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(54) CASSETTE FOR RECEIVING AN IRREGULARLY SHAPED OBJECT

(57) The present disclosure relates to a cassette (4, 4', 4") adapted for receiving an irregularly shaped object (2). The cassette (4, 4', 4") has a regular outer shape and comprises a receptacle (6, 6', 6") having an irregular shape, which is adapted to receive the irregularly shaped object (2). The shape of the receptacle (6, 6', 6") is adapted to hold the irregularly shaped object (2) in a fixed position in relation to the cassette (4, 4', 4").

The disclosure further relates to a kit comprising the cassette (4, 4', 4") and the irregularly shaped object (2), a cassette system comprising a plurality of cassettes (4, 4', 4"), a process arrangement for manufacturing and/or assembly of a product and a method for changing from manufacturing and/or assembly of a first product to a second product in a process arrangement.

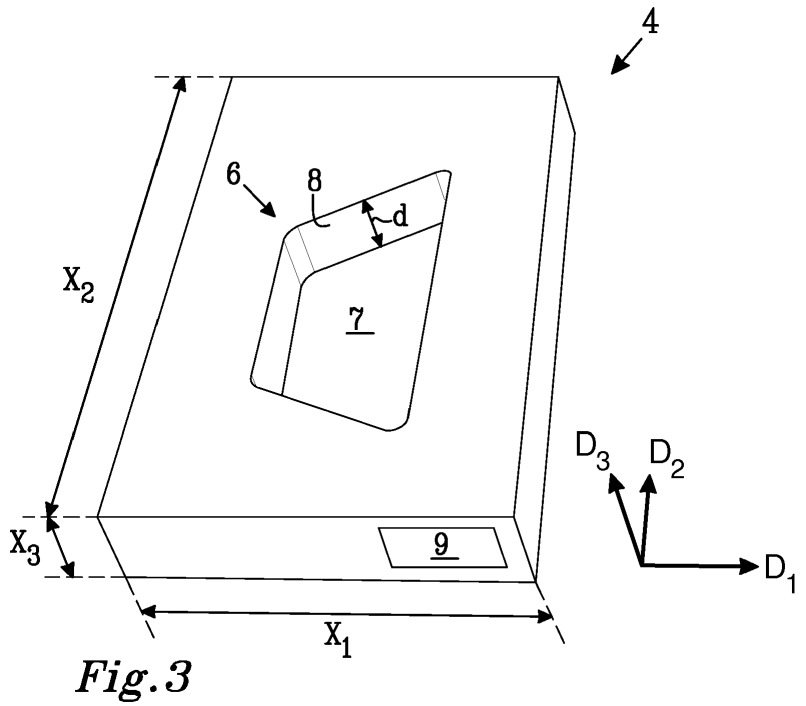

Fig. 3

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to a cassette adapted for receiving an irregularly shaped object. The disclosure further relates to a kit comprising the cassette and the irregularly shaped object, a cassette system comprising a plurality of cassettes, a process arrangement for manufacturing and/or assembly of a product and a method for changing from manufacturing and/or assembly of a first product to a second product in a process arrangement.

BACKGROUND

[0002] Many products are manufactured in a process arrangement, wherein an object to be comprised in the product is conveyed through the arrangement comprising at least one work station adapted to perform a manufacturing step or assembly step.

[0003] The object may be a container, which is adapted to be filled with contents. The contents may form the actual consumer product. In that case, a composite product to be sold comprises the container and the consumer product, which is packed in the container. Purely as examples, a beverage may be contained in a bottle, a can or a liquid-package, food stuff may be contained in a can or box, a medicine may be contained in a bottle, can or box, and a tobacco product may be contained in a box or can.

[0004] As an alternative, the object may be a consumer product, which is to be provided with a protective outer packaging and/or a label, e.g. a toilet paper roll. In that case, the composite product to be sold comprises the consumer product and the packaging and/or label.

[0005] Often the object to be conveyed through the arrangement, e.g. a container, such as a bottle, can or box, has a regular shape or outline as seen from above. Purely as examples, a bottle or a can may have a circular cross-section, while a liquid-package or a box may have a square or rectangular cross-section. Such objects are in general easy to grip in a work station of the process arrangement, e.g. holding the container immovable when filling the contents into the container. If the cross-section is circular, it usually does not matter, which rotation angle the object has, since it is rotation-symmetric along its longitudinal axis. If the cross-section is square or rectangular, the object may be gripped at its lateral sides, e.g. a milk package.

[0006] However, sometimes the object has an irregular shape, which in general is more difficult to grip. It may be important to hold the object in a predefined position, such that e.g. a filling station in the process arrangement fills inside the container and not partly outside. There is hence a desire to be able to handle objects having an irregular shape.

[0007] When changing from manufacturing and/or assembly of a first product to manufacturing and/or assembly of a second product in a process arrangement, assuming the second product has a size and/or shape differing from the size and/or shape of the first product, there is usually a considerable time spent in order to make machine adjustments, such that the process arrangement can handle the second product. During the downtime, nothing is manufactured. There is hence a desire to reduce the downtime as much as possible.

SUMMARY

[0008] The object of the present disclosure is to overcome or ameliorate at least one of the disadvantages of the prior art, or to provide a useful alternative.

[0009] The object above may be achieved by the subject-matter of claim 1. Embodiments are set forth in the appended dependent claims, in the following description and in the drawings.

[0010] Thus, in a first aspect of the present invention there is provided a cassette adapted for receiving an irregularly shaped object. The cassette has a regular outer shape and comprises a receptacle having an irregular shape, which is adapted to receive the irregularly shaped object. The shape of the receptacle is adapted to hold the irregularly shaped object in a fixed position in relation to the cassette.

[0011] As mentioned above, the irregularly shaped object may be a container, such as a bottle, can, liquid-package or box, for food, beverage, medicine or tobacco products. In particular, the irregularly shaped object may be a container for a smokeless tobacco product or a non-tobacco snuff product.

[0012] The term "irregular shape" as used herein denotes a shape having one or no symmetry axis. The object is assumed to be seen from above, such that the "irregular shape" is a cross-sectional shape or an outline of the object. One example of an irregular shape is a chiral shape, e.g. a pair of hands. The left hand is a non-superposable mirror image of the right hand. No matter how the two hands are oriented, it is impossible for all the major features of both hands to coincide. A chiral shape has no symmetry axis. An example of an object having one symmetry axis, is a moon crescent, a semi-circle or a pair of spectacles, which may be mirrored along an axis forming a centre-line. If mirrored along the centre-line, the crescent has a mirror image which is superposable. The other mirror images are non-superposable.

[0013] The term "regular shape" as used herein denotes a shape having two or more symmetry axes. The object is assumed to be seen from above, such that the "regular shape" is a cross-sectional shape or an outline. Examples with two symmetry axes are rectangles or ellipses. A square has four symmetry axes. A circle has an infinite number of symmetry axes, since it is rotation-symmetric.

[0014] According to one definition, a regular shape has all sides equal and/or all angles equal. For example, a

square has all sides equal and all angles equal, a rectangle has all angles equal but sides only pairwise equal and a rhombus has all sides equal but angles only pairwise equal. The shape forms a two dimensional structure which lies in a plane. Other shapes than regular may then be defined as irregular. The irregular shapes may have unequal sides and unequal angles. Irregular shapes may be made up of composite two-dimensional figures, i.e. comprising more than one basic shape, e.g. a semicircle beside a square.

[0015] The cassette as disclosed herein is utilized to provide the irregularly shaped object with a temporary regular outer contour. This makes the irregularly shaped object easier to handle e.g. in the process arrangement, since the regular outer contour of the cassette may be selected to be easy to handle. The cassette may form a frame around the irregularly shaped object. The cassette as disclosed herein may be utilized to convey the irregularly shaped object in a process arrangement and/or to hold the irregularly shaped object during different manufacturing and/or assembly steps.

[0016] The receptacle may comprise, or be constituted by, a recess in the cassette or a through-going aperture in the cassette. As an alternative, the receptacle may be located on top of the rest of the cassette.

[0017] The receptacle may be large enough to receive the entire object. Alternatively, the irregularly shaped object may protrude from the recess, or the irregularly shaped object may be recessed in the cassette.

[0018] The shape of the receptacle, and in particular its contour, is adapted to hold the irregularly shaped object in a fixed position in relation to the cassette. The term "fixed position" as utilized herein implies that both the position and the orientation of the irregularly shaped object are fixed and predefined in relation to the cassette. A "fixed position" does not allow alternative orientations, such as holding the irregularly shaped object upside down, unless both the upper side and lower side are equal, since that would mean another orientation. It is neither included to hold the irregularly shaped object rotated away from a predefined position, even if the mean position of the irregularly shaped object would be the same. Further the irregularly shaped object is fixedly held by the receptacle, such that the irregularly shaped object does not move in relation to the cassette. The fixed position in relation to the cassette is predetermined, such that the work stations of the process arrangement may be set up accordingly.

[0019] The cassette has a first extension along a first direction, a second extension along a second direction and a third extension along a third direction. The first, second and third directions are orthogonal to each other forming a Cartesian coordinate system. The extensions are selected to be appropriate for the irregularly shaped object, as well as for the process arrangement, in which the cassette is to be used. The first extension may be in the range of 20 mm to 300 mm, preferably in the range of 30 mm to 250 mm, more preferably in the range of 40 mm to 160 mm. The second extension may be in the range of 20 mm to 300 mm, preferably in the range of 30 mm to 250 mm, more preferably in the range of 40 mm to 160 mm. The third extension may be in the range of 5 mm to 50 mm, preferably in the range of 10 mm to 40 mm, more preferably in the range of 20 mm to 30 mm. The first direction may coincide with the conveying direction of the process arrangement. The second direction may be in a width direction of the process arrangement. The third direction may be in a height direction.

[0020] As mentioned above, the cassette has a regular outer shape. The outer shape may be rectangular when seen from above, i.e. a rectangular cross-sectional shape or a rectangular outline. This kind of outer shape is easy to grip, e.g. at its lateral sides. A square is seen as a special case of a rectangle. It may be advantageous that the cross-sectional shape is non-square rectangular, since that decreases the risk of improper orientation of the cassette, which could be a risk since a square cross-sectional shape has four equal lateral sides.

[0021] The cassette may have a rectangular cuboid three-dimensional shape. All angles in the cuboid are right angles, and opposite faces of the cuboid are equal. By definition this makes the shape a right rectangular prism. This shape may also be called a rectangular parallelepiped and/or a orthogonal parallelepiped. The outer shape of the rectangular cuboid is rectangular when seen from above, i.e. the cuboid has a rectangular cross-sectional shape.

[0022] The cassette may be adapted to receive a singular irregularly shaped object. As an alternative, the cassette may be adapted to receive a plurality of irregularly shaped objects, e.g. arranged in rows and/or columns, such as two, three, four, six, eight or nine objects. In that case, a corresponding plurality of receptacles is provided. The irregularly shaped objects to be received in the same cassette are assumed to have the same, or substantially the same, irregular shape.

[0023] The cassette may be utilized to determine the weight of the irregularly shaped object. If the weight of the cassette when empty is known or determined, the weight of the irregularly shaped object may be determined as the difference of the weight of the cassette with the irregularly shaped object and the weight of the cassette when empty. The weight of the cassette with the irregularly shaped object may be determined in the process arrangement. In this case, it is preferred that the cassette is be adapted to receive a singular irregularly shaped object.

[0024] The cassette may comprise cassette identity information, e.g. being labelled with an individual identity. A database may be used to connect properties, such as weight when empty, size etc., to a certain cassette identity information. The label may be an RFID tag or information printed on, written on or attached to the cassette, e.g. a number, letters, and/or an EAN code. The information may be sensed by a reading unit comprised in the process arrangement.

[0025] The cassette identity may also be used to store information, e.g. in the database, related to the irregularly shaped object temporarily being located in the receptacle, such as weight of the irregularly shaped object or if something has gone wrong with the irregularly shaped object in the process arrangement, e.g. contents outside the container or a lid or cap not being closed.

[0026] In a second aspect of the present invention, there is provided a kit comprising a cassette as described herein and an irregularly shaped object, the shape of the receptacle being adapted to hold the irregularly shaped object in the fixed position in relation to the cassette.

[0027] The receptacle may comprise, or be constituted by, a recess in the cassette or a through-going aperture in the cassette. As an alternative, the receptacle may be located on top of the rest of the cassette.

[0028] The receptacle may be large enough to receive the entire irregularly shaped object. Alternatively, the irregularly shaped object may protrude from the recess, or the irregularly shaped object may be recessed in the cassette. The irregularly shaped object may e.g. comprise a flange such that it may rest on the flange, either on top of the cassette or on an abutment in the recess.

[0029] It may be advantageous that the irregularly shaped object abuts on a bottom of the recess, such that a force applied from above to the irregularly shaped object is transferred to the cassette via the bottom of the recess. The bottom of the recess may be planar.

[0030] The shape of the receptacle may comprise at least one fixation member for holding the irregularly shaped object in the fixed position in relation to the cassette.

[0031] The minimum number of fixation members depends on the shape of the irregularly shaped object and the shape of the receptacle. Two fixation members may be e.g. enough to hold the irregularly shaped object, if the irregularly shaped object comprises a narrow waist section and the fixation members are located at either side of the narrow waist section. Other shapes may need three, four, five, six or more fixation members. The fixation members may be resilient, e.g. being made of an elastic material. The fixation members are adapted to cooperate with each other, such that the irregularly shaped object is held in the fixed position in relation to the cassette.

[0032] At least one of the fixation members may have a shape, which corresponds to at least a portion of the shape of the irregularly shaped object, e.g. having the same curvature.

[0033] The shape of the receptacle may correspond to the irregular shape of the irregularly shaped object, as seen in two and/or three dimensions. The shape of the receptacle may mimic the shape of the irregularly shaped object, i.e. the receptacle may have the same shape as the irregularly shaped object, although somewhat larger such that the irregularly shaped object fits in the receptacle. It is only somewhat larger, such that the receptacle is able to hold the irregularly shaped object in the fixed position in relation to the cassette. In that case the receptacle itself forms a single fixation member.

[0034] At least one additional space may be located in the receptacle outside the irregularly shaped object. The receptacle then has a larger cross-sectional area than the irregularly shaped object, having another shape and/or a larger size. However, the receptacle is anyway adapted to hold the irregularly shaped object in the fixed position in relation to the cassette, e.g. by means of any of the fixation members described herein. The additional space/s may e.g. be useful when lifting the irregularly shaped object out of the receptacle.

[0035] In a third aspect of the present invention, there is provided a cassette system comprising a first plurality of cassettes as described herein or a plurality of kits as described herein. The cassettes may be conveyed one after each other through the process arrangement. They may come directly after each other or interspaced. The cassettes of the first plurality preferably all have similarly shaped receptacles adapted to receive one, or more, objects. By utilizing such a cassette system, the irregularly shaped objects are easily handled in the process arrangement.

[0036] The cassettes may comprise coupling means, such that they may be connected to each other. Purely as an example a male coupling means, such as a hook, may be used at a front side and a female coupling means, such as a recess for receiving the hook, at the opposite side, wherein the female coupling means is adapted to receive the male coupling means of the adjacent cassette and vice versa. Alternatively, magnetic coupling means may be used. Preferably the coupling means are releasable, such that the cassettes may be released from each other. A number of such consecutive cassettes may form a chain of cassettes. The chain of cassettes may form a portion of a conveying system, e.g. the chain of cassettes forming a conveyor. As an alternative, the cassettes may be connectable to the conveying system, e.g. to a conveyor.

[0037] If the cassettes comprise information with individual identities as described above, it is possible to keep track of the individual cassettes of the plurality of cassettes. Preferably each cassette is provided with its own individual cassette identity information. The database used to connect properties, such as weight when empty, size etc., to a certain cassette identity may form part of the process arrangement. The cassette identities may be used to store information related to the irregularly shaped object temporarily being located in the receptacle of a certain cassette identified by its identity, such as weight of the irregularly shaped object or if something has gone wrong with the irregularly shaped object in the process arrangement, e.g. contents outside the container or a lid or cap not being closed.

[0038] The cassette system may further comprise at least one second plurality of cassettes. The cassettes of the second plurality preferably all have similarly shaped receptacles adapted to receive one, or more, objects.

The shape and/or size of the receptacles of the second plurality of cassettes is different from the shape and/or size of the first plurality of cassettes. The outer shape of the cassettes of the second plurality is the same, or corresponding to, the outer shape of the first plurality. The receptacles of one of the first or second plurality of cassettes may have a regular shape. The cassette system may also comprise a third plurality of cassettes, a fourth plurality of cassettes etc. At least one of the pluralities of cassettes has irregularly shaped receptacles adapted to receive an irregularly shaped object.

[0039] The term "corresponding outer shapes" as used herein means that a number of cassettes of one of the first and the second plurality of cassettes may together have a shape similar to one cassette of the other of the first and the second plurality of cassettes. Purely as an example, a rectangular cassette may have an outer shape corresponding to two square cassettes being located side by side.

[0040] Any of the pluralities of cassettes in the cassette system may be interchangeable with any other pluralities of cassettes in the process arrangement as disclosed herein.

[0041] If using cassettes with individual identity as described above, the identity may be used to keep track of which plurality of cassettes a certain cassette belongs to, if more than one plurality of cassettes is provided.

[0042] A cassette corresponding to the one described herein, but instead having a regularly shaped receptacle, may be utilized to receive and hold a regularly shaped object, i.e. an object with a regularly shaped cross-section, such as a circle.

[0043] In a fourth aspect of the present invention there is provided a process arrangement for manufacturing and/or assembly of a product. The arrangement comprises the cassette system as described herein, a conveying system and at least one work station. The product comprises the irregularly shaped object. The conveying system is adapted to cooperate with the cassettes in order to convey the cassettes through the at least one work station, the cassettes thereby holding the irregularly shaped object in a fixed position in relation to the cassette. There may be parallel production lines in the same process arrangement.

[0044] When changing from a first product to a second product in a process arrangement, assuming the second product has a size and/or shape differing from the size and/or shape of the first product, there is usually a considerable time spent in order to make machine adjustments, such that the process arrangement can handle the second product. During the downtime, nothing is manufactured. There is hence a desire to reduce the downtime as much as possible.

[0045] Therefore, a cassette system comprising a first and a second plurality of cassettes may be utilized for the two different products.

[0046] The first product comprises a first object. The cassettes of the first plurality of cassettes are adapted to receive and hold the first object. The second product comprises a second object, which differs from the first object in at least one of size and shape. The cassettes of the second plurality of cassettes are adapted to receive and hold the second object. Since the second object has a size and/or shape differing from the size and/or shape of the first object, it is not feasible to use the same kind of cassette for both the first and the second object. Instead the respective receptacles have to be configured according to the respective object. One of the first or second objects may have a regular shape. The receptacles of one of the first or second plurality of cassettes may have a regular shape, but at least one of the pluralities of cassettes has irregularly shaped receptacles adapted to receive an irregularly shaped object. The outer shape of the cassettes of the first and the second plurality of cassettes are the same or corresponding.

[0047] The process arrangement may further comprise a reading unit and a database. The reading unit is adapted to sense cassette identity information from the cassettes, which comprise cassette identity information, e.g. being labelled with an individual identity. The database may be used to connect properties, such as weight when empty, size etc., to a certain cassette identity information and hence to a certain cassette.

[0048] In a fifth aspect of the present invention there is provided a method for changing from manufacturing and/or assembly of a first product to manufacturing and/or assembly of a second product in an arrangement for manufacturing and/or assembly of a product. The first product comprises a first object and the second product comprises a second object, differing from the first object in at least one of size and shape. At least one of the first and second objects is irregularly shaped. The arrangement comprises a cassette system comprising a first plurality of cassettes for conveying the first objects and a second plurality of cassettes for conveying the second objects. The cassettes of the first plurality of cassettes comprise a receptacle adapted to receive the first object and to hold it in a fixed position in relation to the cassette. The cassettes of the second plurality of cassettes comprise a receptacle adapted to receive the second object and to hold it in a fixed position in relation to the cassette, the receptacle of the second plurality of cassettes being different from the receptacle of the first plurality of cassettes as regards shape and/or size. The cassettes of both of the first and the second pluralities of cassettes have a regular outer shape, the outer shape of the cassettes of the second plurality of cassettes being the same, or corresponding to, the outer shape of the cassettes of the first plurality. The method comprises

- utilizing the cassettes of the first plurality for manufacturing and/or assembly of the first product,
- exchanging the cassettes of the first plurality for the cassettes of the second plurality,
- utilizing the cassettes of the second plurality for manufacturing and/or assembly of the second product.

[0049] The method as described herein makes changing from a first product to a second product in the process arrangement as disclosed herein quick and easy. Fewer machine adjustments need to be made in order for the process arrangement to be able to handle the second product as compared to known technology. Hence downtime is reduced, thereby improving machine efficiency.

[0050] Purely as an example, if the process arrangement is a line for filling containers with portion pouches of a smokeless tobacco product or a non-tobacco snuff product, the first plurality of cassettes may be used to fill an irregularly shaped container in the form of an irregularly shaped can, while the second plurality of cassettes may be used to fill a standard-shaped cylindrical can having a circular cross-section.

BRIEF DESCRIPTION OF THE DRAWINGS

[0051] The present invention will hereinafter be further explained by means of non-limiting examples with reference to the appended drawings wherein:

Fig. 1 a-l illustrate a number of different two-dimensional shapes,

Fig. 2a-b illustrate an example of an irregularly shaped object,

Fig. 3 illustrates a cassette comprising a receptacle having an irregular shape according to a first embodiment of the invention,

Fig. 4 illustrates a cassette according to a second embodiment of the invention,

Fig. 5 illustrates a cassette according to a third embodiment of the invention,

Fig. 6 illustrates a cassette comprising a receptacle having a regular shape.

[0052] It should be noted that the appended drawings are not necessarily drawn to scale and that the dimensions of some features of the present invention may have been exaggerated for the sake of clarity.

DETAILED DESCRIPTION

[0053] The invention will, in the following, be exemplified by embodiments. It should however be realized that the embodiments are included in order to explain principles of the invention and not to limit the scope of the invention, defined by the appended claims. Details from two or more of the embodiments may be combined with each other.

[0054] Fig. 1 illustrates a number of different two-dimensional shapes. The symmetry axes are seen as dashed lines. Any of the shapes described herein may have one or more of the corners rounded off.

[0055] A square, Fig. 1a, has four symmetry axes. An equilateral triangle, Fig. 1d, has three symmetry axes. A rectangle, Fig. 1b, an ellipse, Fig. 1h, and a parallelogram, Fig. 1j, have two symmetry axes. A circle, Fig. 1g, has an infinite number of symmetry axes, since it is rotation-symmetric around an axis going out of the plane of the paper. The shapes having two or more symmetry axes are regular in the meaning of "regular shape" as used herein.

[0056] An isosceles triangle, Fig. 1e, a crescent, Fig. 1f, a trapezium, Fig. 1i, a spectacles-shape, Fig. 1k, and a semi-circle, Fig. 1l, have one symmetry axis. An arbitrary triangle with unequal sides, Fig. 1c, has no symmetry axis. The shapes having one or no symmetry axis are irregular in the meaning of "irregular shape" as used herein.

[0057] Fig. 2 schematically illustrates an example of an irregularly shaped object, a container 2. Fig. 2a shows a perspective view of the container 2, while Fig. 2b is a view from above illustrating the cross-sectional shape, which is a trapezium with rounded corners. The container 2 has one symmetry axis, see dashed line, i.e. the upper half in Fig. 2b forms a mirror image of the lower half and vice versa.

[0058] A suitable material for the container 2 is metal, plastic, cardboard or combinations thereof. The container 2 may be used for containing a smokeless tobacco product or a non-tobacco snuff product, e.g. packed in portion pouches. As an alternative, the container 2 may be used for containing food stuff or candies, or a medicine, e.g. pills.

[0059] The container 2 is to be filled with its contents in a process arrangement, which comprises a conveying system. The container 2 is to be conveyed through the process arrangement by the conveying system, e.g. on one or more conveyors.

[0060] Due to its shape, the container 2 is difficult to handle in the process arrangement, e.g. difficult to grip and hold. Therefore the container is instead handled by means of a cassette 4 having a regular outer shape, which cassette 4 is illustrated in Fig. 3. The cassette 4 with its regular shape is easier to handle in the process arrangement than the irregularly shaped container 2. The cassette 4 temporarily provides the irregularly shaped object, i.e. the container 2, with a regular outer shape, which is easy to handle, e.g. to grip and hold.

[0061] In the illustrated embodiment, see Fig. 3, the cassette 4 forms a rectangular cuboid, having a first extension x_1 along a first direction D_1, a second extension x_2 along a second direction D_2 and a third extension x_3 along a third direction D_3. The first, second and third directions D_1, D_2, D_3 are orthogonal to each other forming a Cartesian coordinate system. The first direction D_1 may coincide with the conveying direction of the process arrangement. The second direction D_2 may be in a width direction of the process arrangement. The third direction D_3 may be in a height direction.

[0062] The cassette 4 comprises a receptacle 6 having an irregular shape, which is adapted to receive the irregularly shaped object 2. The shape of the receptacle 6 is adapted to hold the irregularly shaped object 2 in a fixed position in relation to the cassette 4. The receptacle 6 forms a recessin the cassette 4. The depth d of the recess is selected such that the container 2 will stand on a bottom 7 of the receptacle 6. Hence the bottom 7 is preferably planar. Since the receptacle 6 forms a recess, the depth d is less than the third extension x_3 of the cassette 4. As an alternative, the receptacle may form a through-going aperture in the cassette 4.

[0063] In the illustrated embodiment of Fig. 3, the shape of the receptacle 6 when seen from above corresponds to the cross-sectional shape of the container 2 forming a trapezium with rounded corners. The container 2 may be held in a fixed, predefined position in the cassette 4 by being received in the receptacle 6. When the cassette 4 is gripped, e.g. by a gripper of the process arrangement, the position of the container 2 in relation to the cassette 4 is known. Further, since the container 2 is fixedly held by the receptacle 6, the container 2 cannot move within the receptacle 6. In the illustrated embodiment of Fig. 3 the container 2 fits perfectly in the receptacle 6, implying that the whole contour of the receptacle 6 forms a single continuous fixation member 8.

[0064] The cassette 4 and the container 2 together forms a kit, wherein the shape of the receptacle 6 is adapted to hold the container 2 in the fixed position in relation to the cassette 4.

[0065] The cassette 4 may be utilized to determine the weight of the container 2. If the weight of the cassette 4 when empty is known or determined, the weight of the container 2 may be determined as the difference of the weight of the cassette 4 with the container 2 and the weight of the cassette 4 when empty. The weight of the cassette 4 with the container 2 may be determined in the process arrangement.

[0066] The cassette 4 may comprise cassette identity information, e.g. being labelled with an individual identity, illustrated as an RFID tag 9 in Figure 3. A database may be used to connect properties, such as weight when empty, size etc., to a certain cassette identity information. The information may be sensed by a reading unit comprised in the process arrangement.

[0067] The cassette identity may also be used to store information, e.g. in the database, related to the container 2 temporarily being located in the receptacle 6, such as weight of the container 2 or if something has gone wrong in the process arrangement, e.g. contents outside the container 2 or a lid or cap not being closed.

[0068] Fig. 4 illustrates in a top view an alternative embodiment of the cassette 4', wherein the container 2 is held by four separate fixation members 8', which are distributed around the circumference of the receptacle 6'. The fixation members 8' are located such that they are able to hold the container 2 in a fixed position in relation to the cassette 4', e.g. one fixation member 8' at each side of the trapezium of the container 2. The fixation members 8' may be resilient, e.g. being made of an elastic material. The fixation members 8' are adapted to cooperate with each other, such that the irregularly shaped object 2 is held in the fixed position in relation to the cassette 4'. The receptacle 6' has a larger cross-sectional area than the container 2, such that an additional space 10' is located in the receptacle 6' outside the container 2. The additional space 10' may e.g. be useful when lifting the container 2 out of the receptacle 6'.

[0069] The minimum number of fixation members depends on the shape of the irregularly shaped object and the shape of the receptacle. Purely as an example, for a spectacles-shape as in Fig. 1k two fixation members would be enough to hold the irregularly shaped object, since these may be located above and below the narrow waist section, while e.g. a triangular shape may utilize three fixation members.

[0070] Fig. 5 illustrates yet another embodiment of the cassette 4", wherein the container 2 is held by portions of the contour of the receptacle 6" forming fixation members 8", which are shaped to correspond to the shape of the container 2. However, the receptacle 6" has a larger cross-sectional area than the container 2, such that at least one additional space 10", in the illustrated embodiment two additional spaces 10", is/are located in the receptacle 6" outside the container 2. The additional space/s 10" may e.g. be useful when lifting the container 2 out of the receptacle 6".

[0071] A cassette corresponding to the one described herein, but instead having a regularly shaped receptacle, may be utilized to receive and hold a regularly shaped object, i.e. an object with a regularly shaped cross-section, e.g. any one of the regular shapes described above. See Fig. 1a, 1b, 1d, 1g, 1h and 1j. Fig. 6 illustrates a cassette 104 comprising a receptacle 106 having a circular cross-section.

[0072] Normally the cassette is utilized as a part of a cassette system comprising a first plurality of cassettes, like the cassettes 4, 4', 4" described in conjunction with Figures 3-5. The cassettes may be conveyed one after each other through the process arrangement. They may come directly after each other or interspaced. The cassettes of the first plurality preferably all have similarly shaped receptacles adapted to receive a container 2 each. By utilizing such a cassette system, the irregularly shaped objects 2 are easily handled in the process arrangement, as described above. There may be parallel production lines in the same process arrangement.

[0073] When changing from a first product to a second product in a process arrangement, assuming the second product has a size and/or shape differing from the size and/or shape of the first product, there is usually a considerable time spent in order to make machine adjustments, such that the process arrangement can handle the second product. During the downtime, nothing is manufactured. There is hence a desire to reduce the downtime as much as possible.

[0074] In that case, a cassette system comprising a first and a second plurality of cassettes may be utilized for the two different products.

[0075] The first product comprises a first object. The cassettes of the first plurality are adapted to receive and hold the first object. The second product comprises a second object, which differs as regards size and/or shape from the first object. The cassettes of the second plurality are adapted to receive and hold the second object. Since the second object has a size and/or shape differing from the size and/or shape of the first object, it is not feasible to use the same kind of cassette for both the first and second object. Instead the respective receptacles have to be configured according to the respective object. One of the first or second objects may have a regular shape. The outer shape of the cassettes of the first and the second plurality of cassettes are the same or corresponding.

[0076] Corresponding shapes means that a number of cassettes of one of the first and the second plurality of cassettes may together have a shape corresponding similar to one cassette of the other of the first and the second plurality of cassettes. Purely as an example, a rectangular cassette may have an outer shape corresponding to two square cassettes being located side by side.

[0077] Purely as an example, if the process arrangement is a line for filling containers with portion pouches of a smokeless tobacco product or non-tobacco snuff product, the first plurality of cassettes may be used to fill an irregularly shaped container in the form of a can, while the second plurality of cassettes may be used to fill a standard-shaped cylindrical can having a circular cross-section. The cassette of the first plurality may look like any of the cassettes 4, 4', 4" described in conjunction with Fig. 3-5, while a cassette 104 of the second plurality may have a cylindrical receptacle 106. See Fig. 6. The first plurality hence has a receptacle 6, 6', 6" adapted to receive an irregularly shaped object. The second plurality has a receptacle 106 adapted to receive a regularly shaped object, illustrated as a circular cross-section.

[0078] Further modifications of the invention within the scope of the appended claims are feasible. As such, the present invention should not be considered as limited by the embodiments and figures described herein. Rather, the full scope of the invention should be determined by the appended claims, with reference to the description and drawings.

Claims

1. A cassette (4, 4', 4") adapted for receiving an irregularly shaped object (2),
said cassette (4, 4', 4") having a regular outer shape,
said cassette (4, 4', 4") comprising a receptacle (6, 6', 6") having an irregular shape, which is adapted to receive said irregularly shaped object (2),
said shape of said receptacle (6, 6', 6") being adapted to hold said irregularly shaped object (2) in a fixed position in relation to said cassette (4, 4', 4").

2. The cassette (4, 4', 4") according to claim 1, wherein said outer shape is rectangular when seen from above.

3. The cassette (4, 4', 4") according any one of the preceding claims, wherein said receptacle (6, 6', 6") comprises, or is constituted by, a recess or a through-going aperture in said cassette (4, 4', 4").

4. The cassette (4, 4', 4") according any one of the preceding claims being adapted to receive a singular irregularly shaped object (2).

5. The cassette (4, 4', 4") according any one of the preceding claims comprising cassette identity information (9), e.g. being labelled with an individual identity.

6. A kit comprising a cassette (4, 4', 4") according to any one of the preceding claims and an irregularly shaped object (2), said shape of said receptacle (6, 6', 6") being adapted to hold said irregularly shaped object (2) in said fixed position in relation to said cassette (4, 4', 4").

7. The kit according to claim 6, wherein said receptacle (6, 6', 6") comprises at least one fixation member (8', 8") for holding said irregularly shaped object (2) in said fixed position in relation to said cassette (4', 4").

8. The kit according to claim 7, wherein at least one of said fixation members (8") has a shape, which corresponds to a portion of the shape of said irregularly shaped object (2).

9. The kit according to any one of claims 6-8, wherein said shape of said receptacle (6) corresponds to said irregular shape of said irregularly shaped object (2).

10. The kit according to any one of claims 6-8, wherein at least one additional space (10', 10") is located in said receptacle (6', 6") outside said irregularly shaped object (2).

11. A cassette system comprising a first plurality of cassettes (4, 4', 4") according to any one of claims 1-5 or a plurality of kits according to any one of claims 6-10.

12. The cassette system according to claim 11 further comprising at least one second plurality of cassettes (4, 4', 4"), the shape and/or size of said receptacles (6, 6', 6") of said second plurality of cassettes (4, 4', 4") being different from the shape and/or size of said first plurality of cassettes (4, 4', 4"), said outer shape of said cassettes (4, 4', 4") of said second plurality of cassettes (4, 4', 4") being the same, or corre-

sponding to, the outer shape of the first plurality.

13. A process arrangement for manufacturing and/or assembly of a product,
said arrangement comprising said cassette system according to claim 11 or 12, a conveying system and at least one work station,
said product comprising said irregularly shaped object (2),
said conveying system being adapted to cooperate with said cassettes (4, 4', 4") in order to convey said cassettes (4, 4', 4") through said at least one work station,
said cassettes (4, 4', 4") thereby holding said irregularly shaped object (2) in a fixed position in relation to said cassette (4, 4', 4").

14. The process arrangement according to claim 13 further comprising a reading unit and a database, said cassettes (4, 4', 4") comprising cassette identity information (9), e.g. being labelled with an individual identity,
said reading unit being adapted to sense said cassette identity information from said cassettes (4, 4', 4"),
said database being used to connect properties, such as weight when empty, size etc., to a certain cassette identity information.

15. A method for changing from manufacturing and/or assembly of a first product to manufacturing and/or assembly of a second product in a process arrangement, said first product comprising a first object (2) and said second product comprising a second object (2), at least one of said first and second objects (2) being irregularly shaped,
said arrangement comprising a cassette system comprising a first plurality of cassettes (4, 4', 4") for conveying said first objects (2) and a second plurality of cassettes (4, 4', 4") for conveying said second objects (2),
said cassettes (4, 4', 4") of said first plurality comprising a receptacle (6, 6', 6") adapted to receive said first object (2) and to hold it in a fixed position in relation to said cassette (4, 4', 4") of said first plurality,
said cassettes (4, 4', 4") of said second plurality comprising a receptacle (6, 6', 6") adapted to receive said second object (2) and to hold it in a fixed position in relation to said cassette (4, 4', 4") of said second plurality,
said receptacle of said second plurality being different from said receptacle of said first plurality as regards shape and/or size,
said cassettes (4, 4', 4") of both of said first and said second pluralities having a regular outer shape, said outer shape of said cassettes (4, 4', 4") of said second plurality of cassettes (4, 4', 4") being the same, or corresponding to, said outer shape of said cassettes (4, 4', 4") of said first plurality,
said method comprising

- utilizing said cassettes (4, 4', 4") of said first plurality for manufacturing and/or assembly of said first product,
- exchanging said cassettes (4, 4', 4") of said first plurality for said cassettes (4, 4', 4") of said second plurality,
- utilizing said cassettes (4, 4', 4") of said second plurality for manufacturing and/or assembly of said second product.

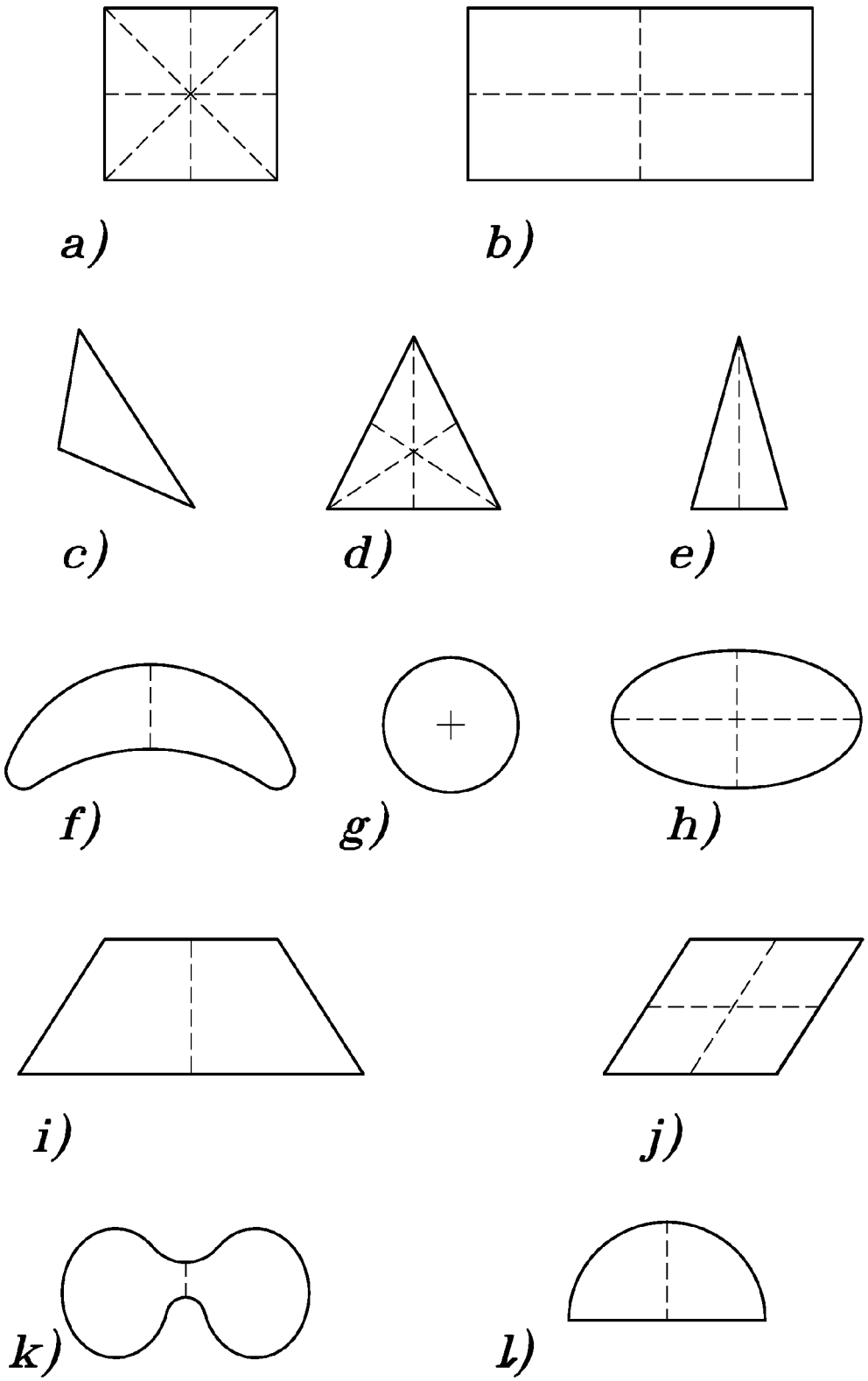

Fig. 1

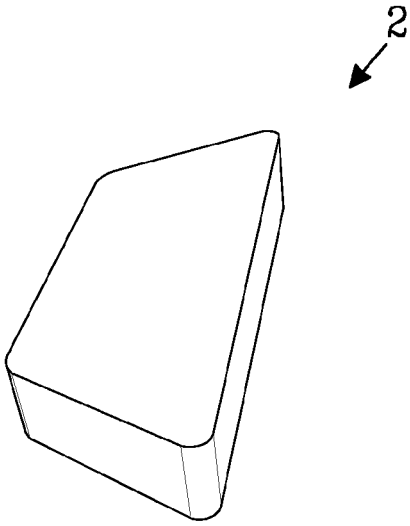

Fig.2a

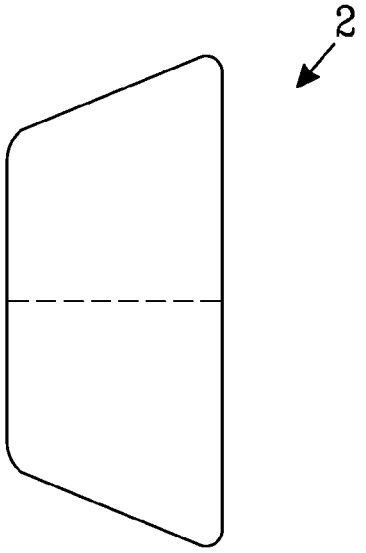

Fig.2b

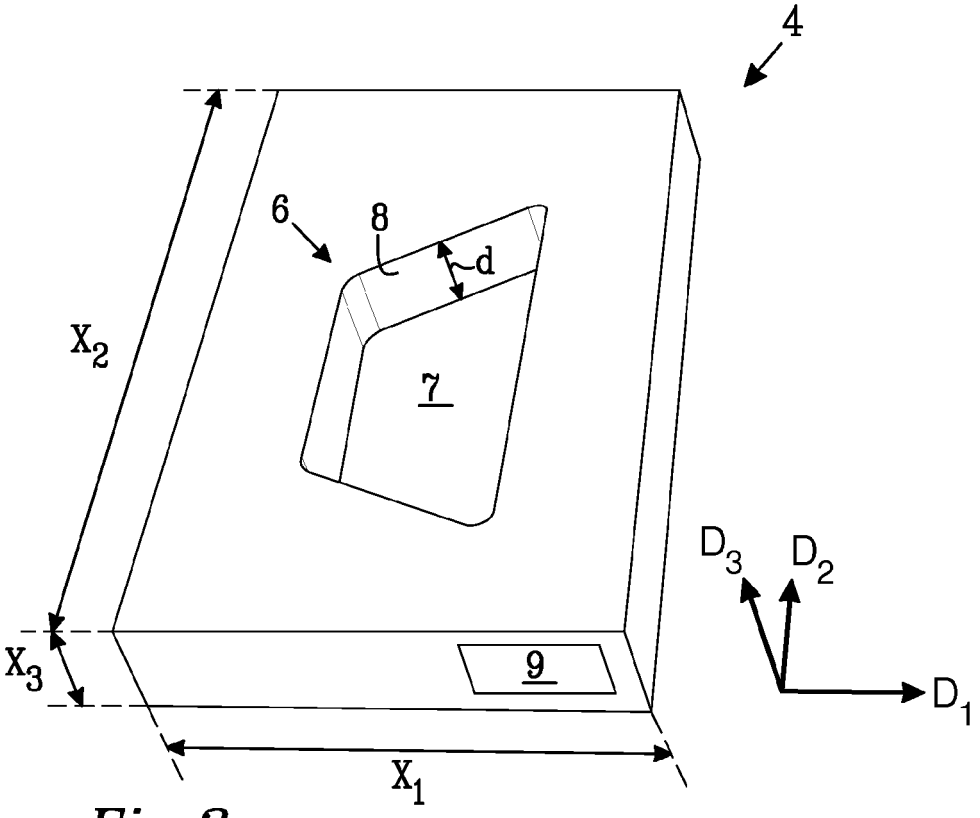

Fig.3

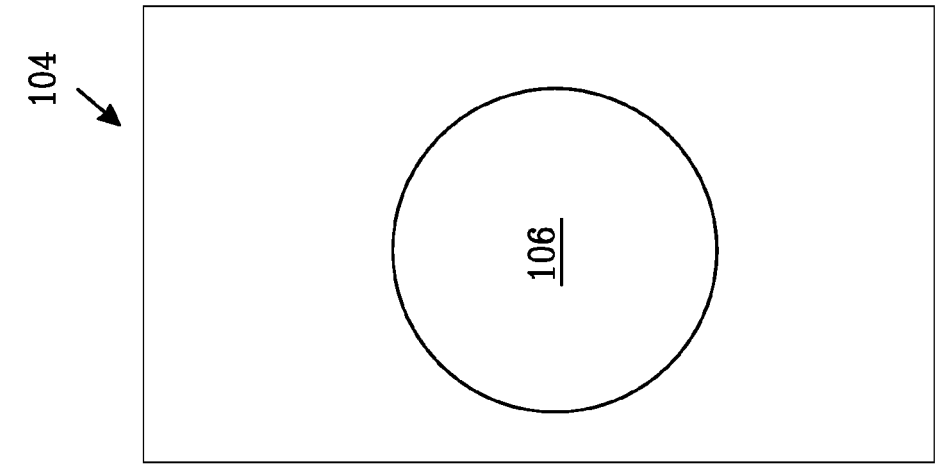

Fig.6

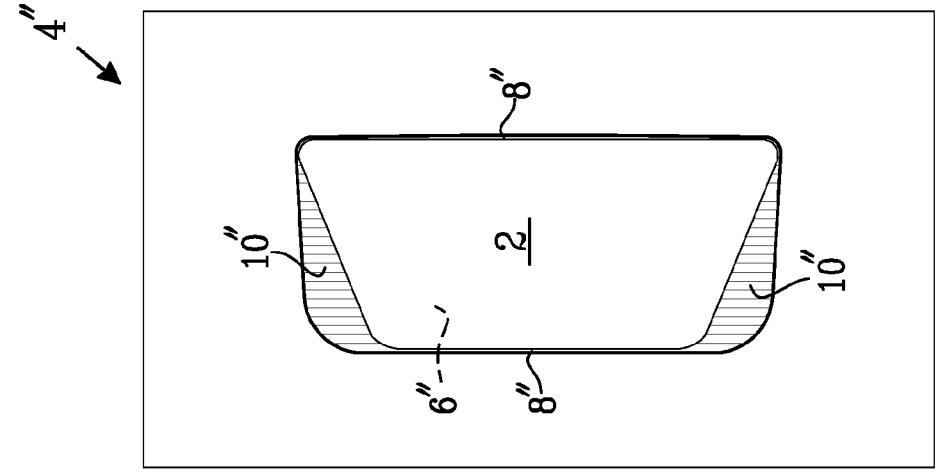

Fig.5

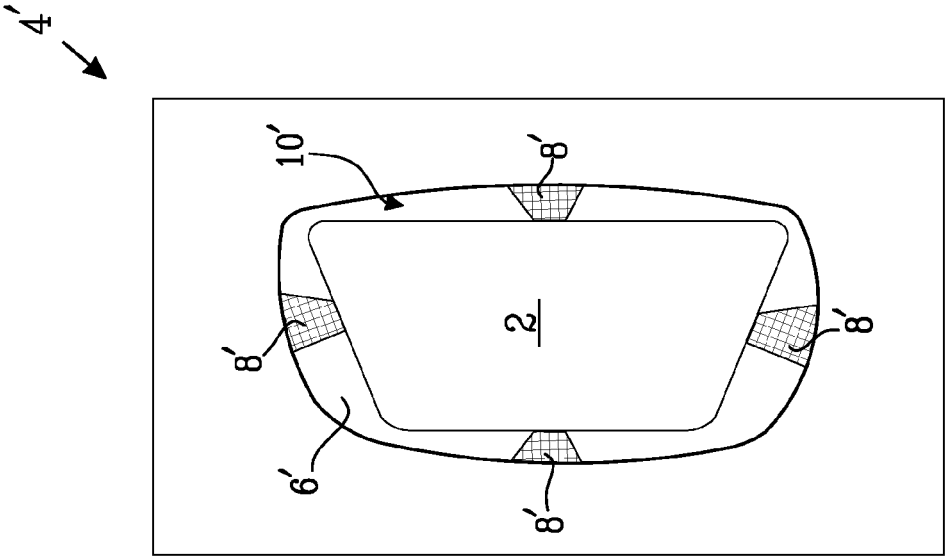

Fig.4

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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 1620

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2013/284560 A1 (LUKES MATTHEW R [US] ET AL) 31 October 2013 (2013-10-31) * paragraph [0004] - paragraph [0005] * * paragraph [0013] - paragraph [0015]; figures 1-7 *	1-4,6, 11-13,15	INV. B65B35/56 B65B43/54 B65B59/00 B65G17/32 B65G17/36
X	US 5 484 052 A (PAWLOSKI JAMES C [US] ET AL) 16 January 1996 (1996-01-16) * page 5, line 1 - line 3; figure 6 * * figures 7-9 and 12 *	1-4,6, 11-13,15	
X	EP 0 173 798 A1 (LIEDER MASCHINENBAU GMBH & CO [DE]) 12 March 1986 (1986-03-12) * column 5, line 20 - line 48; figures 1-3 *	1-4,6, 11,13	
X	US 2005/109422 A1 (DUMAN ROGER A [US]) 26 May 2005 (2005-05-26) * paragraph [0040]; figures 1-8 *	1-4,6, 11,13	
A	EP 0 727 367 A1 (KAO CORP [JP]) 21 August 1996 (1996-08-21) * figures 9, 10 *	1-4,6, 11-13,15	TECHNICAL FIELDS SEARCHED (IPC) B65B B65G

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
Munich	27 October 2015	Paetzke, Uwe

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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Application Number
EP 15 16 1620

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☒ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

1-4, 6, 11-13, 15

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 15 16 1620

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-4, 6, 11, 13

The first group of inventions relates to subject-matter that is, in addition to the known common features of claim 1, 6, 11 and 13, further defined by the potential special technical features contained in claims 2-4, that are dependent on claim 1, particularly in that the outer shape of the cassette and the shape of the recess may have specific shapes, etc. and that the cassette may be used in kits, cassette systems, and process arrangements. The features have the technical effect, that the cassettes can be used for various containers and in various machines. Consequently, the technical problem that is solved by the first group of inventions can be identified as being, to provide versatile cassettes, kits, cassette systems, and process arrangements.

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2. claims: 5, 14

The second group of inventions relates to subject-matter that is, in addition to the known common features of claims 1 and 13, further defined by the potential special technical features contained in claims 5 and 14, particularly in that cassettes comprise cassette identity information. Consequently, the technical problem that is solved by the second group of inventions can be identified as being, to provide cassettes and process arrangements with improved automatisation properties.

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3. claims: 7-10

The third group of inventions relates to subject-matter that is, in addition to the known common features of claim 6, further defined by the potential special technical features contained in claims 7-8, particularly in that fixation members and/or additional spaces are provided. The fixation members can be resilient so that damage of the containers can be avoided. The additional spaces (that can also be located between fixation members as apparent from figure 4) serve to facilitate lifting the container out of the receptacle (see page 15 lines 17-18). The technical problem that is solved by the third group of inventions can be identified as being, to provide a kit including a cassette that improves the handling of containers.

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4. claims: 12, 15

The fourth group of inventions relates to subject-matter

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 15 16 1620

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

that is, in addition to the known common features of claim 11, further defined by the potential special technical features contained in claims 12, particularly in that a cassette system may comprise at least two sets of cassettes each having a different size/shape of the receptacles.
Also independent method claim 15 belongs to this fourth group of inventions since it contains in addition to the features corresponding to the common subject-matter of claim 11 only additional features that correspond to the potential special technical features of claim 12.
Consequently, the technical problem that is solved by the fourth group of inventions can be identified as being, to provide a cassette system that facilitates adapting a product environment to a new product, i.e. the retooling process.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 16 1620

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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27-10-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013284560 A1	31-10-2013	EP 2844562 A1	11-03-2015
		US 2013284560 A1	31-10-2013
		WO 2013165933 A1	07-11-2013
US 5484052 A	16-01-1996	US 5484052 A	16-01-1996
		WO 9530611 A1	16-11-1995
EP 0173798 A1	12-03-1986	DE 3431174 A1	06-03-1986
		DK 382585 A	25-02-1986
		EP 0173798 A1	12-03-1986
		US 4778045 A	18-10-1988
US 2005109422 A1	26-05-2005	NONE	
EP 0727367 A1	21-08-1996	CN 1134389 A	30-10-1996
		DE 69602976 D1	29-07-1999
		DE 69602976 T2	28-10-1999
		EP 0727367 A1	21-08-1996
		JP 3443804 B2	08-09-2003
		JP H08282633 A	29-10-1996
		TW 467104 U	01-12-2001
		US 5687874 A	18-11-1997

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82