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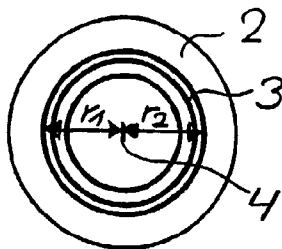
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Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

(54) Title: MACHINE-READABLE IDENTIFIER ON A PORTION PACKAGE, WHICH CONTAINS GROUND COFFEE, FOR ESPRESSO MACHINES

(54) Bezeichnung: MASCHINELL LESBARE KENNUNG AUF EINER KAFFEEMEHL ENTHALTENDEN PORTIONSEINHEIT FÜR ESPRESSOMASCHINEN



(57) Abstract: A machine-readable identifier on a portion package, which contains ground coffee, for espresso machines is provided in a rotationally symmetrical manner, whereby permitting it to be easily and reliably read, on an essentially flat surface of the portion package. The portion package is preferably a portion capsule (1) with an essentially round bottom (2) to which the identifier is coaxially applied.

(57) Zusammenfassung: Eine maschinell lesbare Kennung auf einer Kaffee-mehl enthaltenden Portionseinheit für Espressomaschinen ist in einfach und zuverlässig auslesbarer Form rotationssymmetrisch strukturiert auf einer im wesentlichen ebenen Fläche der Portionseinheit angeordnet, wobei die Portionsein-

heit vorzugsweise eine Portionskapsel (1) mit einem im wesentlichen runden Boden (2) ist, auf dem die Kennung koaxial aufgebracht ist.

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Description

Machine readable identification on a single-serving unit containing coffee powder for espresso machines, a system for registration of the identification and a testing procedure for the identification

5 The invention concerns machine readable identification on a single-serving unit containing coffee powder for espresso machines.

Another aspect of the invention concerns a system particularly suitable for the registration of machine readable identification.

10 A further aspect of the invention concerns a testing procedure for the machine readable identification.

The invention concerns single-serving units for the simplified stocking of espresso machines with coffee powder. Increasingly, single-serving capsules or pouches are being used as single-serving units. The pouches enclose a certain amount of pre-portioned coffee powder within a transparent material similar to that of coffee filter paper.

15 Compared to the previously common method of supplying the brewing head of an espresso machine with loose coffee powder, the use of pouches is advantageous due to the fact that the coffee powder contained therein is already pre-pressed, which is important for the generation of crema.

The single-serving capsules consist mostly of a deep-drawn plastic or aluminium foil and their advantage, when compared to pouches, lies in the fact that they have an air-tight seal and that certain manufacturers fill them with a protective gas containing the coffee' aroma as well. Such pre-proportioned single-serving units are available for approximately
5 10 different coffee fillings. Due to this variety the consumer is able to stock smaller amounts of different types of coffee. In addition, the use of these single-serving units in conjunction with the special brewing heads of those espresso machines equipped to process such single-serving units results in a reliably constant optimum brew.

Such espresso machines, already known from EP 1 046 366 A1, for example, are
10 provided with a storage magazine storing assorted single-serving units having different contents that are conveyed from the storage magazine into the brewing head during the course of an automatic brewing process. The storage magazine consists of cartouches, also termed magazine tubes, arranged on a turntable, wherein the individual single-serving units are stacked. In order to keep the different types of coffee separate and to
15 select different coffee types, each magazine tube is stocked with only one type of coffee. At the start of the brewing process the selected magazine tube is rotated with the turntable into the dispensing position so that the desired type of coffee can be obtained. For this purpose the single-serving unit at the bottom of the stack inside the magazine tube is conveyed to a brewing chamber of the brewing head. Preferably each magazine
20 tube is provided with a window so that the consumer is able to recognize the desired type of coffee, for example by means of a certain colour that is assigned to a certain type of coffee. It is also possible to equip the single-serving units with a certain identification

code able to be registered by a reading device, so that the contents of the single-serving units can be recognized electronically. However, this method has thus far not been used for presently-known espresso machines. This may be due to the fact that the usual bar code structured in a linear manner to be read by a simple linear reading device must
5 either be positioned correctly with regard to the position of the reading device, which is somewhat difficult in view of the inherent rotation-symmetric design of single-serving capsules and pouches due the technology of their manufacture, or that an expensive and voluminous double mirror scanner is required as the reading device.

Thus the use of a colour code for the identification of single-serving pouches according to
10 their contents is now the premier method of identification. This method allows the consumer, without any guarantee, however, to stock the magazine tubes of the storage magazine in the correct manner and to select the desired type of coffee prior to the brewing process. For the automatic selection of one of the magazine tubes whereby the selection of the desired type of coffee is effected via a control panel or a knob, the
15 magazine tubes may either be equipped with machine readable identification, or the respective position of the turntable, starting from a basic position, is electronically computed and stored. However, this system, whereby the correct manual stocking of the magazine tubes is assumed, cannot prevent stocking errors resulting in the incorrect automatic selection of the coffee type. This may well have very undesirable side effects,
20 for example if a non-decaffeinated type of coffee is mistaken for a decaffeinated coffee.

It is thus the task of the present invention to equip the actual single-serving units to be selected with suitable machine readable identification whereby complicated voluminous double mirror scanners are not required for reading the identification code and whereby the accurate alignment of the single-serving pouch with regard to the scanner or its
5 reading unit does not matter. In particular, the difficult process of aligning a rotation-symmetrical single-serving unit, whereby the shape of the capsule is mainly frustoconical and the pouch is mainly lozenge-shaped, is thus eliminated.

The present invention provides a magazine unit for use in dispensing rotationally
10 symmetrical portion packs that each bear an automatically readable identifier, the magazine unit comprising:

a plurality of magazine tubes that are each arranged to hold a stack of the portion packs; and

a detector device having at least one linear-scan reading head that is
15 arranged under the magazine tubes and is directed upwards onto a plane that extends through the base of the magazine tubes such that the identifier of a portion pack in each of the magazine tubes can be linearly scanned and read.

According to the invention, direct scanning or immediate reading of the identification
20 on the single-serving unit, particularly of the single-serving capsule itself and not of any part of the storage magazine adjacent to the capsule, guarantees that the selected type of coffee is correctly identified with the single-serving unit and is actually being brewed after removal of the single-serving unit from the storage magazine. The identification can be read easily and accurately via an uncomplicated and compact reading head able
25 to read in a linear manner, provided that the reading head is able to register the rotation-symmetrical identification. However, the rotational or angular position of the rotation-symmetrical identification with regard to the reading head that reads in a linear manner is not important, whereby the alignment of the single-serving unit with regard to the reading head is greatly simplified.

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The above-mentioned advantage, i.e. that the rotational or angular position of the single-serving unit (in other words, the portion pack) with regard to the reading head does not matter, applies particularly to a rotation-symmetrical single-serving unit which does not have a preferred position, defined by its shape, around its symmetrical axis. In such cases the identification is preferably structured in a rotation-symmetrical manner around this symmetrical axis. Thus the reading head, reading in a linear manner, can register the identification regardless of the rotational or angular position of the single-serving unit, so that a single-serving unit stored inside a magazine tube can be identified regardless of the rotational position of the single-serving unit inside the magazine tube. Thus any measures ensuring the definite alignment of the single-serving units inside the magazine tube can be eliminated.

An advantage of the testing procedure is that because the identifier consists of a barcode of concentric circles, conventional linear reading heads can be used. If the ID code (in other words, the barcode) is a multi-digit binary code, just four concentric circles are sufficient to reliably identify a great variety of coffee types.

If the portion pack consists of a capsule with a mainly circular base, the identification as defined above is applied to the base in a coaxial manner.

If the single-serving unit consists of an essentially lozenge-shaped pouch with an upper and a lower surface, the identification is applied to each surface in a coaxial manner. Therefore it does not matter, with regard to the machine reading of the identification, whether the upper or the lower surface of a pouch is facing downwards when the pouches are inserted into the storage magazine.

Apart from coffee type identification, the identification on any single-serving unit may also contain producer identification, whereby the latter in conjunction with an adapted evaluation system for controlling the espresso machine can block operation of the espresso machine if the producer identification on the single-serving unit does not

correspond to the machine's preprogrammed producer identification.

As mentioned above, an uncomplicated system for the registration of the machine readable identification on a single-serving unit according to the invention may consist
5 of a registration device with at least one reading head able to read in a linear manner. The reading head comprises a reading sensor consisting of a transmitter scanning a luminous spot on the identification or part thereof, and of a decoder receiver. The latter may be equipped with a controlling device whereby the setting, particularly that of a magazine unit, can be controlled in order to convey the single-serving units containing
10 the desired coffee type into the dispensing position.

The linear reading head can be located in a compact and secure position below the magazine tubes of the magazine unit. The reading head can be directed upwards towards the plane where the bases of the single-serving capsules are positioned within
15 the magazine tubes, in such a way that the rotation-symmetrical identification on the base of the respective lowest single-serving capsule can be read.

Furthermore, the carrier of a system whereby the magazine tubes are positioned on a carrier and may be conveyed together with that carrier, if desired, is provided with a
20 transparent section at least in the area below the magazine tubes so that the base of any single-serving capsule can be scanned. The transparent section may be designed in particular as a radially positioned slit-shaped window.

A scanner and a transparent section may be provided below each magazine tube. This
25 type of configuration ensures that the identification of all single-serving capsules in the lowest position inside each magazine tube can be read in a parallel manner. Based on the respective registered positions of the capsules containing various types of coffee, the magazine tube whose lowest-positioned single-serving capsule contains the selected coffee type is then conveyed to the dispensing position.

30

However, in certain embodiments, the magazine unit can have one reading station with just one scanning head for all magazine tubes, whereby the reading station is positioned before the dispensing station in the conveying direction, at the conveying path of those sections of the carrier that are able to move together with the carrier and are transparent so that the identification can be read. In this way it is possible to check if a single-serving unit containing the desired coffee type is conveyed into the dispensing position, whereby conveyance is controlled according to the stored positions of the single-serving capsules containing the various types of coffee.

10 In certain embodiments, the support is in the form of a turntable. In such embodiments, the magazine tubes can be arranged in a mainly circular manner on the turntable. A Maltese-cross-type drive mechanism can be positioned below the turntable and is connected to the latter via an actuation connection. The turntable is adjustable whereby its adjustment may be controlled via the registration device containing the reading head/s for reading the identification of the respective lowest single-serving capsule within the magazine tubes.

The present invention also provides a test procedure for an automatically readable identifier on a rotationally symmetrical portion pack in a magazine unit of any one of Claims 1 to 8, in which the identifier consists of a barcode formed of concentric circles that is read linearly across its maximum diameter formed of a first radius and a second radius, the test procedure comprising:

25 taking a first reading from the first radius of the identifier;
taking a second reading from the second radius of the identifier; and
comparing the first and second readings.

The above-described testing procedure facilitates simple and reliable reading of the automatically readable identifier.

30

According to this testing procedure, the barcode is essentially read in a linear manner across its greatest diameter, formed by a first radius and a second radius. The identification read across the first radius is compared with that read across the second radius. If the barcode is registered correctly, the two identifications read separately
5 must occur. Otherwise an espresso machine designed to carry out testing may be blocked for safety reasons.

Design types of the invention are described below by means of the drawing, whereby additional characteristics and advantages may result.

- Fig. 1 shows the lateral view of a single-serving capsule,
Fig. 1a shows a view of the base of the single-serving capsule according to Fig. 1,
Fig. 2 shows the lateral view of a pouch
Fig. 2a shows a view of the upper or lower surface of the pouch
5 Fig. 3 shows in a partial cross-section, the lateral view of a system with a magazine unit as well as with a registration unit, and
Fig 4 shows a plan view of the system according to Fig. 3.

Basic unit assembly groups that do not immediately serve to register the identification on the single-serving units used here are not shown in Fig. 3 and Fig. 4.

- 10 Figures 1, 1a and 3 show a single-serving capsule 1 of an essentially frustoconical design arranged in a rotation-symmetrical manner around a symmetrical axis 1a.

An ID code 3 consisting of concentric circles is shown on the base 2 of the single-serving capsule 1, whereby the symmetrical axis 1a of the single-serving capsule passes through the centre point 4 of the circles.

- 15 Figures 2 and 2a show a pouch 5 containing one serving of pre-pressed coffee powder whereby the pouch, with the exception of its edge 6, is essentially lozenge-shaped. The pouch 5 with its edge 6 are arranged in a rotation-symmetrical manner around a symmetrical axis 5a. The lower surface 7 as well as the upper surface 8 of pouch 5 is

provided with an ID code 9 consisting of concentric circles and extending in a rotation-symmetrical manner around the symmetrical axis 5a.

A system with a magazine unit 10 suitable for storing single-serving capsules 1 is described below by means of Figures 3 and 4. A magazine unit for pouches may be
5 similarly designed.

The magazine unit 10 essentially consists of a turntable 11 whereby magazine tubes 12 to 16 are arranged on the turntable in an approximately circular manner. Each magazine tube is designed to hold a stack of single-serving capsules 1 whose bases 2 are each facing downwards, whereby each of the magazine tubes 12 to 16 contains single-serving
10 capsules containing one of several available coffee types. Each magazine tube is provided with an ejection opening 17 adjacent to the outer edge (no reference number given) of the turntable 11, whereby the respective single-serving capsule 1 that is in the lowest position is ejected by means not described here through the magazine tube opening 17 that has been rotated to a dispensing position, i.e. dispensing station 18.

15 In order to move the selected magazine tube 12 to 16 to the dispensing position 18 for the purpose of removing a single-serving capsule, a Maltese-cross-type drive mechanism 20 is positioned below turntable 11 and is coupled with the latter. The Maltese-cross-type drive mechanism essentially consists of a driving motor 21 with a drive mechanism 22 and a Maltese-type driving pin 23 on a disc 24 that is connected to the drive mechanism.

20 The Maltese-type driving pin is positioned in such a way that it is able to engage between

two flanks each of the Maltese-type drive mechanism, whereby one of these flanks 25 is firmly connected to the turntable 11 or is formed as one unit together with the turntable.

The Maltese-cross-type drive mechanism 20 is mounted below the turntable 11 on a support frame 26 which also serves as mounting of turntable 11.

5 The support frame 26 also carries a reading head 27 mainly consisting of a scan transmitter and an encoder receiver. Reading head 27 is pointing from below towards the turntable 11 in such a way that it is able to register and scan the single-serving capsules stacked with their base facing downwards inside the magazine tubes 12 to 16 when the magazine tubes are moved across the reading head 27. For this purpose at least part of
10 turntable 11 is transparent to the scanning of the ID code: windows 29 located below the magazine tubes 12 to 16 are designed as slits and are each arranged at equal radial distance to a main axis 30 of turntable 11, cf. Fig 3. The ID codes 3 on the bases 2 of the single-serving capsules can be registered across their greatest radius r_1 and r_2 through these slits, according to Fig. 1a. In this case ID code 3 is being registered on entering and
15 on leaving the reading station when the base 2 of the capsule, equipped with the ID code, passes on its circular path across reading head 27 arranged in front of dispensing station 18 in the direction of rotation 28 of the turntable. It is thus guaranteed, via comparison of the two registered ID codes as well as via data processing, that only one single-serving capsule 1 containing the desired coffee type is conveyed to the dispensing station 18,
20 once the desired coffee type has been selected, for example by means of a control panel or a knob.

List of reference numbers:

	1	single-serving capsule
	2	base
	3	ID code
5	4	centre point
	5	pouch
	6	pouch edge
	7	lower surface
	8	upper surface
10	9	ID code
	10	magazine unit
	11	turntable
	12	magazine tube
	13	magazine tube
15	14	magazine tube
	15	magazine tube
	16	magazine tube
	17	ejection opening of magazine tube
	18	dispensing station (or position)
20	19	capsule ejection slit
	20	Maltese-cross-type drive mechanism
	21	driving motor

- 22 drive
- 23 Maltese-type driving pin
- 24 disc
- 25 flank of Maltese-type drive mechanism
- 5 26 support frame
- 27 reading head
- 28 direction of rotation
- 29 slit-shaped window
- 30 main axis

10

In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word “comprise” or variations such as “comprises” or “comprising” is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

15

It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A magazine unit for use in dispensing rotationally symmetrical portion packs that each bear an automatically readable identifier, the magazine unit comprising:
 - 5 a plurality of magazine tubes that are each arranged to hold a stack of the portion packs; and
 - a detector device having at least one linear-scan reading head that is arranged under the magazine tubes and is directed upwards onto a plane that extends through the base of the magazine tubes such that the identifier of a portion pack in each of the
 - 10 magazine tubes can be linearly scanned and read.

2. A magazine unit according to Claim 1, wherein the magazine tubes are arranged on a support and can be moved with the support to a dispensing position; and wherein under each magazine tube the support has a transparent section to allow the bottom of a
- 15 portion pack in each magazine tube to be scanned.

3. A magazine unit according to Claim 2, wherein the at least one reading head comprises a single reading head provided at a reading station; and wherein the single reading head is arranged on a movement path of the transparent sections to allow
- 20 reading of identifiers as the magazine tubes move towards the dispensing position.

4. A magazine unit according to either Claim 2 or 3, wherein the support comprises a turntable, and the magazine unit further comprises a Maltese-cross-type drive mechanism that is in driving connection with the turntable.
- 25
5. A magazine unit according to claim 4, wherein the magazine tubes are arranged in a circle on the turntable.

6. A magazine unit according to any one of Claims 2 to 5, wherein the support can
- 30 be moved in a controlled way by the detector device.

7. A magazine unit according to any one of Claims 2 to 6, wherein the transparent sections each comprise a slit in the support.
- 5 8. A magazine unit according to any one of Claims 1 to 7, wherein the portion packs comprise portion capsules containing different ground coffee varieties.
9. A test procedure for an automatically readable identifier on a rotationally symmetrical portion pack in a magazine unit of any one of Claims 1 to 8, in which the
10 identifier consists of a barcode formed of concentric circles that is read linearly across its maximum diameter formed of a first radius and a second radius, the test procedure comprising:
taking a first reading from the first radius of the identifier;
taking a second reading from the second radius of the identifier; and
15 comparing the first and second readings.
10. A magazine unit substantially as herein described with reference to the accompanying drawings.
- 20 11. A test procedure for an automatically readable identifier on a rotationally symmetrical portion pack in a magazine unit substantially as herein described with reference to the accompanying drawings.

Fig.1

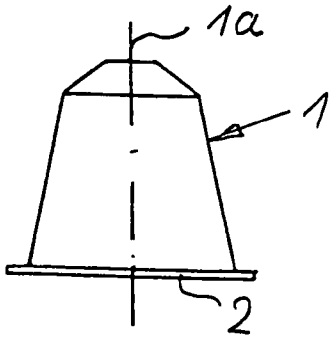


Fig.1a

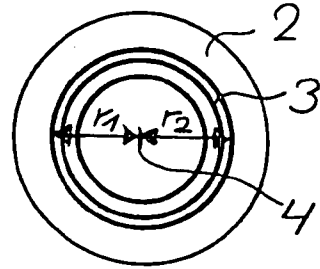


Fig.2

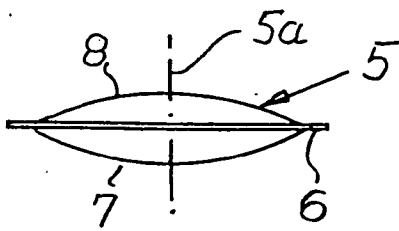
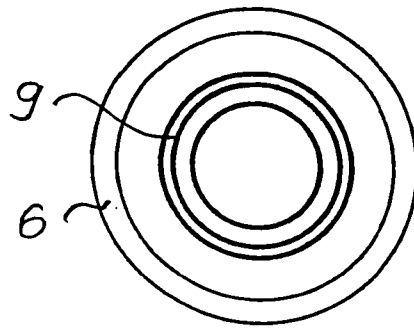


Fig.2a



Section A-B

Fig.3

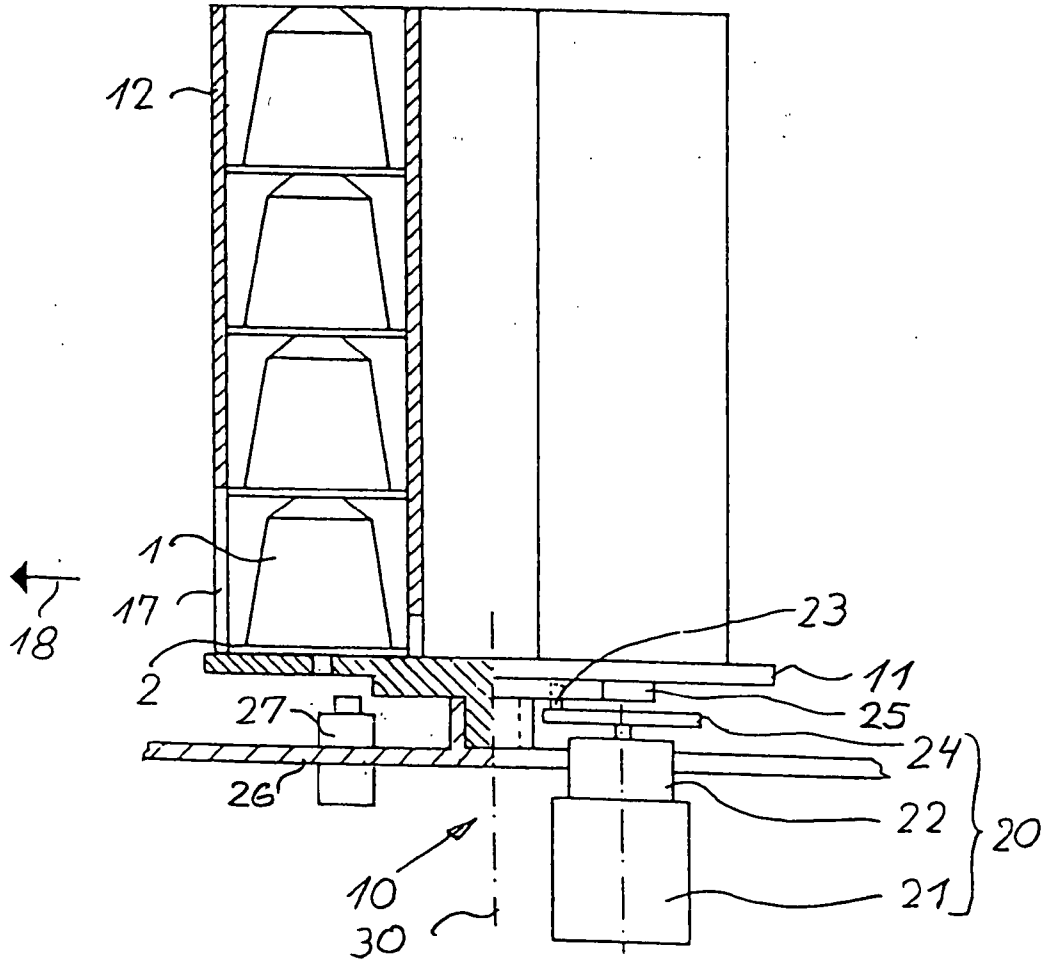


Fig.4

