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(54) **REVERSE VENDING MACHINE**

(57) The present invention relates to a reverse vending machine (10), comprising: detection means (12) adapted to detect a shape of an inserted object (14); and a barcode reader (16), wherein the reverse vending machine is configured to: modify a barcode number provided by the barcode reader; search in a database (20) for a database record (22) that includes a) a classification (24)

that matches a classification provided by the detection means and b) a barcode number (26) that matches the modified barcode number; and in response to finding such a database record in the database, handle the inserted object in accordance with further data (28) in the found database record.

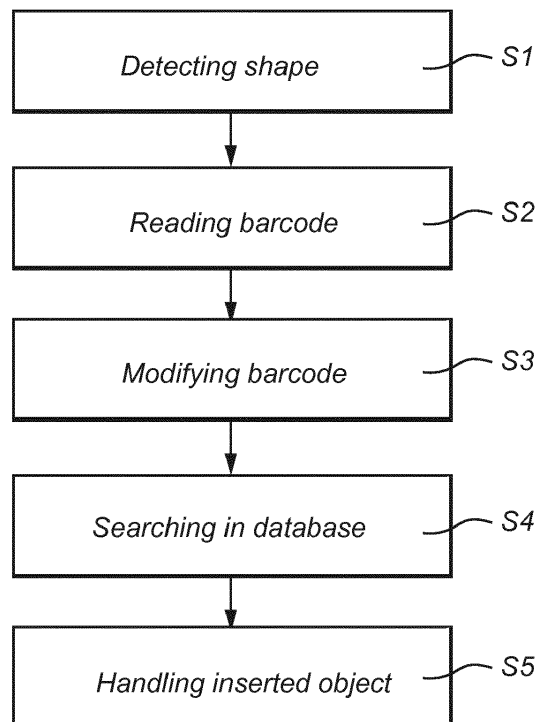


Fig. 3

DescriptionTechnical field of the invention

[0001] The present invention relates to reverse vending machine comprising (shape) detection means and a barcode reader. The present invention also relates to a database, a method, a computer program product, a computer-readable storage medium, and an electrical signal.

Background

[0002] A reverse vending machine is a machine where people can return empty beverage containers like bottles and cans for recycling. The machine often gives back a deposit or refund amount to the end user.

[0003] An example of a technology used to recognize objects and in particular containers inserted into a reverse vending machine is TOMRA's Sure Return™. In Sure Return™, precise shape and barcode recognition ensures correct refund.

[0004] Technologies like Sure Return use a database containing the barcodes - or rather the barcode numbers - of all the different containers that should be accepted by one or more reverse vending machines on a particular market. Such a database typically includes 1000+ barcodes/barcode numbers, and the database has to be constantly monitored, maintained, and updated, which among other things is time consuming and requires great accuracy.

Summary of the invention

[0005] It is an object to provide a technical solution that alleviates or overcomes the aforementioned problem(s).

[0006] According to a first aspect of the present invention, this and other objects is achieved by means of a reverse vending machine, comprising: detection means adapted to detect at least a shape of at least a portion of an object inserted into the reverse vending machine and to provide a classification of the inserted object based at least partly on the detected shape; and a barcode reader adapted to read a barcode on the inserted object and to provide a barcode number corresponding to the read barcode, wherein the reverse vending machine is configured to:

- modify the barcode number provided by the barcode reader;
- search in a database for a database record that includes a) a classification that matches the classification provided by the detection means and b) a barcode number that matches the modified barcode number; and
- in response to finding such a database record in the database, handle the inserted object in accordance with further data in the found database record.

[0007] The present invention is based on the understanding that by modifying the barcode number, several different inserted objects - even an object which is a product that did not exist when the record was created - can match of a single database record, whereby the database can contain much fewer database records than a conventional database, while the modified barcode number together with the shape-based classification still allows the reverse vending machine to be sufficiently sure that the inserted object is an object that should be accepted. As (will be) appreciated, the present invention may greatly reduce the need to monitor, maintain, and update the database. Furthermore, fewer database records may reduce the storage space needed for the database as well as reduce the search response time (fewer records to search), which overall may lead to a more efficient operation of the reverse vending machine. Furthermore, the reverse vending machine may be configured to modify the barcode number and search in the database as defined above by means of software using existing or conventional hardware, making it a cost effective solution.

[0008] In a preferred embodiment, the reverse vending machine is configured to modify the barcode number provided by the barcode reader by replacing a subset of positionally consecutive digits of the barcode number at a predetermined position in the barcode number with a predetermined set of characters, in which predetermined set of characters the number of characters is equal to the number of digits in said subset of positionally consecutive digits, and in which predetermined set all characters are the same, wherein the predetermined set of characters is the same for any modified barcode number for a given barcode type.

[0009] Consider the following non-limiting examples: a first object inserted into the reverse vending machine is a 33 cl aluminium can of a product A from manufacturer (producer or distributor) X, which first object has a barcode (EAN-13) encoding the barcode number 12 34567 89101 2, wherein the first two digits of the barcode number are a country code or prefix, the following five digits are a manufacturer code, the following five digits are a product code, and the last digit is a check digit. Furthermore, a second object inserted into the reverse vending machine is a 33 cl aluminium can of a different product B from the same manufacturer X, which second object has a barcode (EAN-13) encoding the barcode number 12 34567 87652 3. By replacing the product code and check digit ('subset of positionally consecutive

digits') in both barcode numbers with zeros ('predetermined set of characters'), both objects can match a single database record which includes the barcode number 12 34567 00000 0 and the classification '33 cl aluminium can'. Combined with the shape-based classifications, such a match is an additional check for the reverse vending machine that the inserted objects should be accepted, as the match links the objects to the manufacturer X, even if the specific products A and B are not confirmed by the database. Also a brand new 33 cl aluminium can product C from manufacturer X would be accepted by the reverse vending machine modifying the barcode number of the new product as defined above (e.g. 12 34567 22222 2 modified to 12 34567 00000 0), without having to add the new product C to the database. Furthermore, another database record which includes the same barcode number 12 34567 00000 0 but a different classification '1.5 l PET bottle' would cover any number of 1.5 l PET bottle products by the same manufacturer X. Furthermore, if a new manufacturer Y enters the market with say five different 50 cl PET bottle products, only one record would have to be added to the database for the reverse vending machine to accept these products. That record could include the classification '50 cl PET bottle' and a barcode number including manufacturer code for the manufacturer Y but ending with 00000 0 instead of a conventional product code and check digit.

[0010] Accordingly, the subset of positionally consecutive digits of the barcode number provided by the barcode reader may include a product code, wherein the barcode number provided by the barcode reader further includes a manufacturer code, and wherein the modified barcode number includes the manufacturer code but not the product code.

[0011] Furthermore, the barcode may be a EAN-13 barcode, wherein replacing a subset of positionally consecutive digits of the barcode number at a predetermined position in the barcode number includes replacing the last six digits of the barcode number with said predetermined set of characters. Alternatively, the barcode may be UPC-A (12 digits) or EAN-8 (8 digits), for example. To this end, the reverse vending machine may be configured to determine the type of the barcode read by the barcode reader (e.g. EAN-13 or UPC-A or EAN-8), and to modify the barcode number based on the determined type.

[0012] Furthermore, the characters of said predetermined set may be zeros, for example 00000 0. Hence, the barcode number may generally be modified by replacing the last four or six digits with (an equal number of) zeros.

[0013] Furthermore, the database may comprise several database records with the same barcode number but different classifications, which barcode number comprises said predetermined set of characters. For example, that barcode number may include a manufacturer code but no product code. In one market wherein the conventional database includes over 16000 regular barcode numbers, about 90% of those barcode numbers could be covered with approximately 1390 barcode numbers comprising zeros instead of the product code and the check digit.

[0014] Furthermore, the modified barcode number may comprise one or more zeros at at least one predetermined position such that a product code of the barcode number provided by the barcode reader is nullified, whereby the modified barcode number only indicates country/manufacturer.

[0015] Furthermore, the reverse vending machine is configured to modify the barcode number provided by the barcode reader by replacing the last four or six digits of the barcode number provided by the barcode reader with four or six zeros.

[0016] The database may be included in the reverse vending machine. Having the database locally stored in the reverse vending machine is good for performance.

[0017] The reverse vending machine may be configured to modify the barcode and search in the database in response to failing to find in the database a database record that includes a classification that matches the classification provided by the detection means and a barcode number that matches the barcode number provided by the barcode reader. Hence, before modifying the barcode number, the reverse vending machine may first try to find a barcode number in the database that matches the (unmodified) barcode number provided by the barcode reader, like in a conventional reverse vending machine.

[0018] The detection means may be adapted to further detect at least one of: whether or not the inserted object comprises or is made of a metallic material, and the weight of the inserted object, and wherein the detection means is adapted to provide the classification of the inserted object further based on whether or not the inserted object comprises or is made of a metallic material as detected by the detection means and/or the detected weight.

[0019] For example, in one embodiment the detection means may be adapted to provide the classification 'bottle' of the inserted object in response to detecting and recognizing the shape of at least one curved bottle detail on the inserted object, and to provide the classification 'can' of the inserted object in response to detecting and recognizing a linear shape with horizontal lines and detecting that the inserted object comprises or is made of a metallic material. The curved bottle detail may for example be bottle shoulder, a bottle neck, or a bottle collar. Metallic material could be pure metal, alloy, or steel, for example. If none of the classifications 'bottle' and 'can' can be provided, the detection means may provide the classification 'garbage', and return the inserted object to the user. This embodiment may be referred to as fuzzy shape recognition. The fuzzy shape recognition together with the modified barcode number allows the reverse vending machine to accept a large portion of objects (products) on a market with a satisfactory level of accuracy with respect to correct handling of the inserted object by the reverse vending machine. In particular, it may beneficially be used on markets wherein the remuneration is the same for all bottles regardless of type (e.g. size) and wherein the remuneration is the same for all can regardless of type.

[0020] In another embodiment, the classification of the inserted object is further based the detected weight. This may provide a more refined classification of the inserted object, such as '33 cl aluminium can', '50 cl aluminium can', '50 cl PET bottle', '1.5 l PET bottle', etc., which may increase the level of accuracy with respect to correct handling of the inserted object by the reverse vending machine. In particular, it may beneficially be used on markets wherein the remuneration is not the same for all bottles and for all cans.

[0021] The aforementioned further data of the found database record may include instructions for at least one of: compaction of the object, sorting of the object, and remuneration of the object.

[0022] According to a second aspect of the present invention, there is provided a database for a reverse vending machine, such as the reverse vending machine according to the first aspect, which database comprises several database records, wherein each database record comprises an object classification, a barcode number, and further data that include instructions for the reverse vending machine on how to handle an object inserted into the reverse vending machine, wherein at least two database records of the several database records have the same barcode number but different classifications, which barcode number at a predetermined position in the barcode number has a predetermined set of characters, such as six zeros at the end of the barcode number. This aspect may exhibit the same or similar feature and technical effects as the first aspect, and vice versa.

[0023] According to a third aspect of the present invention, there is provided a method, comprising: by detection means of a reverse vending machine, detecting at least a shape of at least a portion of an object inserted into the reverse vending machine and providing a classification of the inserted object based at least partly on the detected shape; by a barcode reader of the reverse vending machine, reading a barcode on the inserted object and providing a barcode number corresponding to the read barcode; by the reverse vending machine, modifying the barcode number provided by the barcode reader; by the reverse vending machine, searching in a database for a database record that includes a) a classification that matches the classification provided by the detection means and b) a barcode number that matches the modified barcode number; and in response to finding such a database record in the database, the reverse vending machine handling the inserted object in accordance with further data in the found database record. This aspect may exhibit the same or similar feature and technical effects as the first and/or second aspects, and vice versa.

[0024] According to a fourth aspect of the present invention, there is provided a computer program product comprising computer program code to perform, when executed on a computer of a reverse vending machine, the steps of: modifying a barcode number corresponding to a barcode on an object inserted into the reverse vending machine, which barcode number is provided by a barcode reader of the reverse vending machine; searching in a database for a database record that includes a) a classification that matches a classification of the inserted object, which classification is provided by detection means of the reverse vending machine, and b) a barcode number that matches the modified barcode number; and in response to finding such a database record in the database, causing the reverse vending machine to handle the inserted object in accordance with further data in the found database record. This aspect may exhibit the same or similar feature and technical effects as any one of the first to third aspects, and vice versa. The computer program product could be incorporated in a new reverse vending machine, but it could also be used to upgrade an existing reverse vending machine.

[0025] According to a fifth aspect of the present invention, there is provided a computer-readable storage medium comprising the computer program product according to the fourth aspect.

[0026] According to a sixth aspect of the present invention, there is provided an electrical signal embodied on a carrier wave and propagated on an electrical medium, the electrical signal comprising the computer program product according to the fourth aspect.

Brief description of the drawing

[0027] These and other aspects of the present invention will now be described in more detail, with reference to the appended drawings showing currently preferred embodiments of the invention.

Fig. 1 schematically illustrates a reverse vending machine according to an embodiment of the present invention.

Fig. 2 schematically illustrate records in a database of the present invention.

Fig. 3 is a flowchart of a method according to an embodiment of the present invention.

Fig. 4 is an extended flowchart illustrating exemplary operation according to the present invention.

Detailed description

[0028] Fig. 1 shows a reverse vending machine 10 according to an embodiment of the present invention.

[0029] The reverse vending machine 10 comprises detection means 12. The detection means 12 is adapted to detect at least a shape of at least a portion of an object 14 inserted into the reverse vending machine, to provide a classification of the inserted object 14 based at least partly on the detected shape. To detect the shape, the detection means 12 may

for example comprise an optical system (not shown) similar to that of TOMRA's Sure Return™. The object 14 may be a container, in particular a beverage container, such as a bottle or a can.

[0030] The detection means 12 may for example be adapted to detect and recognize the shape of a bottle detail on the inserted object 14, such as a shoulder, neck or collar, and in response thereto provide the classification 'bottle' of the inserted object 14.

[0031] Alternatively, the detection means 12 may be adapted to further detect whether or not the inserted object 14 comprises or is made of a metallic material (e.g. pure metal or alloy or steel), and/or the weight of the inserted object. For the former, the detection means 12 may comprise a metal sensor (not shown), and for the latter, the detection means 12 may comprise a scale (not shown). The detection means 12 may here be adapted to provide the classification of the inserted object 14 further based on whether or not the inserted object 14 comprises or is made of a metallic material and/or the detected weight, which classification for example may be '33 cl aluminium can', '50 cl aluminium can', '50 cl PET bottle', '1.5 l PET bottle', etc.

[0032] The reverse vending machine 10 further comprises a barcode reader 16. The barcode reader 16 is adapted to read a barcode 18 on the inserted object 14, and to provide a barcode number corresponding to the read barcode 18. The barcode 18 may for example be an EAN-13 barcode, in which case the barcode number is a 13-digit number, wherein the first two digits of the barcode number may be a country code or prefix, the following five digits may be a manufacturer code, the five digits following the manufacturer code may be a product code, and the last digit is a check digit.

[0033] The reverse vending machine 10 is further configured to: modify the barcode number provided by the barcode reader 16, search in a database 20 of the reverse vending machine 10 for a database record 22 (see fig. 2) that includes a) a classification 24 that matches the classification provided by the detection means 12 and b) a barcode number 26 that matches the modified barcode number; and in response to finding such a database record 22 in the database 20, handle the inserted object 14 in accordance with further data 28 in the found database record. The reverse vending machine 10 may be configured to modify the barcode number and search in the database by means of software 30 executed on a computer 32 of a reverse vending machine 10. The computer 32 may be connected to each of the detection means 12, the barcode reader 16, and the database 20.

[0034] Specifically, the reverse vending machine 10 may be configured to modify the barcode number provided by the barcode reader 16 by replacing a subset of positionally consecutive digits (e.g. the product code and the check digit) of the barcode number at a predetermined position (e.g. the last six digits) in the barcode number with a predetermined set of characters (e.g. six zeros), in which predetermined set of characters the number of characters is equal to the number of digits in said subset of positionally consecutive digits (e.g. six), and in which predetermined set all characters are the same (e.g. all zeros), wherein the predetermined set of characters is the same for any modified barcode number for a given barcode type (e.g. for EAN-13, the modified barcode number of a first inserted object has six zeros and the modified barcode number of a second inserted object also has six zeros, even if the first and second objects are different products).

[0035] Exemplary operation of the reverse vending machine 10 will now be described with further reference to fig. 3.

[0036] In step S1, the detection means 12 detects at least a shape of at least a portion of the object 14 inserted into the reverse vending machine 10, and provides a classification of the inserted object 14 based at least partly on the detected shape. The classification may for example be '33 cl aluminum can'.

[0037] In step S2 (which could be performed after, before, or simultaneously with step S1), the barcode reader 16 reads the barcode 18 on the inserted object 14, and provides a barcode number corresponding to the read barcode 18. The provided barcode number can for example be 12 34567 89101 2, wherein the first two digits of the barcode number are a country code or prefix, the following five digits are a manufacturer code, the following five digits are a product code, and the last digit is a check digit.

[0038] In step S3, the reverse vending machine modifies the barcode number provided by the barcode reader 16 e.g. by replacing the product code and check digit with six zeros, whereas the country code or prefix and the manufacturer code are left, whereby the modified barcode number is 12 34567 00000 0.

[0039] In step S4, the reverse vending machine 10 searches in its database 20 for a database record 22 that includes a) a classification 24 that matches the classification provided by the detection means 16, e.g. '33 cl aluminum can', and b) a barcode number 26 that matches the modified barcode number, e.g. 12 34567 00000 0.

[0040] In step S5, in response to finding such a database record 22, the reverse vending machine 10 handles the inserted object 14 in accordance with further data 28 in the found database record 22. The further data 28 may include instructions for at least one of: compaction of the object 14, sorting of the object 14, and remuneration of the object 14. The instruction for compaction could be "compact by compactor B". The instruction for sorting could be "sort in bin 2". The instruction for remuneration could be "pay out 1 NOK".

[0041] It is appreciated that another 33 cl aluminum can inserted into the reverse vending machine 10 and having a barcode number 12 34567 87652 3 (i.e. same manufacturer but different product) would match the same database record 22 following modification of the barcode number 12 34567 87652 3 to 12 34567 00000 0.

[0042] Furthermore, another database record 22' which includes the same barcode number 12 34567 00000 0 but a

different the classification '1.5 l PET bottle' would cover any number of 1.5 l PET bottle products by the same manufacturer.

[0043] Furthermore, if a new manufacturer enters the market with say five different 50 cl PET bottle products, only one database record 22" would have to be added to the database for the reverse vending machine 10 to accept these products, as illustrated in fig. 2. In the database record 22', 98765 of the barcode number 26 is the manufacturer code of the new manufacturer. That record would include the classification '50 cl PET bottle' and a barcode number including manufacturer code for the manufacturer Y but ending with 00000 0 instead of a product code and check digit. The further data 28 of database record 22" which has a different classification 24 than record 22 could be "compact by compactor A", "sort in bin 1", and "pay out 2 NOK", for example.

[0044] Fig. 4 is an extended flowchart illustrating exemplary operation according to the present invention.

[0045] The operation starts with the object 14 being inserted into the reverse vending machine 10 (step S10).

[0046] Next, a classification of the inserted object 14 is provided, corresponding to the aforementioned step S1.

[0047] Next, the reverse vending machine 10 checks if any record at all in the database that has a barcode number assigned to this classification (step S11).

[0048] If yes, the reverse vending machine 10 reads, or at least tries to read, the barcode 18 on the inserted object 14 using the barcode reader 16, corresponding to the aforementioned step S2. This step may include rotating the inserted object 14, unless the barcode reader 16 is a 360-degree barcode reader, like TOMRA Flow Technology™.

[0049] Next in step S12, the reverse vending machine 10 checks if any barcode was read.

[0050] If yes, the reverse vending machine 10 searches in the database 20 for a database record that includes a classification that matches the classification provided by the detection means 12 and a barcode number that matches the barcode number provided by the barcode reader 14 (step S13).

[0051] If the reverse vending machine 10 finds such a record, the reverse vending machine 10 handles the inserted object 14 in accordance with further data in that database record (step S14).

[0052] If the reverse vending machine 10 fails to find such a record, the reverse vending machine 10 may proceed to S15, wherein the reverse vending machine 10 checks whether the database 20 has a database record that includes the barcode number provided by the barcode reader 14 and a similar or superior classification.

[0053] If the outcome of S15 is no, the reverse vending machine 10 modifies the barcode number as in the aforementioned step S3, searches in the database 20 as in the aforementioned step S4, and in response to finding a database record 22 with the correct classification and the (modified) barcode number (yes at S16), handles the inserted object 14 as in the aforementioned step S5.

[0054] If the outcome of S15 is yes, the reverse vending machine 10 proceeds to S17, wherein the reverse vending machine 10 checks whether the inserted object 14 could be classified according to the aforementioned similar or superior classification (if for example the inserted object 14 is a 50 cl PET bottle it could also fall under the superior classification 'PET bottle').

[0055] If the outcome of S17 is no, the reverse vending machine 10 modifies the barcode number as in the aforementioned step S3, searches in the database 20 as in the aforementioned step S4, and in response to finding a database record 22 with the correct classification and the (modified) barcode number (yes at S19), handles the inserted object 14 as in the aforementioned step S5.

[0056] If the outcome of S15 is yes, the inserted object 14 is handled (step S18) according to the database record found in S15.

[0057] In each of S11, S12, S16 and S19, if the outcome is no, the reverse vending machine 10 could handle the inserted object 14 based (only) on the classification provided by the detection means 12 (S20).

[0058] The person skilled in the art realizes that the present invention by no means is limited to the embodiments described above. On the contrary, many modifications and variations are possible within the scope of the appended claims.

[0059] For example, in case the barcode 18 is UPC-A, the modified barcode number may have six zeros at the end. In case the barcode 18 is EAN-8, the modified barcode number may have four zeros at the end. In case the barcode 18 is UPC-E, barcode numbers could be modified like this (X represents any digit 0-9):

7 digit UPC-E	
Read barcode number	Modified barcode number
XXXXXX0X	XX00000
XXXXXX1X	XX00010
XXXXXX2X	XX00020
XXXXXX3X	XXX0030

(continued)

7 digit UPC-E	
Read barcode number	Modified barcode number
XXXXX4X	XXXX040
XXXXX5X	XXXXX50
XXXXX6X	XXXXX60
XXXXX7X	XXXXX70
XXXXX8X	XXXXX80
XXXXX9X	XXXXX90

6 digit UPC-E	
Read barcode number	Modified barcode number
XXXXX0	XX00000
XXXXX1	XX00010
XXXXX2	XX00020
XXXXX3	XXX0030
XXXXX4	XXXX040
XXXXX5	XXXXX50
XXXXX6	XXXXX60
XXXXX7	XXXXX70
XXXXX8	XXXXX80
XXXXX9	XXXXX90

Claims

1. A reverse vending machine (10), comprising:

detection means (12) adapted to detect at least a shape of at least a portion of an object (14) inserted into the reverse vending machine and to provide a classification of the inserted object based at least partly on the detected shape; and

a barcode reader (16) adapted to read a barcode (18) on the inserted object and to provide a barcode number corresponding to the read barcode,

wherein the reverse vending machine is configured to:

- modify the barcode number provided by the barcode reader;
- search in a database (20) for a database record (22) that includes a) a classification (24) that matches the classification provided by the detection means and b) a barcode number (26) that matches the modified barcode number; and
- in response to finding such a database record in the database, handle the inserted object in accordance with further data (28) in the found database record.

2. A reverse vending machine according to any one of the preceding claims, wherein the reverse vending machine is configured to modify the barcode number provided by the barcode reader by replacing a subset of positionally consecutive digits of the barcode number at a predetermined position in the barcode number with a predetermined set of characters, in which predetermined set of characters the number of characters is equal to the number of digits

in said subset of positionally consecutive digits, and in which predetermined set all characters are the same, wherein the predetermined set of characters is the same for any modified barcode number for a given barcode type.

- 5 3. A reverse vending machine according to claim 2, wherein the subset of positionally consecutive digits of the barcode number provided by the barcode reader includes a product code, wherein the barcode number provided by the barcode reader further includes a manufacturer code, and wherein the modified barcode number includes the manufacturer code but not the product code.
- 10 4. A reverse vending machine according to claim 2 or 3, wherein the barcode is a EAN-13 barcode, and wherein replacing a subset of positionally consecutive digits of the barcode number at a predetermined position in the barcode number includes replacing the last six digits of the barcode number with said predetermined set of characters.
- 15 5. A reverse vending machine according to any one of the claims 2-4, wherein the characters of said predetermined set are zeros.
6. A reverse vending machine according to any one of the claims 2-5, wherein the database comprises several database records (22, 22') with the same barcode number but different classifications, which barcode number comprises said predetermined set of characters
- 20 7. A reverse vending machine according to any one of the preceding claims, wherein the modified barcode number comprises one or more zeros at at least one predetermined position such that a product code of the barcode number provided by the barcode reader is nullified.
- 25 8. A reverse vending machine according to any one of the preceding claims, wherein the reverse vending machine is configured to modify the barcode number provided by the barcode reader by replacing the last four or six digits of the barcode number provided by the barcode reader with four or six zeros.
- 30 9. A reverse vending machine according to any one of the preceding claims, wherein the database is included in the reverse vending machine.
- 35 10. A reverse vending machine according to any one of the preceding claims, wherein the reverse vending machine is configured to modify the barcode and search in the database in response to failing to find in the database a database record that includes a classification that matches the classification provided by the detection means and a barcode number that matches the barcode number provided by the barcode reader.
- 40 11. A reverse vending machine according to any one of the preceding claims, wherein the detection means is adapted to further detect at least one of: whether or not the inserted object comprises or is made of a metallic material, and the weight of the inserted object, and wherein the detection means is adapted to provide the classification of the inserted object further based on whether or not the inserted object comprises or is made of a metallic material as detected by the detection means and/or the detected weight.
- 45 12. A reverse vending machine according to claim 11, wherein the detection means is adapted to provide the classification 'bottle' of the inserted object in response to detecting and recognizing the shape of at least one curved bottle detail on the inserted object, and to provide the classification 'can' of the inserted object in response to detecting and recognizing a linear shape with horizontal lines and detecting that the inserted object comprises or is made of a metallic material.
- 50 13. A reverse vending machine according to any one of the preceding claims, wherein said further data of the found database record include instructions for at least one of: compaction of the object, sorting of the object, and remuneration of the object.
- 55 14. A database (20) for a reverse vending machine (10), such as the reverse vending machine according to any one of the preceding claims, which database comprises several database records, wherein each database record comprises an object classification (24), a barcode number (26), and further data (28) that include instructions for the reverse vending machine on how to handle an object inserted into the reverse vending machine, wherein at least two database records (22, 22') of the several database records have the same barcode number but different classifications, which barcode number at a predetermined position in the barcode number has a predetermined set of characters, such as six zeros at the end of the barcode number.

15. A method, comprising:

by detection means (12) of a reverse vending machine (10), detecting at least a shape of at least a portion of an object (14) inserted into the reverse vending machine and providing a classification of the inserted object based at least partly on the detected shape;
by a barcode reader (16) of the reverse vending machine, reading a barcode (18) on the inserted object and providing a barcode number corresponding to the read barcode;
by the reverse vending machine, modifying the barcode number provided by the barcode reader;
by the reverse vending machine, searching in a database (20) for a database record (22) that includes a) a classification (24) that matches the classification provided by the detection means and b) a barcode number (26) that matches the modified barcode number; and
in response to finding such a database record in the database, the reverse vending machine handling the inserted object in accordance with further data (28) in the found database record.

16. A computer program product (30) comprising computer program code to perform, when executed on a computer (32) of a reverse vending machine (10), the steps of:

modifying a barcode number corresponding to a barcode (18) on an object (14) inserted into the reverse vending machine, which barcode number is provided by a barcode reader (16) of the reverse vending machine;

- searching in a database (20) for a database record (22) that includes a) a classification (24) that matches a classification of the inserted object, which classification is provided by detection means (12) of the reverse vending machine, and b) a barcode number (26) that matches the modified barcode number; and
- in response to finding such a database record in the database, causing the reverse vending machine to handle the inserted object in accordance with further data (28) in the found database record.

17. A computer-readable storage medium comprising the computer program product according to claim 16.

18. An electrical signal embodied on a carrier wave and propagated on an electrical medium, the electrical signal comprising the computer program product according to claim 16.

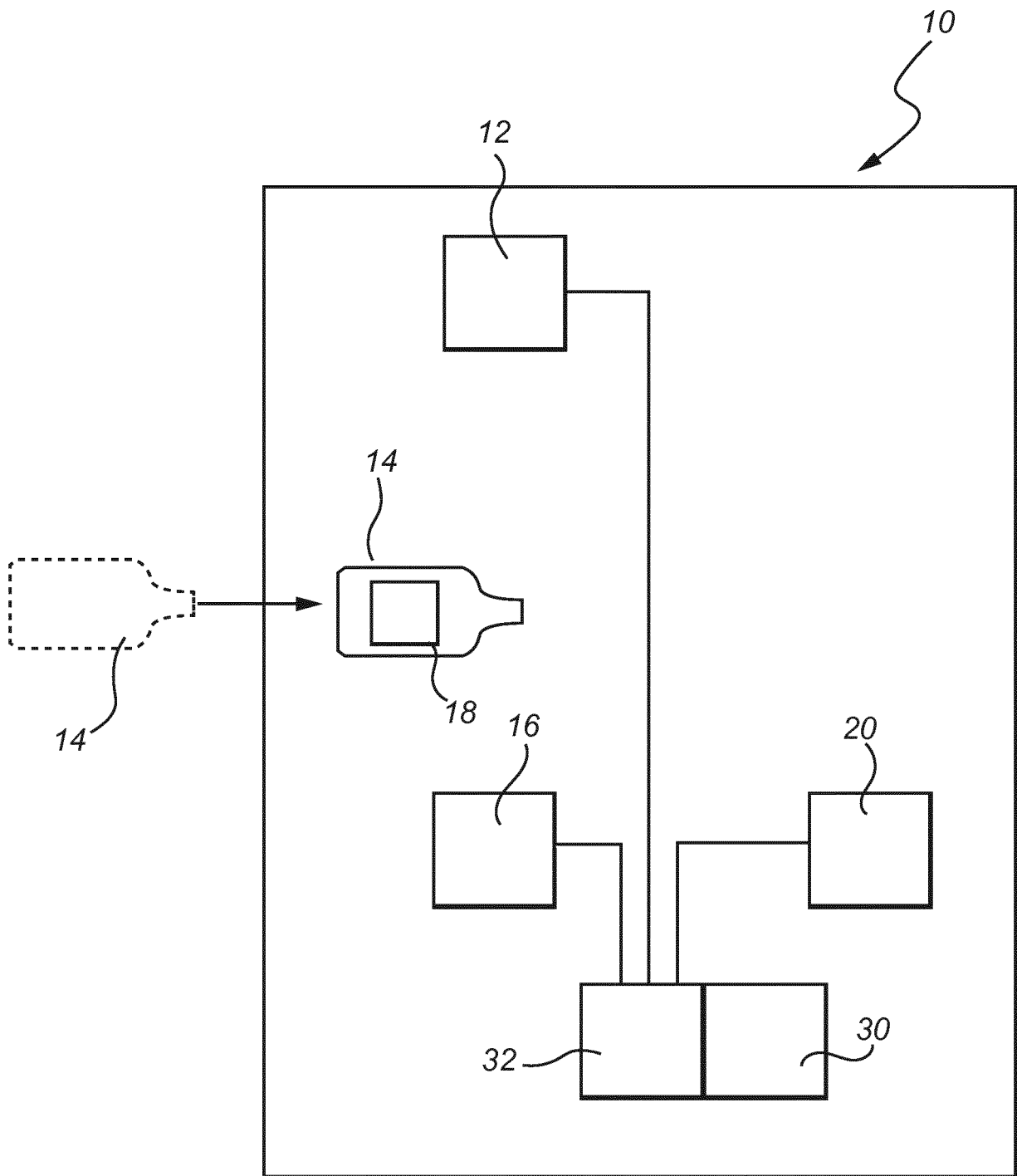


Fig. 1

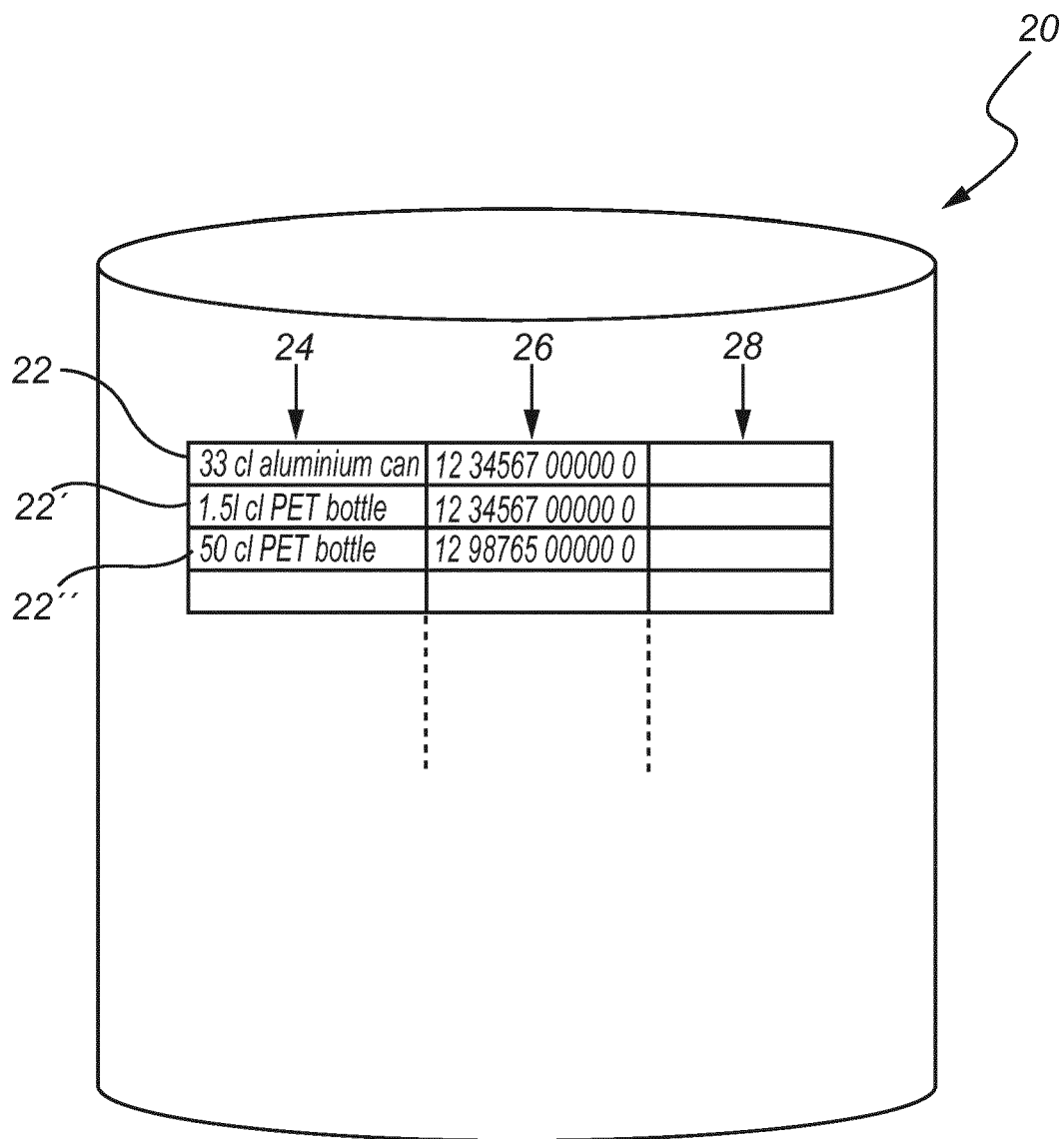


Fig. 2

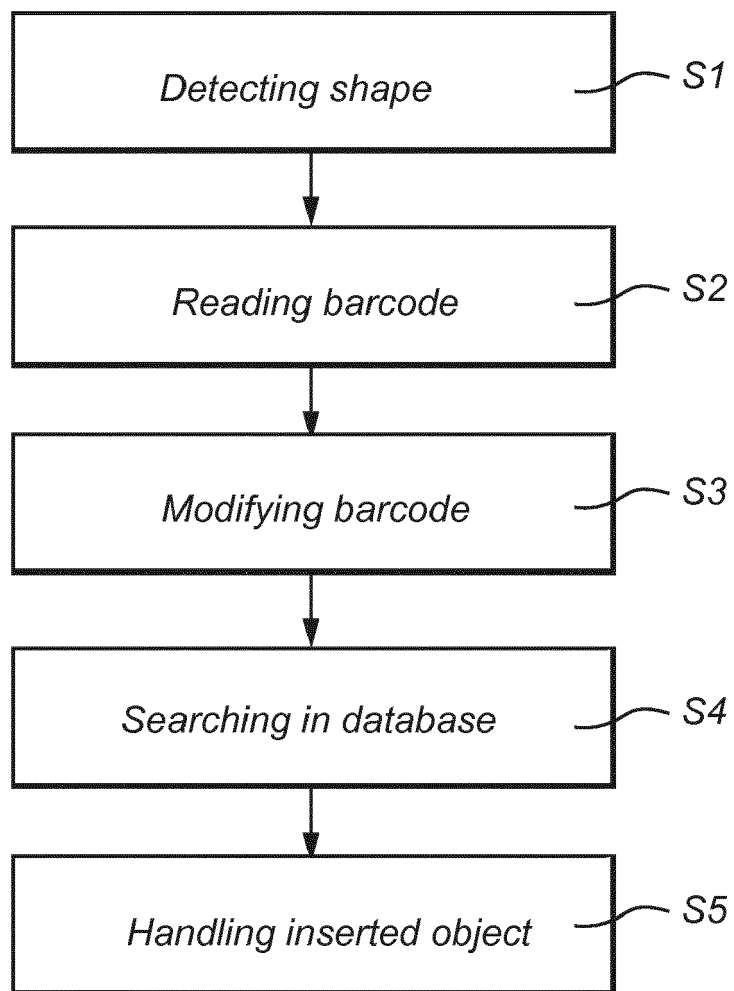
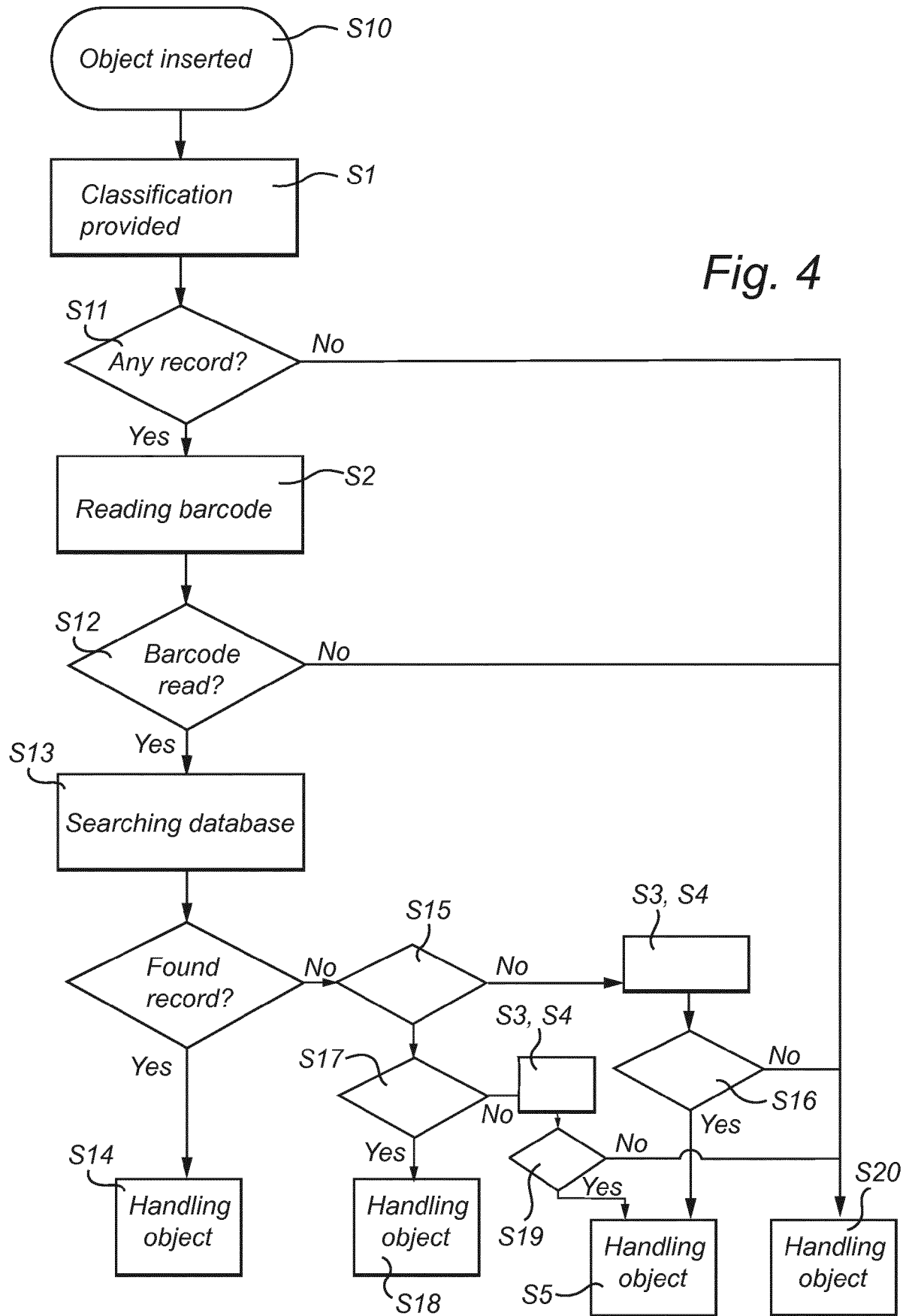


Fig. 3





EUROPEAN SEARCH REPORT

 Application Number
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Place of search The Hague		Date of completion of the search 13 March 2019	Examiner Raymaekers, Jens
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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