In embodiments, the first position is at (including directly at or proximal with a small gap away from) an axis of rotation of the container. By arranging the first position at the axis of rotation, elements of the code to extend up to and converge to a common point at the axis of rotation, the code may also be read proximal the axis of rotation.

In embodiments, the second position is proximal or at an outer rim of the flange. By arranging the code to extend up to or over a rim of the flange the code may be read on the underside of the flange or the rim of the flange.

In embodiments, the code elements extend with a centre line aligned to a radial direction from the first position to the second position. By implementing the code to extend outwardly from the rotational axis in a direction that is aligned radially, it may be ensured that the code can be read at a range of positions. As used herein the term “centre line” may refer to a line that extends along a code element through a mid-distance of the circumferential extent of the element.

In embodiments, the code elements extend with increasing circumferential width with radial distance. By arranging the code elements to increase in circumferential width (e.g. a minor dimension, wherein the major dimension is aligned to the radial direction) the further away from the axis of rotation, it may be ensured that the same information is accurately encoded independent of where the code is read from. In embodiments, the code elements may increase in circumferential width proportionally with radial distance, so that their relative circumferential proportion does not change with radial distance. By relative circumferential proportion, it is meant a ratio of circumferential width and total circumference at where said width is measured.

In embodiments, the code elements extend continuously between the first and second positions. By arranging the elements to extend continuously, e.g. with no separation or bisection by features of the container, the code may be read at any position between the first and second positions.

In embodiments, the elements (e.g. some or all the elements forming the code) extend on the storage portion from a first position to a second position, the first position at a base region of the storage portion (including at a centre, which can include directly or proximate the center, of the storage portion, which may be aligned to a rotational axis of symmetry) the second position at the flange (including directly at the junction between the flange and storage portion, or proximal thereto), the elements arranged to be read about an axis of rotation of the container. In embodiments, the second position on the storage portion at the flange comprises the storage portion arranged to face a radial direction, e.g. the storage portion intersects the flange portion at

network (WAN); an Internet Protocol Multimedia Subsystem (IMS) network; a private network; the Internet; an intranet.

As used herein, the term "**code**" may refer to storage medium that encodes preparation information. The code may be an optically readable code, e.g. a bar code. The code may be formed of a plurality of units, which can be referred to as elements or markers.

As used herein, the term "**preparation information**" may refer to information related to a preparation process. Depending on the implementation of the processing unit said information may vary. The parameters that may be associated container processing unit that comprises a fluid processing system, can include one or more of: fluid pressure; fluid temperature; mass/volumetric flow rate; fluid volume; filtering/purification parameters for the fluid; carbonation parameters for the fluid. The parameters that may be associated container processing unit that comprises a loose material processing unit, can include one or more of: grinding parameters, including intensity; heating temperature. More general parameters can include one or more: container geometric parameters, e.g. shape or volume; the type of precursor; phase identifier, for when a preparation process is split into a series of phases, whereby each phase comprises a set of one or more of any of the aforesaid parameters; duration, including phase duration (e.g. a duration for applying the parameters of a phase or any of the aforementioned parameters generally); and a container identifier, which may for example be used to monitor container consumption for the purpose of container re-ordering or look-up of information from the server system; an expiry date, a recipe identifier, which may be used to lookup a recipe stored on the memory of the machine for use with the container.

[General system description]

Referring to figure 1, the system **2** comprises a machine **4**, a container **6**, server system **8** and a peripheral device **10**. The server system **8** is in communication with the machine **4** via a computer network **12**. The peripheral device **10** is in communication with the machine **4** via the computer network **12**.

In variant embodiments, which are not illustrated: the peripheral device and/or server system is omitted.

Although the computer network **12** is illustrated as the same between the machine **4**, server system **8** and peripheral device **10**, other configurations are possible, including: a different computer network for intercommunication between each device: the server system communicates

In variant embodiments, which are not illustrated: the pump is omitted, e.g. the fluid is fed by gravity to the container processing unit or is pressurised by a mains water supply; the reservoir is omitted, e.g. water is supplied by a mains water supply; the heat exchanger is arranged to cool the fluid, (e.g. it may include a refrigeration-type cycle heat pump); the heat exchanger is omitted, e.g. a mains water supply supplies the water at the desired temperature; the fluid conditioning system includes a filtering/purification system, e.g. a UV light system, a degree of which that is applied to the fluid is controllable; a carbonation system that controls a degree to which the fluid is carbonated.

[Container processing unit]

The container processing unit **20** can be implemented with a range of configurations, as illustrated in examples 1 – 6 below:

Referring to figures 4A and 4B, a first example of the container processing unit **20** is for processing of a container arranged as a capsule **6** (a suitable example of a capsule is provided in figure 7, which will be discussed) to prepare a beverage. The container processing unit **20** is configured as an extraction unit **32** to extract the beverage from the capsule **6**. The extraction unit **32** includes a capsule holding portion **34** and a closing portion **36**. The extraction unit **32** is movable to a capsule receiving position (figure 4A), in which capsule holding portion **34** and a closing portion **36** are arrange to receive a capsule **6**. The extraction unit **32** is movable to a capsule extraction position (figure 4B), in which the capsule holding portion **34** and a closing portion **36** form a seal around a capsule **6**, and the beverage can be extracted from the capsule **6**. The extraction unit **32** can be actuator driven or manually movable between said positions.

The outlet **30** of the fluid conditioning system **22** is arranged as an injection head **38** to inject the conditioned fluid into the capsule **6** in the capsule extraction position, typically under high pressure. A beverage outlet **40** is arranged to capture the extracted beverage and convey it from the extraction unit **32**.

The extraction unit **32** is arranged to prepare a beverage by the application of pressurised (e.g. at 10 – 20 Bar), heated (e.g. at 50 – 98 degrees C) fluid to the precursor material within the capsule **6**. The pressure is increased over a predetermined amount of time until a pressure of a rupturing portion (not illustrated in figure 4A, 4B) of the capsule **6** is exceeded, which causes rupture of said portion and the beverage to be dispensed to the beverage outlet **40**.

[Control electrical circuitry]

Referring to figure 7, the electrical circuitry **16** is implemented as control electrical circuitry **48** to control the processing unit **14** to execute a preparation process. In the embodiment of figure 7, for illustrative purposes, the processing unit **14** is exemplified as the first example, which comprises a container processing unit **20** and a fluid supply unit **22**.

The electrical circuitry **16, 48** at least partially implements (e.g. in combination with hardware) an: input unit **50** to receive an input from a user confirming that the machine **4** is to execute a preparation process; a processor **52** to receive the input from the input unit **46** and to provide a control output to the processing unit **14**, and; a feedback system **54** to provide feedback from the processing unit **54** during the preparation process, which may be used to control the preparation process.

The input unit **50** is implemented as a user interface, which can include one or more of: buttons, e.g. a joystick button or press button; joystick; LEDs; graphic or character LDCs; graphical screen with touch sensing and/or screen edge buttons; other like device; a sensor to determine whether a container has been supplied to the machine by a user.

The feedback system **54** can implement one or more of the following or other feedback control based operations:

a flow sensor to determine a flow rate/volume of the fluid to the outlet **30** (shown in figure 3) of the fluid supply system **22**, which may be used to meter the correct amount of fluid to the container **6** and thus regulate the power to the pump **26**;

a temperature sensor to determine a temperature of the fluid to the outlet **30** of the fluid supply unit **22**, (which may be used to ensure the temperature of fluid to the container **6** is correct and thus regulate the power to the heat exchanger **28**);

a level sensor to determine a level of fluid in the reservoir **24** as being sufficient for a preparation process;

a position sensor to determine a position of the extraction unit **32** (e.g. a capsule extraction position or a capsule receiving position).

It will be understood that the electrical circuitry **16**, **44** is suitably adapted for the other examples of the processing unit **14**, e.g.: for the second example of the container processing system the

The electrical circuitry **16** subsequently controls the container processing unit **20** to move from the capsule extraction position through the capsule ejection position to eject the container **6** and back to the capsule receiving position.

In variant embodiments, which are not illustrated: the above blocks can be executed in a different order, e.g. **block 72** before **block 70** or **block 76** before **block 74**; some block can be omitted, e.g. where a machine stores a magazine of capsules **block 70** can be omitted; alternatively at blocks **70** to **76** a user presents the code of the container to the code reading system and after it is read opens said container and dispenses the pre-precursor material into the processing unit. Moreover, the container processing unit may be manually moved between the extraction position and capsule receiving position.

Blocks **76** and **78** may be referred to a code reading and processing process. Block **80** may be referred to as the preparation process. The electrical circuitry **16**, includes instructions, e.g. as program code, for the preparation process (or a plurality thereof). In an embodiment the processor **52** implements the instructions stored on a memory (not illustrated).

As part of the preparation process, the electrical circuitry **16** can obtain additional preparation information via the computer network **12** from the server system **8** and/or peripheral device **10** using a communication interface (not illustrated) of the machine.

[Code general description]

Referring to figure 10, the code **44** is formed of a plurality of elements **80**. The elements **80** are arranged on a surround **82**. The elements **80** are a dark colour (e.g. including one of the following: black, dark blue, purple, dark green) and the surround **82** is a comparatively light colour (e.g. including one of the following: white, light blue, yellow, light green) such that there is sufficient contrast for the image capturing unit **46** to distinguish therebetween. In variant embodiments, which are not illustrated: the elements are a light colour and the surround is a dark colour.

The elements **80** are formed by printing e.g. by means of an ink printer. As an example of printing the ink may be conventional printer ink and the substrate may be the container outer surface including one of the closing member, flange or storage portion , or a separate substrate, which is connected to the container. In variant embodiments, which are not illustrated, the elements are alternatively formed, including by embossing, engraving or other suitable means.

The elements **80** have various shapes as will be discussed. As used herein the term “shape” in respect of the elements may refer to an exact shape or an approximation of the actual shape, which can occur to a printing or other manufacturing variations in precision.

The elements **80** are arranged to be read sequentially when the container is rotated about an axis of rotation **100** (as also illustrated in figure 5). The elements **80** of the code **44** are arranged on a circumferentially extending virtual line **L**.

[Code encoding]

The elements **80** encode a data portion for storing the preparation information, and encode a finder sequence for locating the data portion. The elements **80** are encoded as a bit code, wherein the absence or presence of an element encodes a logical 1 or a 0.

The finder sequence (not illustrate) comprises a predefined reserved sequence of logical 1s and/or 0s, which is identifiable when processing the code. The data sequence is arranged at a known position with respect to the finder sequence, e.g. immediately after or distributed within the finder sequence. Hence with the finder sequence located, the data sequence can then be located read and decoded. The data sequence may be decoded based on a rule stored on the electrical circuitry **16** (e.g. via electronic memory) of the machine **4**. A specific example of such a code is provide in EP 2594171 A1.

[Code arrangement]

Referring to figures 11 and 12, which is a more detailed example that implements the features discussed in association with the embodiments of figure 8 and 10. The each element **80** of the code **44** extends from a first position **82** a second position **84**, which span a substantial portion of the storage portion **58** and flange **60**. The first position **82** is arranged on the storage portion **58**. The second position **84** is arranged on the flange **60**. In this way the code **44** can be read from a range of positions both on the storage portion **58** and the flange **60**.

The elements **80** converge to the axis of rotation **100** of the container **6**. In this way the code **44** can be read from any position between the first position **82** and the second position **84** as the container is rotated about the axis **100**. The first position 82 is at the axis of rotation **100**. The second position is at junction of an outer rim **62** and a lower surface **64** of the flange **60** (an upper surfaces **66** of the flange **60** is defined as the surface over which the membrane **56** extends). Hence the elements **80** extend across the entire storage portion **58** to an interior edge **68** of the

flange **60** that adjoins the storage portion **58** and over the entire lower surface **64** of the flange **60**.

The elements **80** are arranged with a centreline **86** through the circumferentially extending section of the elements aligned to a radial direction **R**. The elements **80** extend with increasing circumferential distance with radial distance such that they occupy the same circumferential portion of the whole circumference independent of radial distance. The elements **80** extend continuously, e.g. not in discrete separate portions, between the first position **82** and the second position **84**. In this way the code can be read equivalently at any position between the first and second positions.

In variant amendments, the elements of the code can be alternatively arranged including: with the centre lines not aligned to the radial direction, e.g. they may be arranged forward and/or be arranged behind the radially line including as a swirl; the outer rim of the flange may also include the code; the first position can be arranged proximal to rather than at the axis of rotation, including at a base region of the storage portion; and the elements may extend as a series of discrete positions between the first and second position.

A “base region” of the storage portion can be defined as a region that includes the base (i.e. a lowest point) of a cavity of the storage portion **58**. It may also include a region of depth **D** greater than 70% or 80% or 90% of the maximum depth, wherein the maximum depth is at the lowest point of the cavity and the depth direction extends from the flange.

In variant embodiments, which are not illustrated: the first position and second position are both arranged on the storage portion (e.g. and not on the flange) such that the code can be read at a range of positions on the storage portion. In particular, the first position can be arranged at the axis or rotation or more generally at a base region as defined above. The second position can be arranged at or proximal the inner edge of the flange that adjoins the storage portion.

A method of encoding preparation information with the code **44** comprises: arranging elements **80** of the code **44** to extend from the first position **82** to the second position **84**, wherein the first position is arrange on the storage portion and the second position is arranged on the storage portion **58** or flange **60**. A method of reading the code **44** comprises reading the code at any position between the first position **82** and second position **84**, hence the code **44** is compatible with a range of machines **4**, wherein a code reading system **18** can have a range of orientations.