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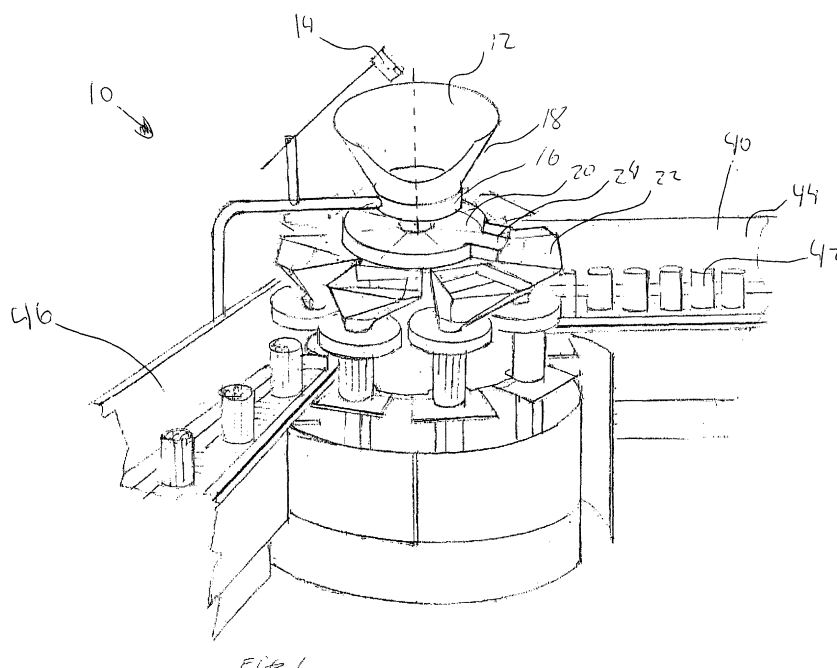
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(54) **Apparatus and method for arranging a plurality of elongate foodstuff products**

(57) An apparatus (10) for arranging a plurality of elongate foodstuff products and/or elongate processed foodstuff products from a substantially random orientation to a substantially parallel orientation comprises a supply system for supplying the plurality of elongate products, and a chute (12) defining an open inlet portion and an open outlet portion. The supply system supplies the plurality of elongate products to the open inlet portion of the chute, the elongate products being provided to the inlet portion of the chute in a random orientation, the chute having a wall (18) adapted to aligning the plurality of elongate products without subjecting the elongate

products to any mechanical impact that would cause the products to be deformed, damaged or broken. The apparatus further comprises a first path of travel defined from the inlet portion to the outlet portion, the path being partly defined by the wall of the chute. The elongate products travel along the first path and are thereby orientated by means of the wall so that the longitudinal axis of the plurality of elongate products are substantially parallel. The apparatus still further comprises a conveyor for conveying a multitude of containers (42) each adapted to receive the elongate products arranged in the substantially parallel orientation.



Description

[0001] The present invention relates to an apparatus and a method for aligning and packaging elongated articles or products. Further, the present invention relates to a funnel for being incorporated in the apparatus and for assisting in performing the method according to the present invention.

[0002] The products to be aligned are mostly products having a longitudinal axis and a length greater than the width or diameter. The products are provided to the apparatus in a random order, meaning that the longitudinal axis of each of the products are not deliberately arranged parallel to each other. The products are to be packaged into a number of containers each adapted for receiving and storing a multitude of products. The products may be foodstuff products, processed foodstuff products or a combination thereof. The products may be e.g. sausages, asparagus, carrots, slices or sticks of vegetables, picked cucumbers, spring rolls, french-fries and the like. The products may be frozen.

[0003] Related prior art may be found in patent publications such as US 4,514,959, US 4,629,017, US 4,773,527, US 4,832,205, US 5,641,073, US 5,178,256, US 4,094,123, US 3,447,660, EP 0 646 534, US 4,351,141, US 4,203,269 and EP 0 413 913. Reference is made to all of the above mentioned publications and all publications are hereby incorporated in the present specification by reference in their entirety for all purposes.

[0004] A first aspect the present invention relates to an apparatus for arranging a plurality of elongate foodstuff products and/or elongate processed foodstuff products from a substantially random orientation to a substantially parallel orientation. The apparatus according to the first aspect of the present invention may comprise:

- a supply system for supplying the plurality of elongate products,
- a chute defining an open inlet portion and an open outlet portion, the supply system supplying the plurality of elongate products to the open inlet portion of the chute, the elongate products being provided to the inlet portion of the chute in a random orientation, the chute having a wall adapted to aligning the plurality of elongate products without, to any substantial extent, subjecting the elongate products to any mechanical impact that would cause the products to be deformed, damaged or broken,
- a first path of travel defined from the inlet portion to the outlet portion, the first path of travel being at least partly defined by the wall of the chute, the elongate products travelling along the first path of travel and thereby being orientated by means of the wall so that the longitudinal axis of the plurality of elongate products are substantially parallel at the outlet portion of the chute, and
- a conveyor for conveying a multitude of containers

each adapted to receive the elongate products arranged in the substantially parallel orientation, the elongate products transferred from the open output portion to a respective container.

[0005] The supply system may provide the products from a reservoir or a large container. The products may be provided to the apparatus by means of a conveyor or other transport means.

[0006] The chute, as stated above, may include a wall adapted to align the products in the intended orientation. The wall may be flat or corrugated. Corrugations may help align the products in the intended orientation. As the products glide or are guided by the wall while travelling along the first path of travel, the wall is contemplated to align the products without subjecting the products to any mechanical force that would cause damage to the fragile products. Even if the products are frozen, they may be fragile, frozen products may even be more fragile than non-frozen products. Throughout the description the terms chute and funnel are used interchangeably.

[0007] The apparatus according to the present invention may be placed in a room having a temperature below the freezing point of water or at least below the freezing point of the products.

[0008] The conveyor mentioned above transports the multitude of container to be filled with the products might be part of a larger transport system transporting the containers from e.g., a station for disinfecting the containers before filling them. Also, the conveyor system may be part of, or transport the containers to, a station for heat treatment of the filled containers for prolonging the shelf life of the products. The conveyor system need not be part of, or in any way connected to, both or either of the above mentioned stations.

[0009] Advantageously, the chute may be provided with a first vibrating unit for vibrating the chute in a first direction. As the products pass through the chute, the vibration may allow the products to be aligned. The first direction may be substantially parallel with the parallel orientated products.

[0010] Additionally, the chute may be provided with a second vibrating unit for vibrating the chute in a second direction perpendicular to the first direction.

[0011] Both the first and/or the second vibrating unit may vibrate the chute at a frequency of 0,5 Hz to 20 Hz, such as 1-10 Hz, e.g. approximately 3-8 Hz or 0,5-1 Hz, 1-2 Hz, 2-3 Hz, 3-4 Hz, 4-5 Hz, 5-6 Hz, 6-7 Hz, 7-8 Hz, 8-9 Hz, 9-10 Hz, 10-11 Hz, 11-12 Hz, 12-13 Hz, 13-14 Hz, 14-15 Hz, 15-16 Hz, 16-17 Hz, 17-18 Hz, 18-19 Hz or 19-20 Hz.

[0012] More advantageously, the apparatus may further include a shutter unit operational between a first state where the open output portion is covered by at least a part of the shutter unit thereby stopping the products from being transferred into the specific container and a second state where the shutter allows the products to be transferred into the specific container.

[0013] The shutter device is contemplated to allow a number of products to be assembled in the space defined by the chute and the part of the shutter device covering the output portion of the chute. When a desired number of products, or a specific weight is obtained, the chute may be operated to release the products into the container positioned in registration with the output portion.

[0014] In order to have the containers filled with a batch of products, the apparatus according to the present invention may further comprise a unit for defining a specific batch of products to be transferred into a respective container. Specifically, the apparatus according to the present invention may include a weighting unit for defining a batch of products having a weight within a specific weight interval. Alternatively, or additionally, the apparatus according to the present invention may include a counting unit for defining a batch of products having a specific number of products.

[0015] The apparatus according to the present invention may be used for orientating the plurality of elongate products in a direction substantially parallel to the path of travel. Alternatively, the plurality of elongate products may be orientated in a direction substantially perpendicular to the path of travel. Examples of implementations could be transferring the products into elongate jars and oblong containers, respectively.

[0016] In addition to the above mentioned, a plurality of compartments may be defined in the chute, each of the compartments adapted to receive a batch of products, each of the compartments defining an open compartment inlet and an open compartment outlet. Additionally, each of the compartment outlets may be fitted with a shutter device, for selectively discharging the batch of products. Advantageously, the chute may comprise 1-10 compartments, such as 1-8, e.g. 2, 3, 4, 5, 6, 7, 8, 9 or 10. The compartments are contemplated to be used for filling a corresponding number of containers at once.

[0017] Generally, the open end of the chute may define a width being 10%-30% greater than a maximum length of the products. The products usually have a length and/or size within a specific interval with some sort of statistical distribution. The maximum length of the products may be controlled by a station discarding products having a length outside a given interval. The interval having a minimum and a maximum. Other ways of ensuring that the products do not exceed a maximum may be used.

[0018] An embodiment used for orienting and transferring products into a horizontal orientation and having the size of the opening within 10%-30%, greater than the maximum length of said products, such as 15%-25%, 18%-20%, or 10%-15%, 15%-20%, 20%-25%, 25%-30%, and including the above mentioned shutter device is contemplated to be especially advantageous.

[0019] The funnel or chute for vibrational filling of containers with elongate products, at least some of the products having a length being longer than the width of the opening through which the container is filled, may comprise:

a cylindrical outlet section adapted to the container opening and having a mainly vertical orientation, a lower funnel section comprising a first sloping surface having a slope towards the outlet section and a mainly vertical wall section positioned opposite the first sloping surface,

the first sloping surface and the vertical wall each extending around approximately 180° of the outlet section and the first sloping surface being limited sideways by mainly vertical, parallel side walls, the mutual distance between the side walls being approximately identical to the dimension of the outlet section in this direction,

an upper funnel section comprising a second sloping surface having a slope towards one side of the lower funnel section and ending at one of the mainly vertical side walls of the lower funnel section,

a continuation of the opposite mainly vertical side wall of the lower funnel section providing a mainly vertical wall opposite the second sloping surface, the second sloping surface having mainly vertical parallel side walls, the mutual distance between the side walls of the second sloping surface being approximately identical to the length of the first sloping surface plus the dimension of the outlet section in this direction.

[0020] In this arrangement the elongate products are guided through the funnel without the products blocking the funnel by sticking between opposite sloping surfaces, and the products are guided towards the outlet section in a controlled and secure manner by having the different sloping surfaces positioned opposite mainly vertical wall sections.

[0021] As discussed earlier, the products may be limited to products having a specific maximum length. The chute may then be constructed in a way that the opening, aperture or outlet through which the products pass when being transferred into the containers have a diameter of more than two times the maximum length of the products. It is contemplated to allow products arriving at the opening to have their centre of gravity located in such a way that even if the products are positioned transversally to the opening the products pass through the opening.

[0022] A second aspect of the present invention relates to a chute defining an open inlet portion and an open outlet portion, the supply system supplying the plurality of elongate products to an open inlet portion of a chute, the elongate products being provided to the inlet portion of the chute in a random orientation, the chute having a wall adapted to aligning the plurality of elongate products without, to any substantial extent, subjecting the elongate products to any mechanical impact that would cause the products to be deformed, damaged or broken, and a first path of travel defined from the inlet portion to the outlet portion, the first path of travel being at least partly defined by the wall of the chute, the elongate products travelling along the first path of travel and thereby being

orientated by means of the wall so that the longitudinal axis of the plurality of elongate products are substantially parallel at the outlet portion of the chute.

[0023] The funnel according to the second aspect of the present invention may be incorporated in the apparatus according to the first aspect of the present invention, and incorporate any of the features mentioned in relation to the first aspect of the present invention.

[0024] The outlet section may have a mainly circular cross section. Other cross sections may, however, be envisioned.

[0025] In one embodiment of the present invention, the cross section of an inlet opening to the funnel corresponding to the upper edge of the upper funnel section, may be formed approximately as a sector of a circular ring.

[0026] The lower funnel section may comprise a mainly horizontal zone between the first sloping surface and the outlet section.

[0027] One or more transitional surfaces may be provided between the vertical walls and the sloping surfaces.

[0028] A third aspect of the present invention relates to a method of arranging a plurality of elongated objects from a substantially random orientation to a substantially parallel orientation. The method may comprise providing an apparatus comprising a supply system for supplying the plurality of elongated objects to an open inlet portion of a chute, the elongate products being provided to the inlet portion of the chute in a random orientation, the chute defining the open inlet portion and an open outlet portion, the chute adapted to aligning the plurality of elongate products without, to any substantial extent subjecting the elongate products to any mechanical impact that would cause the products to be deformed, damaged or broken,

a first path of travel defined from the inlet portion to the outlet portion, the first path of travel being at least partly defined by a wall of the chute, the elongate products travelling along the first path of travel and thereby being orientated so that the longitudinal axis of the plurality of elongate products are substantially parallel at the outlet portion of the chute,

a conveyor for conveying a multitude of containers each adapted to receive a specific number of the elongate products arranged in a substantially parallel orientation, the specific number elongate products transferred from the open output portion to a respective container, providing the plurality of products from the supply system to the open inlet portion of the chute, a portion of the products travelling from the chute into the specific container.

[0029] In the method according to the third aspect of the present invention, the apparatus may further comprise any of the features of the apparatus according to the first aspect of the present invention.

[0030] In the method according to the third aspect of the present invention, the funnel may further comprise any of the features of the funnel according to the second aspect of the present invention.

[0031] The present invention will be described in detail with reference to the figures, in which:

Fig. 1 is a schematic view of an apparatus according to the present invention,

Fig. 2 is a schematic view of a funnel incorporated in the apparatus of Fig. 1,

Fig. 3 is a schematic zoomed view of a part of the apparatus of Fig. 1,

Fig. 4 is a schematic illustration of an alternative embodiment of the apparatus according to the teaching of the present invention,

Fig. 5 is a schematic illustration of a first embodiment of a funnel according to the teachings of the present invention, and

Fig. 6 is a schematic illustration of a second embodiment of a funnel according to the teachings of the present invention.

[0032] Fig. 1 is a schematic view of an apparatus incorporating a device for rectifying and orientating a plurality of long products lengthwise. The product could e.g. be sausages, asparagus, carrots, slices or sticks of vegetables, picked cucumbers, spring rolls, french-fries or the like.

[0033] The apparatus 10 includes a funnel 12 into which a plurality of objects or products are provided. In order to monitor the flow of products into the funnel 12, a camera 14 may be provided for visual inspection. The camera may be a colour camera or black and white camera forming an automatic monitoring of the flow of products. Also, the camera may be used for automatic detection of faults or even counting the number of products provided through to the funnel 12.

[0034] The funnel 12 outputs the products at the output 16. The funnel 12 comprises a conical shaped wall 18.

[0035] The products are transferred from the funnel 12 to a distribution arrangement 20 distributing the products into a plurality of funnels all designated the reference numeral 22.

[0036] When the products reach the funnels 22, the products are not arranged parallel to each other. In the presently preferred embodiment of the present invention the distribution device 20 includes a single outlet 24. The products enter the funnel 22 and slide from the distribution device 20 via the outlet 24 into the opening of the funnel 22.

[0037] Fig. 2 is a schematic view of the funnel 22 where it is seen that a product 26 travels in the direction of the arrows 28, 30 and/or 32 by sliding on the bottom and/or sidewalls 34 and 36.

[0038] The opening 38 may be closed by a shutter or the like to selectively discharge the products into an open-ended container positioned below the opening 38, preferably in registration with the opening 38. When the products enter the opening 38 they are temporarily stored before being discharged, so that a number of products may be discharged at one time into a container. This may

be advantageous as discharging a single product at a time to a container may cause the products to be arranged non-parallel in the container, e.g. if the size of the container is considerably larger than the product.

[0039] A vibrating unit may be provided for vibrating the chute and/or the container as the products are being filled into the chute or container, respectively. Vibrating the chute is contemplated to bringing a plurality of products in the desired arrangement, i.e. having their longitudinal axis arranged substantially parallel to each other. Vibrating the container is contemplated to allow a faster and better arrangement of the products in the container.

[0040] Returning to Fig. 1, a conveyor system conveys a plurality of containers 42. The containers 42 may be jars, cans or other containers. As illustrated, the containers 42 are open-ended so that they may be filled with the products. The containers enter at one station and the apparatus 10 may be at least partly rotatable so that the containers 42 are transported from the first section 44 of the conveyor system to the second section 46 where they arrive after having been filled.

[0041] In an alternative embodiment of the present invention, the apparatus 10 may use a combination of two or more funnels to be combined to define a batch.

[0042] Fig. 3 is a schematic zoomed view of a part of the apparatus 10 where the funnels 22 and the containers 42 are positioned in registration so that the containers 42 may receive the products with their longitudinal axis orientated substantially parallel while also being substantially parallel with the longitudinal axis of the container. The containers have been schematically illustrated as having a circular cross section but other cross sections may be envisioned such as square or orthogonal.

[0043] Fig. 4 is a schematic illustration of an alternative embodiment 10' of the apparatus according to the teachings of the present invention. The apparatus 10' orientates and arranges elongated articles or products such as sausages, asparagus, carrots, slices or sticks of vegetables, picked cucumbers, spring rolls, french-fries or the like with their longitudinal axis horizontal in a container.

[0044] Similar to the apparatus 10 of Fig. 1, the apparatus 10' receives a plurality of products through a funnel 48 onto a vibrating conveyor and distributor 50 from where the products enter a multitude of funnels 52.

[0045] A roll of sheet material 54, such as a plastic material being processed for forming the containers to receive the products, is positioned at an inlet of an apparatus 56. The apparatus 56 permanently deforms the sheet material 54 to form a cavity to receive the products. The containers 58 produced by the apparatus 56 are then conveyed on a conveyor 60. When the containers 58 are in registration with a lower opening of the apparatus 10', the products having been arranged with the longitudinal axis parallel and horizontal the products are released into a respective container.

[0046] The production of the containers is an optional step. The production may be performed elsewhere and

the containers simply provided at the conveyor.

[0047] When the containers 58 are conveyed further along the conveyor 60 they may undergo further processing such as having a lid welded on by a welding machine 62 and may also be provided with a label from a labelling machine 64.

[0048] The containers illustrated and described in relation to Figs. 1 and 4 are illustrated and described as plastic jars and plastic trays, respectively. Other types of containers may be used such as cardboard including a vapour barrier such as a PE coating. The containers may be recyclable, reusable or disposable containers depending on the type of products.

[0049] Fig. 5 is a schematic illustration of one embodiment of a funnel 66 comprising side walls 68 and 70 and three connecting walls 72, 74 and 76. The middle wall 74 is mounted horizontally, and the two end walls 72 and 76 are mounted inclined with respect to the middle wall 74.

[0050] In one embodiment, the two walls 72 and 76 may form an angle of 90°. The funnel is preferably made from a material such as stainless steel, aluminium or other noncorrosive metallic material. The funnel may include a coating of a non-stick material such as Teflon® or a plastic material.

[0051] The funnel 66 may be provided with a shutter, not illustrated, along a number of products to be filled into the spaces defined by the walls before transferring the products from the funnel into a respective container. The funnel 66 may further be provided with a device for pushing the products towards one side wall of the funnel 66 so as to ensure that the products are transferred correctly into the containers.

[0052] Fig. 6 is a schematic illustration of a second embodiment of a funnel 78 comprising a plurality of compartments defined by the end walls 80 and 82 and a number of smaller walls all designated the reference numeral 84.

[0053] When a product 86 enters the funnel 78, it may inadvertently land so that it is supported by several walls 84 as illustrated in Fig. 6. In order to position the product 86 correctly in one of the compartments, the funnel 78 may be vibrated. In Fig. 6, the funnel is vibrated along the longitudinal axis of the funnel 78, as indicated by the dashed lines 88. The funnel 78 is displaced a distance as indicated by the arrow 90. Preferably the funnel 78 is vibrated in a direction perpendicular to the direction of the products as illustrated by the dashed lines 89 in Fig. 6, viz. in a direction parallel with the intended orientation of the product. The funnel 78 is then displaced a distance as indicated by the arrow 91. In an alternative embodiment of the apparatus according to the present invention, the funnel 78 may be vibrated in two directions, e.g. in a combination of the directions shown in Fig. 6. Further alternatively, the funnel 78 may be vibrated in a combination of a first direction and a second direction different from the first direction. Still further alternatively, the funnel 78 may be vibrated in a sequence of directions and with

a variation of timer intervals. In one embodiment, the funnel may be vibrated in a direction parallel to the intended orientation of the products for a first period of time, and in a second period of time, the funnel 78 is vibrated in a second direction different from the first direction. This is contemplated to allow products that become stuck or just positioned as shown in Fig. 6 to be transferred into a compartment.

[0054] In the embodiment of the funnel illustrated in Fig. 2, the products have a length which is greater than the width or diameter of the opening through which the products are transferred into the containers. The sloping surfaces guide the products into the opening and the shutter device keeping the opening shut at one end, allows a number of products to be collected before being transferred into the container. Alternatively, the products are guided through the opening and into the container without being stopped by a shutter device.

[0055] It is contemplated that vibrating the funnel 78 in a direction parallel to the orientation of the arranged products 86 and the compartments, and stopping the vibration at one end point, the products will be located at one of the side walls of the funnel 78 and thereby allowing the products to be more precisely transferred into a container.

[0056] The other embodiments of funnels 22, 52 and 66 may also be vibrated in a similar manner.

[0057] The products being transferred to a container using one of the machines as described above, may be frozen so that the products do not vibrate during the handling of the products.

[0058] The following is a further description of the some details regarding one embodiment of a chute or funnel according to the teachings of the present invention.

[0059] In order to align the products 26 before entering a container positioned in registration with the opening 38, the funnel 22 comprises a first sloping surface 94 and a second sloping surface 96 directed crosswise relative to one another, whereby the elongate products 22 are guided towards the cylindrical outlet section 38 and into the container opening.

[0060] The first sloping surface 94 is provided in a lower funnel section and debouches into the cylindrical outlet section 94 along approximately 180° of the circumference of the outlet section 94. The opposite 180° of the outlet section 38 is provided with a vertical wall section 98.

[0061] The first sloping surface 94 is limited sideways by mainly vertical, parallel side walls 100, where the opposing wall is not visible in Fig. 2. The mutual distance between the side walls 100 is approximately identical or equal to the dimension of the outlet section 38 in this direction.

[0062] Variations in the parallelism of the mainly parallel side walls 100 may be present in order to provide an upper funnel section formed approximately as a sector of a circular ring, whereby the side walls are converging

towards the outlet section 38. Having the upper funnel section formed approximately as a sector of a circular ring optimises the space usage when installing the funnels in an apparatus having a substantially circular circumference.

[0063] The upper funnel section comprises a sloping surface 34 having a slope towards one side of the lower funnel section and ending at the vertical side wall of the lower funnel section, which is not visible in Fig. 2.

[0064] The sloping surface 34 is provided with vertical side walls, 98 and 36, and the mutual distance between the side walls is approximately identical to the length of the first sloping surface plus the dimension of the outlet section in this direction.

[0065] The side walls 36 and 98 may be parallel, but parallelism of the mainly vertical parallel side walls should have a certain degree of freedom with the same purpose as the freedom of the parallelism of the mainly vertical parallel sidewalls of the lower funnel section.

[0066] In one embodiment the section 96 may be a mainly horizontal zone between the first sloping surface 94 and the outlet section 38. This mainly horizontal zone is contemplated to prevent the elongate products from being pressed against the mainly vertical wall section 98 opposite the first sloping surface 94, where the pressure against the mainly vertical section 98 may provide sufficient friction to stop the elongate products 22 from moving down into the outlet section 38.

[0067] In order to provide a more soft transition between the different surfaces of the funnel, transitional surfaces may be provided between e.g. the vertical walls and the sloping surfaces, and also the first sloping surface and the second sloping surface may be divided into sections having different slopes and different sloping directions.

Claims

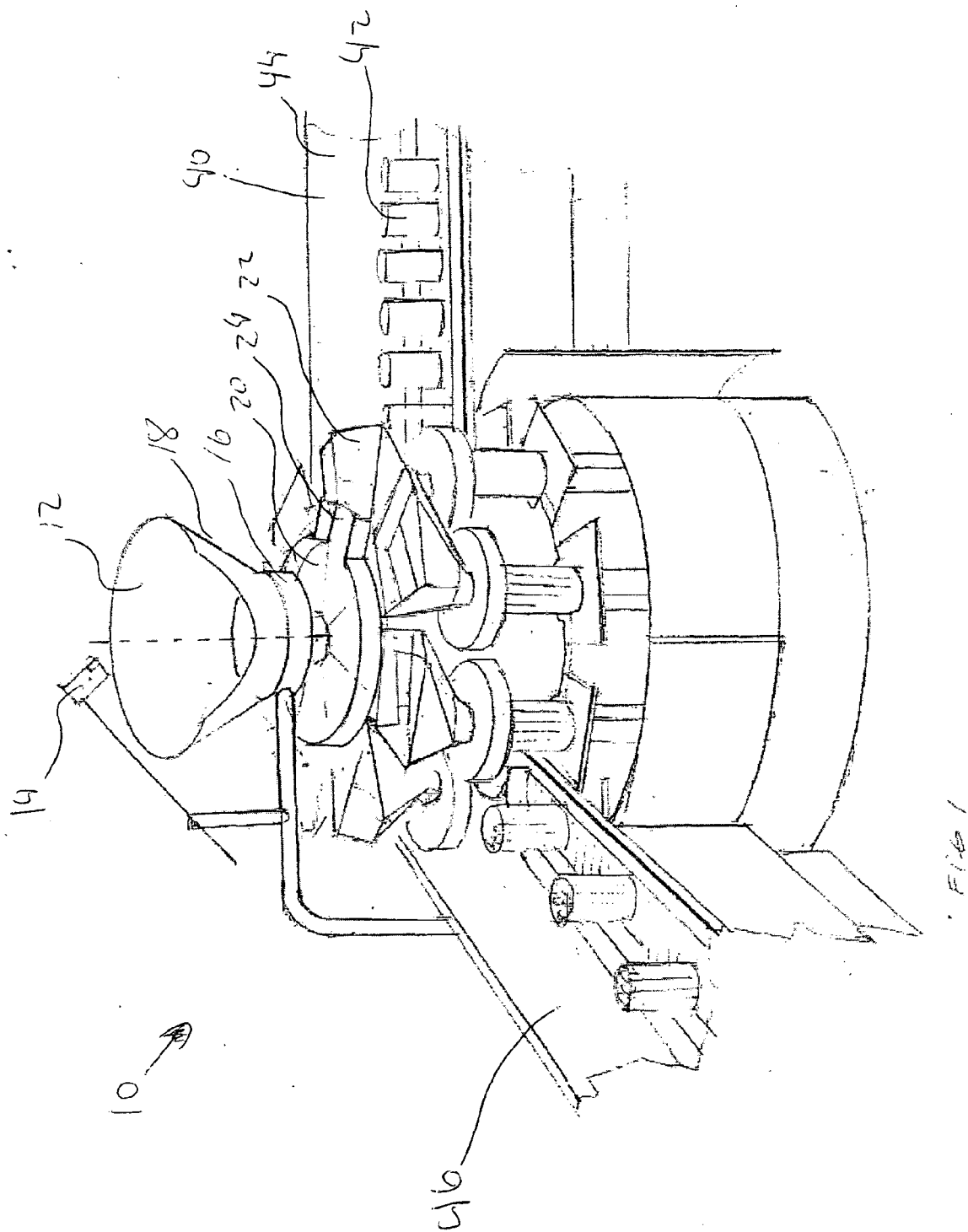
1. An apparatus for arranging a plurality of elongate foodstuff products and/or elongate processed foodstuff products from a substantially random orientation to a substantially parallel orientation, said apparatus comprising:

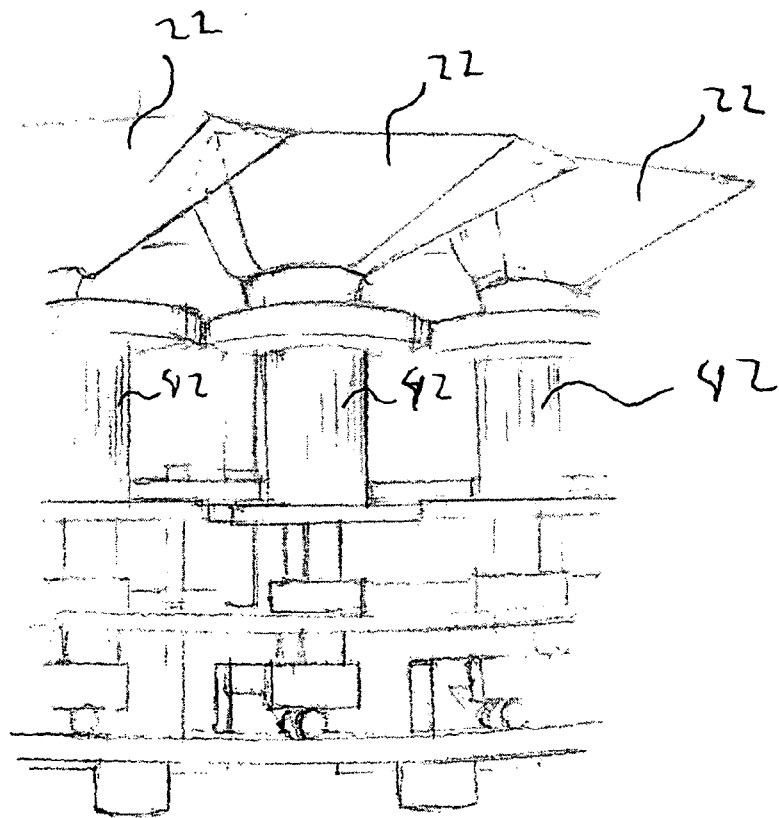
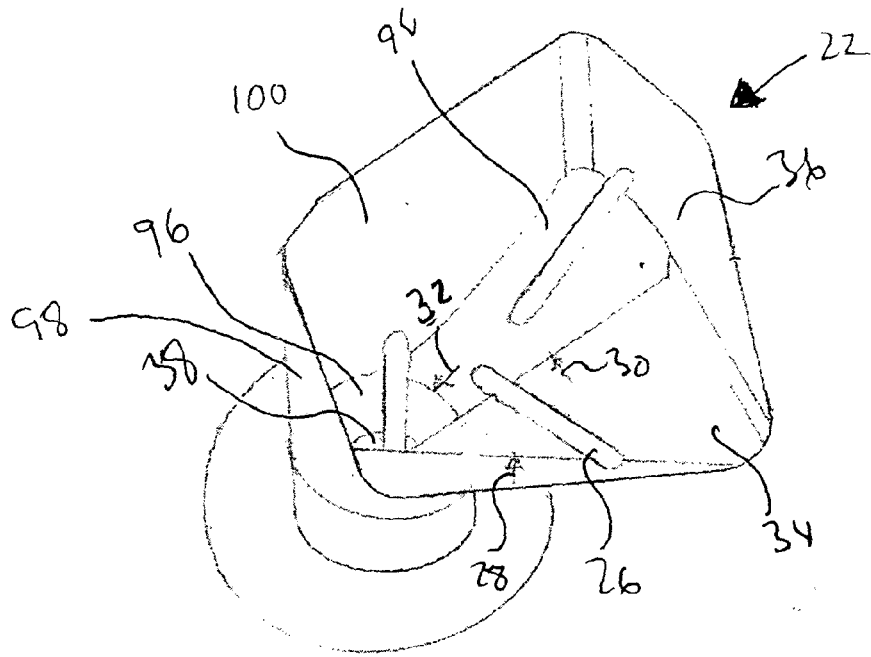
a supply system for supplying said plurality of elongate products,

a chute defining an open inlet portion and an open outlet portion, said supply system supplying said plurality of elongate products to said open inlet portion of said chute, said elongate products being provided to said inlet portion of said chute in a random orientation, said chute having a wall adapted to aligning said plurality of elongate products without, to any substantial extent, subjecting said elongate products to any mechanical impact that would cause said products to be deformed, damaged or broken,

- a first path of travel defined from said inlet portion to said outlet portion, said first path of travel being at least partly defined by said wall of said chute, said elongate products travelling along said first path of travel and thereby being orientated by means of said wall so that the longitudinal axis of said plurality of elongate products are substantially parallel at said outlet portion of said chute, and
 a conveyor for conveying a multitude of containers each adapted to receive said elongate products arranged in said substantially parallel orientation, said elongate products transferred from said open output portion to a respective container.
2. The apparatus according to claim 1, wherein said chute is provided with a first vibrating unit for vibrating said chute in a first direction.
 3. The apparatus according to claim 2, wherein said first direction is substantially parallel with said parallel orientated products.
 4. The apparatus according to claims 2 or 3, wherein said chute is provided with a second vibrating unit for vibrating said chute in a second direction perpendicular to said first direction.
 5. The apparatus according to any of the claims 1-4, wherein said plurality of elongate products are orientated in a direction substantially parallel to said path of travel.
 6. The apparatus according to any of the claims 1-4, wherein said plurality of elongate products are orientated in a direction substantially perpendicular to said path of travel.
 7. The apparatus according to any of the claims 1-6, wherein said apparatus further includes a shutter unit operational between a first state where said open output portion is covered by at least a part of said shutter unit thereby stopping said products from being transferred into said specific container and a second state where said shutter allows said products to be transferred into said specific container.
 8. The apparatus according to any of the claims 2-7, wherein said chute is vibrated at a frequency of 0,5 Hz to 20 Hz, such as 1-10 Hz, e.g. approximately 3-8 Hz or 0,5-1 Hz, 1-2 Hz, 2-3 Hz, 3-4 Hz, 4-5 Hz, 5-6 Hz, 6-7 Hz, 7-8 Hz, 8-9 Hz, 9-10 Hz, 10-11 Hz, 11-12 Hz, 12-13 Hz, 13-14 Hz, 14-15 Hz, 15-16 Hz, 16-17 Hz, 17-18 Hz, 18-19 Hz or 19-20 Hz.
 9. The apparatus according to any of the claims 1-8, wherein a plurality of compartments are defined in said chute, each of said compartments adapted to receive a number of products, each of said compartments defining an open compartment inlet and an open compartment outlet.
 10. The apparatus according to claim 9, wherein said chute comprises 2-10 compartments, such as 2-8, e.g. 2, 3, 4, 5, 6, 7, 8, 9 or 10.
 11. The apparatus according to claim 9 or 10, wherein each of said compartments outlets are fitted with a shutter device.
 12. The apparatus according to any of the claims 1-11, wherein said open end of said chute defines a width being 10%-30%, greater than a maximum length of said products, such as 15%-25%, 18%-20%, or 10%-15%, 15%-20%, 20%-25%, 25%-30%.
 13. The apparatus according to any of the claims 1-12, wherein said apparatus further comprises a unit for defining a specific batch of products to be transferred into a respective container.
 14. The apparatus according to claim 13, wherein said unit is a weighting unit for defining a batch of products having a weight within a specific weight interval.
 15. The apparatus according to claim 13, wherein said unit is a counting unit for defining a batch of products having a specific number of products.
 16. The apparatus according to any of the claims 1-15 wherein said chute comprises:
 - a cylindrical outlet section adapted to the container opening and having a mainly vertical orientation,
 - a lower chute section comprising a first sloping surface having a slope towards the outlet section and a mainly vertical wall section positioned opposite said first sloping surface, said first sloping surface and said vertical wall each extending around approximately 180° of the outlet section and said first sloping surface being limited sideways by mainly vertical, parallel side walls, the mutual distance between said side walls being approximately identical to the dimension of the outlet section in this direction,
 - an upper chute section comprising a second sloping surface having a slope towards one side of the lower chute section and ending at one of said mainly vertical side walls of the lower chute section,
 - a continuation of the opposite mainly vertical side wall of the lower chute section providing a mainly vertical wall opposite said second sloping

- surface, said second sloping surface having mainly vertical parallel side walls, the mutual distance between said side walls of said second sloping surface being approximately identical to the length of the first sloping surface plus the dimension of the outlet section in this direction. 5
17. The apparatus according to claim 16, wherein the outlet section has a mainly circular cross section. 10
18. The apparatus according to claim 16 or 17, wherein the cross section of an inlet opening to said chute, said inlet opening corresponding to the upper edge of the upper chute section, is formed approximately as a sector of a circular ring. 15
19. The apparatus according to any of the claims 16-18, wherein the lower chute section comprises a mainly horizontal zone between the first sloping surface and the outlet section. 20
20. The apparatus according to any of the claims 16-19, wherein transitional surfaces are provided between the vertical walls and the sloping surfaces. 25
21. The apparatus according to any of the claims 1-20, wherein the products define a maximum length of the products being less than or equal to 2 times the diameter of said cylindrical output. 30
22. A chute defining an open inlet portion and an open outlet portion, said supply system supplying said plurality of elongate products to an open inlet portion of a chute, said elongate products being provided to said inlet portion of said chute in a random orientation, said chute having a wall adapted to aligning said plurality of elongate products without, to any substantial extent, subjecting said elongate products to any mechanical impact that would cause said products to be deformed, damaged or broken, and a first path of travel defined from said inlet portion to said outlet portion, said first path of travel being at least partly defined by said wall of said chute, said elongate products travelling along said first path of travel and thereby being orientated by means of said wall so that the longitudinal axis of said plurality of elongate products are substantially parallel at said outlet portion of said chute. 35 40 45
23. The chute according to claim 22 further comprising any of the features of any of the claims 2-21. 50
24. A method of arranging a plurality of elongated objects from a substantially random orientation to a substantially parallel orientation comprising: 55
- providing an apparatus comprising a supply system for supplying said plurality of elongated objects to an open inlet portion of a chute, said elongate products being provided to said inlet portion of said chute in a random orientation, said chute defining said open inlet portion and an open outlet portion, said chute adapted to aligning said plurality of elongate products without, to any substantial extent, subjecting said elongate products to any mechanical impact that would cause said products to be deformed, damaged or broken, a first path of travel defined from said inlet portion to said outlet portion, said first path of travel being at least partly defined by a wall of said chute, said elongate products travelling along said first path of travel and thereby being orientated so that the longitudinal axis of said plurality of elongate products are substantially parallel at said outlet portion of said chute, a conveyor for conveying a multitude of containers each adapted to receive a specific number of said elongate products arranged in a substantially parallel orientation, said specific number elongate products transferred from said open output portion to a respective container, providing said plurality of products from said supply system to said open inlet portion of said chute, a portion of said products travelling from said chute into said specific container.
25. The method according to claim 24, wherein said apparatus comprises any of the features of any of the claims 2-16.
26. The method according to claim 24 or 25, wherein said chute comprises any of the features of any of the claims 16-20.





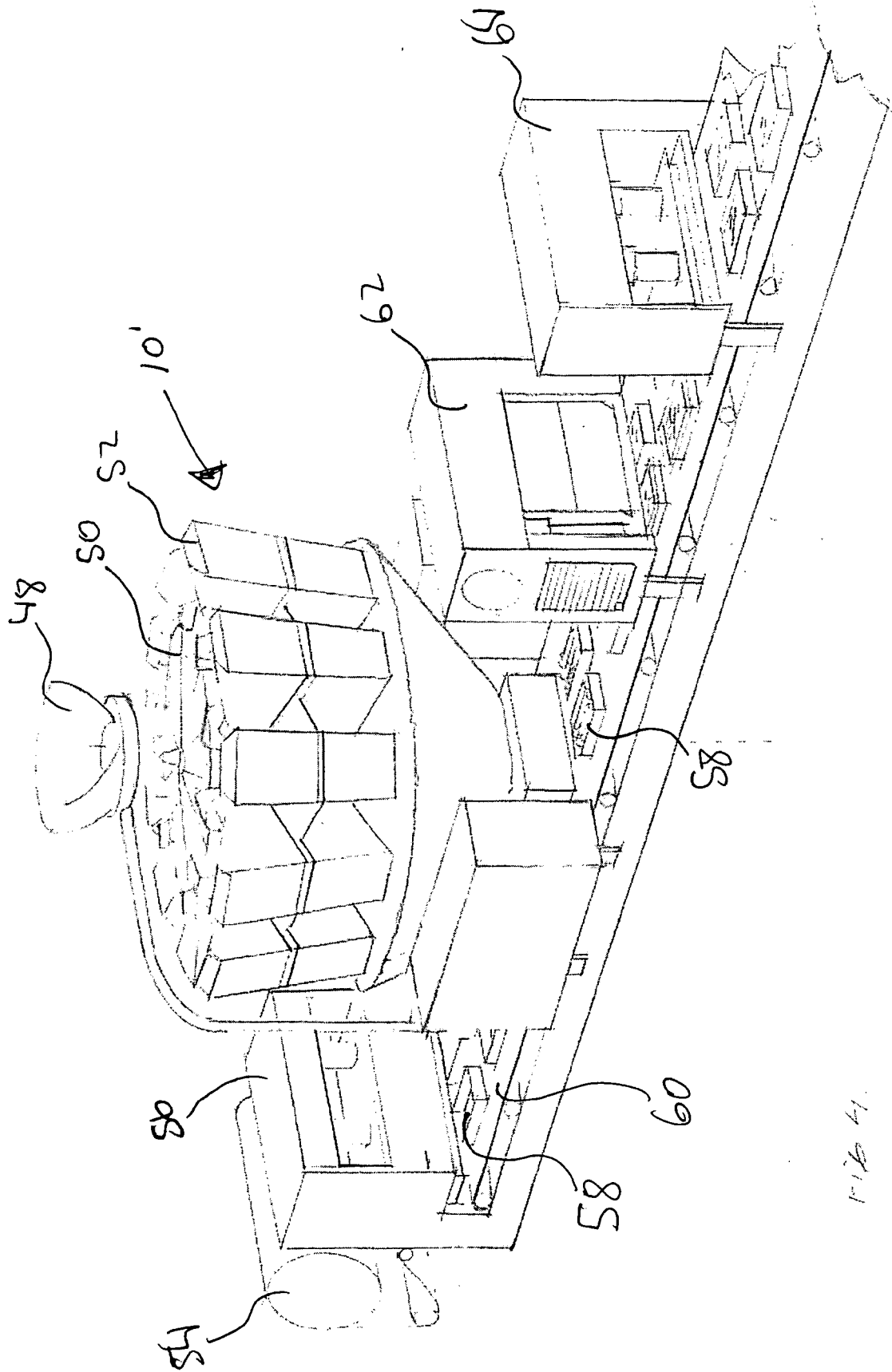


Fig. 4.

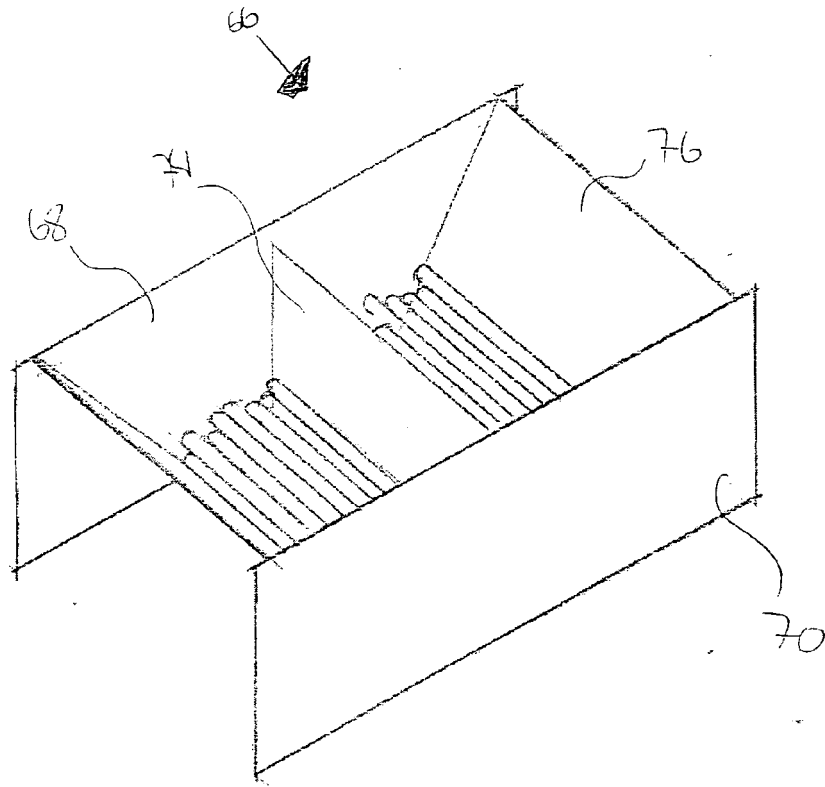


FIG 5

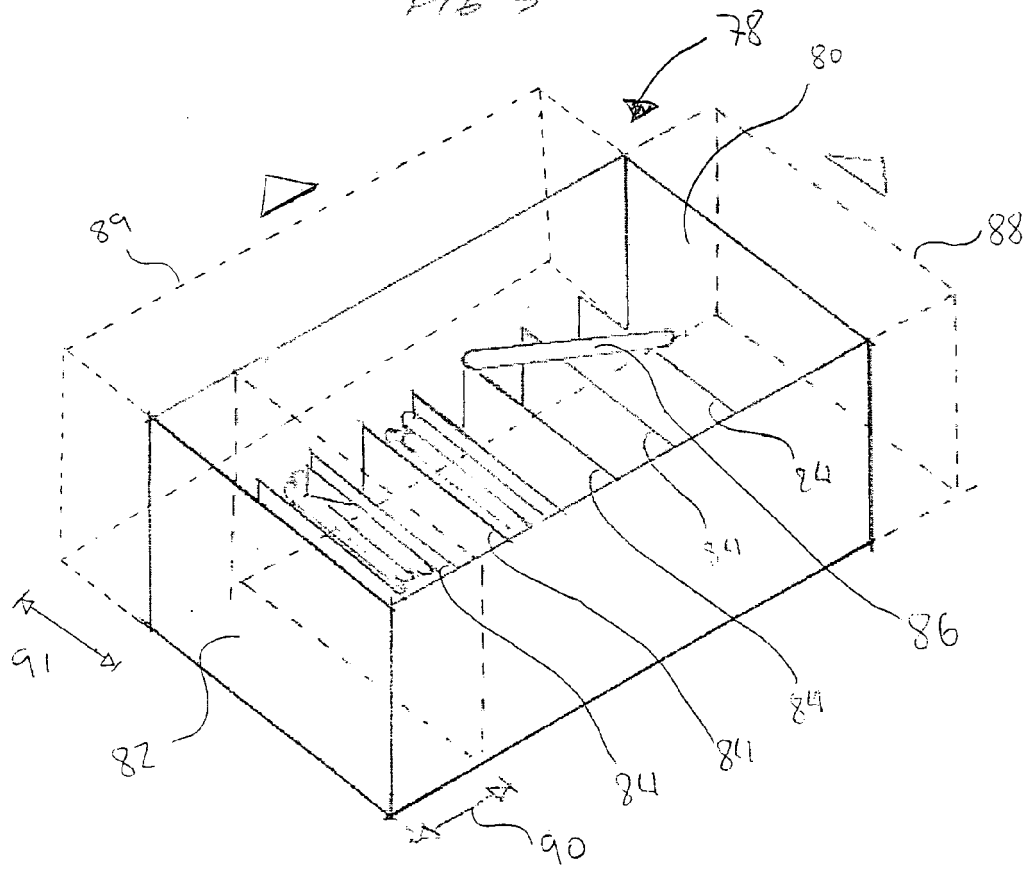


FIG 6



European Patent
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Application Number
EP 06 38 8050

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Place of search The Hague		Date of completion of the search 21 February 2007	Examiner Jagusiak, Antony
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