram indicating an entire configuration of the inspection system 600 in the example

of Figure 56. The imaging element 6180 is connected to the inspection/alarm part 6200. The imaging element 6180 picks up an image while moving on the rail 6178, and outputs the information of a position on the rail and the picked-up image at that position to the inspection/alarm part 6200. The inspection/alarm part 6200 determines the existence of the gaming currencies C for the plural picked-up images obtained by picking up an image while the imaging element 6180 is moving in one direction from one end to the other end on the rail 6181, so as to detect the number of the gaming currencies C housed in the groove 6171.

[0335]

Figure 58 is a diagram indicating one groove of the gaming currency tray using a laser distance meter as detection means. As shown in Figure 58, a laser distance meter 6182 is provided at an upper end of the groove 6171. The laser of the laser distance meter 6182 is set parallel to the longitudinal direction of the groove 6171. When the gaming currencies C stacked sequentially from the bottom are housed in the groove 6171, the laser emitted from the laser distance meter 6182 is reflected on the surface of the uppermost gaming currency C, and returned to the laser distance meter 6182. Accordingly, the laser distance meter 6182 measures a distance from an

observation position to the gaming currency C furthest away from a reference position (the gaming currency C stacked at the uppermost part), when the upper end of the groove 6171 is an observation groove and the lower end is a reference position.

[0336]

Figure 59 is a diagram indicating the entire configuration of the inspection system 600 in the example of Figure 58. The laser distance meter 6182 is connected to the inspection/alarm part 6200, and outputs the measured distance to the inspection/alarm part 6200. The larger the number of the gaming currencies C housed in the groove 6171 gets, the smaller the measured distance gets. Therefore, the inspection/alarm part 6200 detects the number of the gaming currencies C housed in the groove 6171, based on the distance measured by the laser distance meter 6182.

[0337]

Figure 60 is a diagram indicating one groove of the gaming tray using a weight meter as detection means. As shown in Figure 60, the groove 6171 is located on a weight meter 6183. When the gaming currency C is housed in the groove 6171, the weight measured by the weight meter 6183 is increased.

[0338]

Figure 61 is a diagram indicating the entire configuration of the inspection system 600 in the example of Figure 60. The weight meter 6183 is connected to the inspection/alarm part 6200, and outputs the measured weight to the inspection/alarm part 6200. The larger the number of the gaming currencies C housed in the groove 6171 gets, the heavier the measured weight gets. Therefore, the inspection/alarm part 6200 detects the number of the gaming currencies C housed in the groove 6171, based on the weight measured by the weight meter 6183.

[0339]

In any of the above-mentioned examples, the detection means for detecting the number of the gaming currencies C housed in the groove 6171 by means other than RFID is provided; however, it may not be provided. The maximum number for housing the gaming currencies C in the groove 6171 is decided. So, when the RF tags are read while the maximum number of the gaming currencies C are housed in the groove 6171, the number of the gaming currencies C physically existing at that time is already known as a maximum number.

[0340]

Accordingly, the inspection/alarm part 6200 can detect the unfair gaming currency that does not have an RF

tag or whose RF tag is broken, by comparing the number of the gaming currencies C whose tag information is read by the RF reader with the known maximum number.

[0341]

However, the maximum number of the gaming currencies C cannot be always housed in the groove 6171 to be inspected. Then, using a spacer as a dummy currency, a vacant portion in the groove 6171 may be filled. The spacer may have the same shape (disc-like shape) as the gaming currency C, and may have the same shape (columnar shape) as the plural stacked gaming currencies C.

[0342]

Figure 62 is diagram indicating a status that a vacant space of the groove is filled by the spacer. The groove 6171 can house 40 gaming currencies C (the maximum housing number is 40), and 30 gaming currencies C are housed in the groove 6171. To fill a vacant space of 10 gaming currencies, one spacer 6184 for 5 gaming currencies, one spacer 6184 for 3 gaming currencies, and two spacers 6184 for one gaming currency are housed in the groove 6171.

[0343]

The RF tags of the number of the currencies are built in the spacer 6184. For example, 5 RF tags are built in the spacer 6184 for 5 currencies, 3 RF tags are

built in the spacer 6184 for 3 currencies, and one RF tag is built in the spacer 6184 for one currency.

[0344]

Accordingly, when all of 30 gaming currencies C housed in the groove 6171 are fair, the RF reader 6100 reads 40 pieces of the tag information including the RF tags built in the spacer 6184. The inspection/alarm part 6200 determines that the unfair gaming currencies exists, and generates alarms, when the number of the tag information read by the RF reader 6100 is not equal to a predetermined value, i.e., the housable number of the gaming currencies C in the groove 6171.

[0345]

Figure 63 is a diagram indicating the entire configuration of the inspection system 600 in the example of Figure 62. As described above, there is no need of detection means in the example of Figure 62. If inspection is executed at an arbitrary timing, a vacant space is created in the groove 6171, so the RF reader 6100 cannot read a predetermined number of tag information, and may generate alarms. Accordingly, in the example of Figure 63, a switch 6185 for instructing inspection at the inspection/alarm part 6200 is provided. The switch 6185 is pushed to generate ON signals.

[0346]

The switch 6185 is connected to the inspection/alarm part 6200, and outputs the ON signals to the inspection/alarm part 6200. The inspection/alarm part 6200 instructs execution of reading to the RF reader 6100, when receiving the ON signals from the switch 6185.

[0347]

The dealer collects the gaming currencies C from players losing a game, houses them in the groove 6171, houses the spacer 6184 in the vacant spacer, and pushes the switch 6185 after there is no vacant space of the groove 6171. Then, the RF reader 6100 reads the RF tags, and the inspection/alarm part 6200 executes inspection by determining whether the number of the read tag information is equal to a predetermined number.

[0348]

In the fifth embodiment, a system for inspecting gaming currencies used in a casino game is explained, but an object to be inspected may be a valuable other than a gaming currency C. Also, the RF tag is embedded in the gaming currency, but a unique ID that can be individually identified by the other method may be adhered.

[0349]

Also, in the fifth embodiment, various means for detecting the number of the gaming currencies C by means other than RFID are explained. The means for detecting

the number of the gaming currencies C may be means for detecting the number of the gaming currencies including the unfair gaming currencies as the players and the dealer identify them as the gaming currencies C, for example, may be means for detecting the number of the currencies based on an image by picking up the image of the gaming currencies C housed in the gaming currency tray 617 with a camera, as in the example explained below.

[0350]

Furthermore, the inspection system may inspect an object other than a valuable.

[0351]

Figure 64 is a diagram of the entire configuration of the inspection system for inspecting an object, in which the RF tag is built. The inspection system 6001 comprises a table B for locating an object. The object located on the table B is imaged with a camera 6400, and the picked-up image is generated. The camera 6400 is connected to the inspection/alarm part 6200, and the picked-up image is outputted to the inspection/alarm part 6200. The inspection/alarm part 6200 comprises a neural network learnt by deep learning. The number of objects is identified from the picked-up image by the neural network, so as to detect the number of the objects.

[0352]

Also, an RF antenna 6172 is built in the table B. The RF tag built in the object located on the table B transmits electric waves to the RF antenna 6172, and the RF reader 6100 reads the tag information.

[0353]

The inspection/alarm part 6200 compares the number of the tag information read by the RF reader 6100 with the number of the objects identified by the neural network, and generates alarms when both of the numbers are not equal to each other. In this manner, the number of the objects whose fairness is not known but that exist is detected by the camera 6400 that is means other than RFID. By reading the RF tags of these objects, and comparing the number of the read tag information with the number detected by the camera 6400, the objects whose RF tag information cannot be read can be detected.

CLAIMS

1. An inspection system for inspecting valuables provided with RF tags on which information of the valuables is recorded, wherein the valuables are capable of being specified by a weight difference, the inspection system comprising:

an RF reading device for reading the information of the valuables from the RF tags of the valuables placed on a platform;

a weight measuring device for measuring and recording weights of the valuables; and

a management control device for using measurement results of the weight measuring device to ascertain a total weight of the valuables on the platform,

wherein the management control device includes a function for ascertaining the weights of the valuables on the platform based on standard weights of the valuables from the information obtained from the RF reading device, measuring the total weight of the valuables on the platform by using the measurement results of the weight measuring device, performing a comparison between a calculated weight of the valuables obtained from the RF reading device and a total weight of the valuables obtained from the measurement results of the weight measuring device, and estimating whether or not the totals

of the number of the valuables are matching.

2. The inspection system for inspecting valuables according to claim 1,

wherein the information of the RF tags includes weight information of the valuables, and

the management control device includes a function for ascertaining the weights of the valuables on the platform from the weight information obtained from the RF reading device.

3. The inspection system for inspecting valuables according to claim 1 or 2,

wherein the management control device includes a function for ascertaining the weight for each type of the valuables on the platform from the information from the RF reading device, specifying a total weight of the valuables on the platform by using the measurement results of the weight measuring device, and ascertaining an excess weight of the total weight of the valuables obtained from the measurement results of the weight measuring device with respect to a sum of the weights of each type of the valuables obtained from the RF reading device.

4. The inspection system for inspecting valuables according to claim 3,

wherein the management control device includes a function for specifying types of the valuables that are a

cause of a mismatch between the sum of the weights for each type of the valuables obtained from the RF reading device and the total weight of the valuables obtained from the measurement results of the weight measuring device, or types of the valuables not a cause of a mismatch, based on the excess weight.

5. The inspection system for inspecting valuables according to any one of claims 1 to 4,

wherein the management control device includes a function for ascertaining a total money amount of the valuables on the platform from the RF reading device.

6. An inspection system for inspecting valuables including RF tags, the inspection system comprising:

an RF reading device for reading information of the valuables from the RF tags provided in the valuables;

a weight measuring device for measuring weights of the valuables; and

a management control device for ascertaining a total weight of the valuables by using measurement results of the weight measuring device,

wherein the management control device obtains the weights of the valuables based on the information read by the RF reading device, and compares the obtained weights and the weights measured by the weight measuring device to determine whether or not both are matching.

7. The inspection system according to claim 6, wherein the management control device obtains prices of the valuables based on the information read by the RF reading device, and outputs information of the obtained prices.

8. The inspection system according to claim 7,

wherein the information of the price of the valuable is stored in the RF tag of the valuable, and

the management control device obtains the prices of the valuables in accordance with the information read by the RF reading device.

9. The inspection system according to claim 7,

wherein information for specifying a type of the valuable is stored in the RF tag of the valuable,

the inspection system further comprises a storage device for storing the information specifying the types of the valuables and prices of the types in association with each other, and

the management control device refers to the storage device to obtain the prices of the valuables by reading the prices associated with the information read by the RF reading device.

10. A cash register system, comprising:

the inspection system according to any one of claims 7 to 9; and

a cash register device for performing an accounting

process based on the information of the prices output by the management control device.

11. An inspection system, comprising:

an RF reading means for reading RF tags of objects placed at a prescribed location;

a detecting means for detecting at least a number of the objects placed at the prescribed location by a method other than an RFID; and

an alarm means for generating an alarm in the case where the number of the objects with an RF tag that can be read by the RF reading means does not match the number detected by the detecting means.

12. The inspection system according to claim 11, wherein the detecting means is a weight measuring device for measuring weights of the objects placed at the prescribed location, and detecting at least the number of the objects placed at the prescribed location by the weights.

13. The inspection system according to claim 12, wherein the alarm means determines whether or not the number of the objects with an RF tag that can be read by the RF reading means matches the number detected by the detecting means by ascertaining the weights of each of the objects placed at the prescribed location and comparing the ascertained weights and the weights measured by the

weight measuring device based on the information of the RF tags read by the RF reading means.

Fig. 1

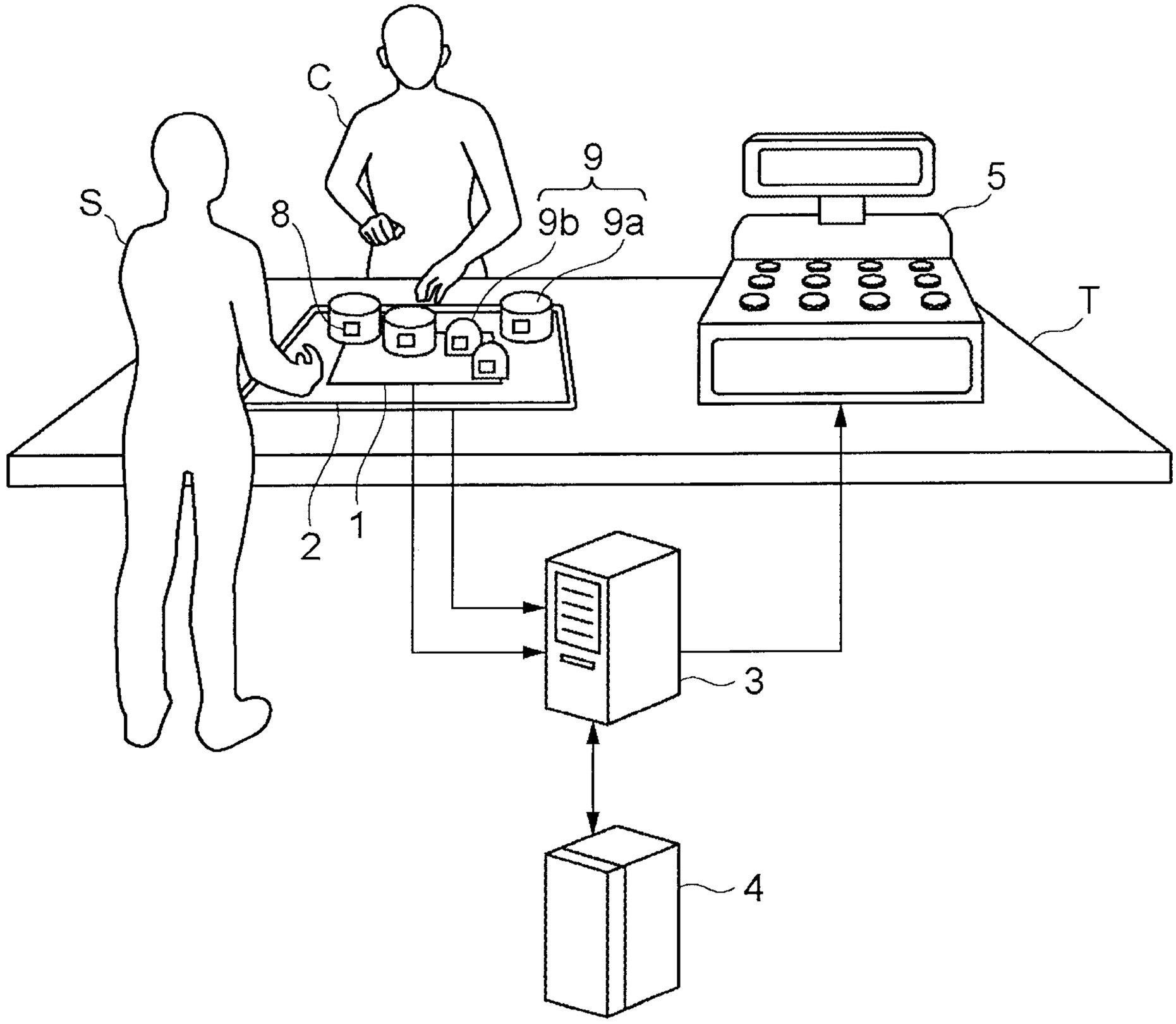


Fig. 2

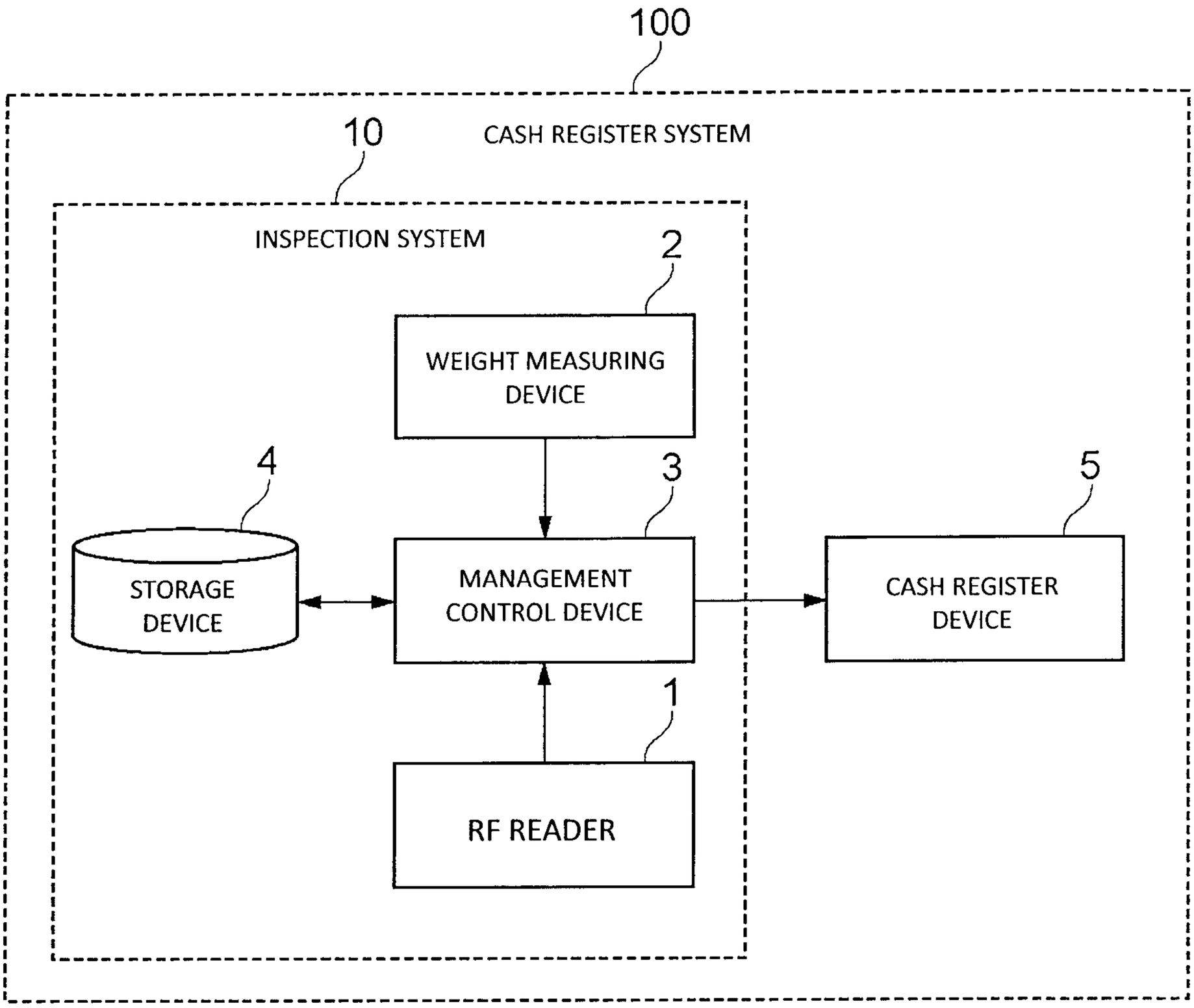

100
10
CASH REGISTER SYSTEM
INSPECTION SYSTEM
2
WEIGHT MEASURING DEVICE
4
3
5
STORAGE DEVICE
MANAGEMENT CONTROL DEVICE
CASH REGISTER DEVICE
1
RF READER

Fig. 3

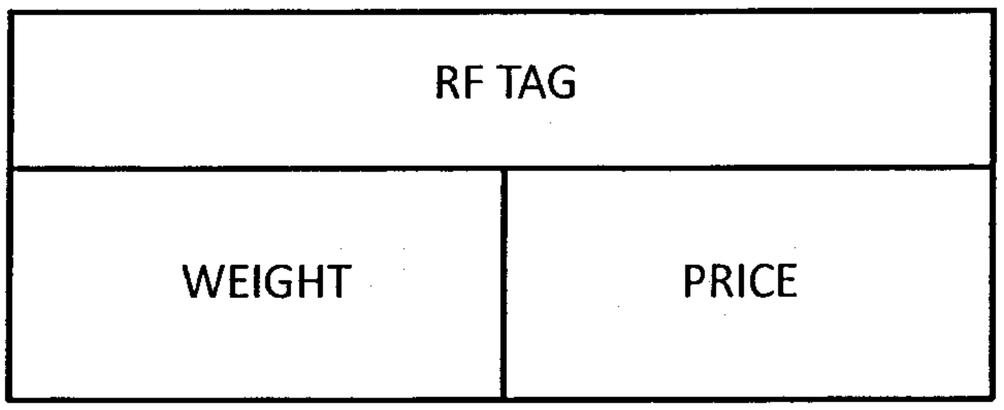


Fig. 4

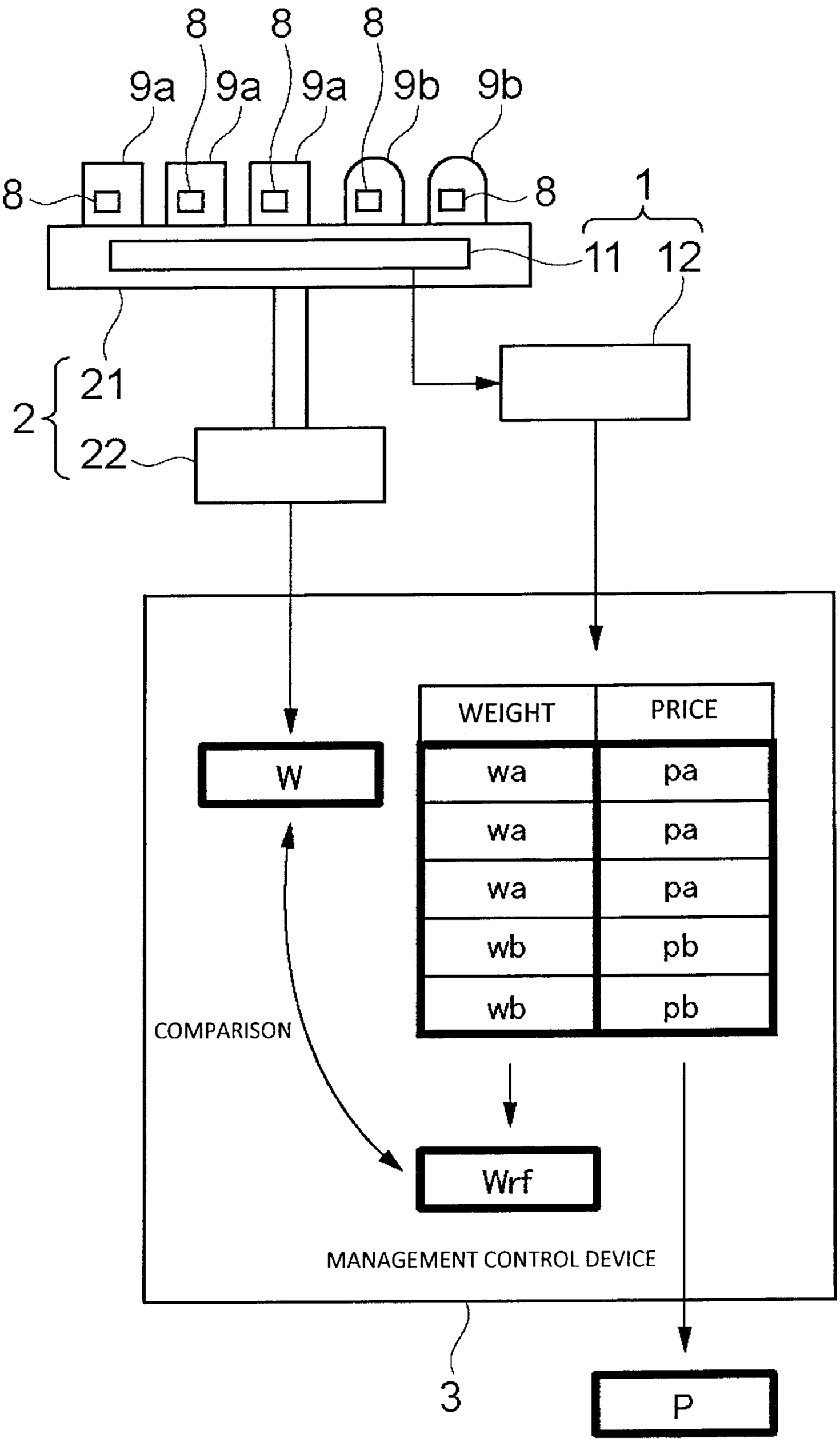

8
8
8
9a
9a
9a
9b
9b
8
8
1
11
12
21
2
22
WEIGHT
PRICE
W
wa
pa
wa
pa
wa
pa
wb
pb
wb
pb
COMPARISON
Wrf
MANAGEMENT CONTROL DEVICE
3
P

Fig. 5

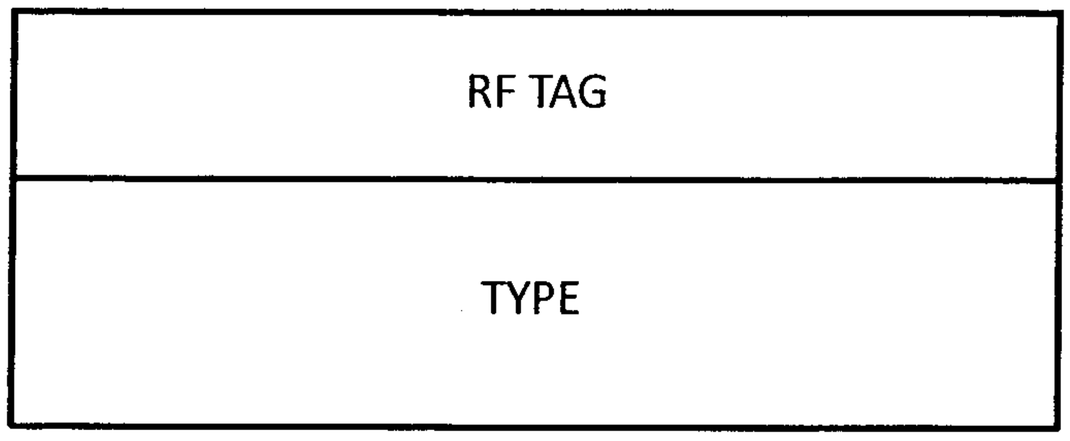


Fig. 6

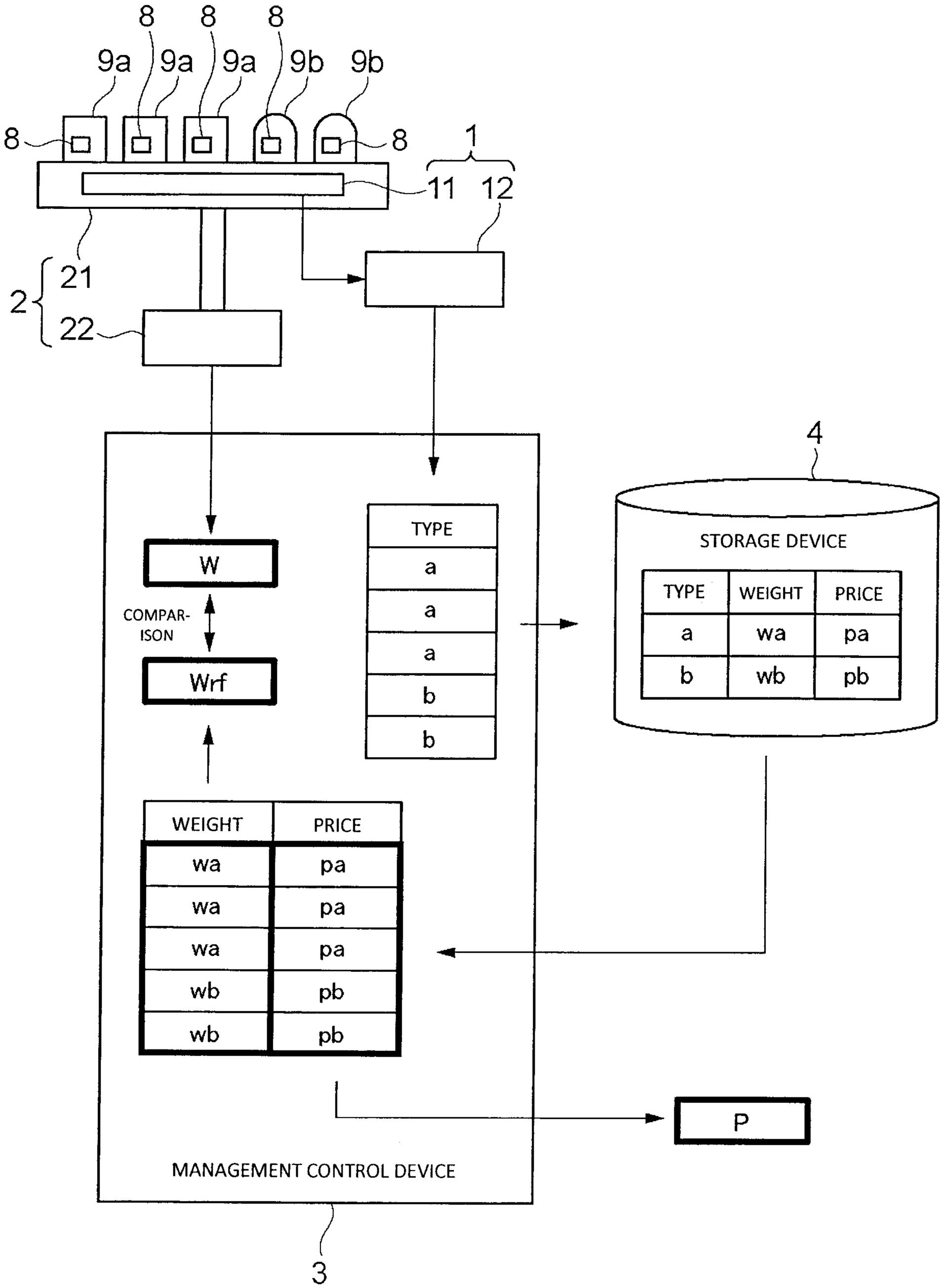

8
8
8
9a
9a
9a
9b
9b
8
8
1
11
12
21
2
22
4
TYPE
a
a
a
b
b
STORAGE DEVICE
TYPE
WEIGHT
PRICE
a
wa
pa
b
wb
pb
W
COMPAR-
ISON
Wrf
WEIGHT
PRICE
wa
pa
wa
pa
wa
pa
wb
pb
wb
pb
P
MANAGEMENT CONTROL DEVICE
3

Fig. 7

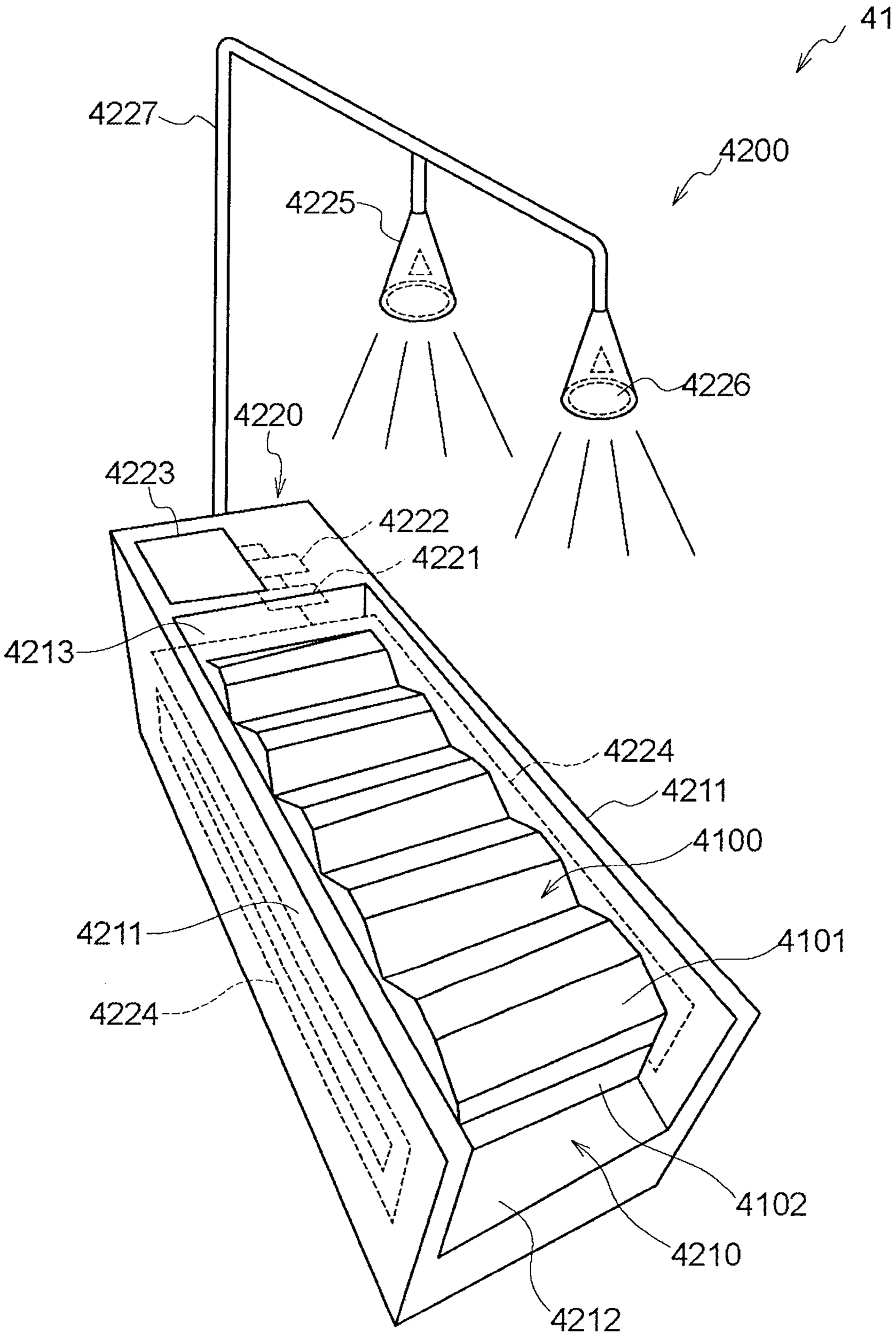

41
4200
4227
4225
4226
4220
4223
4222
4221
4213
4224
4211
4100
4211
4101
4224
4102
4210
4212

Fig. 8

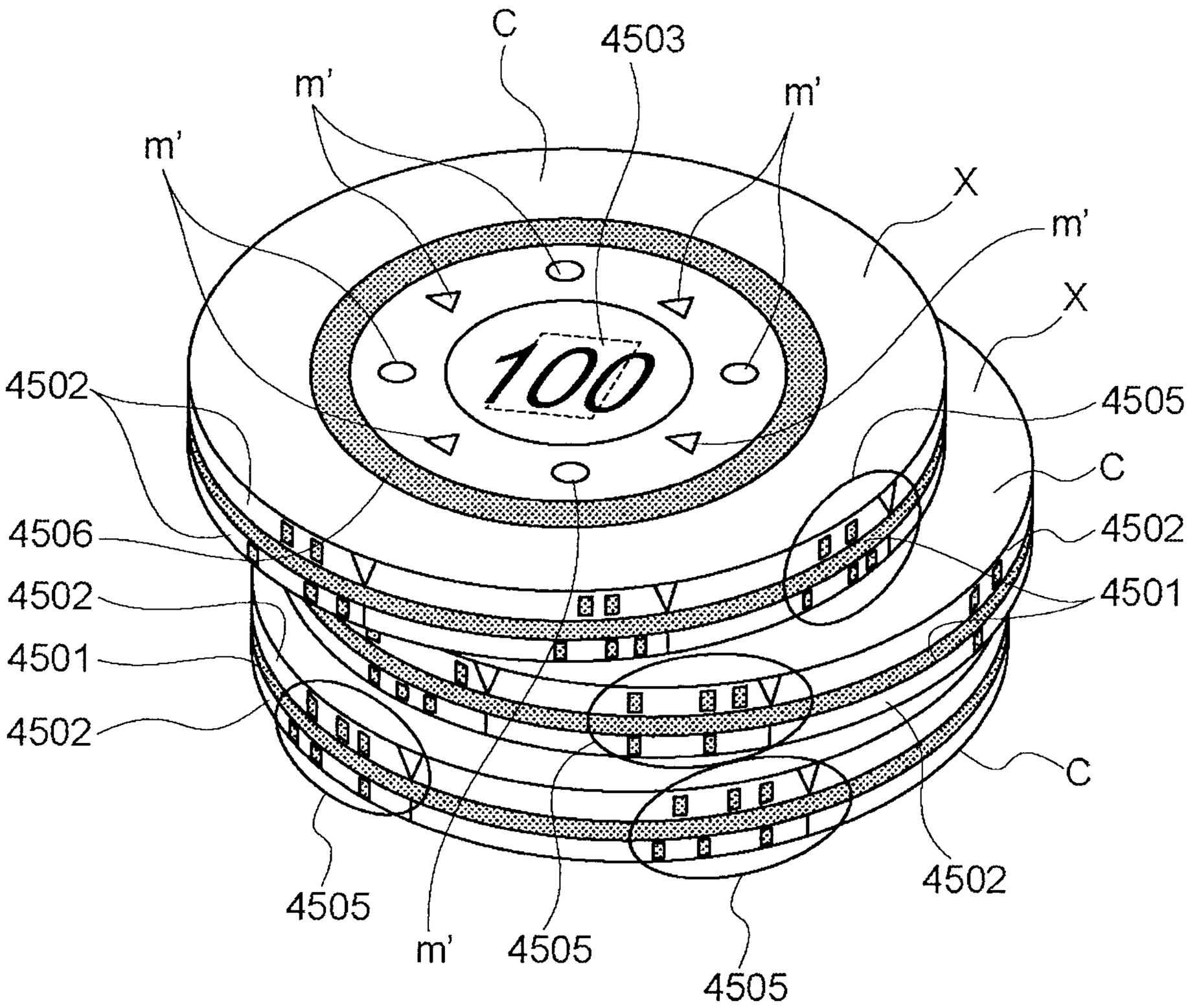

C
4503
m'
m'
m'
X
m'
X
100
4502
4505
C
4506
4502
4502
4501
4501
4502
C
4505
4502
m'
4505
4505

Fig. 9

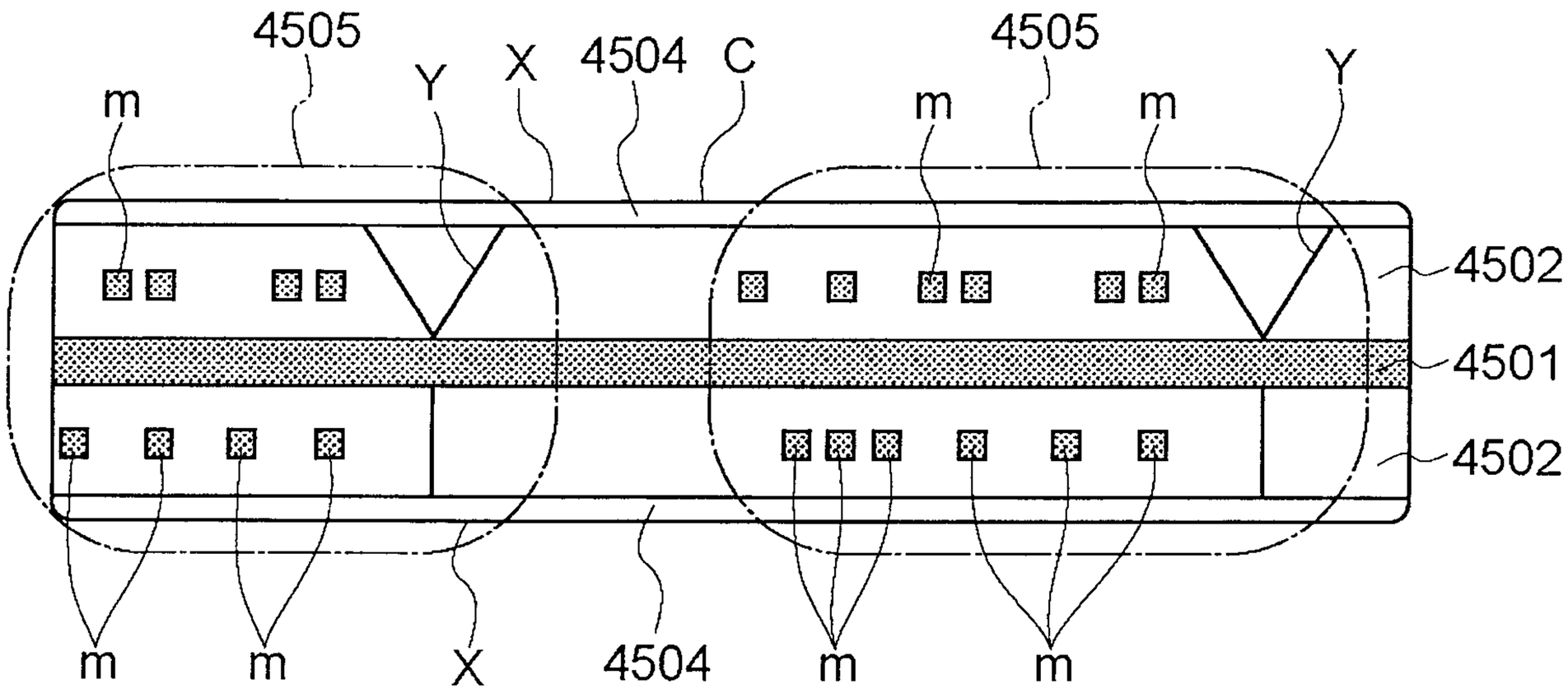


Fig. 10

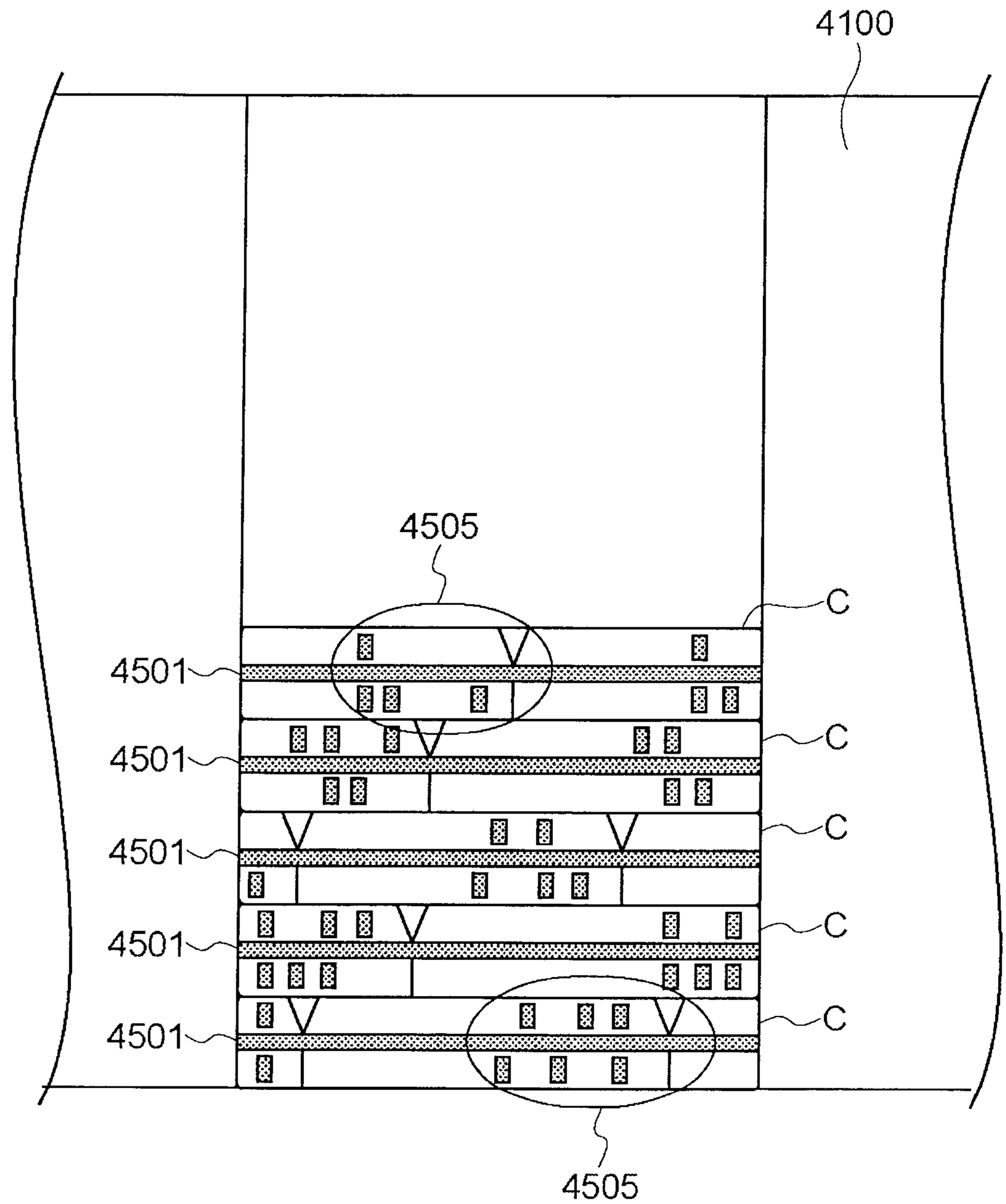


Fig. 11

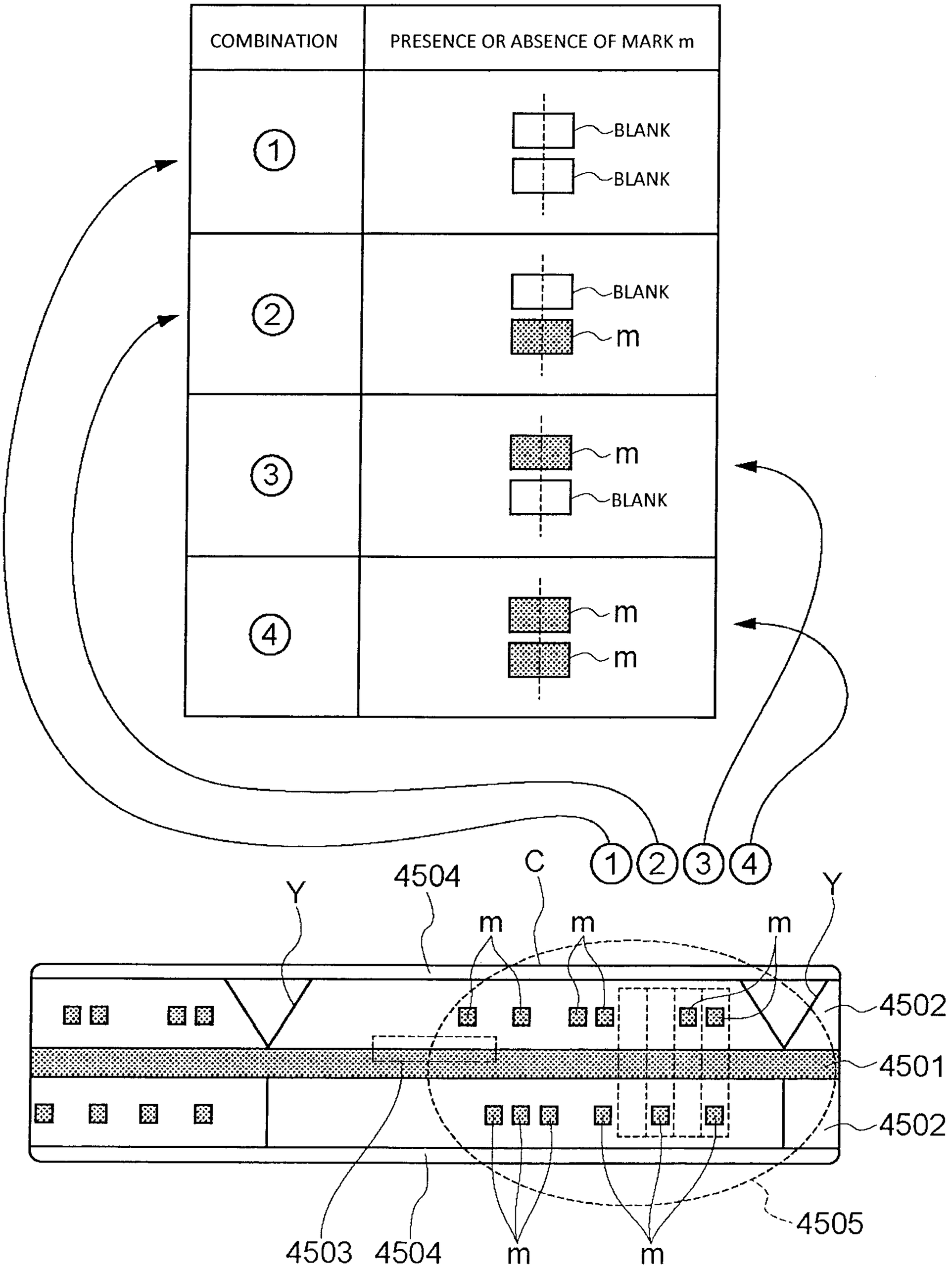

COMBINATION
PRESENCE OR ABSENCE OF MARK m
1
BLANK
BLANK
2
BLANK
m
3
m
BLANK
4
m
m
1
2
3
4
Y
4504
C
Y
m
m
m
4502
4501
4502
4503
4504
m
m
4505

Fig. 12

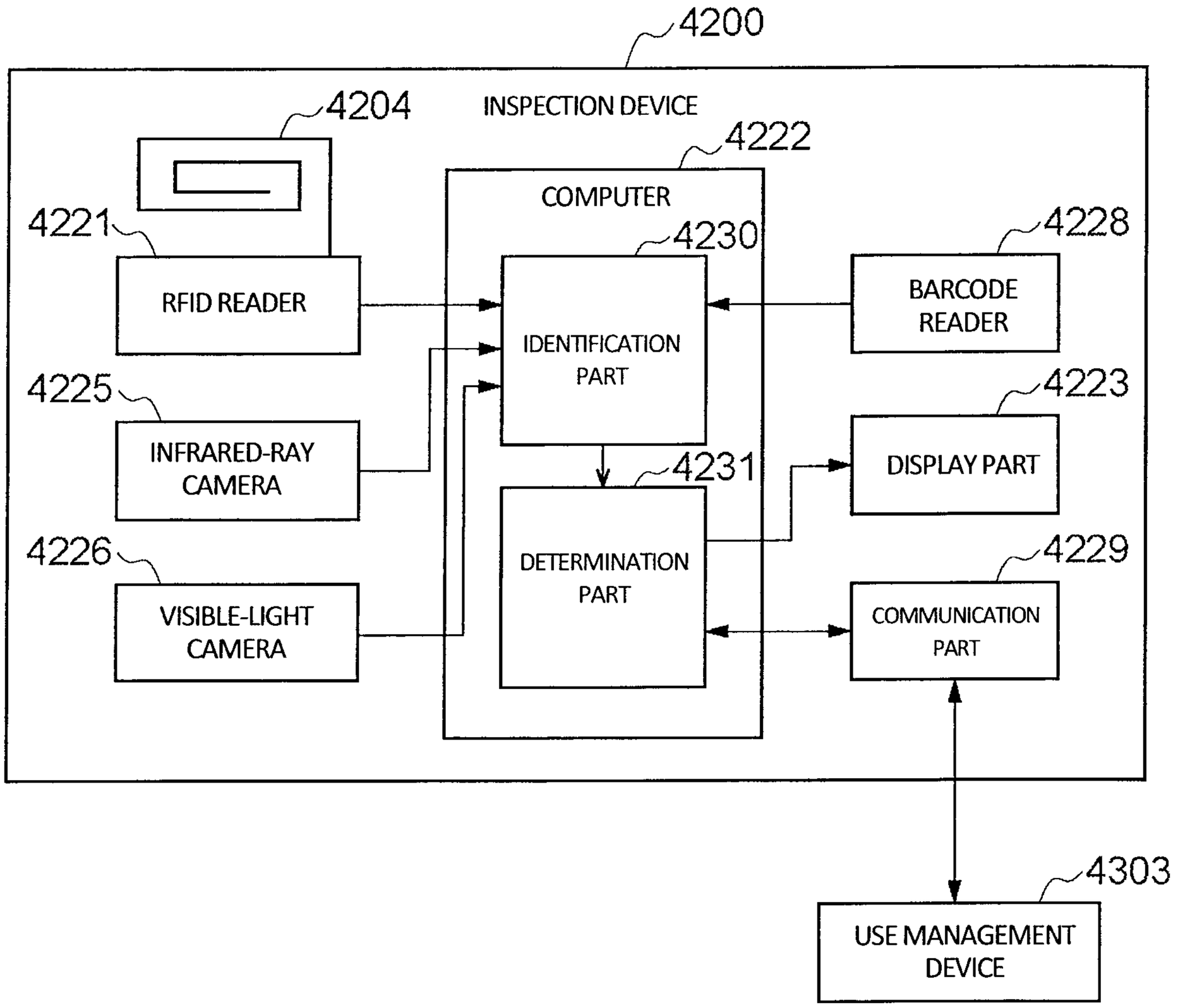

4200
INSPECTION DEVICE
4204
4222
COMPUTER
4221
RFID READER
4230
IDENTIFICATION PART
4228
BARCODE READER
4225
INFRARED-RAY CAMERA
4231
DETERMINATION PART
4223
DISPLAY PART
4226
VISIBLE-LIGHT CAMERA
4229
COMMUNICATION PART
4303
USE MANAGEMENT DEVICE

Fig. 13

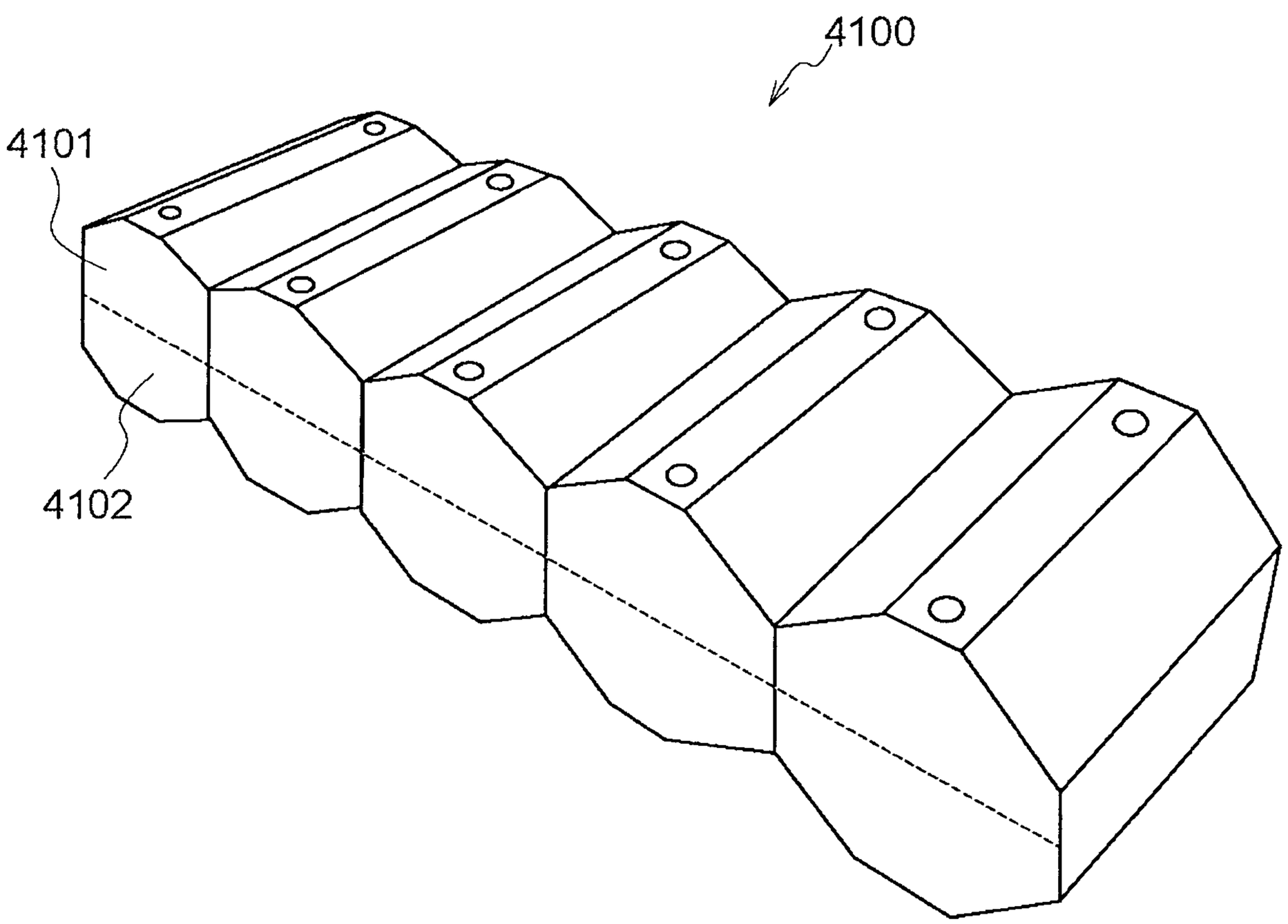


Fig. 14

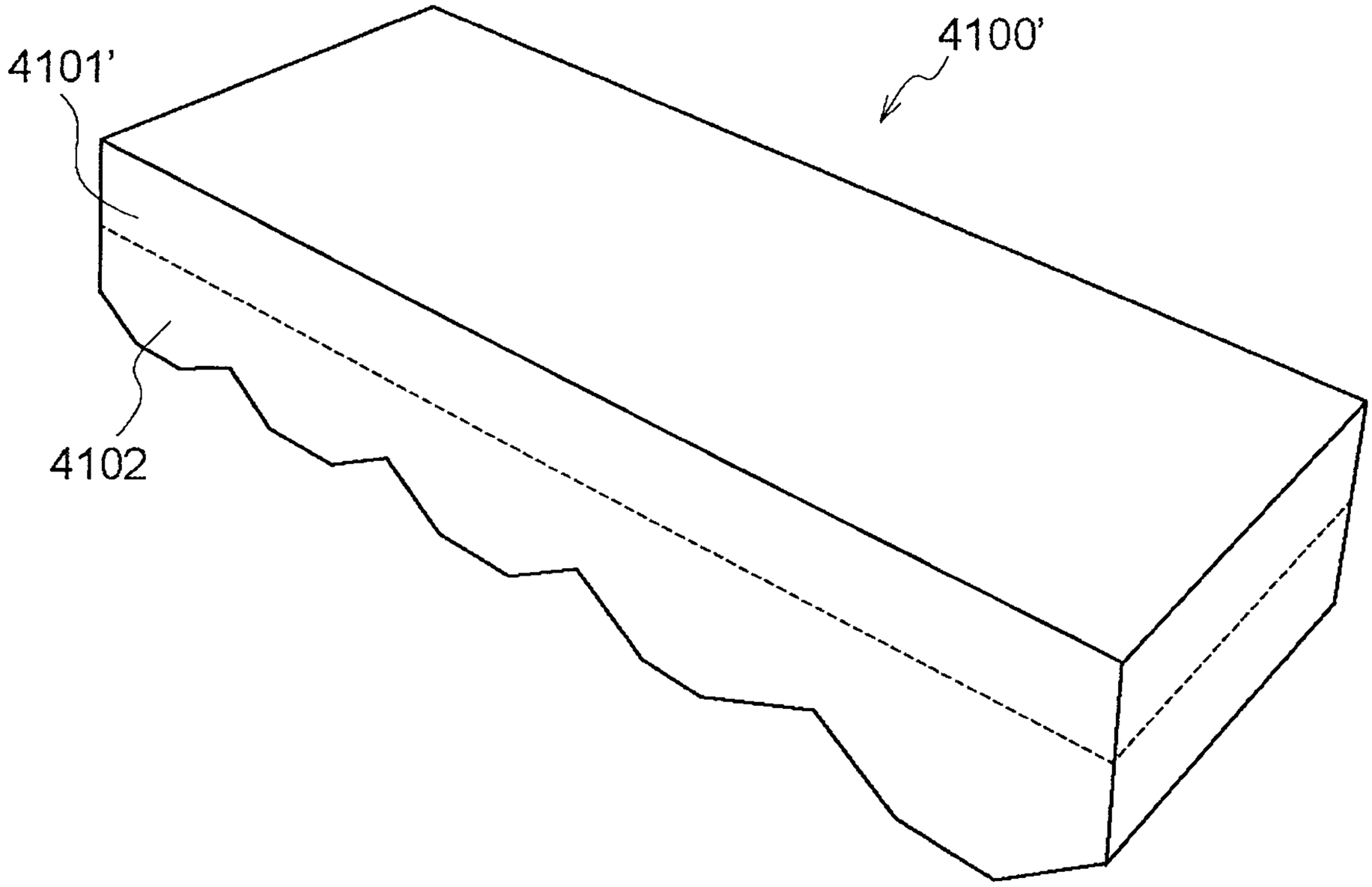
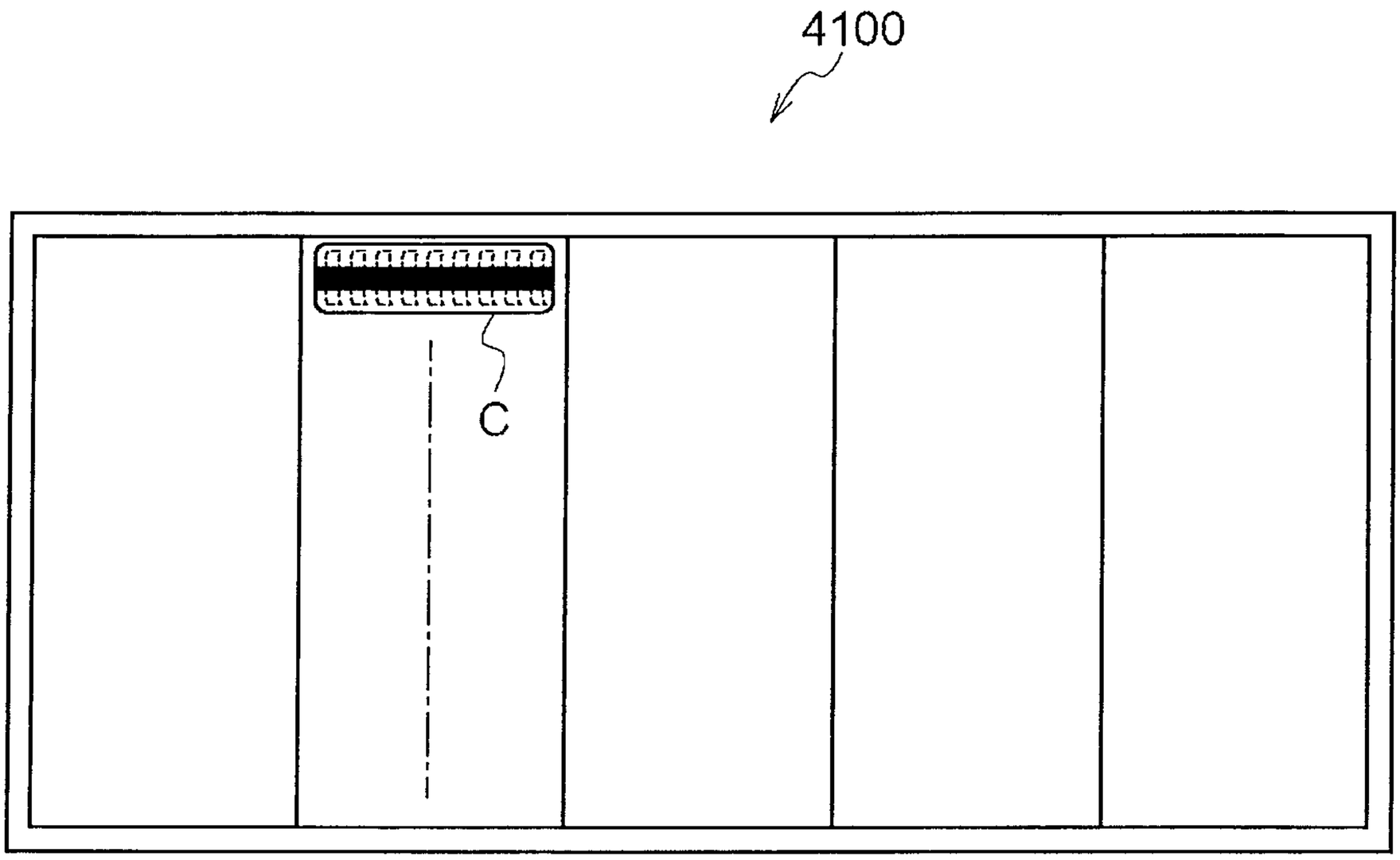


Fig. 15



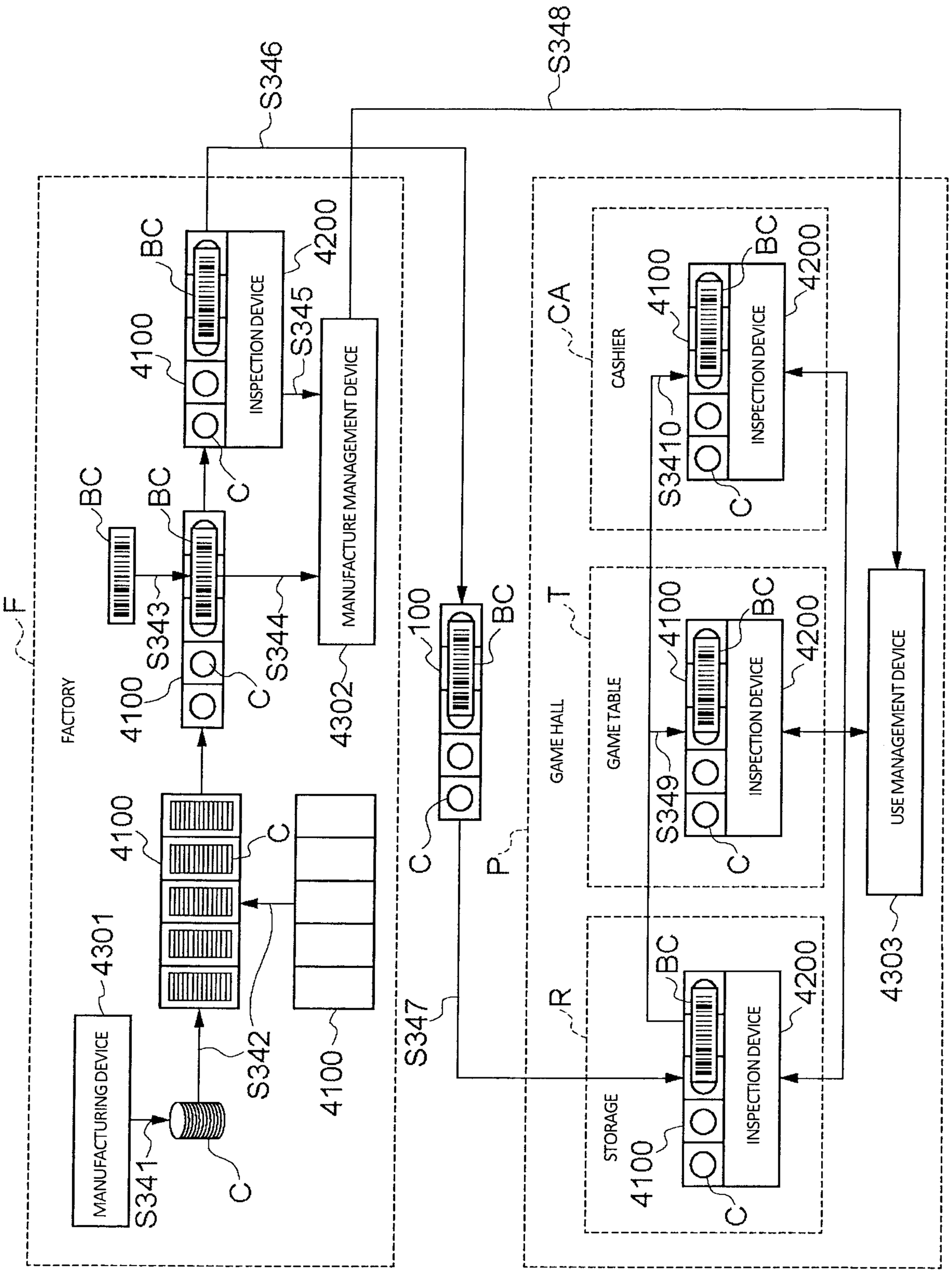
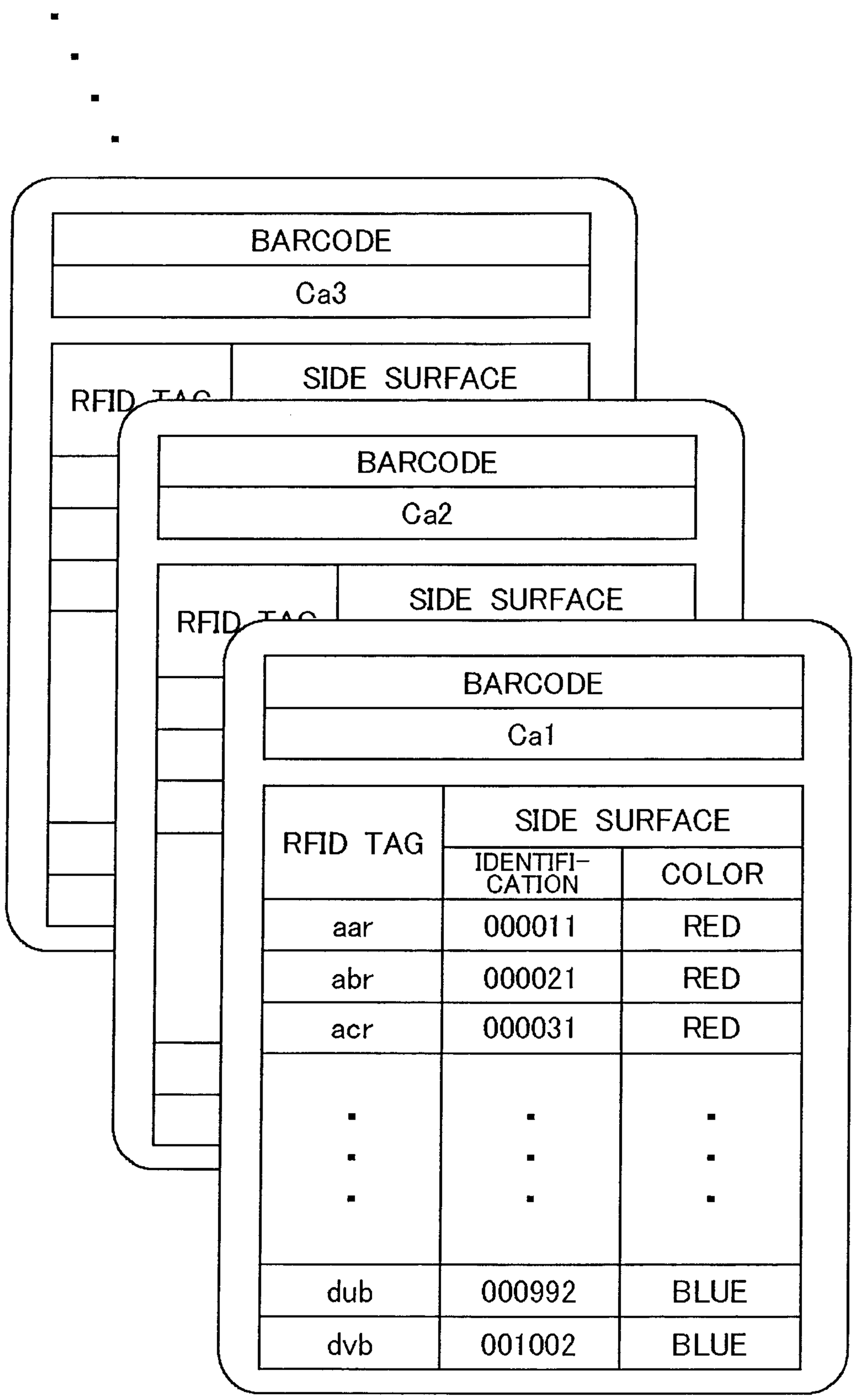

F
FACTORY
MANUFACTURING DEVICE
S341
C
S342
4100
4301
S343
4100
C
S344
4302
MANUFACTURE MANAGEMENT DEVICE
S345
4100
C
INSPECTION DEVICE
4200
BC
BC
BC
S346
S348
100
BC
C
P
S347
T
GAME HALL
GAME TABLE
4100
BC
INSPECTION DEVICE
4200
S349
C
CA
CASHIER
4100
BC
INSPECTION DEVICE
4200
S3410
C
R
STORAGE
4100
BC
INSPECTION DEVICE
4200
C
USE MANAGEMENT DEVICE
4303

Fig. 16

Fig. 17



RFID TAG	SIDE SURFACE	
	IDENTIFI-CATION	COLOR
aar	000011	RED
abr	000021	RED
acr	000031	RED
▪ ▪ ▪	▪ ▪ ▪	▪ ▪ ▪
dub	000992	BLUE
dvb	001002	BLUE

Fig. 18

BARCODE READER
Ca1

RFID READER
bwg
dkg
amr
.
.
.
bbr
cjb

INFRARED-RAY CAMERA
000011
000021
000031
.
.
.
000992
001002

VISIBLE-LIGHT CAMERA
RED
RED
RED
.
.
.
BLUE
BLUE

Fig. 19

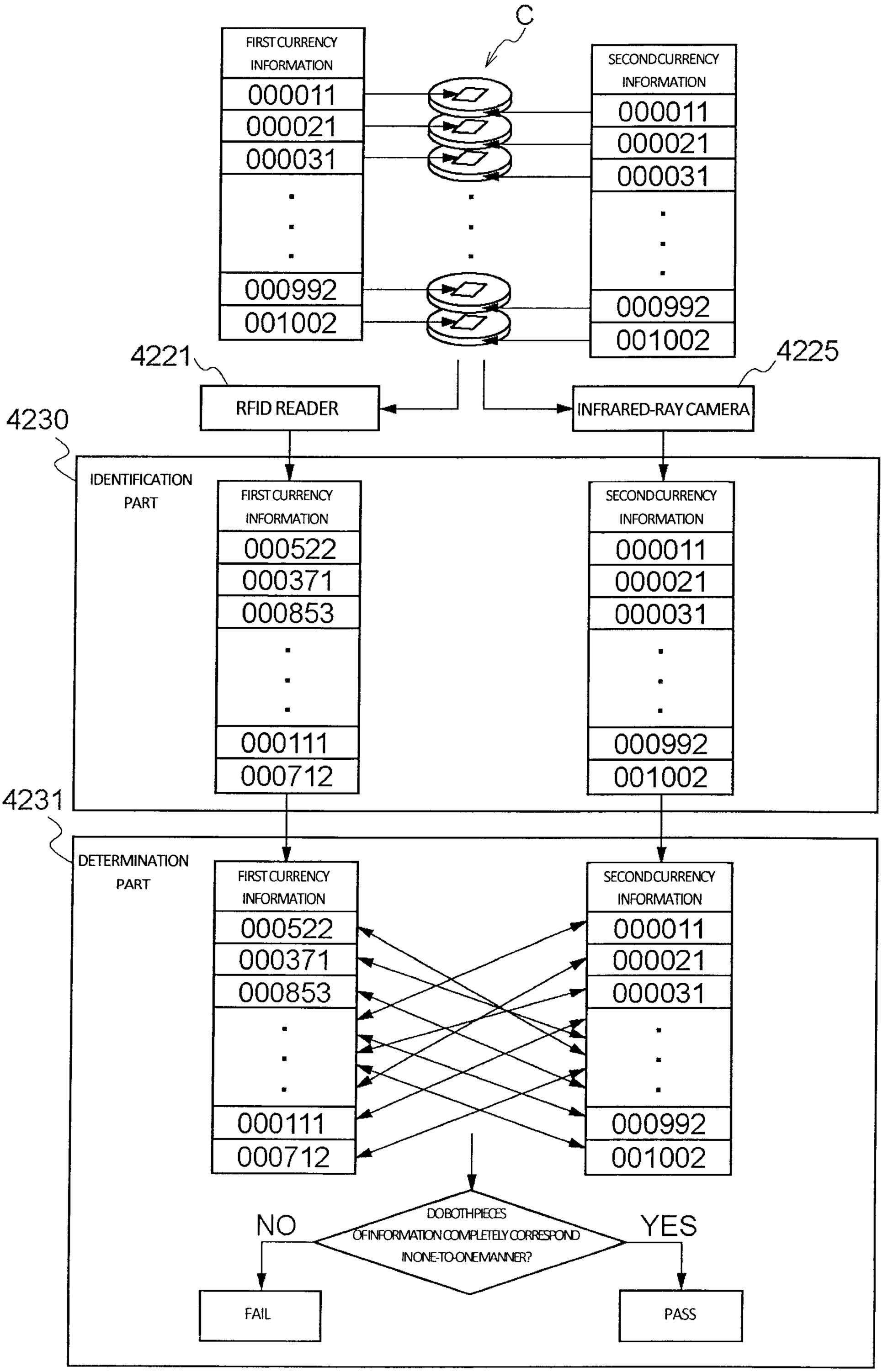

C
FIRST CURRENCY INFORMATION
000011
000021
000031
000992
001002
SECOND CURRENCY INFORMATION
000011
000021
000031
000992
001002
4221
RFID READER
4225
INFRARED-RAY CAMERA
4230
IDENTIFICATION PART
FIRST CURRENCY INFORMATION
000522
000371
000853
000111
000712
SECOND CURRENCY INFORMATION
000011
000021
000031
000992
001002
4231
DETERMINATION PART
FIRST CURRENCY INFORMATION
000522
000371
000853
000111
000712
SECOND CURRENCY INFORMATION
000011
000021
000031
000992
001002
DO BOTH PIECES OF INFORMATION COMPLETELY CORRESPOND IN ONE-TO-ONE MANNER?
NO
YES
FAIL
PASS

Fig. 20

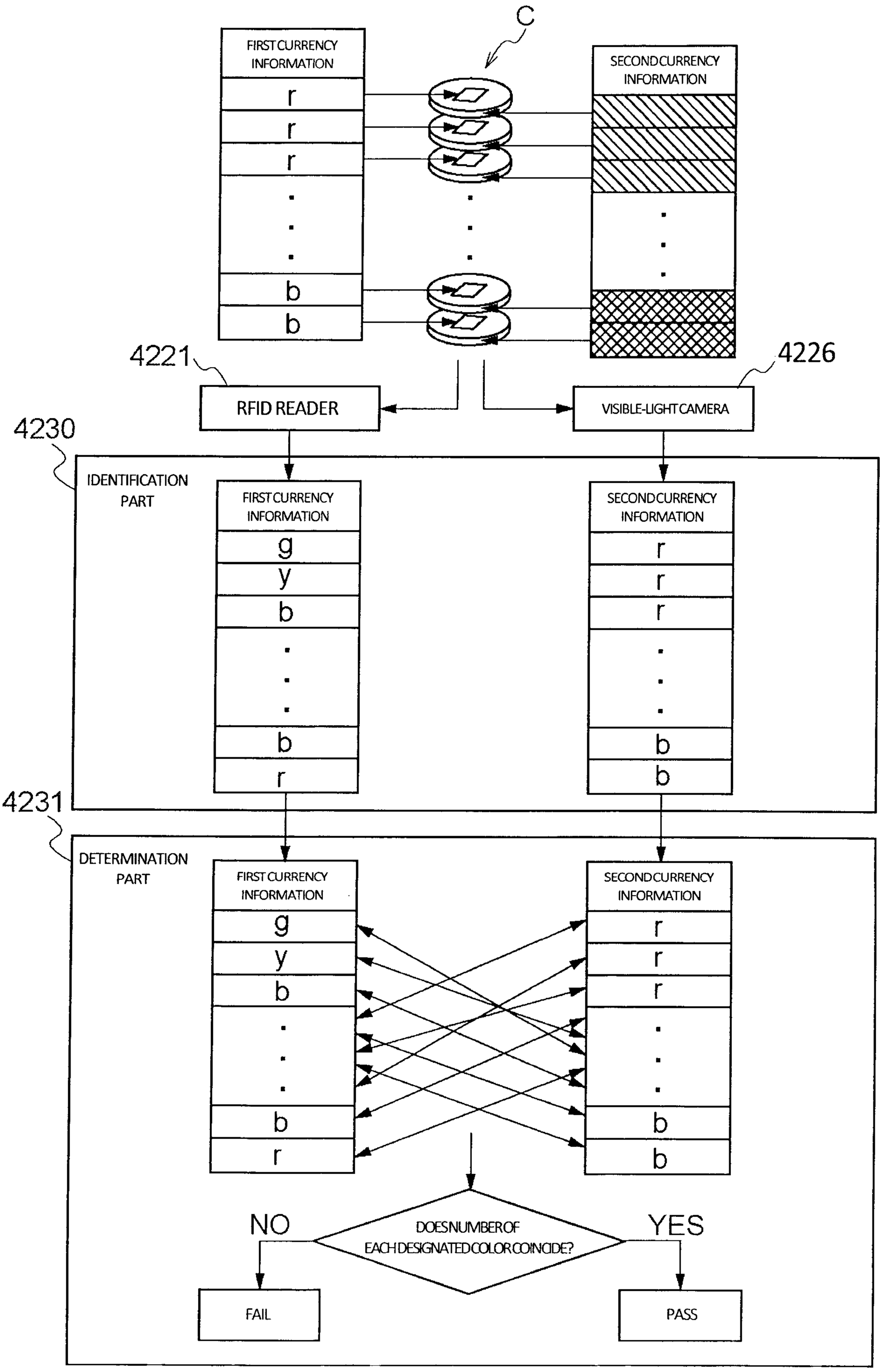

C
FIRST CURRENCY INFORMATION
r
r
r
b
b
SECOND CURRENCY INFORMATION
4221
RFID READER
4226
VISIBLE-LIGHT CAMERA
4230
IDENTIFICATION PART
FIRST CURRENCY INFORMATION
g
y
b
b
r
SECOND CURRENCY INFORMATION
r
r
r
b
b
4231
DETERMINATION PART
FIRST CURRENCY INFORMATION
g
y
b
b
r
SECOND CURRENCY INFORMATION
r
r
r
b
b
NO
DOES NUMBER OF EACH DESIGNATED COLOR COINCIDE?
YES
FAIL
PASS

Fig. 21

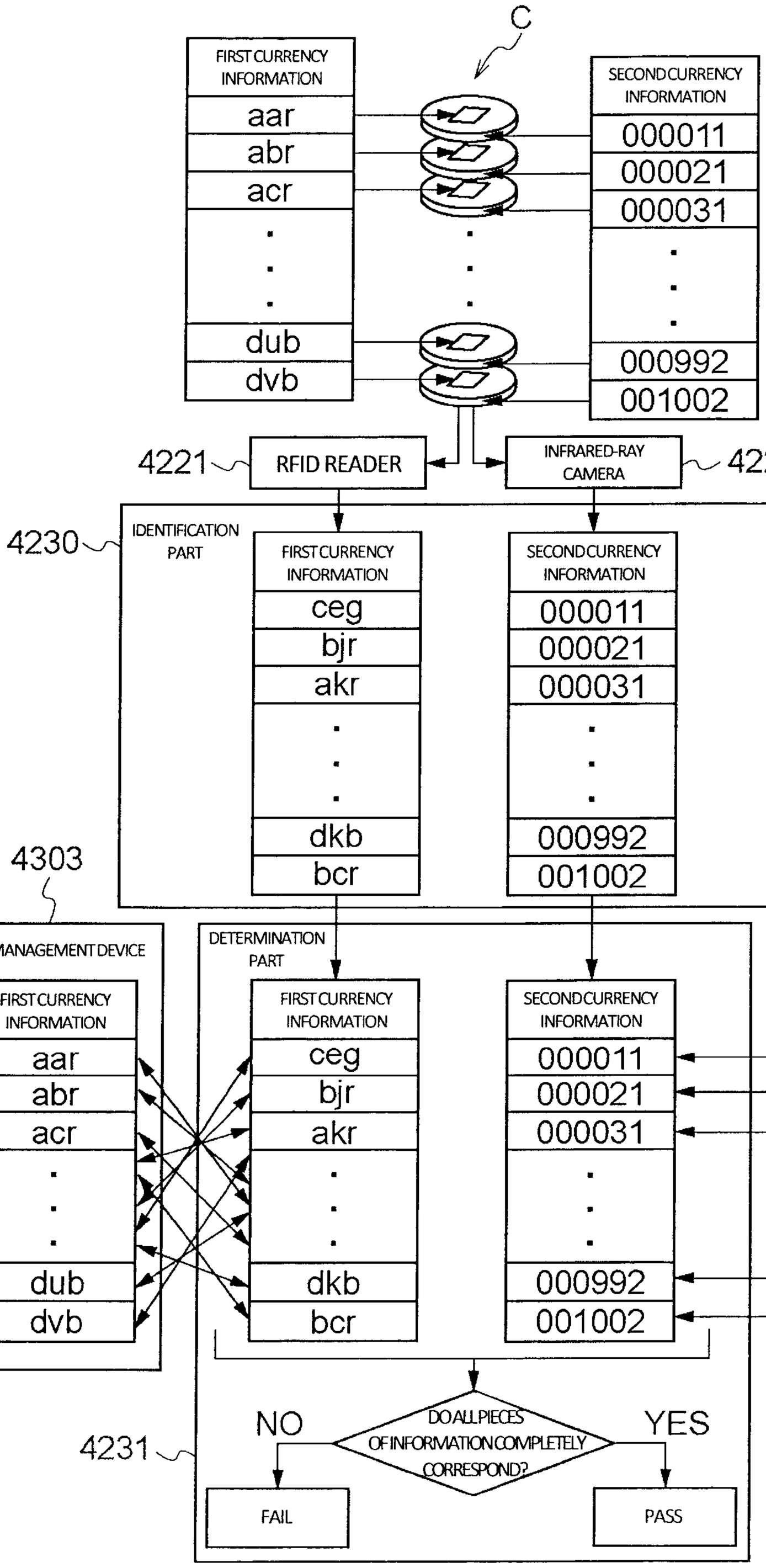

C
FIRST CURRENCY INFORMATION
aar
abr
acr
dub
dvb
SECOND CURRENCY INFORMATION
000011
000021
000031
000992
001002
4221
RFID READER
INFRARED-RAY CAMERA
4225
4230
IDENTIFICATION PART
FIRST CURRENCY INFORMATION
ceg
bjr
akr
dkb
bcr
SECOND CURRENCY INFORMATION
000011
000021
000031
000992
001002
4303
USE MANAGEMENT DEVICE
FIRST CURRENCY INFORMATION
aar
abr
acr
dub
dvb
DETERMINATION PART
FIRST CURRENCY INFORMATION
ceg
bjr
akr
dkb
bcr
SECOND CURRENCY INFORMATION
000011
000021
000031
000992
001002
4303
USE MANAGEMENT DEVICE
SECOND CURRENCY INFORMATION
000011
000021
000031
000992
001002
4231
NO
DO ALL PIECES OF INFORMATION COMPLETELY CORRESPOND?
YES
FAIL
PASS

Fig. 22

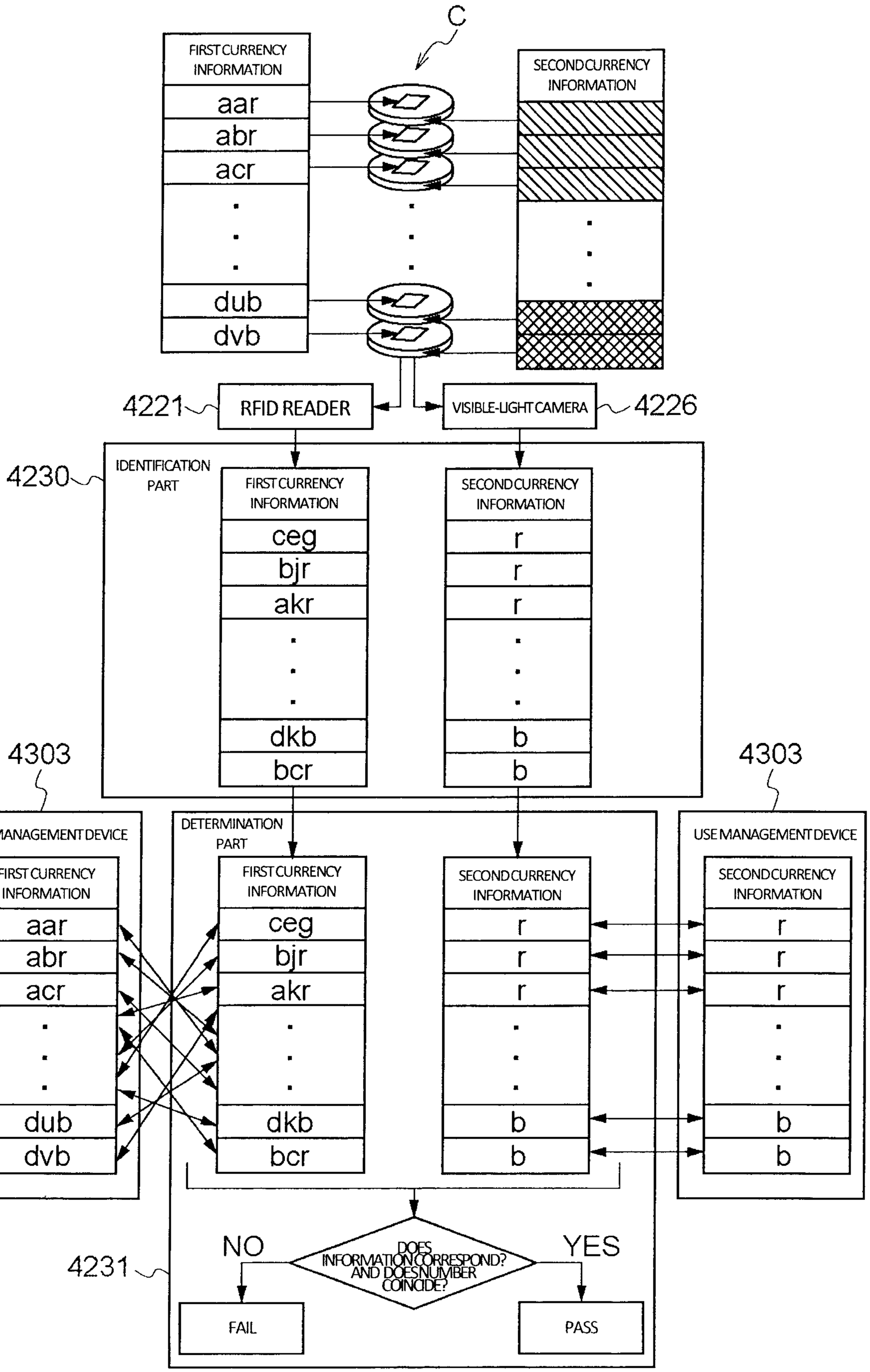

C
FIRST CURRENCY INFORMATION
aar
abr
acr
dub
dvb
SECOND CURRENCY INFORMATION
4221
RFID READER
VISIBLE-LIGHT CAMERA
4226
4230
IDENTIFICATION PART
FIRST CURRENCY INFORMATION
ceg
bjr
akr
dkb
bcr
SECOND CURRENCY INFORMATION
r
r
r
b
b
4303
USE MANAGEMENT DEVICE
FIRST CURRENCY INFORMATION
aar
abr
acr
dub
dvb
DETERMINATION PART
FIRST CURRENCY INFORMATION
ceg
bjr
akr
dkb
bcr
SECOND CURRENCY INFORMATION
r
r
r
b
b
4303
USE MANAGEMENT DEVICE
SECOND CURRENCY INFORMATION
r
r
r
b
b
4231
NO
DOES INFORMATION CORRESPOND? AND DOES NUMBER COINCIDE?
YES
FAIL
PASS

Fig. 23

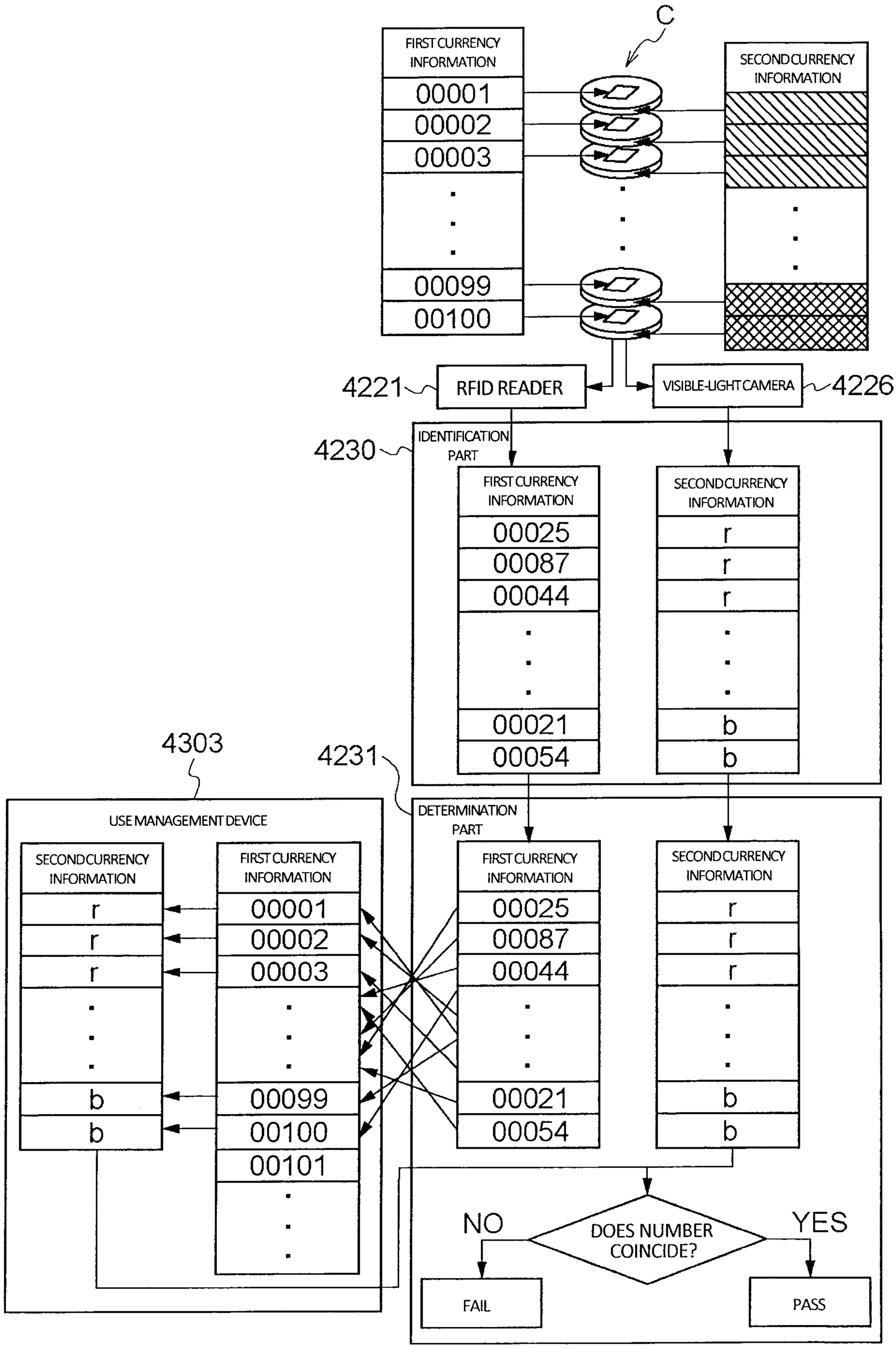

C
FIRST CURRENCY INFORMATION
00001
00002
00003
00099
00100
SECOND CURRENCY INFORMATION
4221
RFID READER
VISIBLE-LIGHT CAMERA
4226
4230
IDENTIFICATION PART
FIRST CURRENCY INFORMATION
00025
00087
00044
00021
00054
SECOND CURRENCY INFORMATION
r
r
r
b
b
4303
USE MANAGEMENT DEVICE
SECOND CURRENCY INFORMATION
FIRST CURRENCY INFORMATION
r
r
r
00001
00002
00003
b
b
00099
00100
00101
4231
DETERMINATION PART
FIRST CURRENCY INFORMATION
00025
00087
00044
00021
00054
SECOND CURRENCY INFORMATION
r
r
r
b
b
NO
DOES NUMBER COINCIDE?
YES
FAIL
PASS

Fig. 24

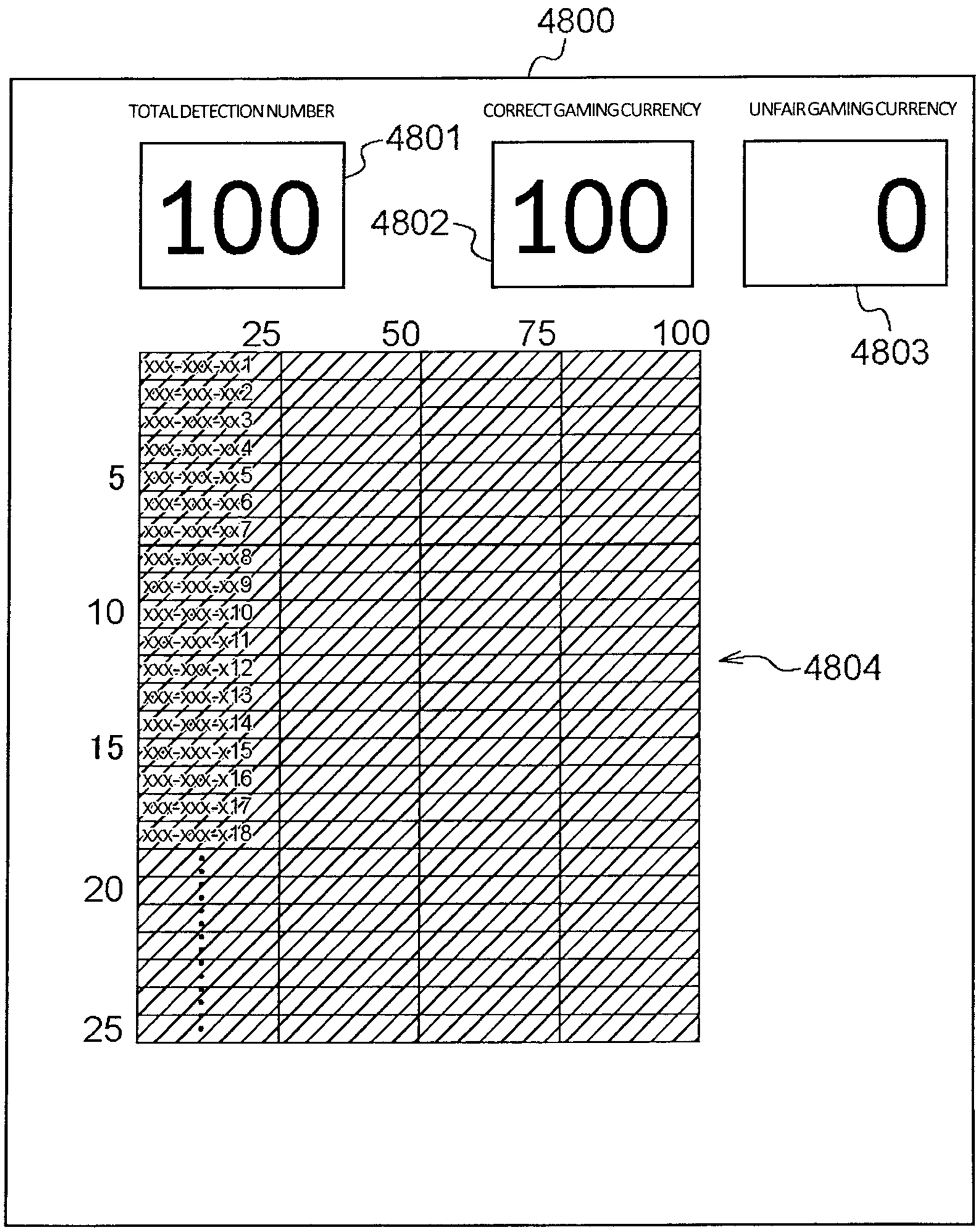

4800
TOTAL DETECTION NUMBER
CORRECT GAMING CURRENCY
UNFAIR GAMING CURRENCY
4801
100
4802
100
0
4803
25
50
75
100
5
10
15
20
25
xxx-xxx-xx1
xxx-xxx-xx2
xxx-xxx-xx3
xxx-xxx-xx4
xxx-xxx-xx5
xxx-xxx-xx6
xxx-xxx-xx7
xxx-xxx-xx8
xxx-xxx-xx9
xxx-xxx-x10
xxx-xxx-x11
xxx-xxx-x12
xxx-xxx-x13
xxx-xxx-x14
xxx-xxx-x15
xxx-xxx-x16
xxx-xxx-x17
xxx-xxx-x18
4804

Fig. 25

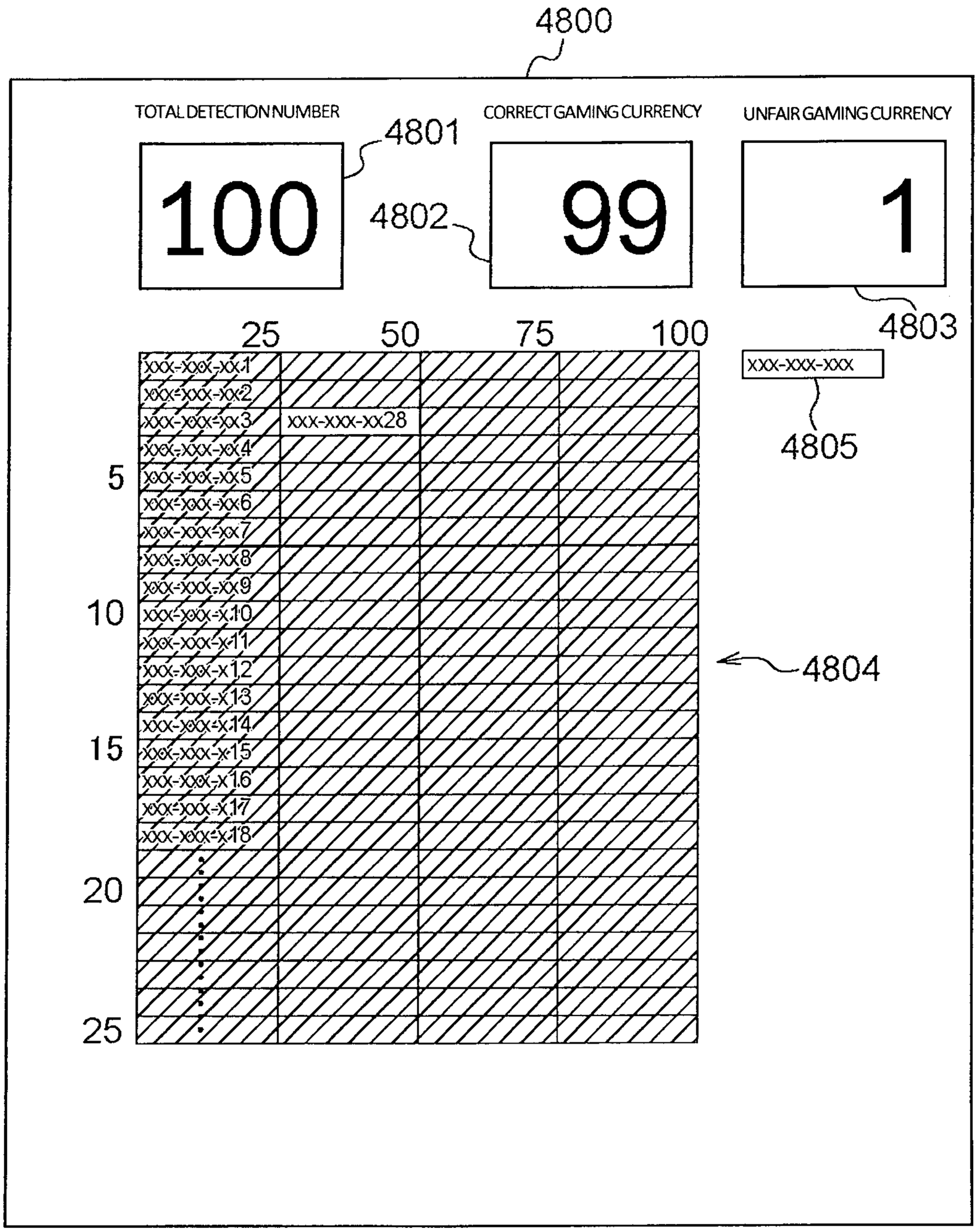

4800
TOTAL DETECTION NUMBER
4801
CORRECT GAMING CURRENCY
UNFAIR GAMING CURRENCY
100
4802
99
1
4803
25
50
75
100
xxx-xxx-xx1
xxx-xxx-xx2
xxx-xxx-xx3
xxx-xxx-xx28
xxx-xxx-xx4
xxx-xxx-xx5
xxx-xxx-xx6
xxx-xxx-xx7
xxx-xxx-xx8
xxx-xxx-xx9
xxx-xxx-x10
xxx-xxx-x11
xxx-xxx-x12
xxx-xxx-x13
xxx-xxx-x14
xxx-xxx-x15
xxx-xxx-x16
xxx-xxx-x17
xxx-xxx-x18
xxx-xxx-xxx
4805
4804
5
10
15
20
25

Fig. 26

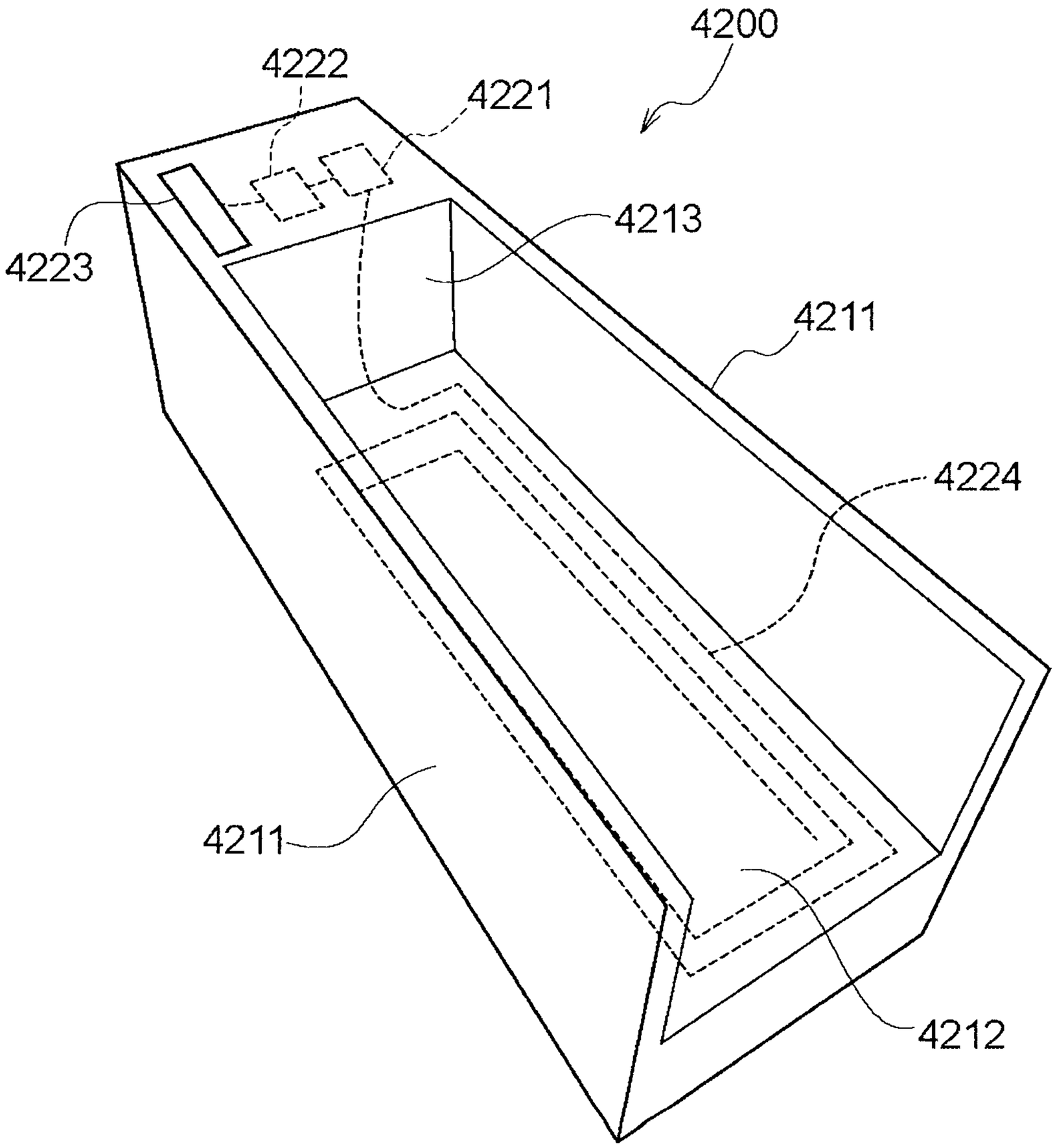


Fig. 27

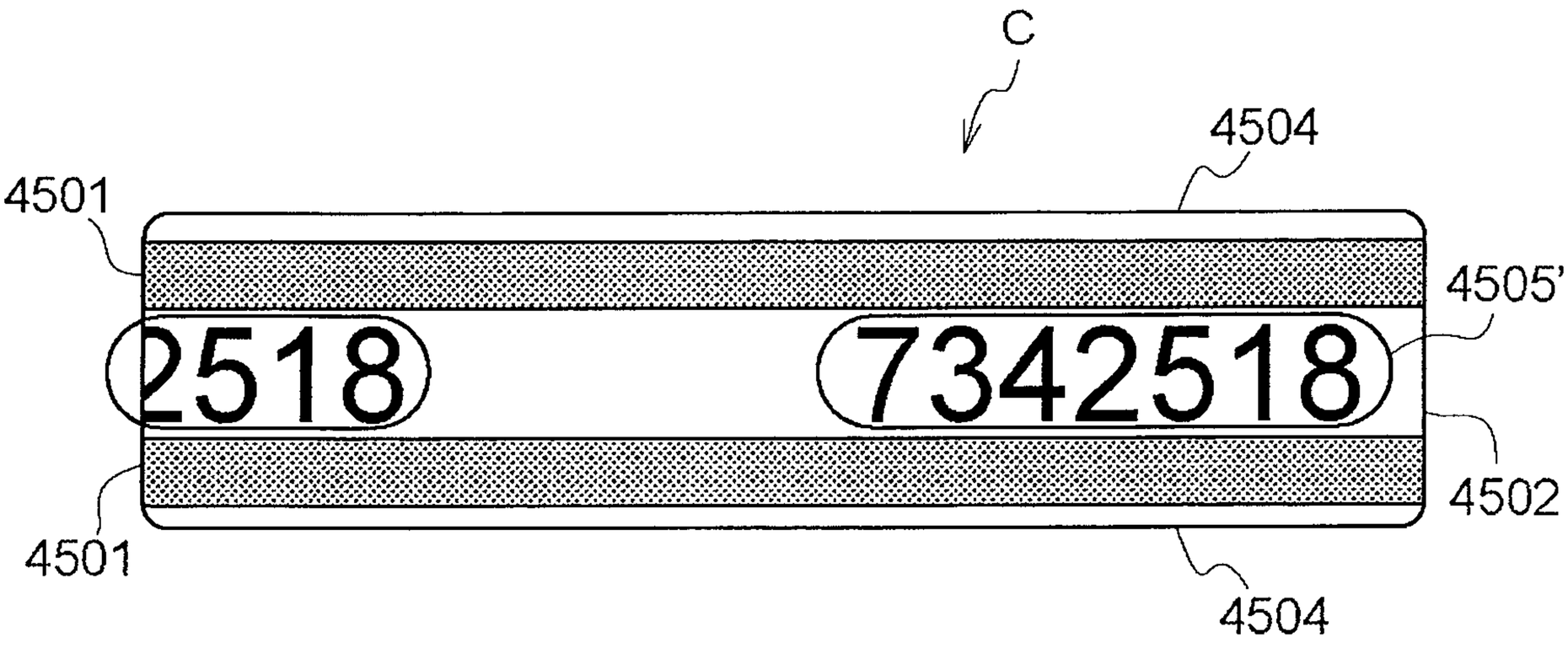


Fig. 28

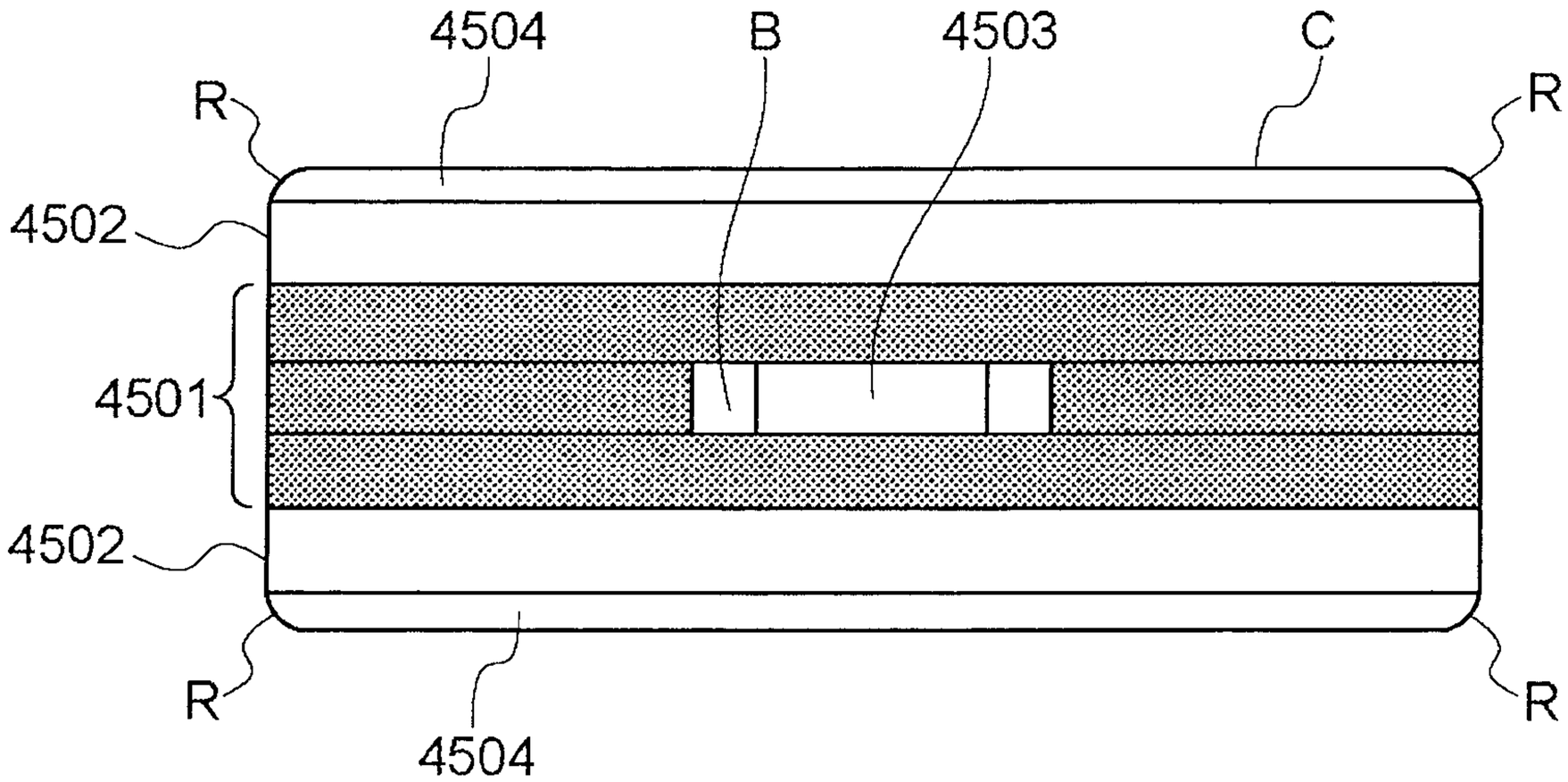


Fig. 29

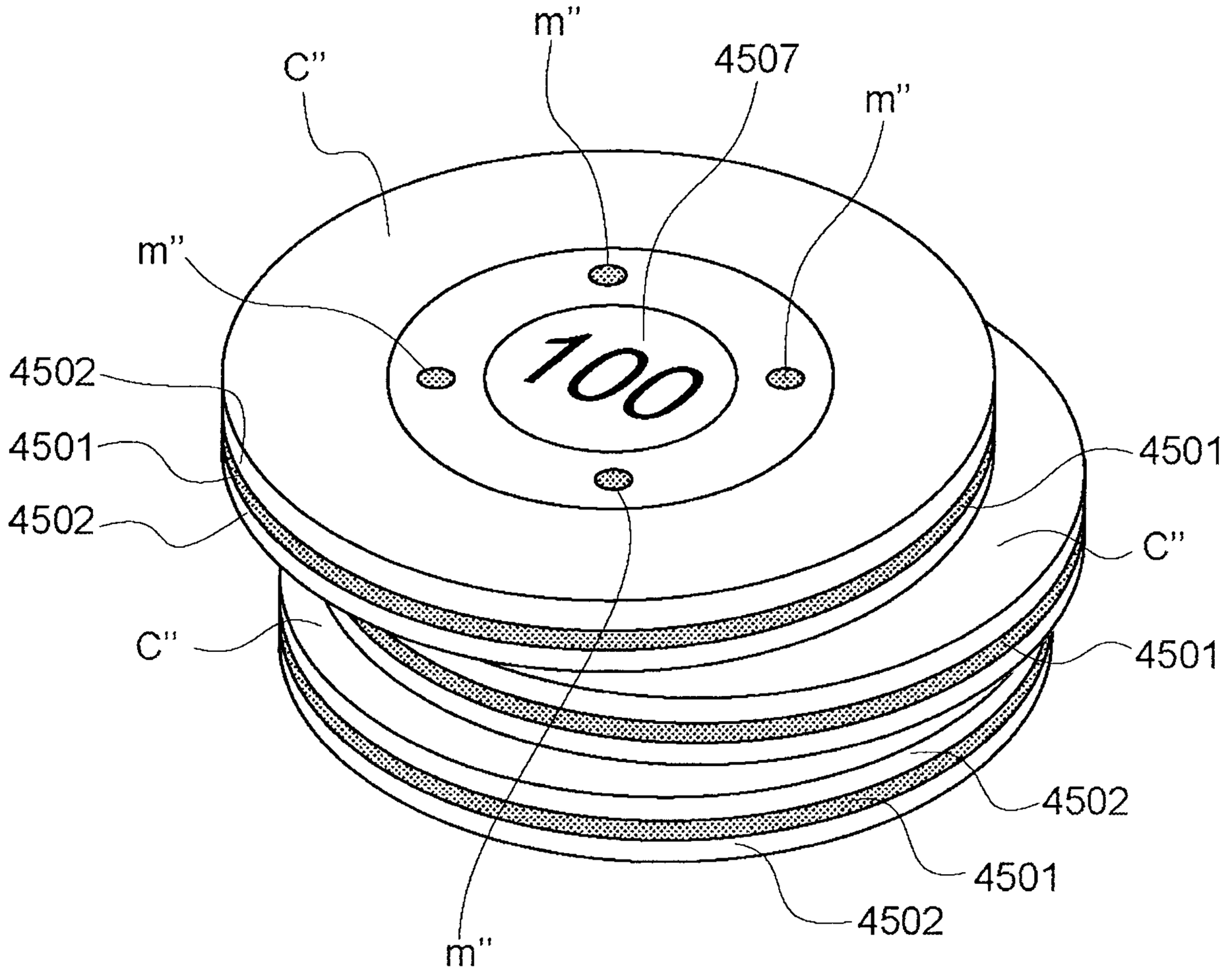


Fig. 30

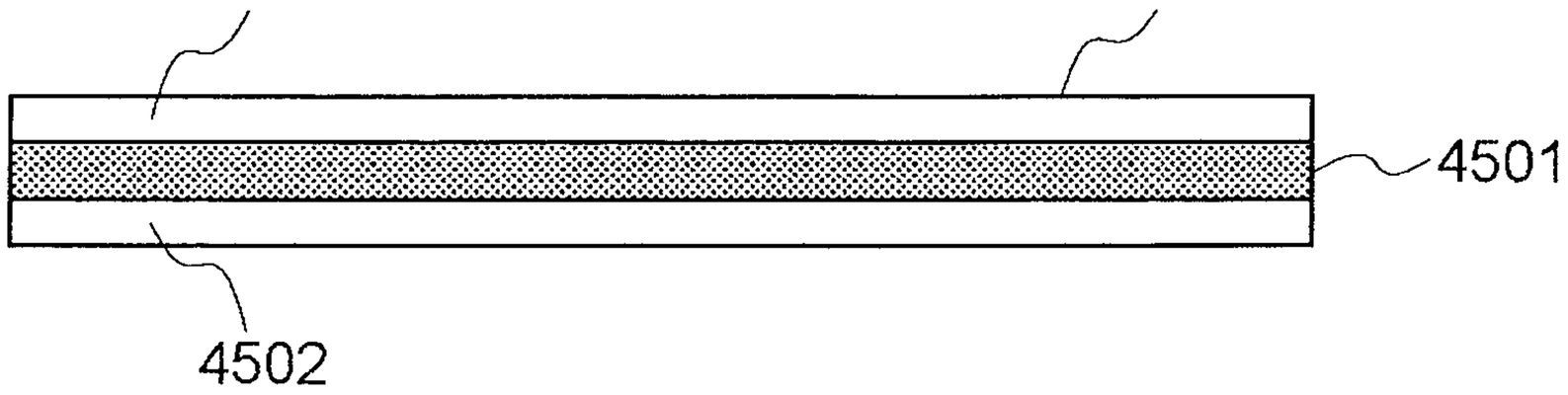


Fig. 31

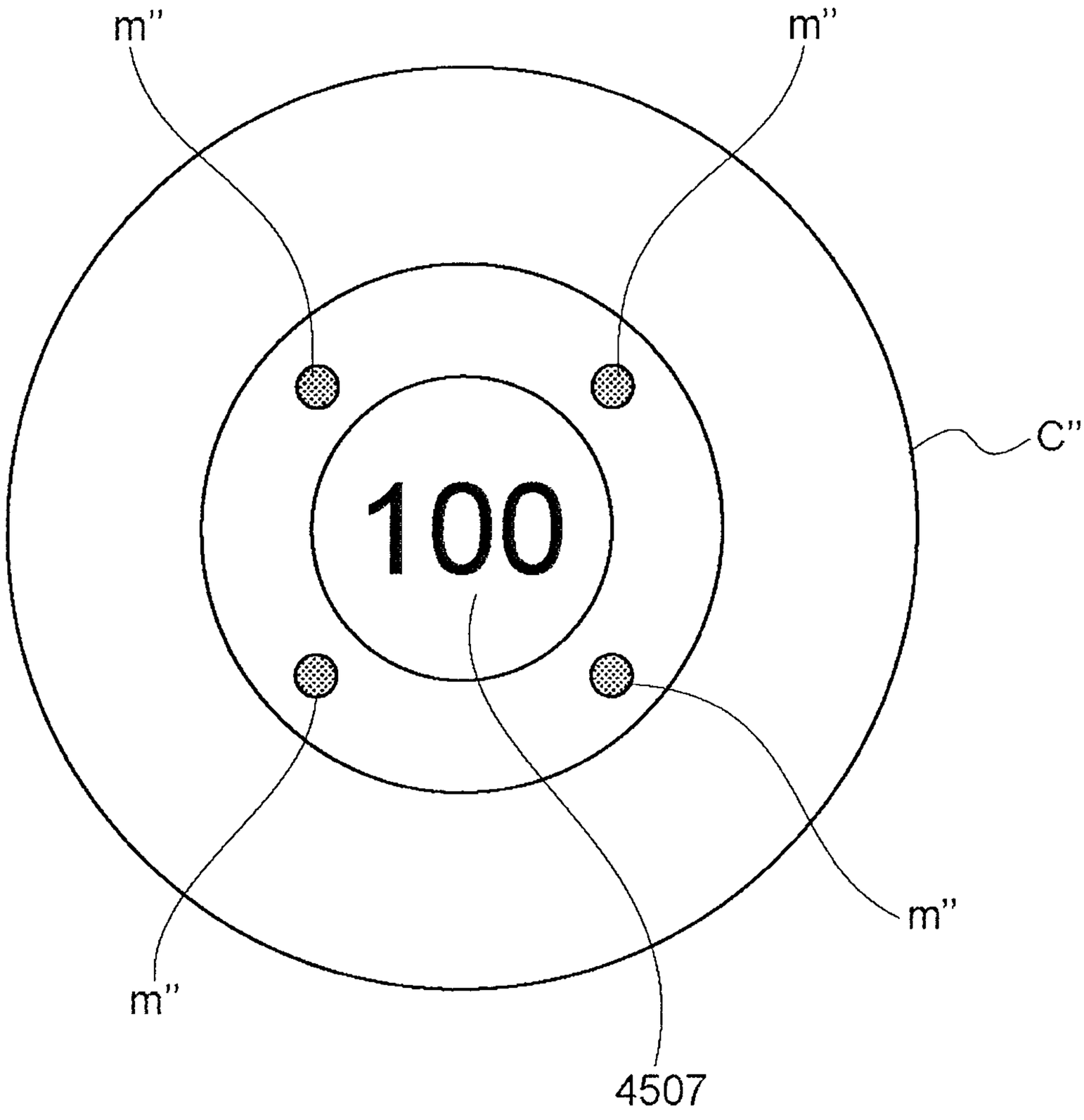


Fig. 32

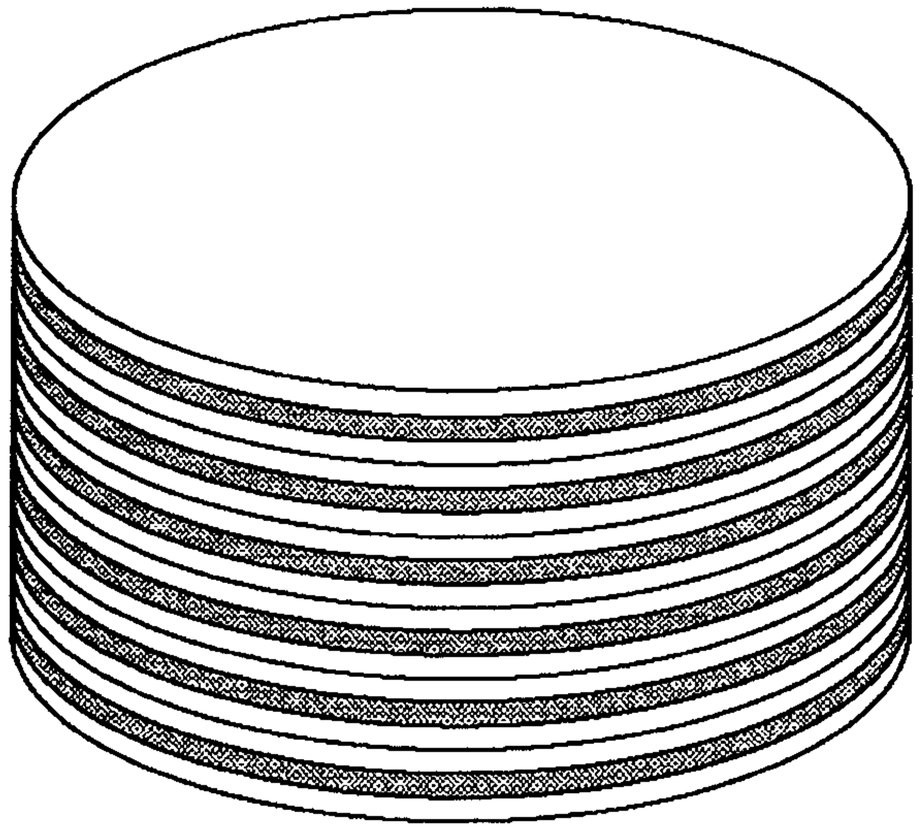


Fig. 33

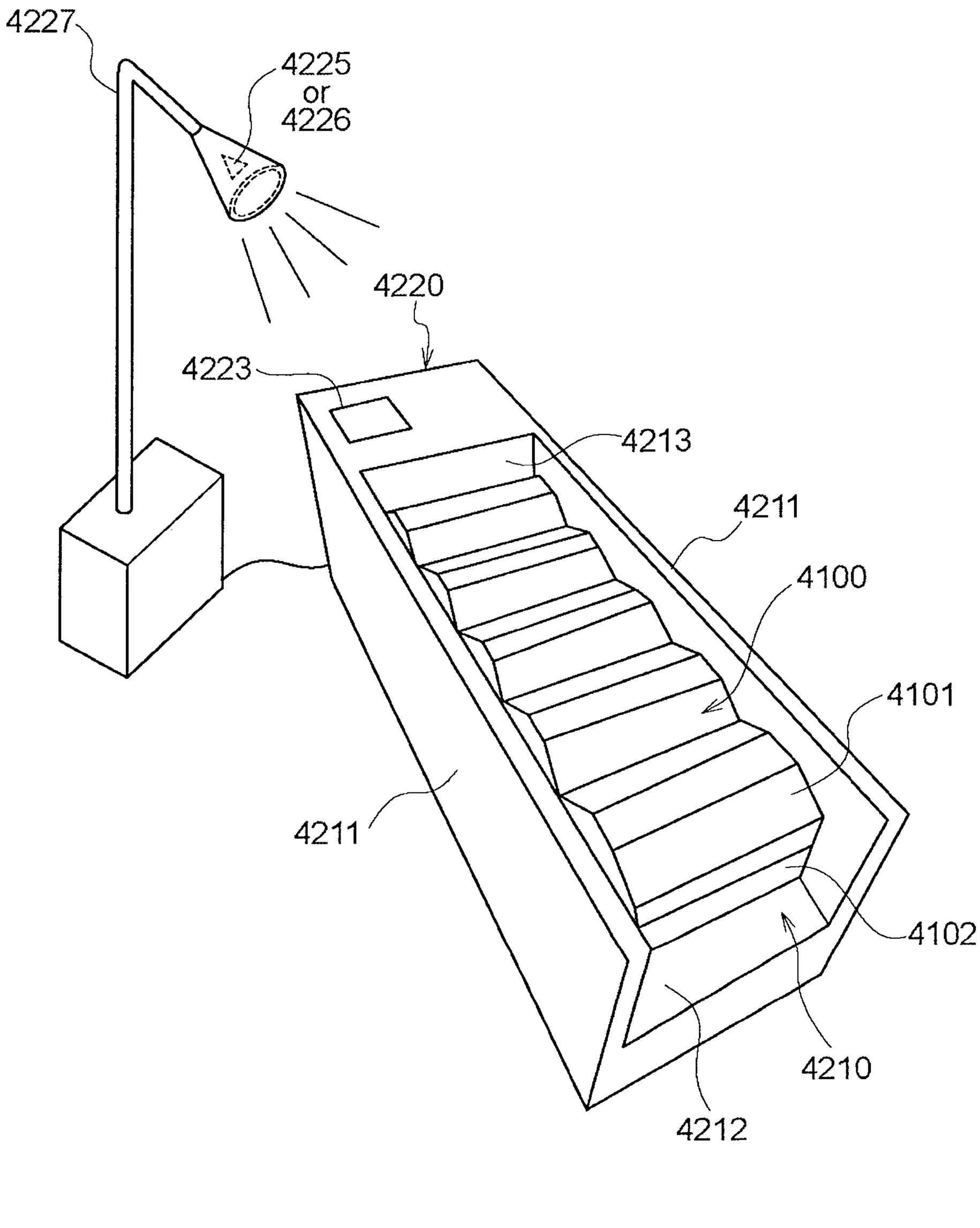

4227
4225
or
4226
4220
4223
4213
4211
4100
4101
4211
4102
4210
4212

Fig. 34

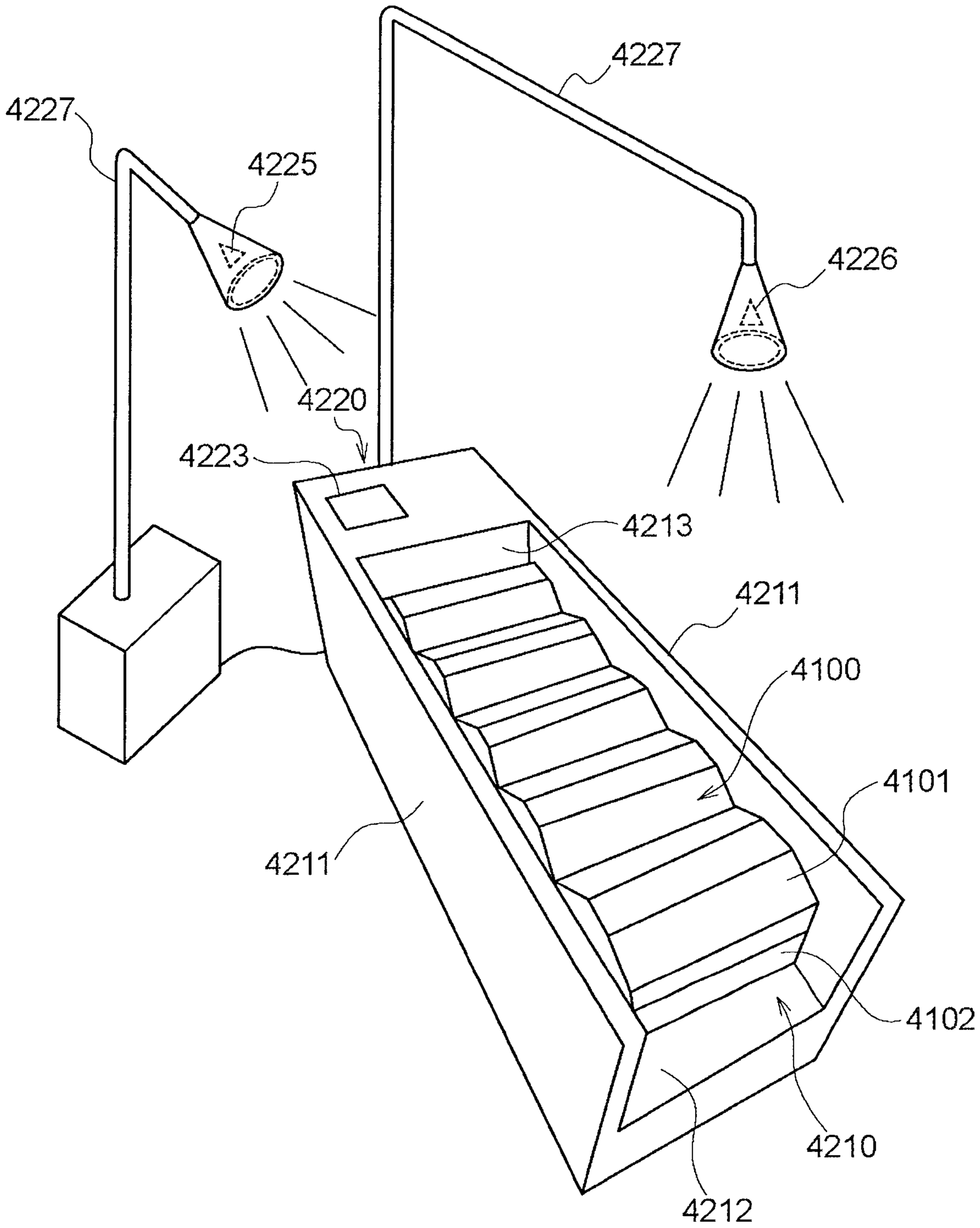

4227
4225
4227
4226
4220
4223
4213
4211
4100
4101
4211
4102
4210
4212

Fig. 35

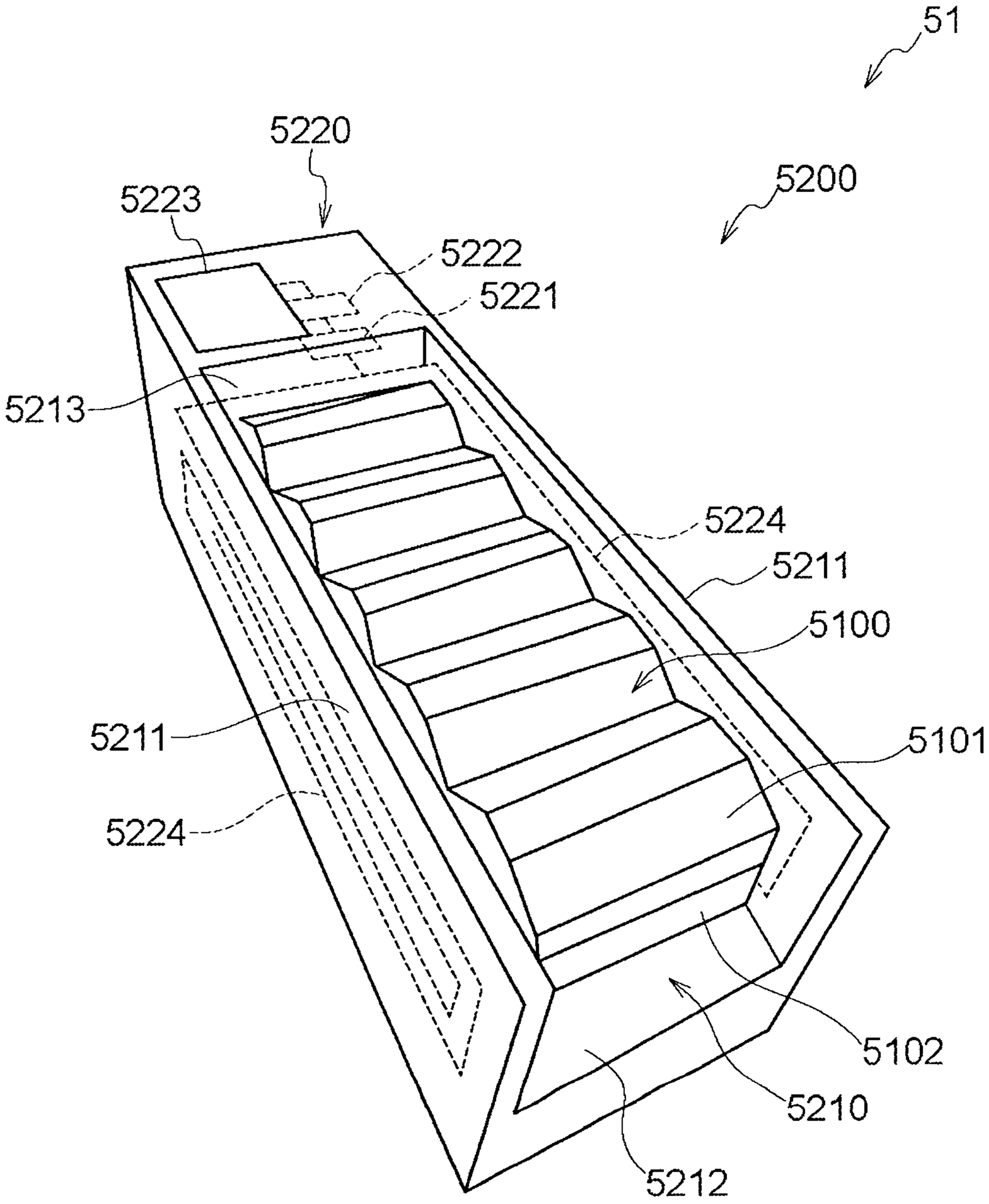

51
5220
5200
5223
5222
5221
5213
5224
5211
5100
5211
5101
5224
5102
5210
5212

Fig. 36

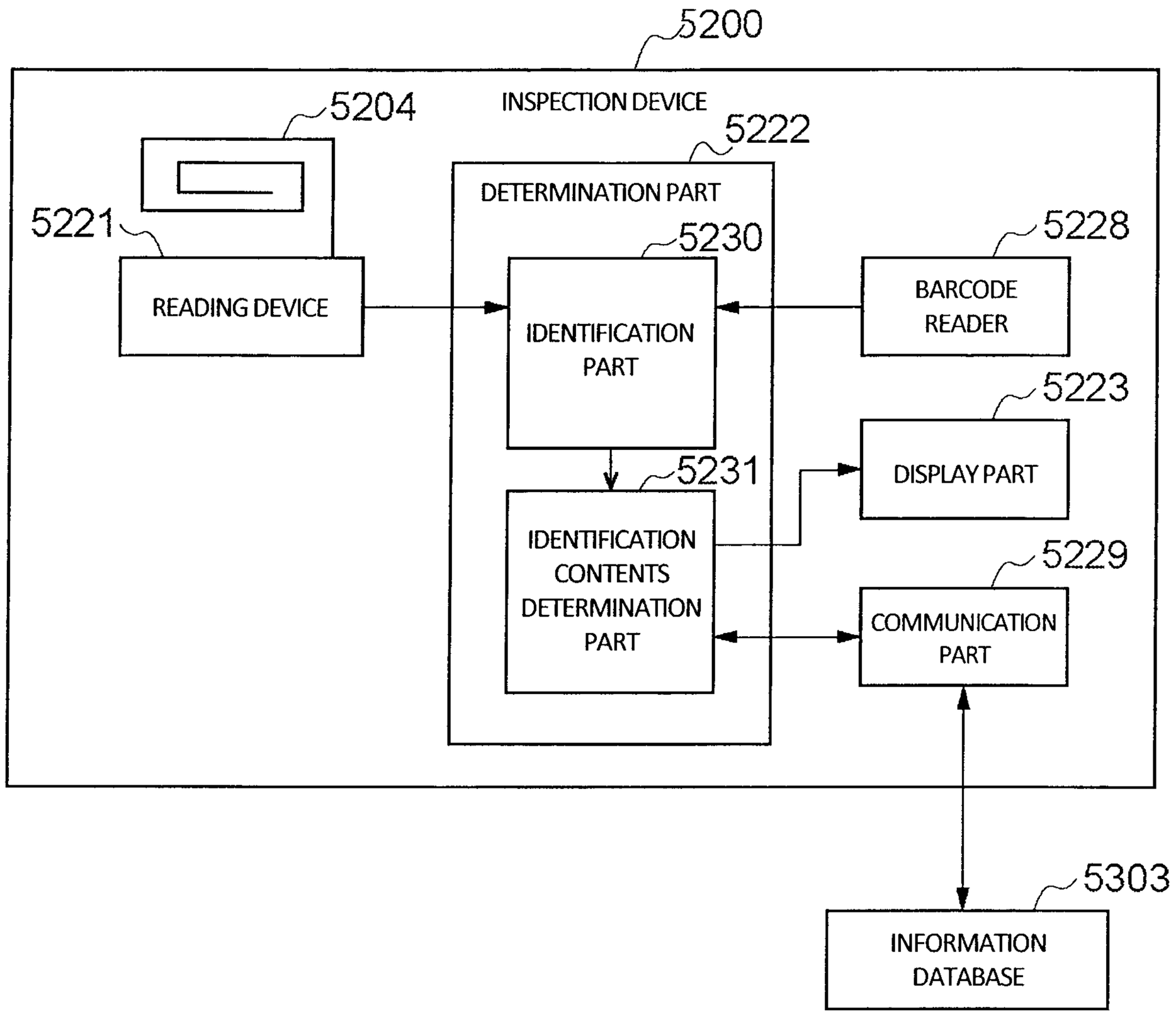

5200
INSPECTION DEVICE
5204
5221
READING DEVICE
5222
DETERMINATION PART
5230
IDENTIFICATION PART
5231
IDENTIFICATION CONTENTS DETERMINATION PART
5228
BARCODE READER
5223
DISPLAY PART
5229
COMMUNICATION PART
5303
INFORMATION DATABASE

Fig. 37

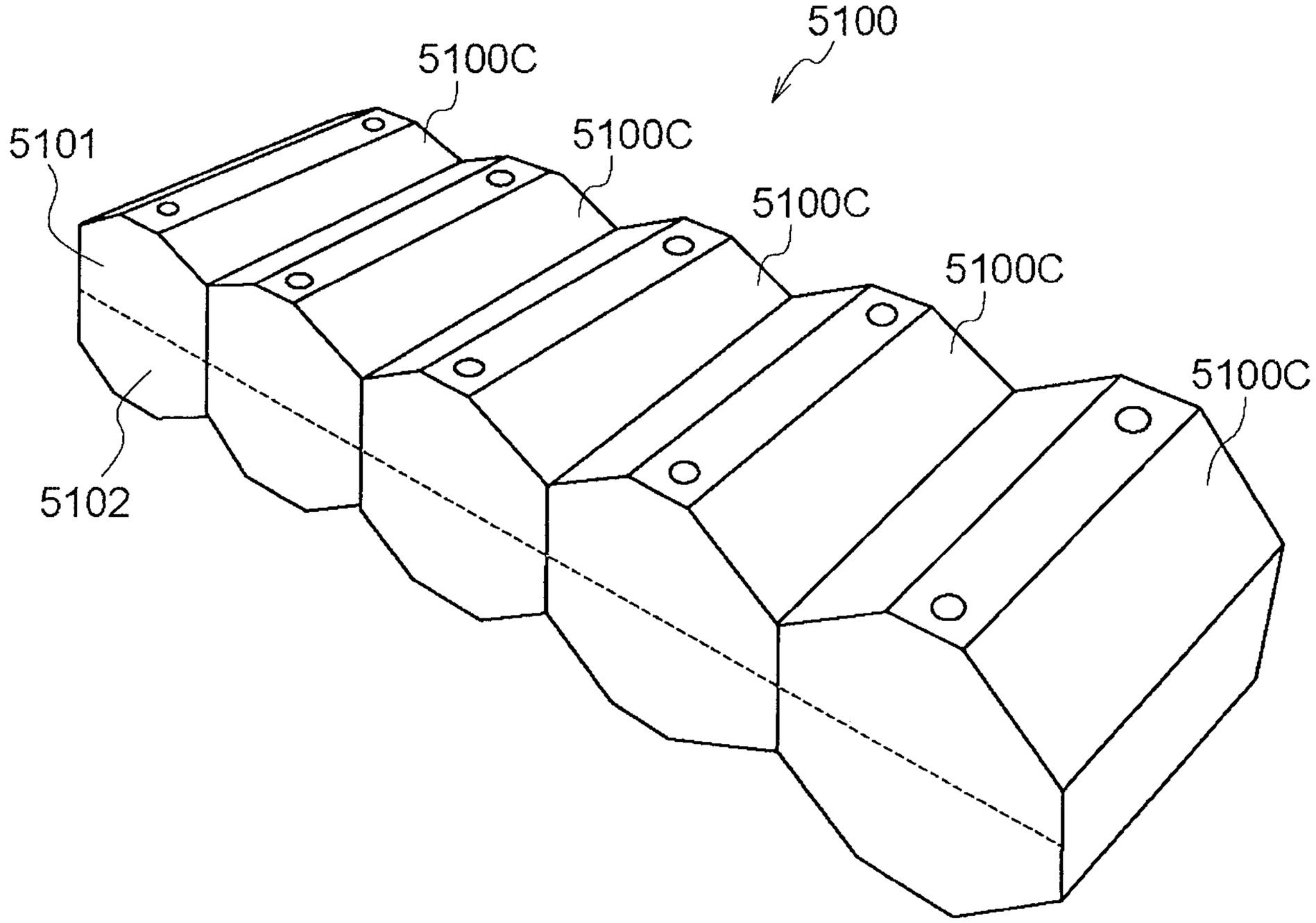


Fig. 38

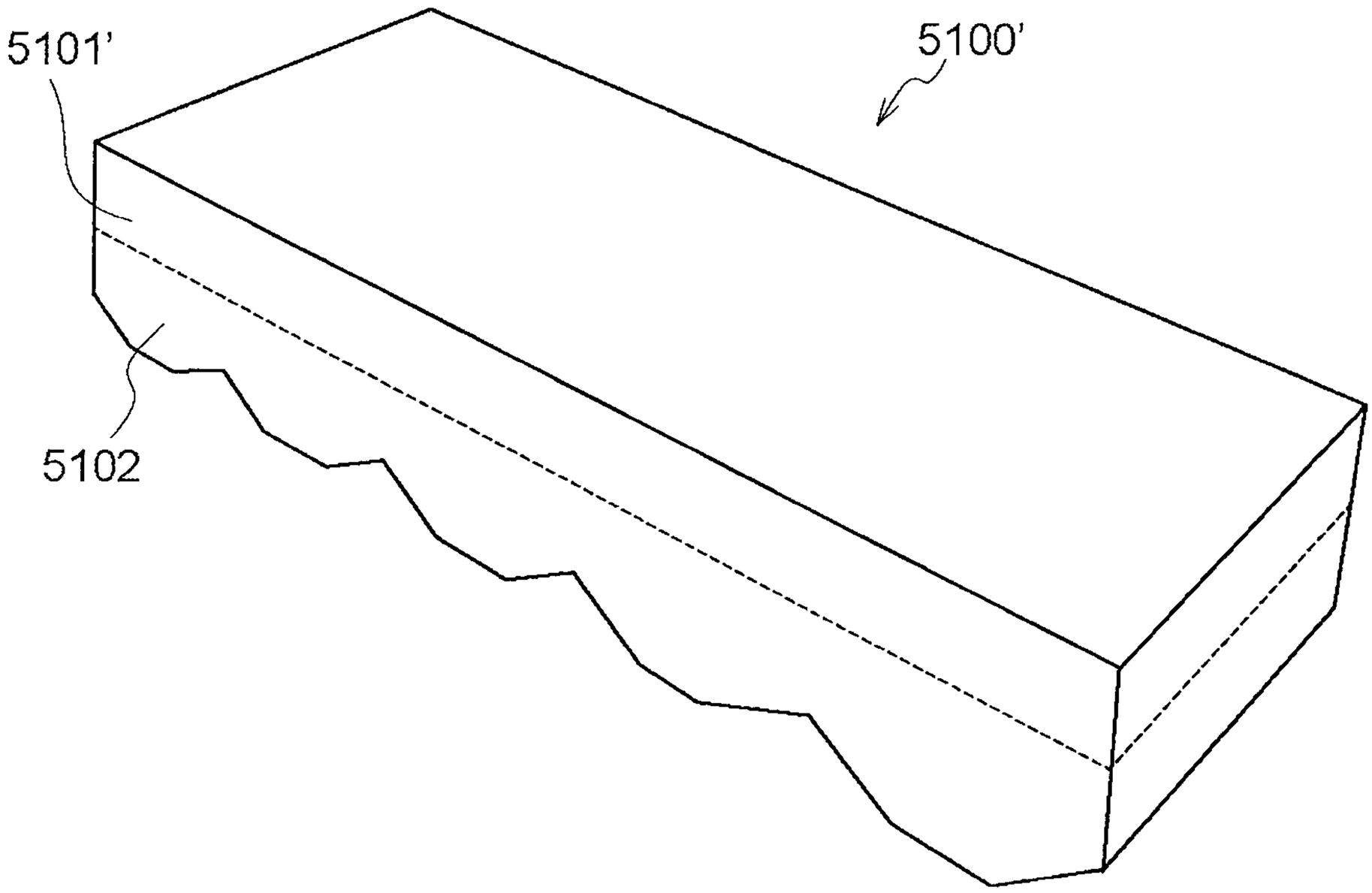


Fig. 39

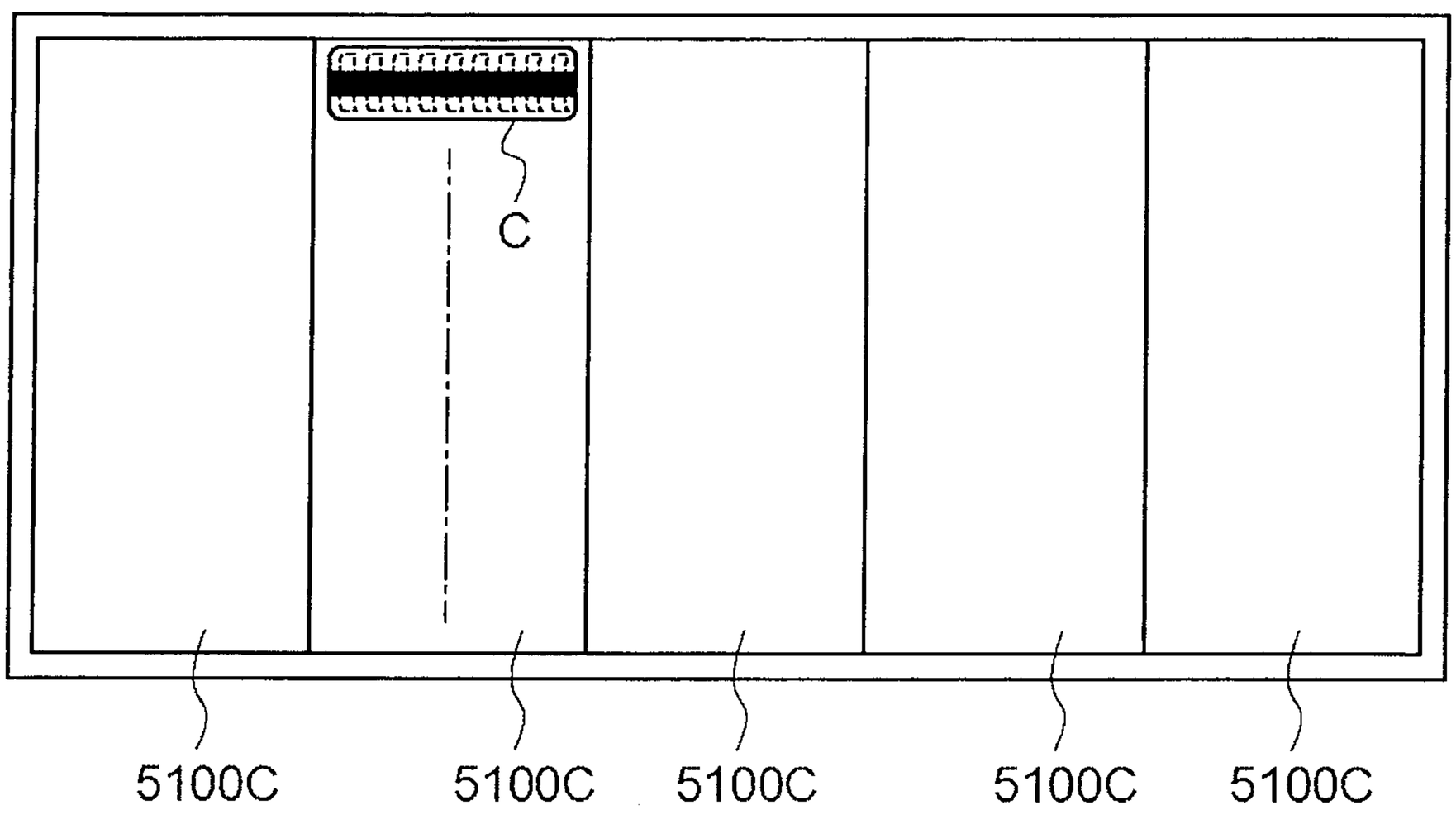


Fig. 40

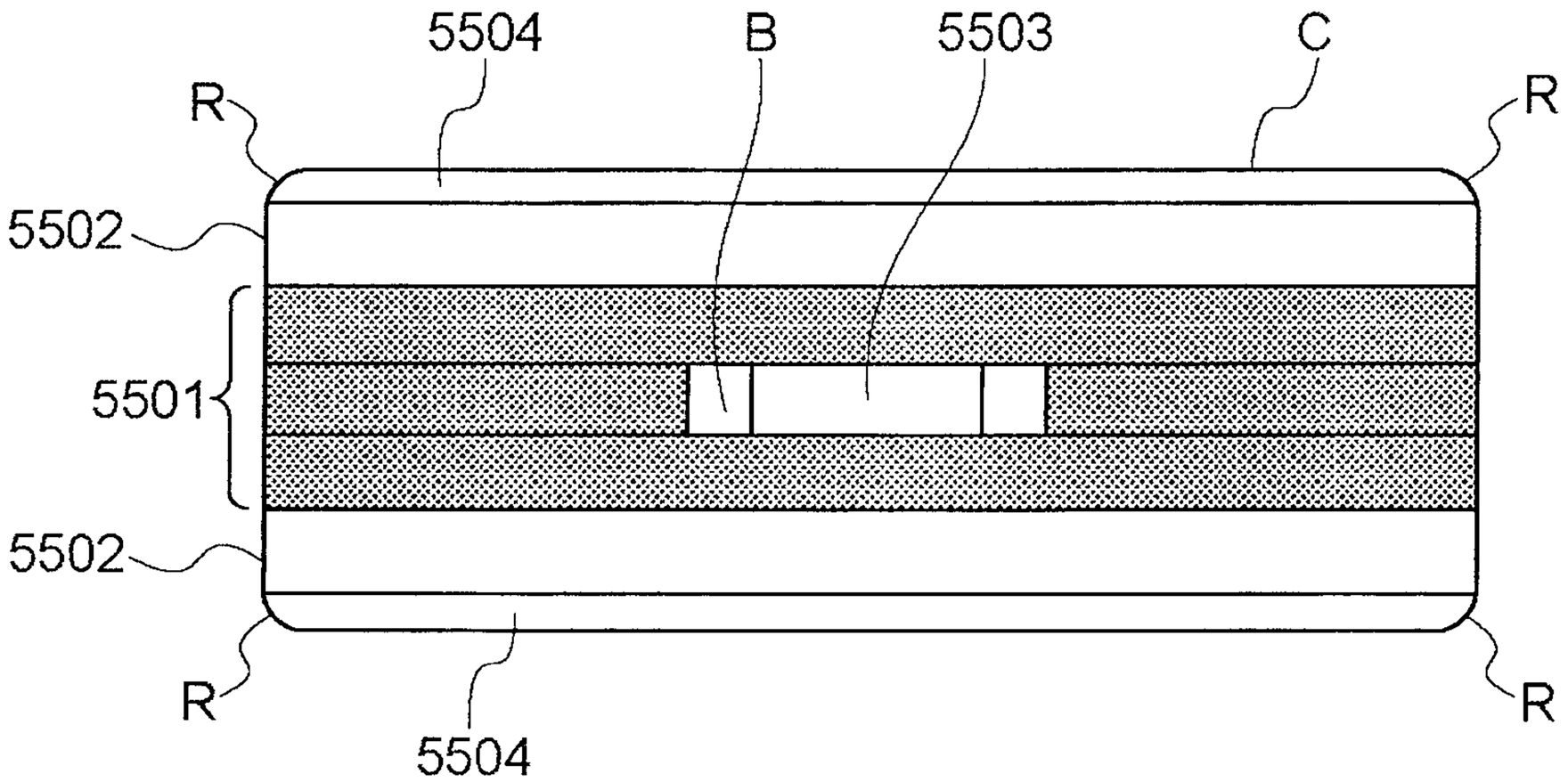


Fig. 41

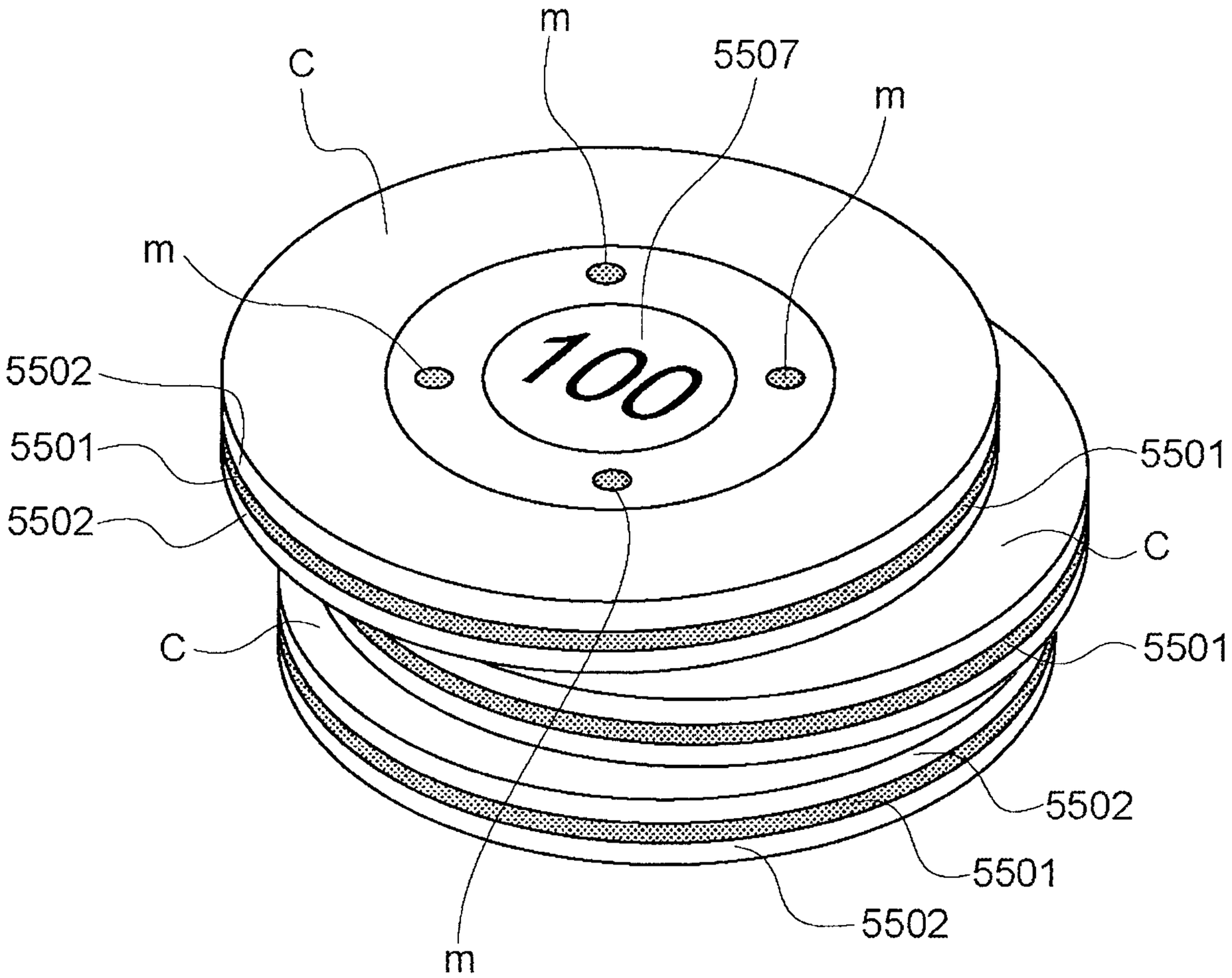


Fig. 42

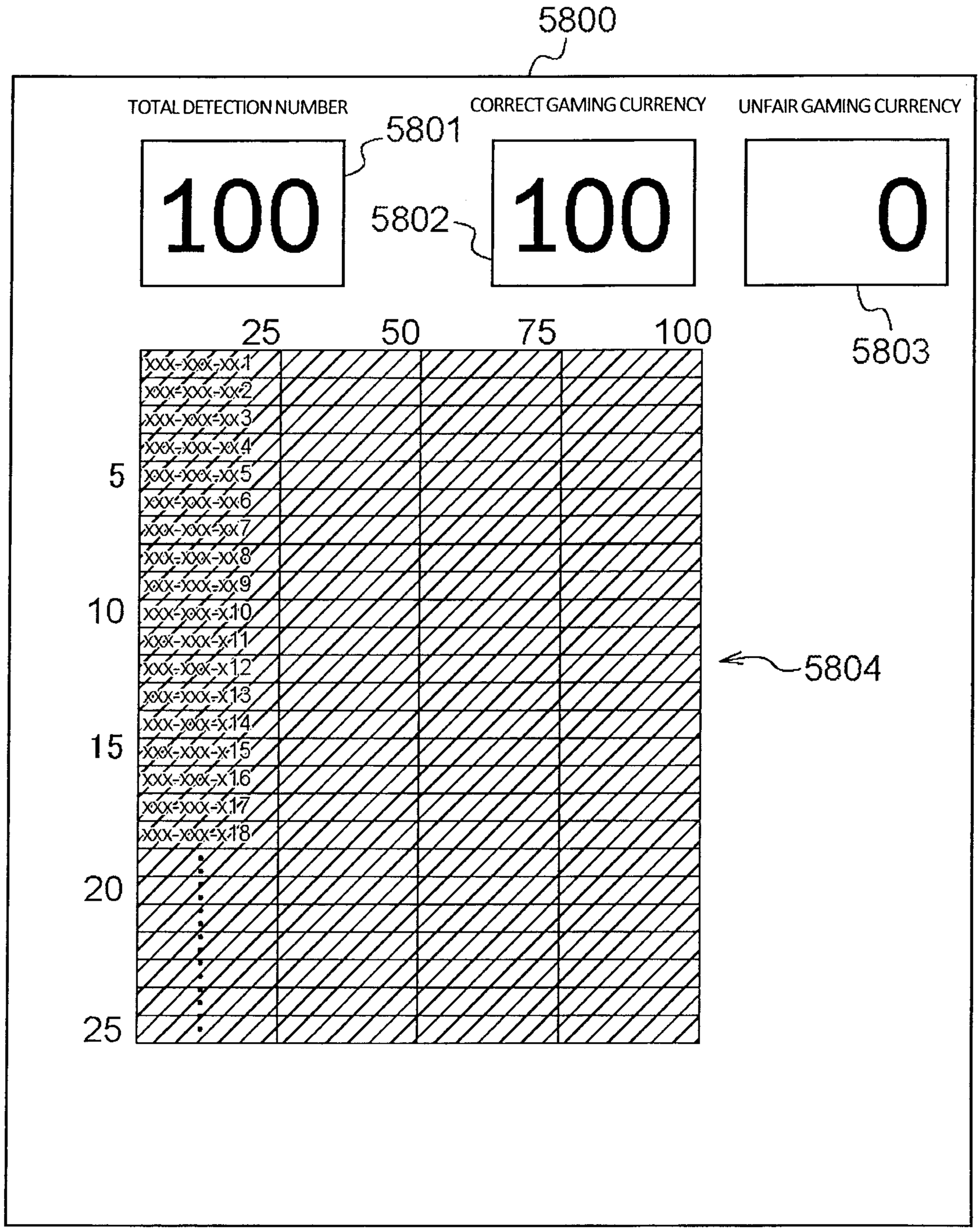

5800
TOTAL DETECTION NUMBER
5801
100
CORRECT GAMING CURRENCY
5802
100
UNFAIR GAMING CURRENCY
0
5803
25
50
75
100
5
10
15
20
25
xxx-xxx-xx1
xxx-xxx-xx2
xxx-xxx-xx3
xxx-xxx-xx4
xxx-xxx-xx5
xxx-xxx-xx6
xxx-xxx-xx7
xxx-xxx-xx8
xxx-xxx-xx9
xxx-xxx-x10
xxx-xxx-x11
xxx-xxx-x12
xxx-xxx-x13
xxx-xxx-x14
xxx-xxx-x15
xxx-xxx-x16
xxx-xxx-x17
xxx-xxx-x18
5804

Fig. 43

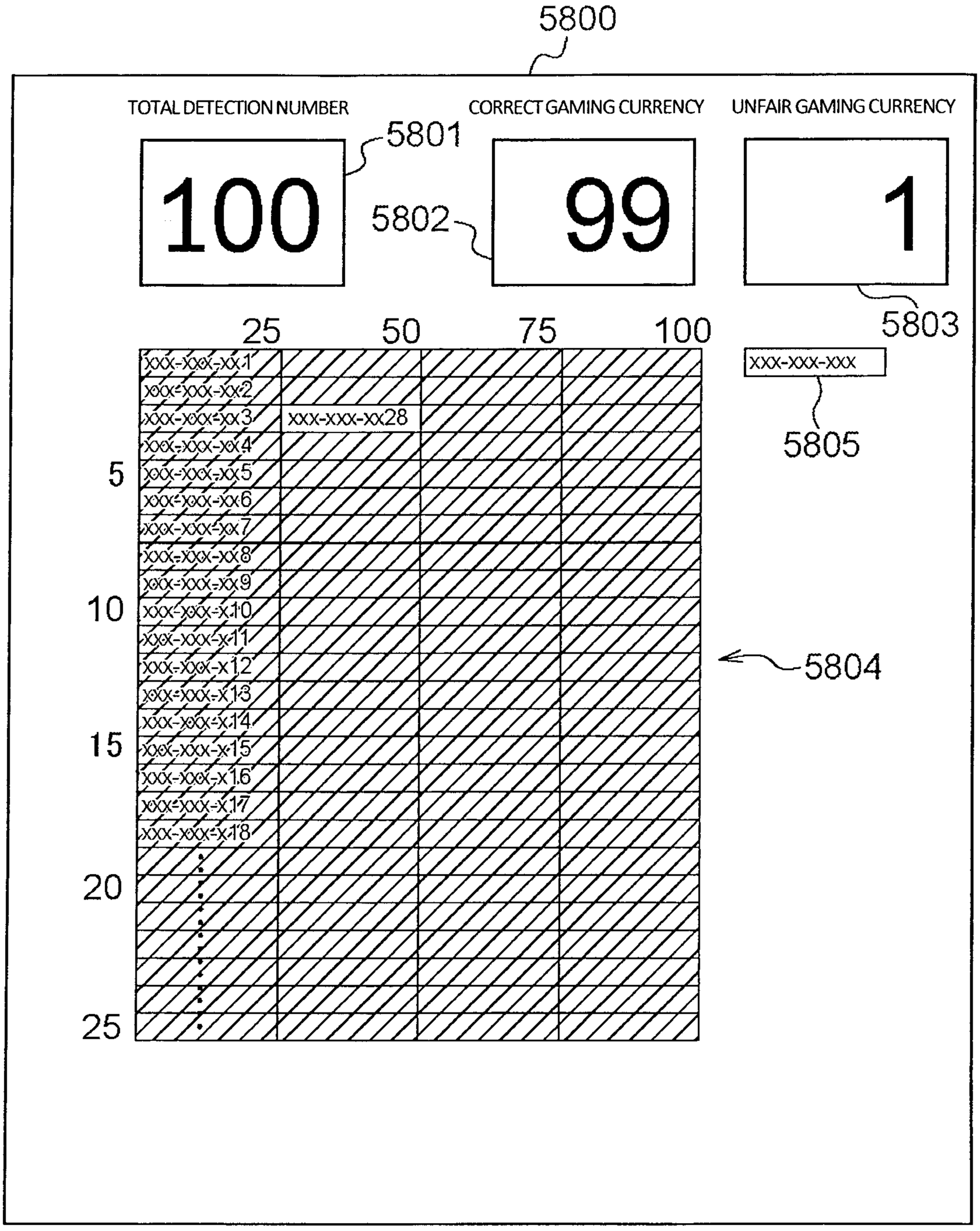
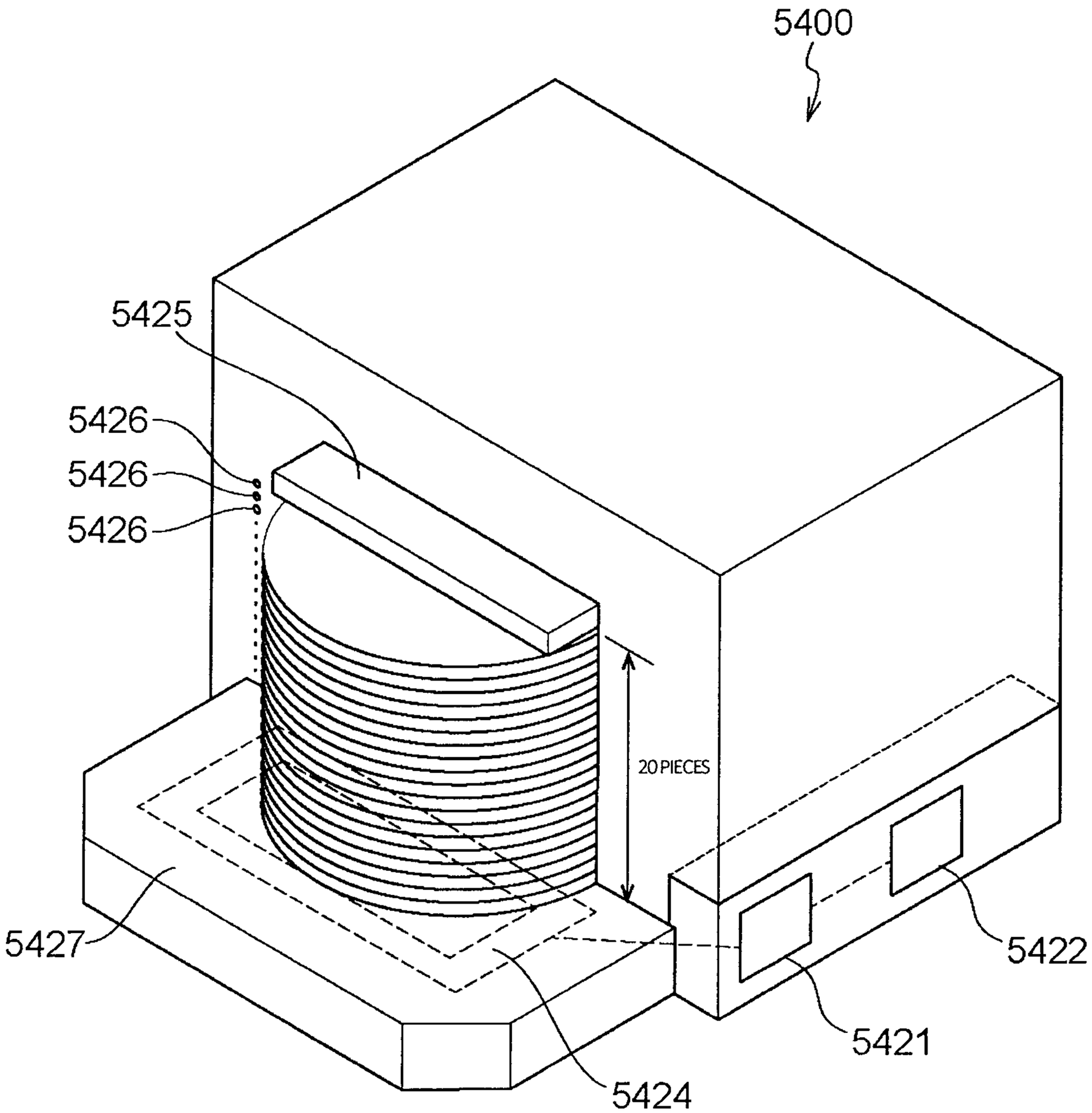

5800
TOTAL DETECTION NUMBER
CORRECT GAMING CURRENCY
UNFAIR GAMING CURRENCY
5801
100
5802
99
1
5803
25
50
75
100
xxx-xxx-xx1
xxx-xxx-xx2
xxx-xxx-xx3
xxx-xxx-xx28
xxx-xxx-xx4
xxx-xxx-xx5
xxx-xxx-xx6
xxx-xxx-xx7
xxx-xxx-xx8
xxx-xxx-xx9
xxx-xxx-x10
xxx-xxx-x11
xxx-xxx-x12
xxx-xxx-x13
xxx-xxx-x14
xxx-xxx-x15
xxx-xxx-x16
xxx-xxx-x17
xxx-xxx-x18
xxx-xxx-xxx
5805
5804
5
10
15
20
25

Fig. 44



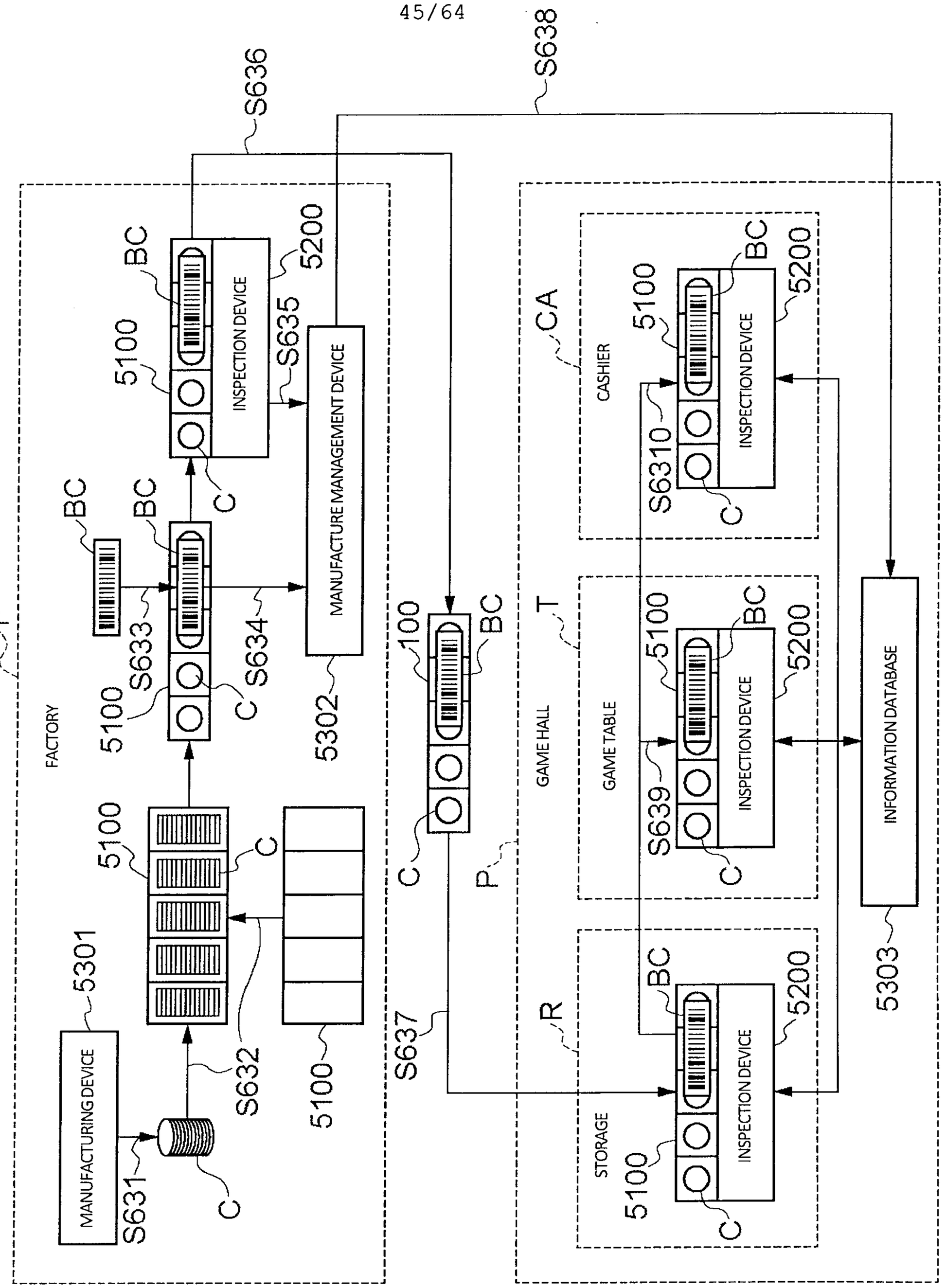

F
FACTORY
MANUFACTURING DEVICE
S631
C
5100
S632
5301
5100
C
S633
BC
BC
C
INSPECTION DEVICE
5100
5200
S634
S635
MANUFACTURE MANAGEMENT DEVICE
5302
S636
S638
100
BC
C
P
S637
T
GAME HALL
GAME TABLE
S639
C
5100
BC
INSPECTION DEVICE
5200
R
STORAGE
5100
C
BC
INSPECTION DEVICE
5200
CA
CASHIER
S6310
C
5100
BC
INSPECTION DEVICE
5200
INFORMATION DATABASE
5303

Fig. 45

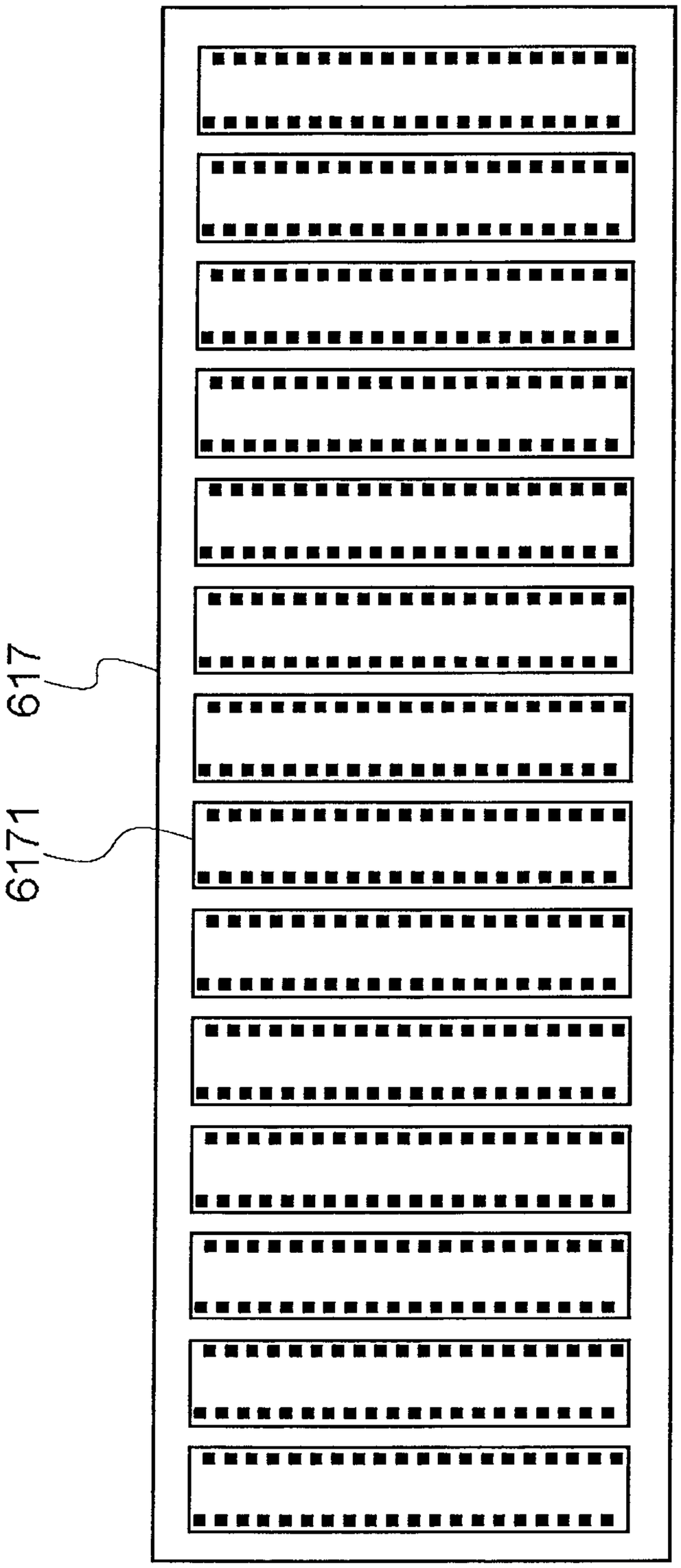


Fig. 46

Fig. 47

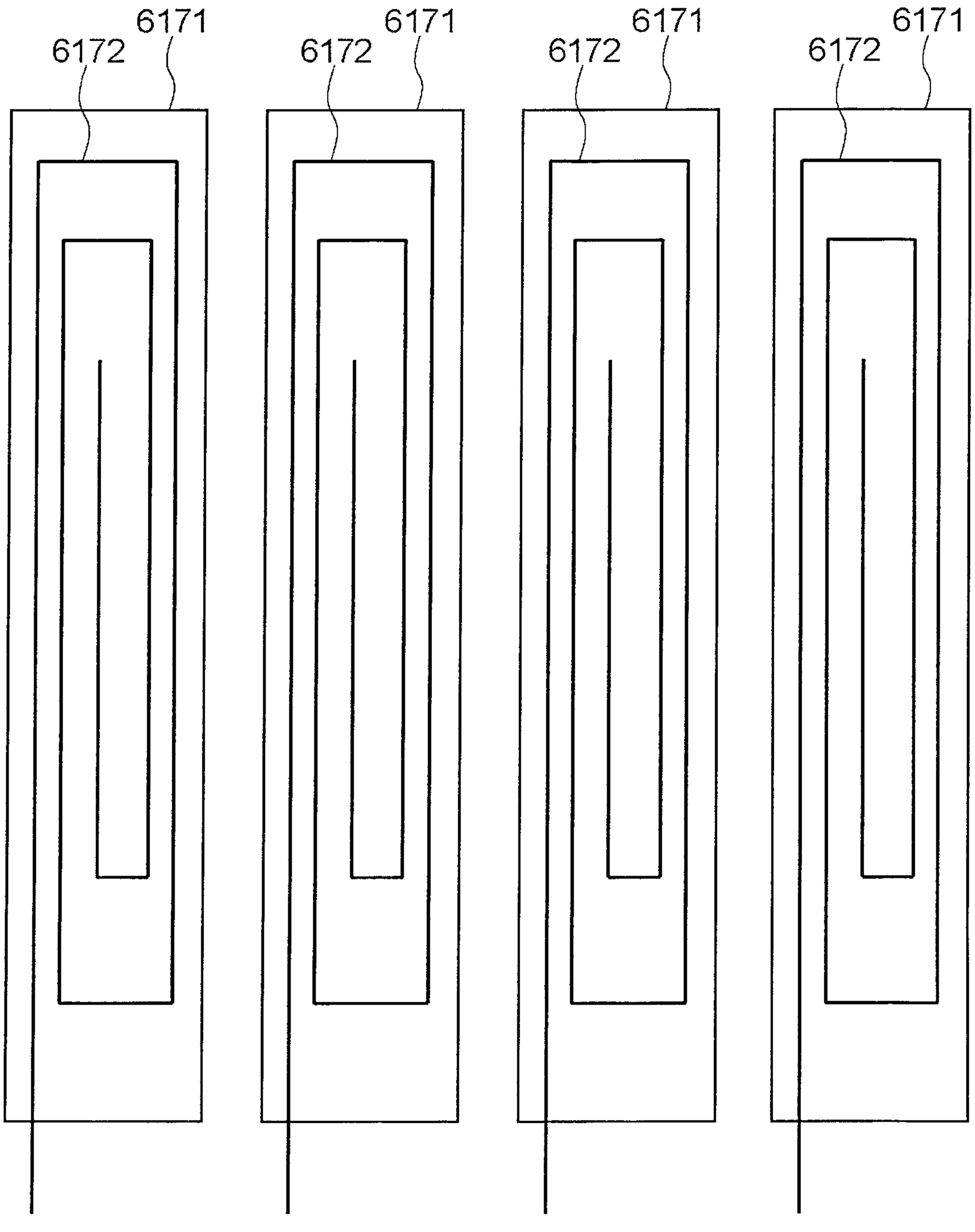


Fig. 48

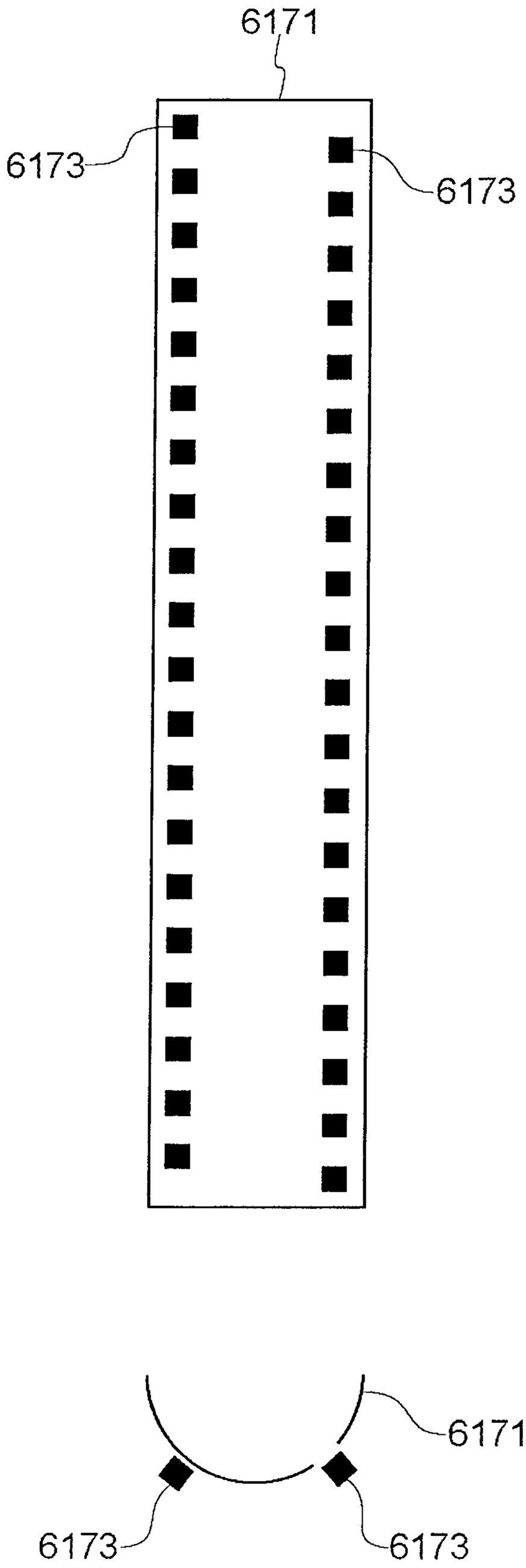
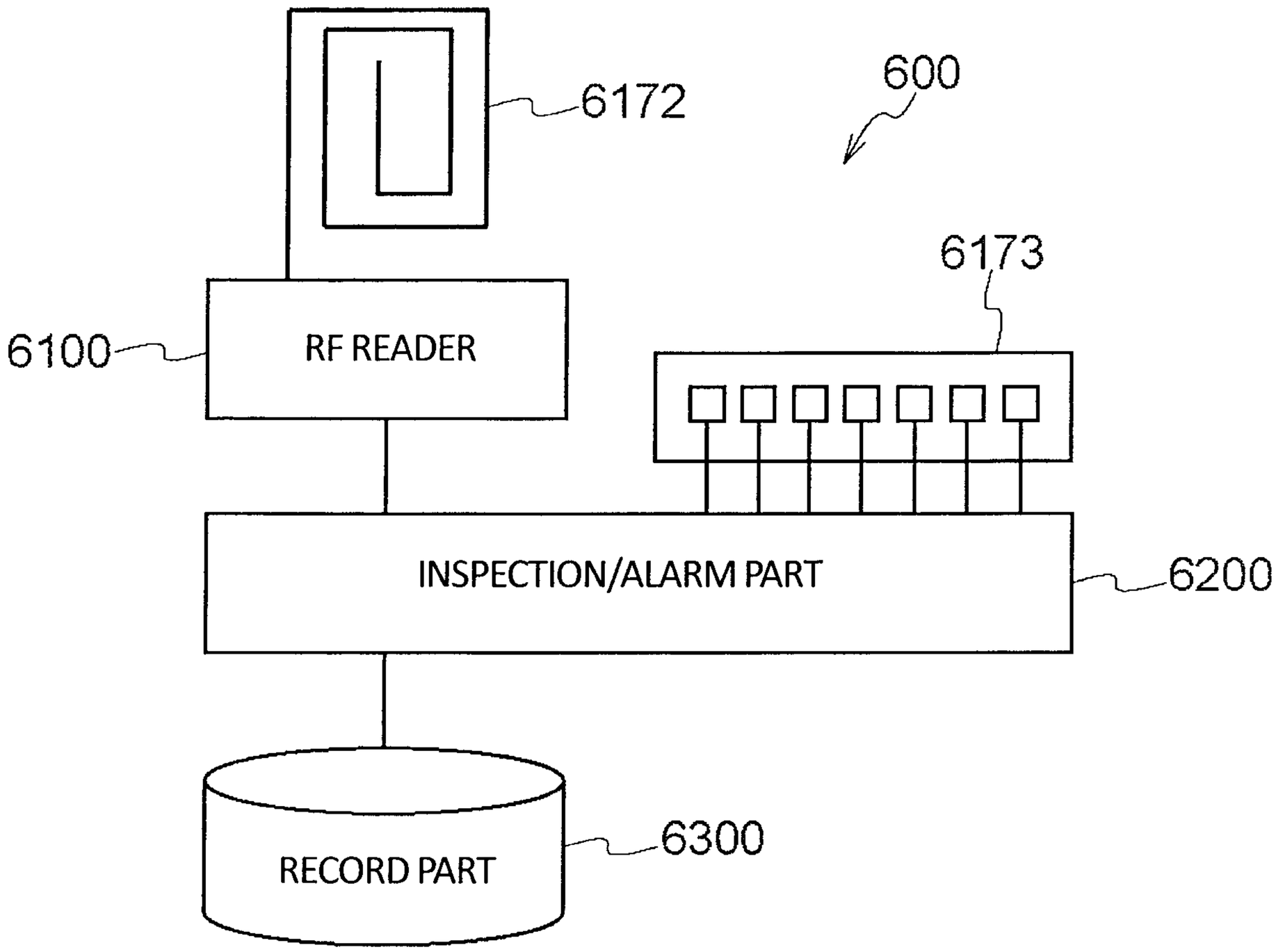


Fig. 49


6172
600
6173
6100
RF READER
INSPECTION/ALARM PART
6200
RECORD PART
6300

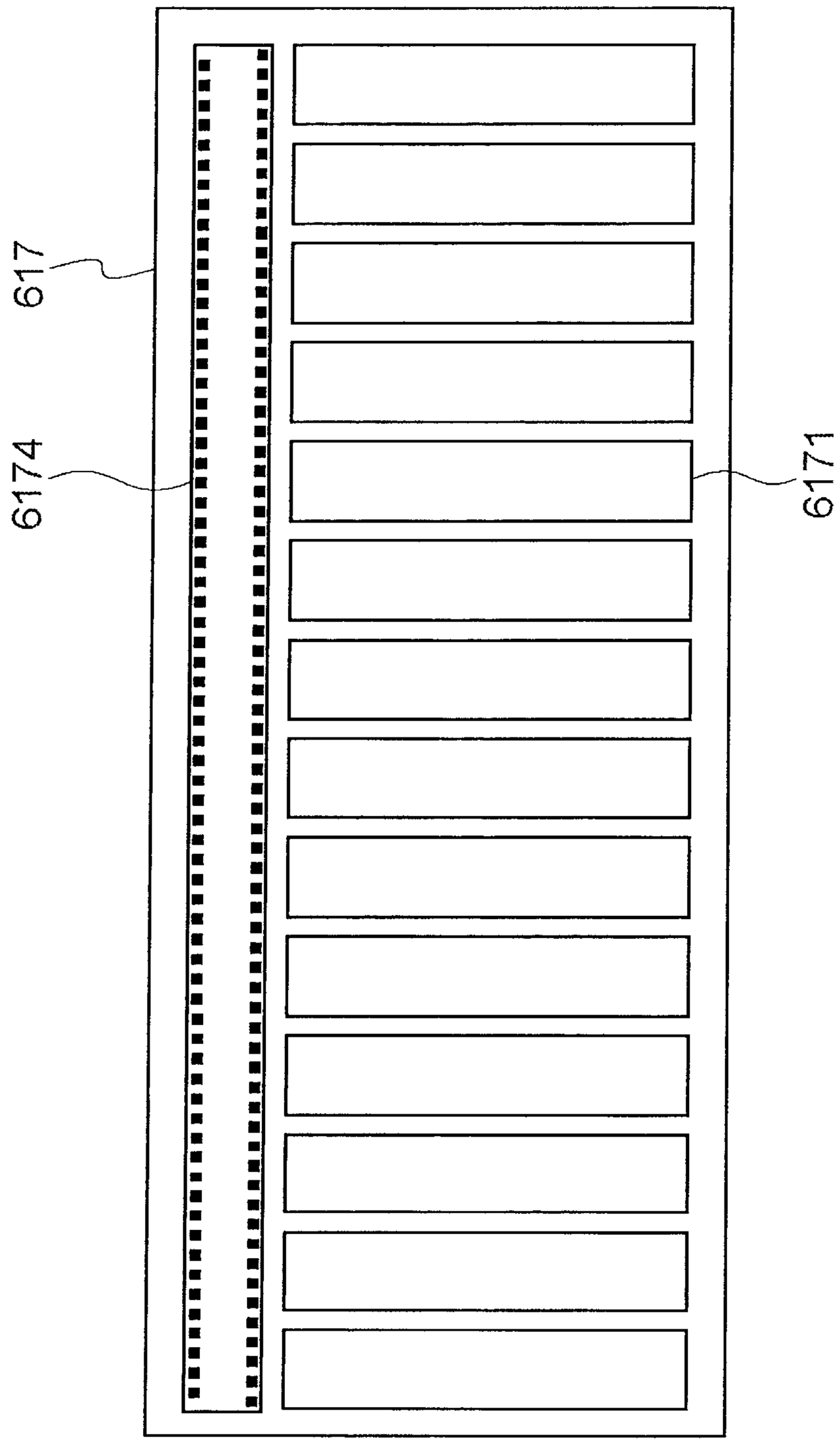


Fig. 50

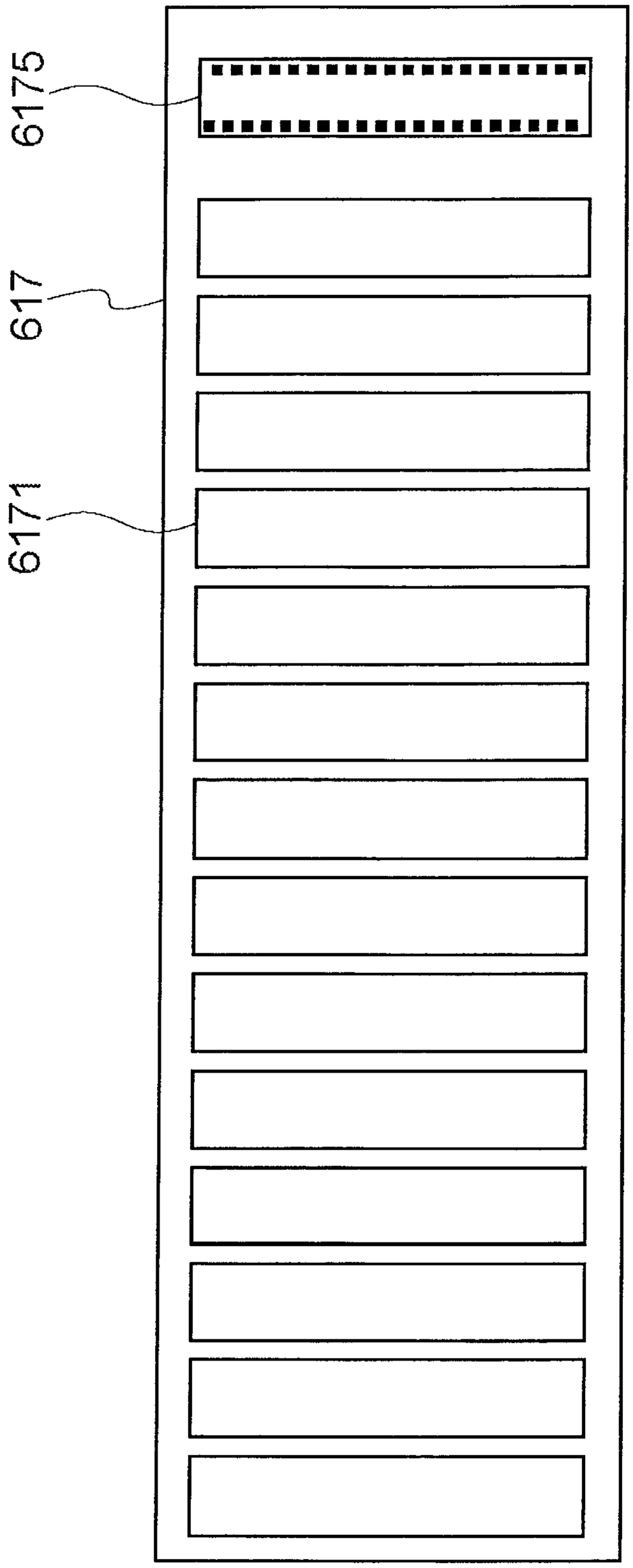


Fig. 51

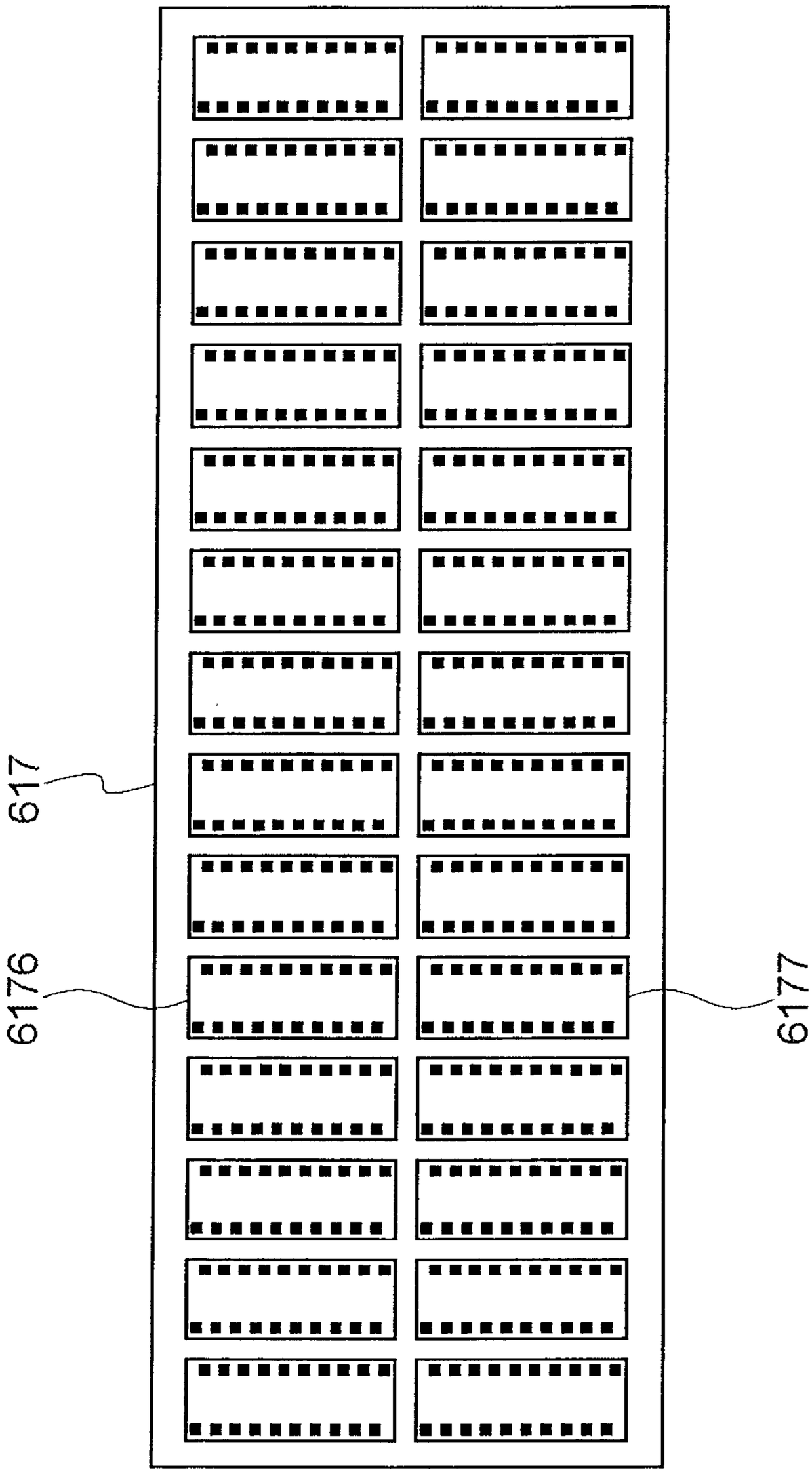


Fig. 52

Fig. 53

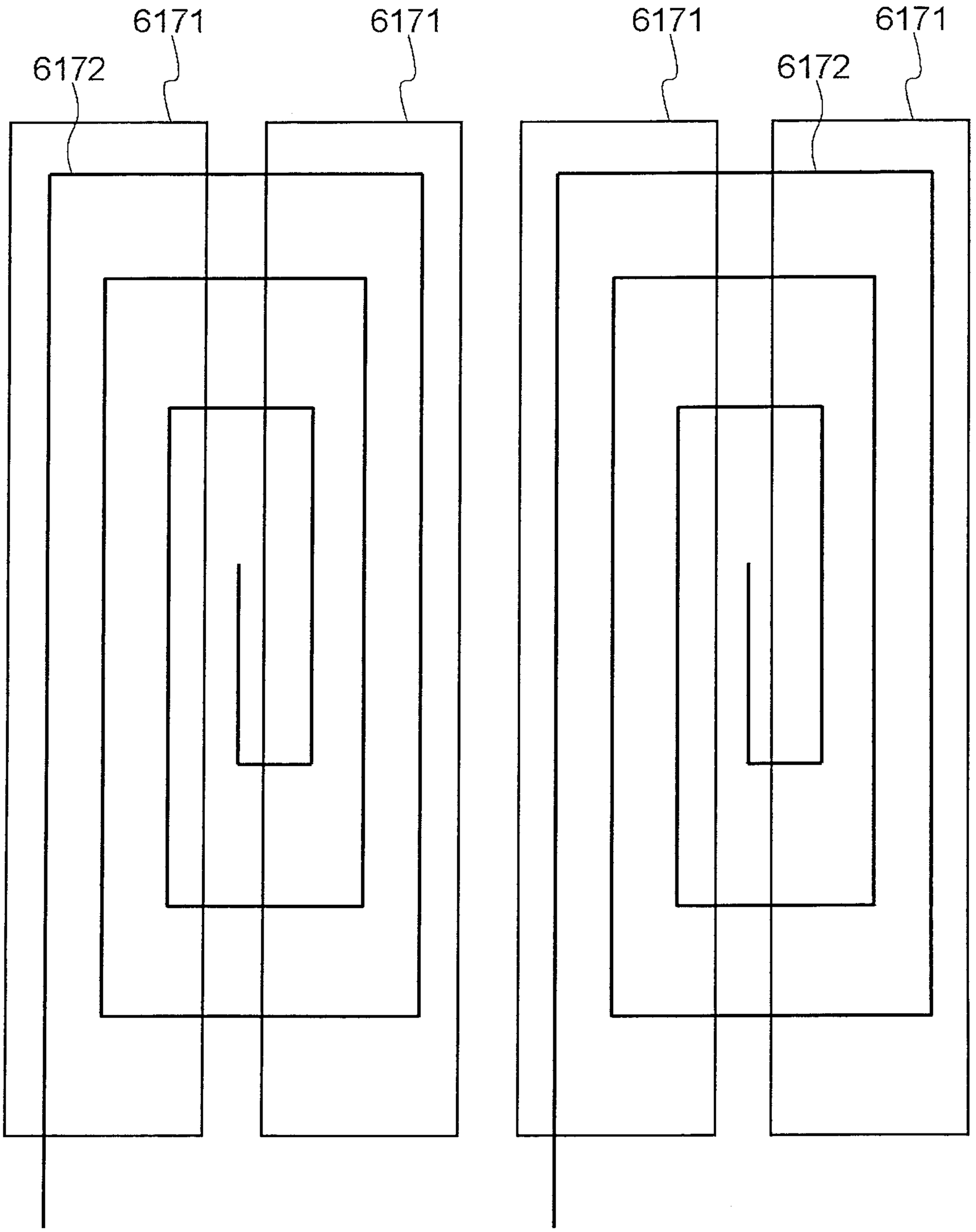


Fig. 54

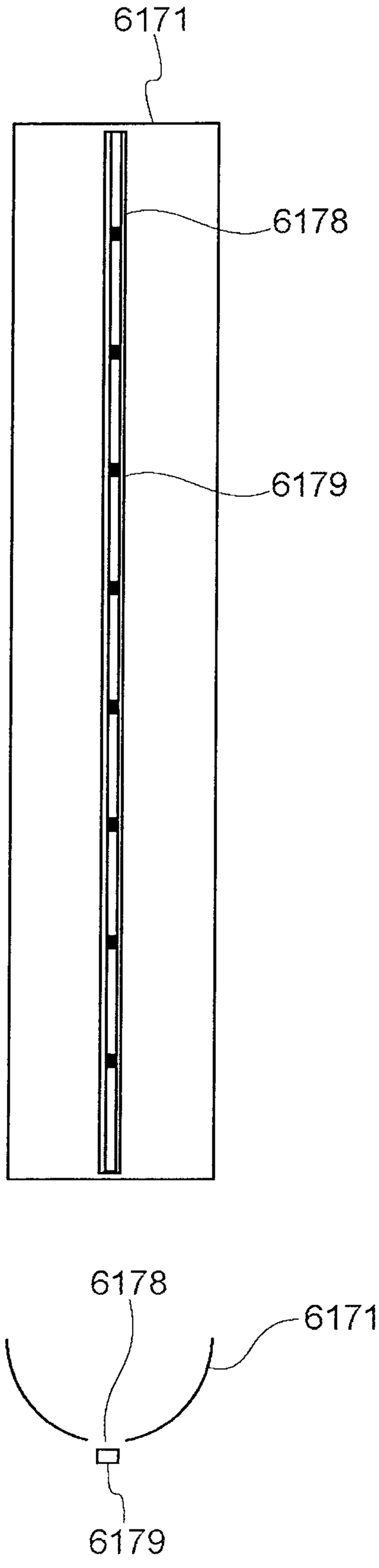


Fig. 55

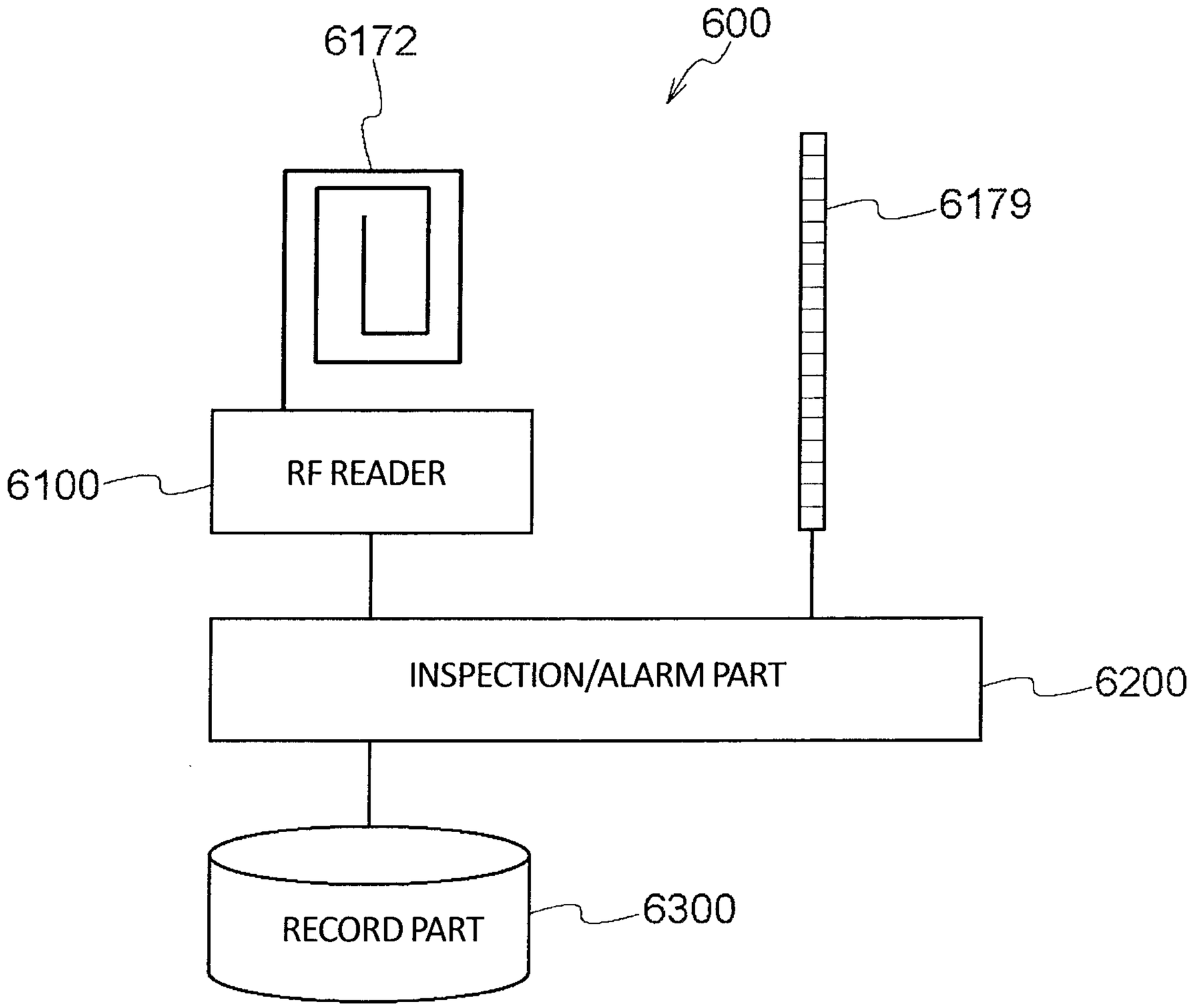

6172
600
6179
RF READER
6100
INSPECTION/ALARM PART
6200
RECORD PART
6300

Fig. 56

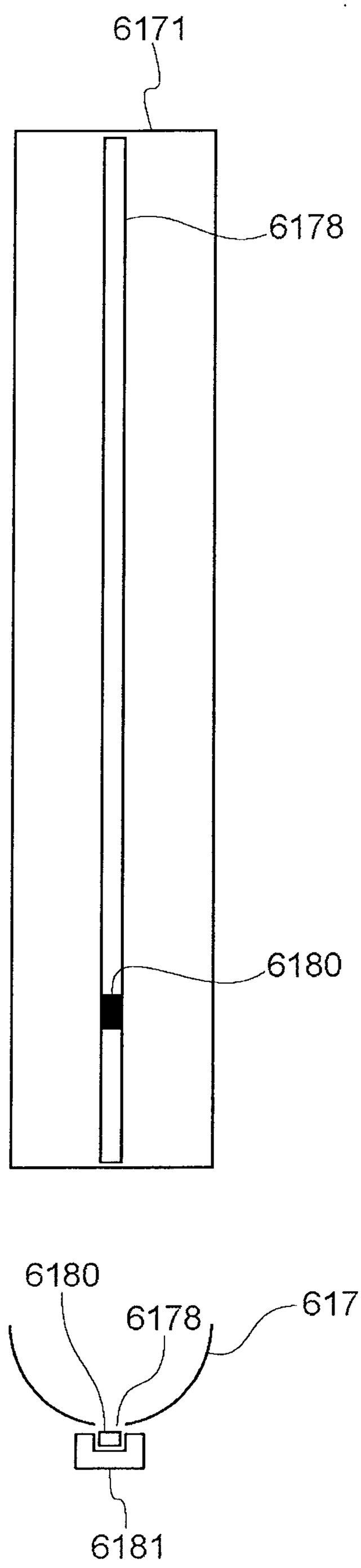


Fig. 57

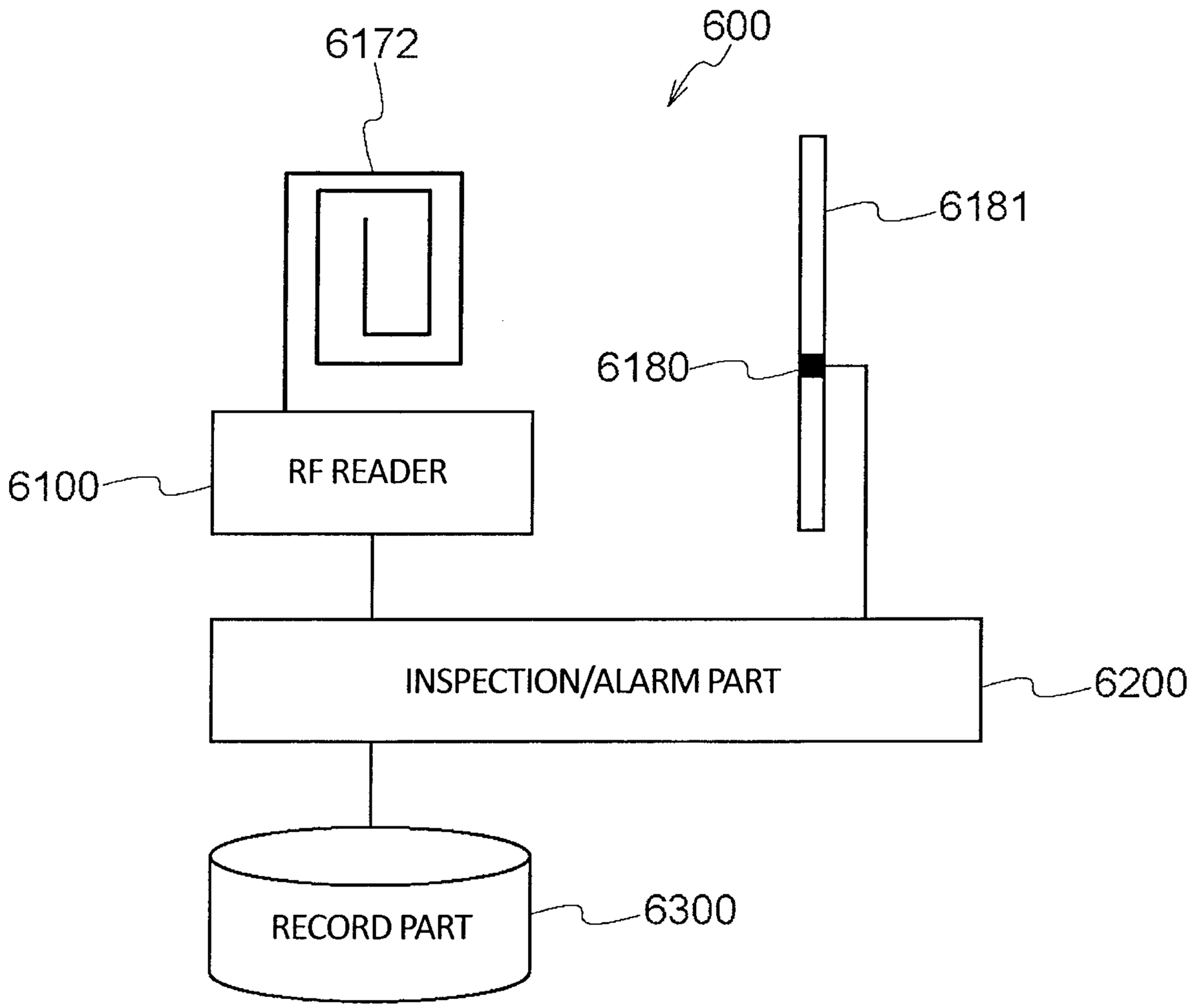

6172
600
6181
6180
RF READER
6100
INSPECTION/ALARM PART
6200
RECORD PART
6300

Fig. 58

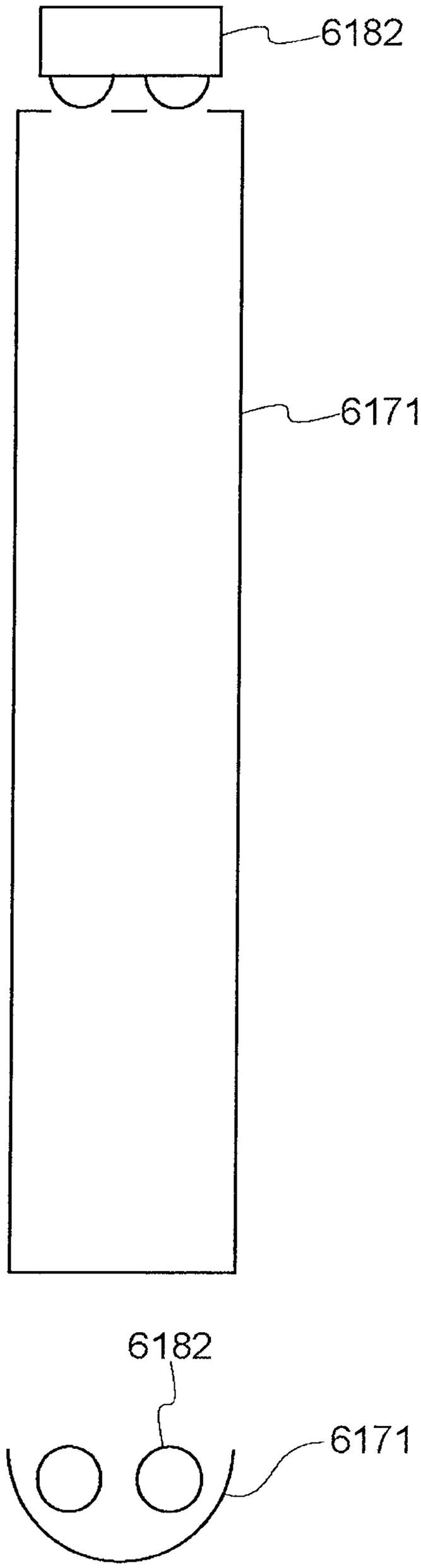


Fig. 59

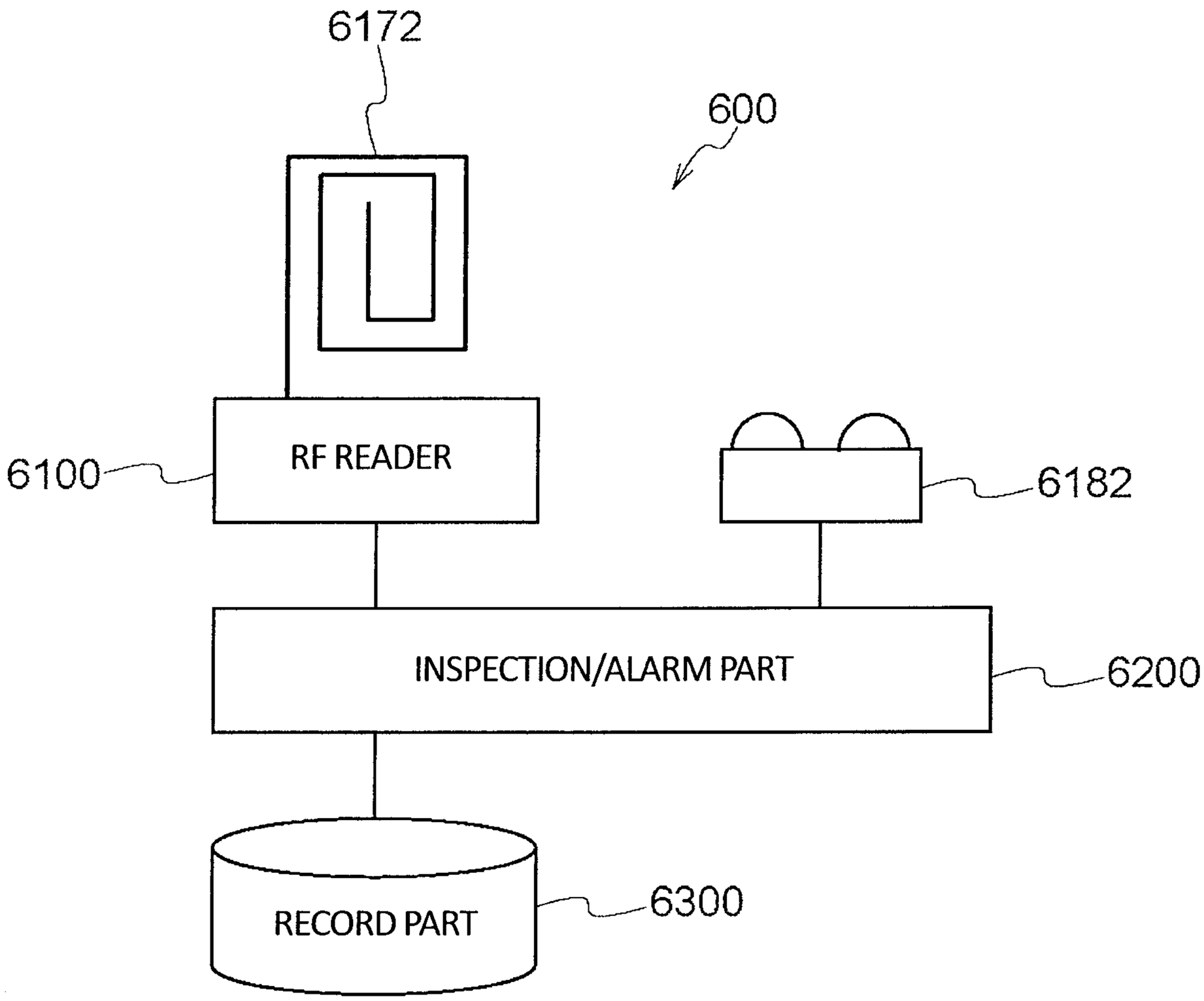

6172
600
RF READER
6100
6182
INSPECTION/ALARM PART
6200
RECORD PART
6300

Fig. 60

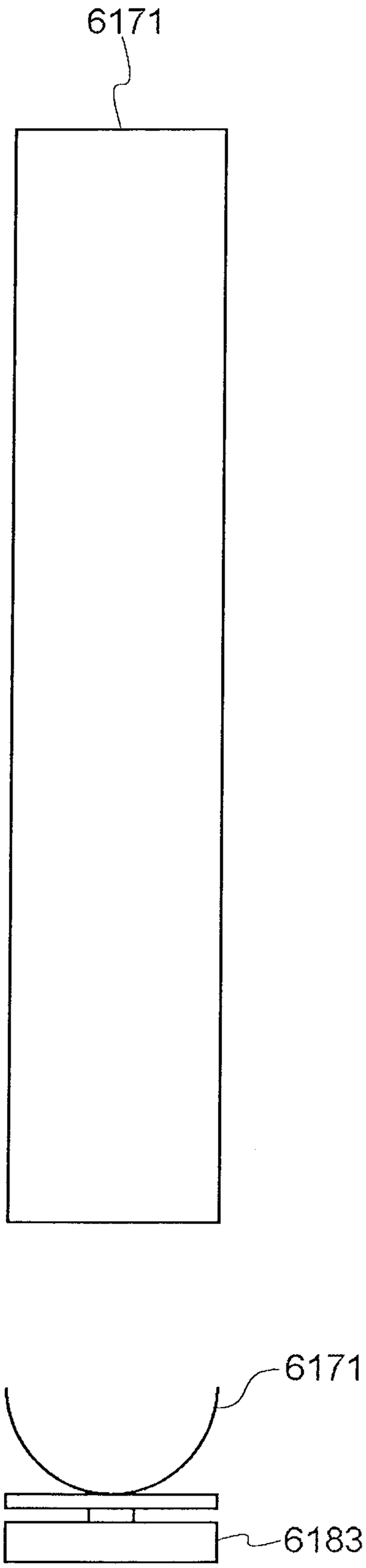


Fig. 61

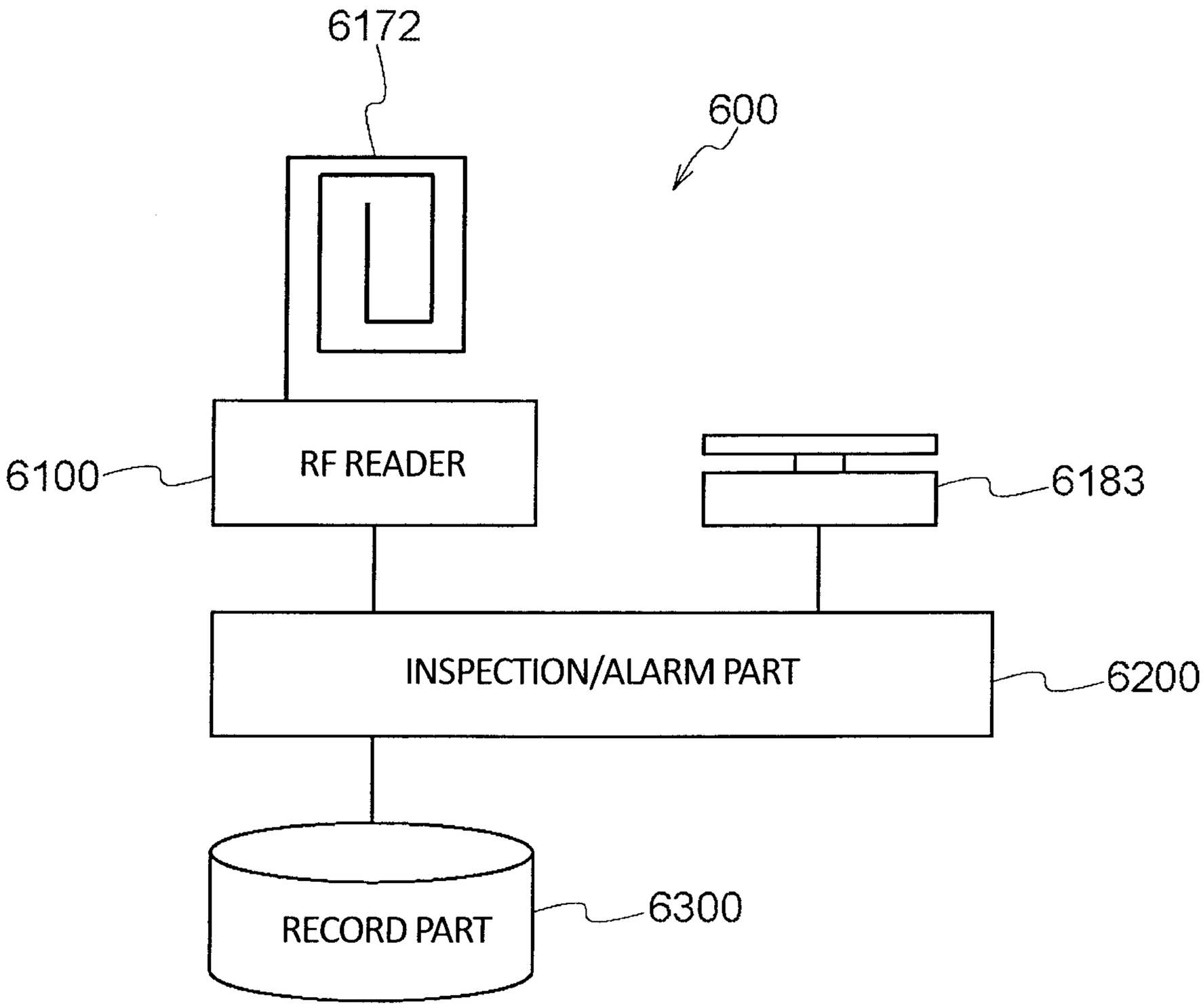

6172
600
RF READER
6100
6183
INSPECTION/ALARM PART
6200
RECORD PART
6300

Fig. 62

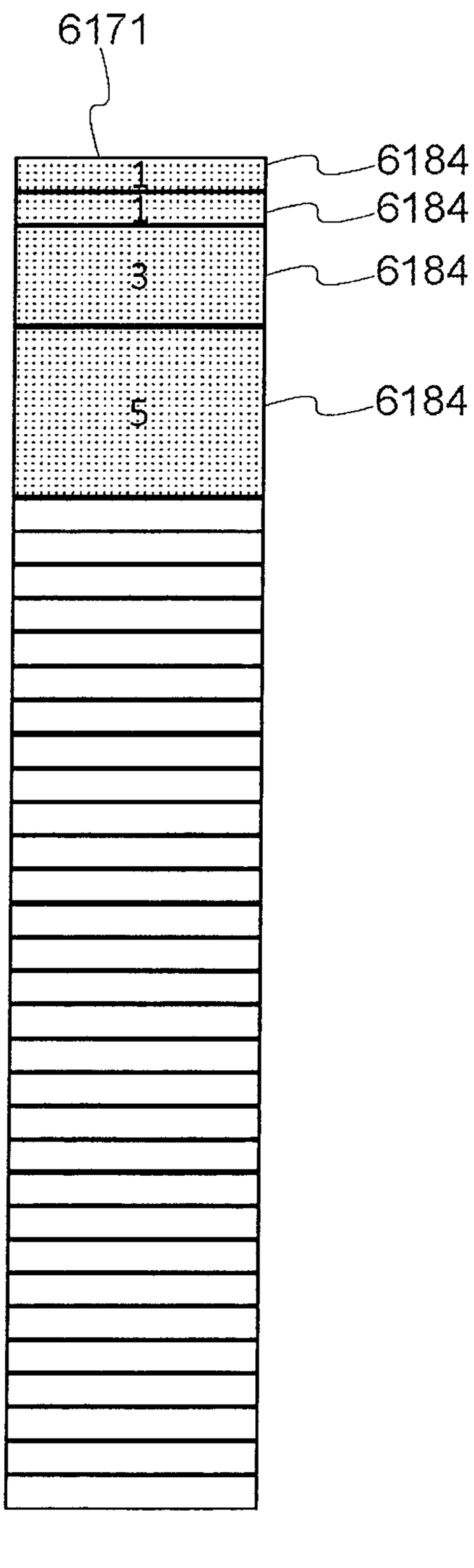


Fig. 63

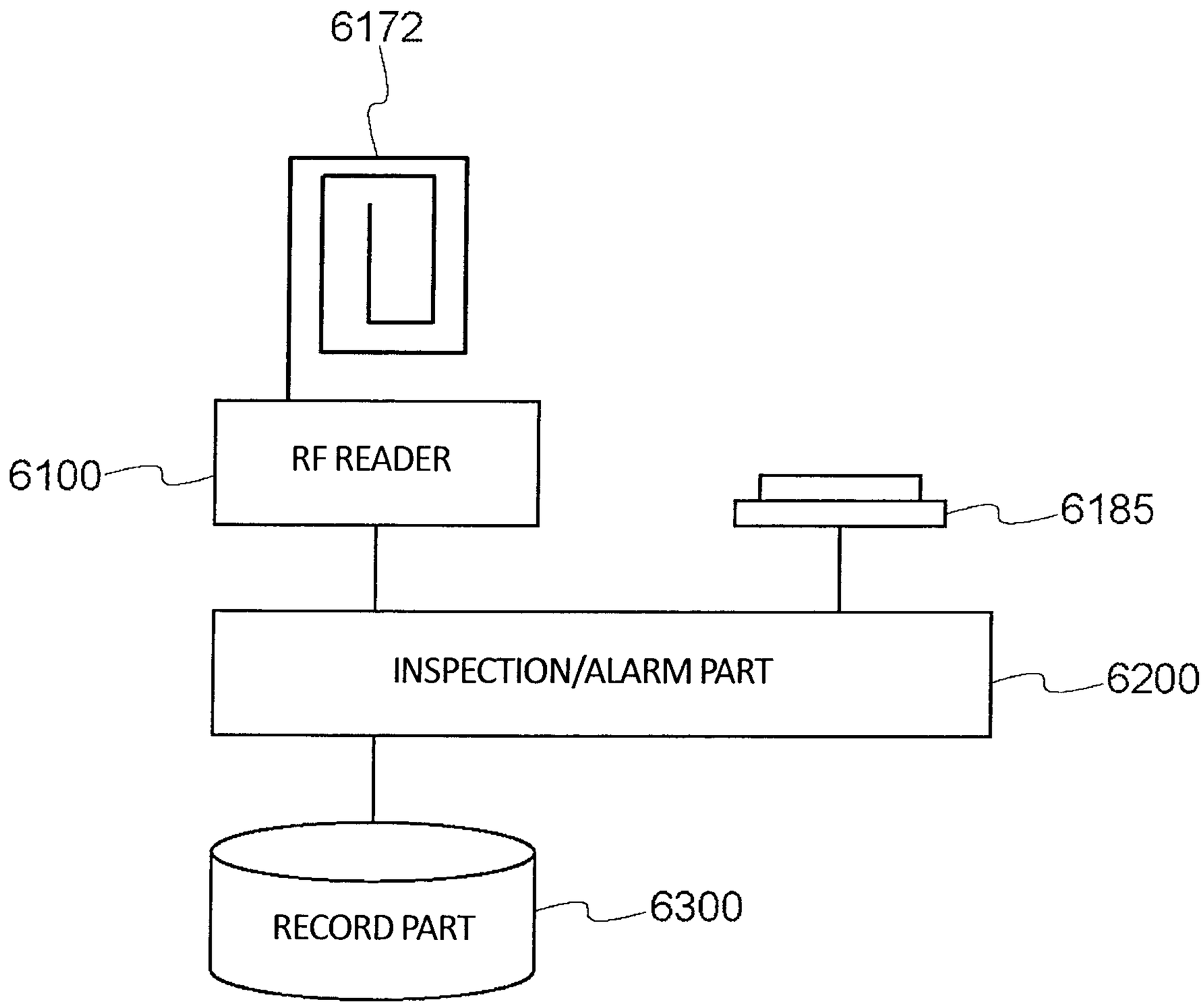
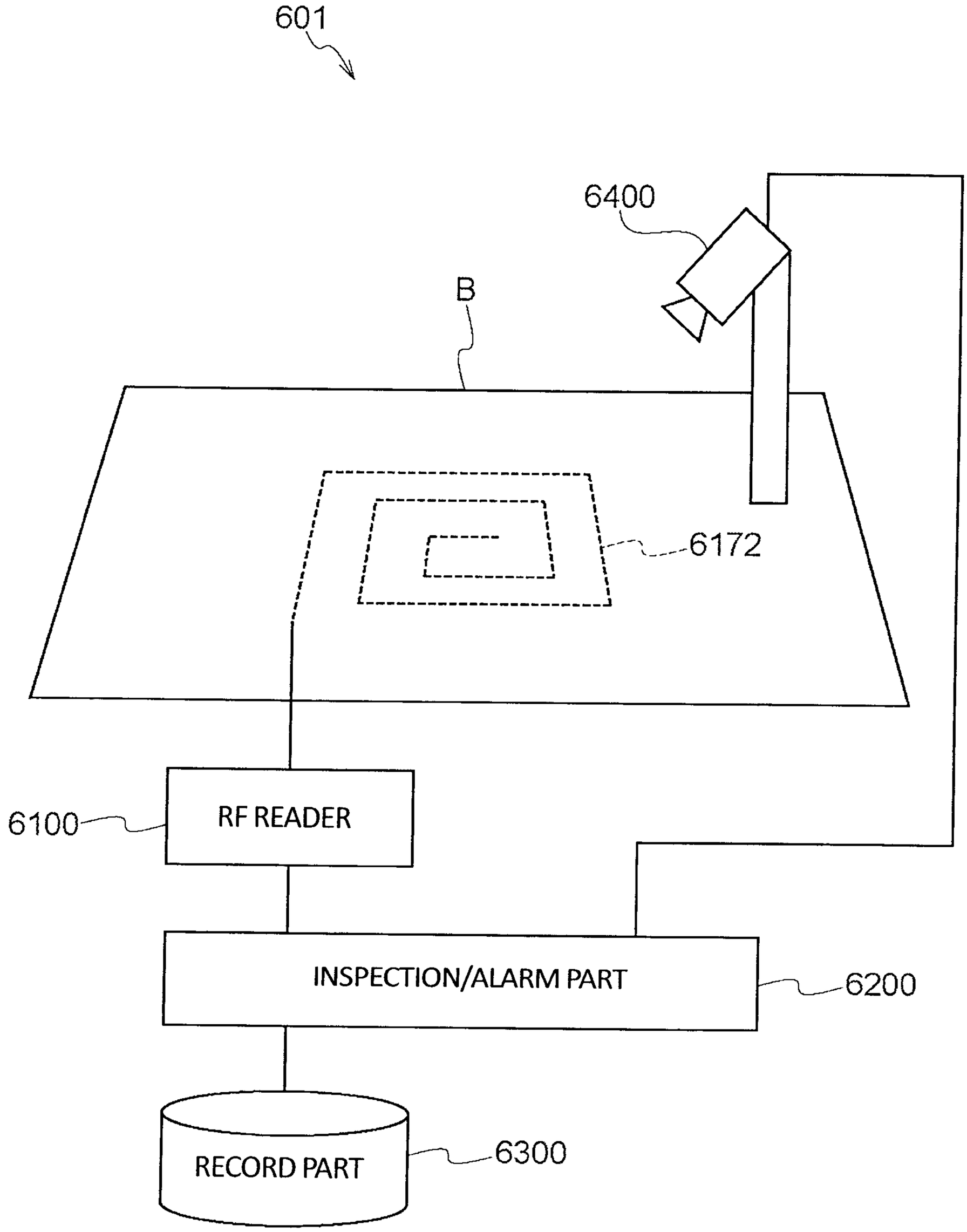
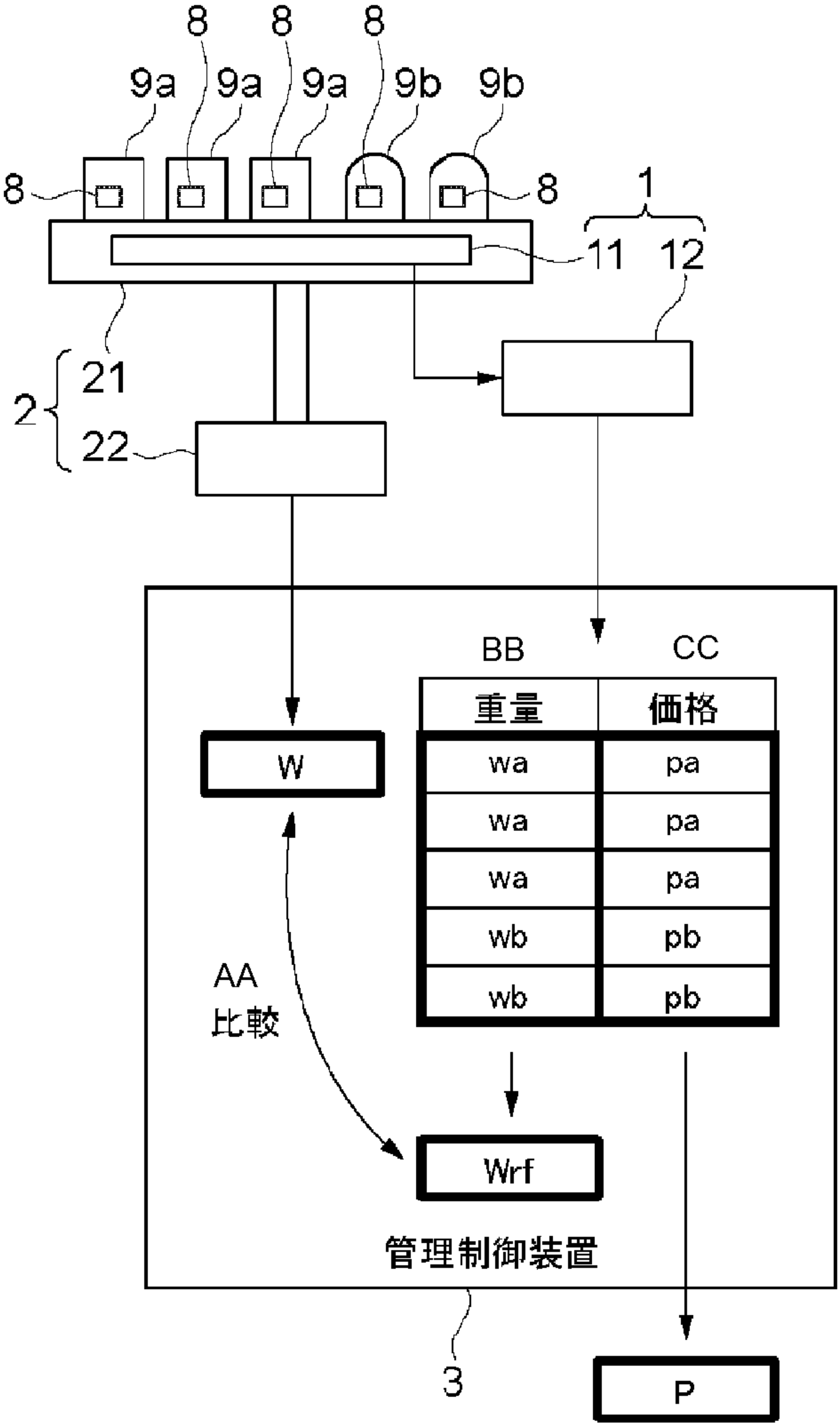

6172
RF READER
6100
6185
INSPECTION/ALARM PART
6200
RECORD PART
6300

Fig. 64


601
6400
B
6172
6100
RF READER
INSPECTION/ALARM PART
6200
RECORD PART
6300

[図4]



3 Management control device
AA Comparison
BB Weight
CC Price