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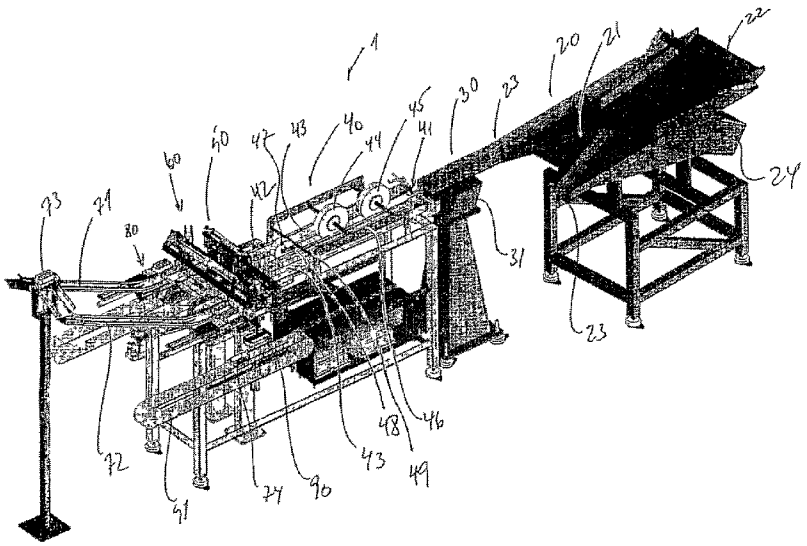
(54) Title: METHOD AND APPARATUS FOR ARRANGING SOFT OR SEMI-SOFT OBJECTS IN SUITABLE SIZES FOR PACKAGING



(57) Abstract: Method and apparatus for concentrating and arranging soft or semi-soft objects in suitable sizes for packaging, where the objects are introduced into a first stacking and distribution means (20) in which the objects are arranged in overlapping relationship, and where the objects are moved to a second stacking means (30) for denser packaging, after which the objects are transported through a shaping station (40) , whereby the objects are shaped into a string having a predefined height and width substantially corresponding to the sizes of the containers (73) into which the objects are to be packed, and that means (50) for cutting the string in size lengthwise are provided such that the string is divided into blocks substantially corresponding to the size of the containers (73) , and where the containers (73) are guided into a position over the blocks, and lowered over said blocks, after which the filled containers are moved away from the cutter means (50) , turned and closed.

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Method and apparatus for arranging soft or semi-soft objects in suitable sizes for packaging

Field of the Invention

The present invention relates to a method for arranging soft or semi-soft objects in suitable sizes for packaging. Furthermore, the invention also discloses an apparatus for performing the method.

As will become evident from the description, the term "soft or semi-soft objects" covers a number of objects or products such as for example fish, fish fillets, meat products as for example chicken breasts, particular cuts of meat, vegetables or any other soft or semi-soft object which is desirable to package, in particular in containers.

By "containers" shall be construed any type of container, but in particular tins, cans or containers made from plastic material are suitable for use within the scope of the present invention.

Throughout the description, the invention will be described with respect to the processing and packaging of fish fillets, but any type of object, which exhibits the same soft or semi-soft characteristics as fish fillets and creates similar problems during handling are suitable for use with the present method and apparatus.

Also, within this specification the terms "upstream" and "downstream" are used. These terms refer to the direction in which the objects move through the method and apparatus. The "upstream" end is therefore the end of the apparatus in which the objects are introduced, and from there they travel "downstream" through the various features of the apparatus until the objects are placed in containers and moved out of the apparatus.

Background of the Invention

When packaging fish fillets in containers, the fish fillets are introduced into the packaging station, for example on an endless conveyor. Here, a number of workers will select an appropriate amount of fish meat to go into each tin. The fish fillets are transported past the workers which will select the fish fillets and shape them into size in order to conform to the tin. The tins including fish fillets will be transported to a weighing station where the weight will be adjusted by a further worker adding a particulate fish meat to each tin in order to bring the amount of fish in each tin within the pre-specified limits. After the adjustment or checking of the weight, the tins will proceed to further processing such as for example adding of sauce, stock, broth or the like to the tin, and thereafter sealing of the tin by adding a lid. Usually, after this the tins are heated in order to pasteurise and thereby preserve the contents of the tins.

Although this method has been used for decades and is quite satisfactory, it is associated with a number of drawbacks, in particular the method is especially labour intensive due to the manpower selecting and filling the fish fillets into the tins. Traditionally, the fish fillets are not filled directly into the tins, but are filled into apertures corresponding in size to the tins which apertures are provided in a conveyor chain. The conveyor chain then propels the fish fillets past the workers and onto a weighing station, where the amount of fish in each aperture is registered and checked, and optionally extra fish material, especially particulate meat, is added to the apertures. After this, the fish fillets with optionally added meat is released onto a further conveyor, where a chute brings the tin into position over the fish meat. As the tin is placed correctly over the fish meat, the container/tin is turned around, and may be conveyed for further processing.

This process requires a certain level of skill from the manpower selecting and filling the apertures in the chain, in that the desired amount of fish in each container must be within certain narrow limits in order to provide the desired product. If the amount of fish is below the limit, a rather high content of particulate fish meat, which is undesirable to the user, must be added in order to bring the desired weigh within the predefined range, and vice versa, if the amount of fish is too high in each aperture/tin, the profit from producing these tins is reduced.

Object of the Invention

It is therefore an object of the present invention to provide a method by which the manpower is reduced such that overall production costs may be reduced, and at the same time improve the precision with which the amount of fish/product added to each tin or container may consistently be within certain predefined narrow ranges.

Description of the Invention

The present invention addresses this by providing a method which is particular in that objects are introduced into a first stacking and distribution means in which the objects are arranged in overlapping relationship, and where the objects are moved to a second stacking means for denser packaging, after which the objects are transported through a shaping station, whereby the objects are shaped into a string having a predefined height and width substantially corresponding to the sizes of the containers into which the objects are to be packed, and that means for cutting the string in size lengthwise are provided such that the string is divided into blocks substantially corresponding to the size of the containers, and where the containers are guided into a position so that the blocks may be introduced into the containers after which the filled containers are moved away from the cutter means.

A number of problems are associated with handling semi-soft and/or soft objects where the integrity of the objects often is such that special requirements must be addressed in order to be able to handle the objects in a manner such that both during and in particular after the handling, i.e. processing the objects for packaging, the integrity of these are maintained, and does appear intact to the user. Furthermore, in order to achieve a rational and economic packaging, it is desirable to package the objects as closely together as possible in order to minimise the space requirements. Therefore, the inventive method provides for a first stacking and distribution means.

The stacking means will achieve the object that the soft and/or semi-soft objects are arranged in an overlapping relationship such that further downstream processes may be carried out, where the objects to be treated substantially have the desired density, i.e. product per volume unit.

The first stacking means create an overlapping relationship between the soft and/or semi-soft objects, and as the objects are introduced into the second stacking means, the density of the objects is increased. Depending on the objects in question, different means may be utilised in order to create this increase in density, for example mechanical means which will push the objects such that objects being placed in contact with the stacking means will have a certain resistance, whereas objects in a first, second and third layer will have less resistance such that, as they are urged forward by mechanical means, they will slide in relation to each other, and thereby increase the density of the objects at a certain position.

The density may also be increased, as disclosed in a further advantageous embodiment, by providing the first and second stacking means with vibrating means, and arranging the stacking means in a downstream sloping fashion. The sloping fashion will urge the objects forwards in the process direction, i.e. further downstream, due to the influence of gravity on the objects. The vibrating means will create a relative movement between different objects placed in the stacking means such that by adjusting the vibration intensity, both with respect to amplitude and frequency, in relation to the objects in question, it is possible to create the desired density of the objects before the objects leave the stacldng means.

Within the present invention the stacking means has been divided into two sections, a first stacking and distribution means and a second stacking means. Although the stacking means as a whole may be one continuous process, it was found that by having a first set of conditions in the first part of the stacking means and a second set of conditions in the second part of the stacking means, a more reliable and repeatable stacking process was achieved.

In one embodiment the first stacking means is in the shape of a slide having a first inclination and in a further embodiment being subjected to vibrations so that the objects placed on the slide will due to the impact of the vibrations be rattled together. The second means is also in the shape of a slide which slide has a decreasing cross section and which slide also may be subjected to vibrations so that the objects are further compacted or densified.

In another embodiment of the invention the stacking means is in the shape of a conveyor belt where the first section of the conveyor belt corresponding to the first concentrating and stacking means receives the objects to be concentrated for packaging, whereafter a second endless conveyor belt arranged so that the plane of said second conveyor is perpendicular to the plane of the first conveyor and progressively overlapping the first conveyor, will due to the progressive overlap push or force the objects on the conveyor belt closer together prior to entering the shaping station. Naturally, the two conveyor belts are rotated at the same speed.

Thereafter, the objects are introduced into a shaping station. In this station, the objects may be further compacted in that although the desired density has been maintained in the stacking stations, it might be desirable to reshape the objects into a desired shape. According to the present invention, this is done by forcing the packaged objects through a shaping station where sideways limitations define the width, and means in the shape of a glider, wheel or the like are provided in order to press down on top of the objects to be transported between the sideways limitations. The bottom of the shaping station is in the shape of a conveyor belt such that as further objects are introduced in the entrance of the shaping station, the already introduced objects may travel through the shaping station due to the movement of the conveyor belt, whereby a string of objects having a desired cross-section and a desired density arrive at the outlet from the shaping station.

Adjacent this outlet, cutter means for example in the shape of a reciprocating knife or cutting wheel is arranged. As the speed of the conveyor belt through the shaping station is well-defined, it is possible to calculate the length of string passing the cutting plane, i.e. the plane where the cutters are arranged. In this fashion, it is possible to calculate, within well-defined limits, the amount of object, i.e. string, passing the cutting plane, and thereby determine the exact correct moment for cutting the string such that a predefined amount of object is separated from the string. Such a predefined amount of object cut from the string is termed "a block". The size of the block will, substantially, correspond to the size of the containers as the process has been designed by adjusting the stacking means and the shaping station such that a desired amount of

soft and semi-soft objects are present in each block. The blocks may thereafter be introduced into a container or, as it is the case in one embodiment of the present invention, the container may be lowered on top of the cut blocks and moved away from the cutter means. Alternatively, the blocks may be moved away from the cutter means before the container is placed on top of the block. Hereafter, the containers are turned and eventually closed.

In a further advantageous embodiment of the invention the gripping means are arranged for rotation around a first vertical axis, such that as the gripping means engages the cut blocks and rotates, the blocks are moved with the gripping means, and that a second turntable arranged for rotation around a second vertical axis comprises means for releasably holding the containers, such that the containers may be moved into a position under the gripping means, after which the blocks are released from the gripping means and the blocks are placed in the containers, which filled containers thereafter are moved away.

The feature of arranging the gripping means and cutters so that they may be rotated around a vertical axis provides the advantage that the gripping means may be positioned in line with the string shaping means, i.e. the shaping station, and as the string of objects is forced or pushed into the space between the gripping means, the cutter will cut off a suitable section of string thereby forming a block after which the gripping means due to the stepwise rotation may be rotated into a position above a container so that when the gripping means releases its grip on the block, the block will be transferred to the container. As one set of gripping means are rotated away from the position in which it receives and cuts the block from the shaping station, another gripping means may be placed and be ready to receive a further block between the gripping means. This stepwise preferably circular motion of the gripping means foresees that a substantially stepwise continuous process, i.e. only separated by the time it takes to rotate one gripping means from its position in front of the shaping station until the following gripping means is arranged in front of the shaping station, is achieved.

The integrity of the block is assured by the firm grip of the gripping means along the sides and e.g. a stop plate onto which stop plate the gripping means are hinged in one

end and the other end may be blocked by the cutter which may rotate with the gripping means towards the position in which the gripping means releases the block into the container.

In a still further advantageous embodiment the second turntable may move horizontally in a linear movement parallel to the shaping station, so that as one container is filled and the gripping means is rotated into a position where the second block is superposed the container, the second turntable may move linearly in order to displace the filled container and place an empty container under the gripping means. In order to provide a simple control of this process the containers should be arranged in the second turntable in a line parallel to the longitudinal direction of the shaping section, i.e. along a line parallel to the tangent to the circle around which the second turntable rotates.

In a further advantageous embodiment the second turntable may be replaced by an endless conveyor arranged parallel to the shaping station and means are provided on said conveyor for conveying the container, so that the containers placed on the conveyor may be superposed the gripping means which when releasing the blocks from the gripping means fills the containers on the conveyor.

This embodiment is particularly interesting where the process for handling of the filled containers makes it advantageous to have a substantially steady supply of spaced containers in that the endless conveyor must move in a stepwise manner corresponding to the stepwise rotation of the first turntable in order to allow the gripping means to bring a block into a superposed position above a container.

Although the means may be knives or a cutting wheel as described above, other means are also contemplated within the present invention. For example, lasers, water jets or other suitable cutting means depending on the objects to be cut may be utilised within the scope of the present invention. The only requirements to the means for cutting the string is the fact that the cut must be performed in a quick, clean and reliable manner, and that the cutting means does not tear or otherwise have influence on the objects outside the cutting zone.

In a further advantageous embodiment of the invention, a check weighing station may be introduced in the method, where said check weighing station is provided either before or after the objects are filled into the containers and before the containers are turned, and that further means are provided for adding object material to the containers if the weighing indicates that the amount of the object in the container is outside predefined limits, and that the check weighing data may be utilised as input for determining the size of the blocks, and thereby the cutting length of the blocks. Although the system of forming the objects to a well-defined string provides for a substantially homogeneous density per cross-section, there might be variations in the actual weight of each block due to voids or other inconsistencies created during the shaping of the string. In order to counter this and assure that the correct weight of the object is supplied to each container, the check weighting is carried out such that additional object material, for example in particulate form, may be added to each container. Furthermore, the check weighing may indicate a trend, i.e. may indicate whether or not the blocks are generally above the weight limit or below the weight limit. This development of a trend may be used as input in order to regulate the speed of the conveyor belt and the shaping station such that the string may be speeded up or slowed down depending on whether the blocks are overweight or underweight.

The method is particularly suitable for use when the objects are fish fillets, whole fish and/or other meat or vegetable products, where the objects are either raw or pre-processed, and that optionally, before the containers are closed, a sauce, broth, stock, oil, pickle or the like is added to the container.

In particular, fillets from mackerel, herring, tuna, sardines, salmon or other fish are suitable. Among the whole fish, also herring, mackerel, sardines and other smaller fish types may be utilised. For a number of fish applications, the fish will typically have been pre-processed before being packaged in the containers. The pre-processing may include boiling, skinning, deboning and filleting such that the end product is a product ready to eat directly from the tin without further processing. For a number of these products it is advantageous to add a sauce, broth, stock, oil, pickle or the like in order to produce for example fish products catering to different tastes. Particularly, when

canning sardines or other smallish fish, the whole fish will be introduced into the stacking station. In these instances, typically oil is added to the tin before it is closed. A number of vegetables may also be packaged in cans such as for example bamboo and palm hearts, fruit such as dates, apricots, pears and the like.

The particular advantage of utilising the inventive method is the fact that the texture of the product is substantially maintained to the user such that, as the tin is opened, a user will find a product having a texture substantially corresponding to a fillet offish, piece of fruit or the like. The method, due to the stacking and string shaping stations, provides a relative high content of fish, meat or vegetable in each container such that an economic packaging method is provided without sacrificing the integrity of the object to be packaged.

The present invention also discloses an apparatus suitable for performing a method as described above. The apparatus is particular in that first stacking and distribution means is provided where said first stacking and distributing means comprises either a first conveyor belt, moving objects placed on the first stacking and distribution means forwards or a downwardly sloping slide means urging objects placed on said slide to move forwards under the influence of gravity, such that the first stacking and distribution means causes the objects to overlap and be transported onto a second stacking means, where said second stacking means either comprises a steeper downwards slope as the first slope or that a conveyor belt arranged perpendicular to the first conveyor belt and increasingly overlapping said first conveyor belt, whereby the objects are further concentrated and from said second stacking means is transported onto a shaping station, which shaping station comprises at least one endless belt, and two side shaping members, and at least one roller arranged over the endless belt for engaging the objects present between the two side shaping members such that a string of objects are formed, where cutter means in the shape of a reciprocating knife is arranged downstream of said shaping station such that the string is cut into predefined blocks, and gripping means are arranged for gripping said cut blocks and moving the blocks into a position where filling means transfers the blocks into a container, and transport means for transporting the container unto further processing.

in a further advantageous embodiment of the apparatus the filling means comprises a sliding cylinder, on which cylinder the gripping means are arranged, such that by activation of the sliding cylinder the gripping means may be moved perpendicularly to the transport direction in the same plane as the transport plane, whereby the gripping means moves the cut block onto a plate, and further that a chute is arranged adjacent the cutter means for guiding and placing a container up side down over the block placed on the plate, and that the plate is arranged for rotation around an axis under the plate such that the plate and container, by rotation about the axis, are placed right side up on transport means.

Another construction of the manner of filling the containers with the blocks foresees that the filling means comprises a first turntable, arranged for rotation around a vertical axis, and that one or more gripping means are arranged extending radially away from said first turntable, and that the reciprocating knife is arranged on the gripping means, and further that a second turntable is arranged for rotation around a vertical axis, where a number of cut-outs or apertures are arranged radially along the periphery of said second turntable, such that by turning the turntables the gripping means may be superposed the cut-outs or apertures, and that the apertures or cut-outs are suitable to releasably hold the containers.

By having the gripping means and the reciprocating knife shaping the block and of course designing the relative sizes of the gripping means and the reciprocating knife so that the cut-off block will have a size suitable to fit inside the containers, a rational, reliable and fully automatic manner of packaging this type of objects is provided. The provision of turntables, where the second turntable has apertures or cut-outs suitable to hold the containers while these are being filled, provides an especially adaptable solution in that by simply replacing the size of the gripping means as well as the member of the second turntable, in which the apertures or cut-outs are provided, the entire apparatus may be converted to other suitable sizes of containers.

The particular workings of the apparatus will be described below as well as further advantageous features are set out in the subclaims such that the apparatus in a further advantageous embodiment comprises means for detecting the object density adjacent

the shaping station, where non-contact measuring means are provided adjacent the upstream end of the shaping station, and optionally contact measuring means are arranged upstream of the cutter means, where said contact measuring means may be a biased wheel or plate being urged against the objects in the shaping station, and that the speed of the endless belt may be adjusted in response to the forces applied to the biased wheel or plate, and that the non-contact measuring means may be vision based or be one or more lasers registering the relative height of the object layer entering the shaping station, and that the measurements from the non-contact means optionally may be used to control the vibration intensity in the first and/or second stacking means in order to increase or decrease the object density at this point.

Additionally, in a still further advantageous embodiment of the weighing station, a weighing station comprising two weighing platforms is arranged between the cutter means and the chute such that two plates on which to place the blocks are provided, and that gripping means engages and alternately moves the newly cut block onto one of the two weighing platforms where the weight of the block is registered, and then moves the block onto one of the two plates, where the chute is provided with two lanes for supplying containers to either of the two plates, after which the plates rotates such that the container is placed right side up on transport means for transporting the container for further processing.

In a further embodiment, the apparatus comprising the weighing station may further comprise means for removing the blocks from the weighing platforms if the block falls outside a predetermined interval, where said means comprises a horizontal plunger, activated by a telescopic member, and a receptacle for collecting the discarded block.

In order to further improve the apparatus and the production speed, a second endless belt is arranged downstream of the cutter means, where the second endless belt is arranged in line with the first endless belt. This is provided in order such that cut off blocks are transported on said second endless belt, and that the gripping means are provided with means for moving the gripping means along the second endless belt during the gripping and moving of the blocks.

One of the objects of the present invention is to reduce the manpower needed in order to arrange the product in containers, but also to improve the accuracy, i.e. improve the amount of product in the containers within certain limits. Therefore, in a further advantageous embodiment of the invention, dispensing means are arranged in the shaping station in order to add extra particulate object material to the string of objects. As the objects may have varying shapes, sizes and density, the exact weight of the product in the containers may be adjusted by adding extra particulate object material to the string of objects in order to adjust the density in a given cross-section.

In a still further advantageous embodiment, the side shaping members in the shaping station are endless conveyor belts adjusted to travel at approximately the same speed as the string. This embodiment may be particularly advantageous in eliminating friction between the shaping members and the objects placed in the shaping section such that the integrity of the string will be assured. In other embodiments, depending on the friction between the objects and the side shaping members, the side shaping members maybe for example stainless steel, rails and the like.

hi a further alternative constructional embodiment of the invention the gripping means comprises means for elevating the gripped block onto a shield, where said gripping means may slide the block on the upper surface of said shield into a position where an aperture having an opening slightly smaller than the corresponding opening in the container, is provided in said shield, and that means are provided for arranging the container with the containers' opening in close proximity to the aperture, such that when the gripping means releases its grip on the block, the block is transferred to the container, after which the container is transported away for further processing.

In this embodiment, which is also the subject of a corresponding method claim, the cut block, still held by the gripping means is elevated and placed on the shield. The shield hereby supports the bottom of the block, and hereby maintains the integrity of the block between the block being cut and placed in the container.

The gripping means slides the block to an aperture in the shield. During the sliding as little contact and thereby friction between the block and the shields upper surface is

encouraged, but on the other hand the shield is provided in order to contain the block in the gripping means and retain its integrity.

The aperture has a size and shape slightly smaller than the opening in the container. Furthermore by bringing the containers opening into close proximity with, and in some instances in contact with the underside of the shield, it is assured that when the block is released from the gripping means, all the material making up the block will eend up in the container, in that due to the placing of the container close to the shield, there is no room for the material to escape.

In a further embodiment of this particular construction a hopper for the containers are provided, and a container dispensing unit is interposed between said hopper and a conveyor belt, where said conveyor belt transports the dispensed containers into a position under the aperture in the shield, and further after each container has been filled.

This arrangement provides for automated transport of the containers, such that as long as there are containers in the hopper, no manual effort is required. The conveyor places the container in a position where the blocks may be filled into the container, after which the conveyor removes the container, and makes room for the following container.

In a still further embodiment of this construction a lift is provided, where said lift elevates the containers into a position superposed the aperture and in close proximity to the underside of the shield, and which lift after the container is filled, releases the container for further transport.

The lift foresees that the gap between the rim of the container delimiting the opening in the container is close to or in contact with the underside of the shield, in order to avoid the material in the block spilling out. Spilling of material outside the interior of the container, has a number of drawbacks, for example, where the container is to be closed by an adhesively applied foil, the rim would need to be cleaned before application, where the material in the blocks are foodstuff such as fish or poultry, spill material in the machinery gives rise to possible hygienic problems and difficulties in the

cleaning and maintenance process, and furthermore the lift makes it possible easily to adopt the machinery to different size containers. This is further enhanced in embodiments where the shield is replaceable, such that shields having different size apertures are placed in the apparatus.

Description of the Drawing

The invention will now be explained with reference to the accompanying drawing, wherein

fig. 1 illustrates an overview of an apparatus according to the invention,

fig. 2 illustrates details relating to the cutting and placing of containers,

fig. 3 illustrates details relating to the turning of containers,

fig. 4 illustrates an overview of a second embodiment of the apparatus,

fig. 5 illustrates an overview of a second embodiment of the apparatus.

Fig. 6 illustrates an overview of a third embodiment of the apparatus

Detailed Description of the Invention

The apparatus 1 illustrated in fig. 1 will be explained below where the different elements of the apparatus will be described separately.

The apparatus 1 comprises a first distribution and stacking station 20. This station 20 is provided with a divider 21 such that products introduced into the receiving end 22 of the stacking station 20 may be divided in two separate portions by the divider 21. The outlet 23 has a tapering configuration such that products introduced in the receiving end will be concentrated, and thereby the product density will be increased as the products leave the outlet 23.

In this embodiment, the divider splits the products into two separate outlets 23, whereby a second apparatus may be arranged in parallel to the one illustrated in fig. 1.

The first distribution and stacking station is provided with a vibrator 24, where the intensity and the amplitude of the vibrations may be altered according to the products

treated in the apparatus. At the same time, the station 20 is arranged in a downstream sloping fashion such that the receiving end is at a higher altitude than the outlet 23, whereby products introduced in the receiving end due to the influence of gravity and the vibrations will travel from the receiving end towards the outlet 23. As the products leave the outlet 23, they are conveyed onto a second stacking station, where the inclination of the station 30 is less than the inclination of the first stacking station. At the same time, the vibration created by a vibrator 31 is such that the products travelling through the second stacking station will be further packed whereby the density at the outlet of the second stacking station will have been increased in relation to the density of the outlet 23.

From the outlet of the second stacking station 30, the products are introduced into a shaping station 40. In the shaping station 40, the products introduced at the first end 41 of the shaping station 40 are shaped into a string of products as the products leave the shaping station 40 at the outlet end 42. The shaping station comprises shaping means comprising a bottom structure, side shaping members and a top structure. The bottom structure is a conveyor belt. The side shaping members are, in this embodiment, in the shape of two parallel conveyor belts 43 arranged with their conveying surfaces substantially vertical such that the two conveyor belts 43 will be the sideways limitations of the shaping station 40.

The advantages of using conveyor belts 43 as side shaping members is the fact that there will be no differentiated speed between the products being shaped in the shaping station 40 and the side shaping members 43, which friction otherwise could influence the ability of the forming station 40 to form the product string which will leave the shaping station 40 at the outlet end 42.

The top part of the shaping station is constituted in this embodiment by two wheels 44,45 which may rotate freely in order to slightly compress the product introduced into the shaping station. These wheels are arranged at appropriate places in a frame member 46, which frame member 46 is provided with further attachment means for the wheel structures 44,45, or the wheels 44,45 may be placed at different positions such that they may carry out their task of delimiting the product string in the shaping station

in the height direction. A third wheel 47 is provided for rotation around a separate axle. The wheel 47 is arranged on an arm 48 which arm is mounted on a axle 49. In this manner, if the wheel 47 detects variations in the thickness of the layer of products being string-formed in the shaping station, the wheel 47 will move in a vertical direction and due to the provision of the arm 49 create a rotation of the axle 49. Thus, it is possible to detect the physical thickness of the layer passing through the shaping station by registering the angle and change of angle of the axle 49 in relation to a reference. This input may be used to adjust the vibrations in the vibrating means 24,31 in order to adjust the density of product entering the shaping station through the inlet 41. Through the shaping station 40, a string is formed such that a string of products will leave the shaping station 40 at the outlet 42.

Adjacent the outlet 42, a reciprocating knife 50 is arranged, and immediately downstream from the reciprocating knife 50, a gripping mechanism 60 is provided. The gripping mechanism will be explained with reference to fig. 2. Adjacent the gripping mechanism, two chutes 71,72 are arranged, whereby tins 73 are guided to the platforms 80. The platforms 80 will be further described with reference to figs. 2 and 3.

The reciprocating knife 50 cuts the string into blocks, which blocks by the gripping means 60 are placed on the platforms 80 whereafter tins 73 are guided via the chutes 71,72 to be placed on top of the blocks. As the blocks are covered by a container 73, a mechanism 90 grips, rotates and releases the filled containers onto a further conveyor belt 91, such that the filled tins 74 may be conveyed on for further processing. The further processing may include filling the tins with sauce, stock, broth, oil or other materials, and eventually placing a lid on the tin, and sealing the tin.

Turning to fig, 2, the details of handling the blocks as they have been cut are illustrated. The reciprocating knife means 50, see fig. 1, has been removed in the illustration in fig. 2 in order to illustrate the gripping means mechanism 60. The string, and after being cut, the blocks are transported on the conveyor 61. The gripping means 60 comprises two sets of grippers 62,63. Additionally, a third gripper 64 is provided. As the blocks cut by the knife leave the cutter, they will be caught by the gripping means 64. As the block proceeds, the gripping means 63 or 62 will grab the block and move

it sideways onto a check weighing platform 65. The check weighing platform 65 weighs the block and checks that it is within the predefined limits. If the block is over¬ weight or underweight in relation to the predefined ranges for the weight of a block, a reject mechanism comprising a pushing unit *66* and a piston 67 push the block placed on the check weighing platform 65 off the platform and into a collection bin (not illus¬ trated). Concurrent with this action, the other gripping means 62 or 63 have moved the following block to the opposite check weighing platform for carrying out the same routine as described above. If the block is accepted, i.e. not rejected and pushed into the collection bin, the block is moved onto the plate 68.

As the blocks travel through the shaping mechanism and the cutting mechanism 50, they are placed on the conveyor belt 61. hi order for the gripping means 62,63,64 to follow the blocks on the conveyor belt 61, the gripping means 60 is moved along at substantially the same speed as the conveyor belt 61. The mechanism for moving the gripping means 60 is, in this embodiment, constituted by a rack-and-pinion *69* as well as guide rollers such that a reciprocating movement back and forth in the direction of the conveyor belt 61 may be carried out by the gripping means 60.

Turning to fig. 3, the final stages in the procedure will be explained.

hi fig. 3, the cutting mechanism 50 and the gripping means 60 have been removed in order to illustrate the final steps in placing a tin 73 on the blocks. As the blocks, as explained above with reference to fig. 2, are placed on the platform 68, a tin is by means of tin gripping means 81 collected from the end of the chute 71, and placed on top of the block placed on the plate 68. From here, the gripping means 81 slides the block covered by the tin 73 onto the turning mechanism 90. The turning mechanism 90 comprises tin holding means 92, and by rotating the turning mechanism 90, the tin is turned right side up such that, as the tin holding means 92 releases the tin after being turned, the tin is delivered onto the conveyor 91 for further processing. As there are two check weighing stations in this particular embodiment of the invention, two tin gripping means 81 are also provided, one set in each side, in order to speed up produc¬ tivity.

In the embodiment illustrated with reference to figures 4 and 5 an alternative stacking station as well as means for placing the cut block in the container are illustrated. Reference numbers used with reference to figures 1, 2 and 3 are as far as possible used for the same features with respect to the embodiments of the invention depicted in figures 4 and 5.

With respect to figure 4 the stacking station is divided into a first and second part 20, 30. The bottom of the stacking station is a continuous conveyor belt running through both the first and second stations 20, 30. In the second station 30 a further conveyor belt 35 is arranged substantially perpendicular to the surface of the first conveyor belt and so that it progressively overlaps the first conveyor belt in the second station 30. Together with a side limitation 36 also arranged perpendicularly to the plane of the first conveyor belt, the objects, e.g. fish filets placed on the conveyor belt, will be squeezed together through the second stacking station 30 due to the limited surface area between the side limiter 36 and the second endless conveyor belt 35. At the very end of the second stacking station 30 the objects will have been forced into a cross sectional shape corresponding to the inlet of the string shaping station 40, so that the string will be limited by the conveyor belt 43 arranged perpendicularly on either side of the conveyor belt forming the string shaping section. Wheels 44 and 45 will gently squeeze the objects together thereby forming a string of objects having a predetermined height.

As the string of e.g. fish filets leaves the shaping station 40 at the outlet end 42 gripping means and cutter means will engage the string and cut off the string of e.g. fish filets in an appropriate length.

The mechanism for placing the blocks in the containers will be described in detail with reference to figure 5.

As the fish filets are shaped in the shaping station due to the influence of the wheels 44, 45 and the vertically arranged conveyor belt 43, the string will leave the outlet end 42 of the shaping station substantially having a cross section corresponding to the cross section of the container into which the filets are to be placed.

The string of filets is guided into the gripping means 100 placed on a first turntable 104. In the illustrated example 4 gripping means 101, 102, 103, 104 are arranged radially extending from the turntable 104. The turntable 104 is arranged for rotation around a substantially vertical axis, so that when a block is placed in the gripping means 100 and the turntable 104 is rotated 90 degrees counter clockwise, the gripping means 101 will be in line with the shaping station and ready to receive a portion of the string, e.g. fish filets. By advancing the turntable 104 stepwise in turns of 90 degrees, string will be cut off and transported to the containers according to the rotation of the turntable 104.

The gripping means 100, 101, 102, 103 are provided with reciprocating knives 105, 106, 107 and 108. When the knife 105 is activated in order to create a block inside the gripping means 100, the knife remains in place until the turntable 104 has turned 90 degrees and thereby placed the cut-off block over a container. The containers 110, 111, 112 are arranged in suitable cut-outs exemplified by the cut-out 113. The cut-out 113 has a size and shape so that in this example rectangular containers 110, 111, 112 may be loosely placed inside the cut-out and when the second turntable 114 is rotated, the container 112 may be placed directly underneath the gripping means 103. In this position the knife 108 is removed and a plunger activated by a cylinder 115 may be activated in order to help the block inside the gripping means 103 to be placed in the container 112. The turntable 114 is thereafter moved in a linear movement parallel to the shaping station one step, so that the container 111 is placed underneath the gripping means 101, which in the meantime has been rotated into a position where formerly the gripping means 103 was placed.

The process about opening the gripping means removing the knife and activating the cylinder 115 is repeated and the second container is filled with e.g. fish filets. Thereafter, the turntable is displaced another step, so that the container 110 is superposed the gripping means 101 which in the meantime has been filled with fish filet in the position in line with the shaping means and rotated into the position where the activation of the cylinder 115 will cause a plunger to force the fish filets into the container 110. After this, the turntable is rotated and a new batch of containers may as described

above be brought into a position to receive blocks cut-off as described above from the gripping means arranged on the first turning table 104. The filled containers 110, 111, 112 may thereafter easily be removed from the second turntable 114 for further processing, e.g. to be filled with broth, sauce or the like, and eventually a lid may be placed and optionally further processing can take place.

In an embodiment of the invention not illustrated the second turntable may be replaced by an endless conveyor arranged, so that the containers are placed along the conveyor and the conveyor's longitudinal direction is parallel to the shaping station. As the conveyor advances stepwise underneath the position of the cylinder 115, the activation of the cylinder and release of the gripping means will place the blocks in the containers on the conveyor belt. The filled containers will thereafter be removed from the endless conveyor as this proceeds stepwise by placing a new empty container underneath the activating cylinder 115.

Although two different portioning devices has been described, also portioning devices sold as stand-alone machines may be placed at the end of the string forming station 40. Marel of Iceland markets a series of Intelligent Portioning Machines (IPM series) as does the Danish producer Scanvasgt under the brands ScanBatcher, ScanGrader and ScanSizer. All these devices and others are considered equivalent alternatives to the devices described within this description.

The invention has now been explained above with reference to a particular embodiment, but the inventive concept shall not be delimited by this particular embodiment, but shall be delimited alone by the definition of the invention as stated in the appended claims.

Turning to fig. 6 a third embodiment of the invention is illustrated.

The string forming part corresponding to features 20, 30 and 40, see for example fig. 4 are only schematically indicated. Any of the suggested cutting means for cutting the string into appropriately sized blocks may also be integrated into this embodiment of the invention.

The gripping means, as described with respect to fig. 5 above may also be used in this embodiment, where however the gripping means 100' in this embodiment are arranged on a lifting and turning device 120. The gripping means 100' are fastened on two parallel axles 121,122, which axles in the other ends are arranged in a housing 123. The housing comprises means whereby the axles 121, 122 may be rotated about their longitudinally axis whereby it is possible to bring the gripping means into and out of contact with the block. Furthermore the housing 120 comprises means for elevating and transversal movement of the gripping means 121, 122, such that the gripping means (and thereby the block) may be placed on the upper side of a shield 124. The gripping means 100' are rotated while the bottom part of the block is supported by the upper surface of the shield 124.

In the mean time a container has been dispensed from a hopper 125, by a dispensing unit 126 and thereby placed on a conveyor 126, which will transport the container to a position superposed an aperture 127 in the shield. The container 128 having arrived at the position superposed the aperture 127, is lifted, such that the rim of the container is in contact with the underside of the shield 124. The block is hereafter transferred from the gripping means 100' through the aperture 127 into the container 128. The conveyor 126, then advances in order to place the following container 129 under the aperture 127.

In the illustrated embodiment the shield 124 and aperture 127 matches the containers 128 in size. For other size containers other shields may be installed with suitable apertures.

CLAIMS

1.Method for concentrating and arranging soft or semi-soft objects in suitable sizes for packaging, where the objects are introduced into a first stacking and distribution means in which the objects are arranged in overlapping relationship, and where the objects are moved to a second stacking means for denser packaging, after which the objects are transported through a shaping station, whereby the objects are shaped into a string having a predefined height and width substantially corresponding to the sizes of the containers into which the objects are to be packed, and that means for cutting the string in size lengthwise are provided such that the string is divided into blocks substantially corresponding to the size of the containers, and where the containers are guided into a position such that the blocks may be introduced into the containers after which the filled containers are moved away from the cutter means.

2. Method according to claim 1, wherein the first and second stacking means are provided with vibrating means, and the stacking means are arranged in a downstream sloping fashion.

3. Method according to claim 1 wherein the gripping means are arranged for rotation around a first vertical axis, such that as the gripping means engages the cut blocks and rotates, the blocks are moved with the gripping means, and that a second turntable arranged for rotation around a second vertical axis comprises means for releasably holding the containers, such that the containers may be moved into a position under the gripping means, after which the blocks are released from the gripping means and the blocks are placed in the containers, which filled containers thereafter are moved away.

4. Method according to claim 3 wherein the second turntable may be moved horizontally in a linear movement, and that more containers are releasably arranged along one or more lines parallel to a tangent of the vertical axis in the second turntable.

5. Method according to claim 3, wherein the second turntable is replaced by an endless conveyor, arranged in parallel to the shaping station, and that means are provided on said conveyor for conveying the containers, such that containers placed on the conveyor may be superposed the gripping means, which when releasing the blocks from the gripping means fills the containers on the conveyor.

6. Method according to claim 1, wherein a check weighing station is provided either before or after the objects are filled into the containers and before the containers are turned, and that further means are provided for adding object material to the containers if the weighing indicates that the amount of the object in the container is outside predefined limits, and that the check weighing data may be utilised as input for determining the size of the blocks, and thereby the cutting length of the blocks.

7. Method according to any preceding claim, wherein the objects are fish fillets, whole fish and/or other meat or vegetable products, where the objects are either raw or pre-processed, and that optionally, before the containers are closed, a sauce, broth, stock, oil, pickle or the like is added to the container.

8. Method according to claim 1, wherein the blocks by means of gripping means are placed above an aperture in a shield, where said aperture has a size and shape corresponding to but slightly smaller than the opening in the container, and that the container is arranged superposed the aperture and in close proximity with the underside of said shield, and that the block is passed through the aperture into the container, after which the filled container is moved away, and a new container is superposed the aperture.

9. Method according to claim 8, wherein the gripping means are arranged on a rotatable member above said shield, such that the gripping means grips the block, elevates the block, and moves it onto the upper side of the shield, the gripping means and the block is rotated into a position superposed the aperture in the shield, after which the gripping means releases the block into the container.

10. Method according to claims 8 or 9 wherein the containers are arranged in a hopper, from which the containers are placed on a conveyor one after each other or in consecutive sets of containers, where said conveyor transports each container into a superposed position relative to the aperture in the shield, where the container is brought into close proximity with the shield, such that the container may be filled, after which the conveyor transports the filled container away from the shield.

11. Apparatus for performing the method according to any of claims 1 to 10, wherein a first stacking and distribution means is provided where said first stacking and distributing means comprises either a first conveyor belt, moving objects placed on the first stacking and distribution means forwards or a downwardly sloping slide means urging objects placed on said slide to move forwards under the influence of gravity, such that the first stacking and distribution means causes the objects to overlap and be transported onto a second stacking means, where said second stacking means either comprises a steeper downwards slope as the first slope or that a conveyor belt arranged perpendicular to the first conveyor belt and increasingly overlapping said first conveyor belt, whereby the objects are further concentrated and from said second stacking means is transported onto a shaping station, which shaping station comprises at least one endless belt, and two side shaping members, and at least one roller arranged over the endless belt for engaging the objects present between the two side shaping members such that a string of objects are formed, where cutter means in the shape of a reciprocating knife is arranged downstream of said shaping station such that the string is cut into predefined blocks, and gripping means are arranged for gripping said cut blocks and moving the blocks into a position where filling means transfers the blocks into a container, and transport means for transporting the container unto further processing.

12. Apparatus according to claim 11 wherein the filling means comprises a sliding cylinder, on which cylinder the gripping means are arranged, such that by activation of the sliding cylinder the gripping means may be moved perpendicularly to the transport direction in the same plane as the transport plane, whereby the gripping means moves the cut block onto a plate, and further that a chute is arranged adjacent the cutter means for guiding and placing a container up side down over the block placed on the

plate, and that the plate is arranged for rotation around an axis under the plate such that the plate and container, by rotation about the axis, are placed right side up on transport means.

13. Apparatus according to claim 11 wherein the filling means comprises a first turntable, arranged for rotation around a vertical axis, and that one or more gripping means are arranged extending radially away from said first turntable, and that the reciprocating knife is arranged on the gripping means, and further that a second turntable is arranged for rotation around a vertical axis, where a number of cut-outs or apertures are arranged radially along the periphery of said second turntable, such that by turning the turntables the gripping means may be superposed the cut-outs or apertures, and that the apertures or cut-outs are suitable to releasably hold the containers.

14. Apparatus according to claim 11, wherein means for detecting the object density are provided adjacent the shaping station, where non-contact measuring means are provided adjacent the upstream end of the shaping station, and optionally contact measuring means are arranged upstream of the cutter means, where said contact measuring means may be a biased wheel or plate being urged against the objects in the shaping station, and that the speed of the endless belt may be adjusted in response to the forces applied to the biased wheel or plate, and that the non-contact measuring means may be vision based or be one or more lasers registering the relative height of the object layer entering the shaping station, and that the measurements from the non-contact means optionally may be used to control the vibration intensity in the first and/or second stacking means in order to increase or decrease the object density at this point.

15. Apparatus according to claim 11, wherein a weighing station comprising two weighing platforms is arranged between the cutter means and the chute such that two plates on which to place the blocks are provided, and that gripping means engages and alternately moves the newly cut block onto one of the two weighing platforms where the weight of the block is registered, and then moves the block onto one of the two plates, where the chute is provided with two lanes for supplying containers to either of

the two plates, after which the plates rotates such that the container is placed right side up on transport means for transporting the container for further processing.

16. Apparatus according to claim 15, wherein means are provided for removing the blocks from the weighing platforms if the block falls outside a predetermined interval, where said means comprises a horizontal plunger, activated by a telescopic member, and a receptacle for collecting the discarded block.

17. Apparatus according to claim 11 or 12, wherein dispensing means are arranged in the shaping station in order to add extra particulate object material to the string of objects.

18. Apparatus according to claim 11, wherein the side shaping members in the shaping station are endless conveyor belts adjusted to travel at approximately the same speed as the string.

19. Apparatus according to claim 11, wherein the gripping means comprises means for elevating the gripped block onto a shield, where said gripping means may slide the block on the upper surface of said shield into a position where an aperture having an opening slightly smaller than the corresponding opening in the container, is provided in said shield, and that means are provided for arranging the container with the containers' opening in close proximity to the aperture, such that when the gripping means releases its grip on the block, the block is transferred to the container, after which the container is transported away for further processing.

20. Apparatus according to claim 19 wherein a hopper for the containers are provided, and a container dispensing unit is interposed between said hopper and a conveyor belt, where said conveyor belt transports the dispensed containers into a position under the aperture in the shield, and further after each container has been filled.

21. Apparatus according to claim 19 or 20 wherein a lift is provided, where said lift elevates the containers into a position superposed the aperture and in close proximity

to the underside of the shield, and which lift after the container is filled, releases the container for further transport.

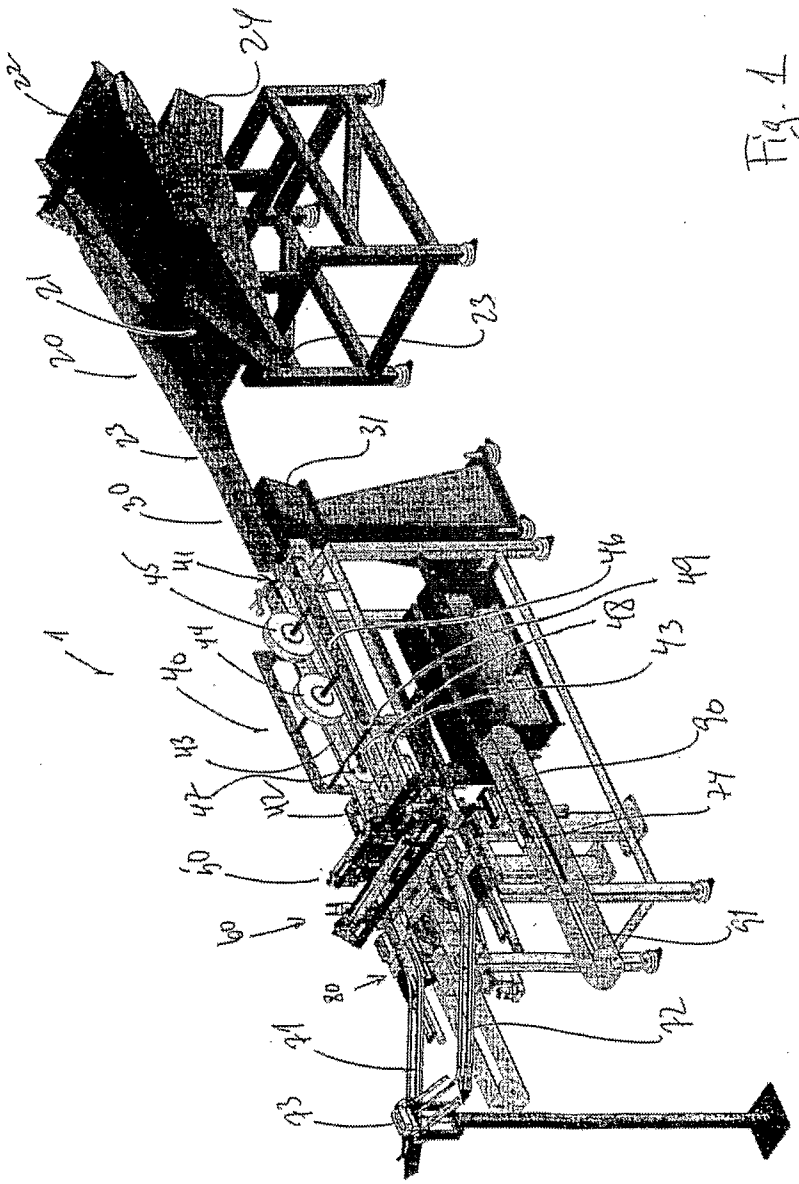
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Fig. 1

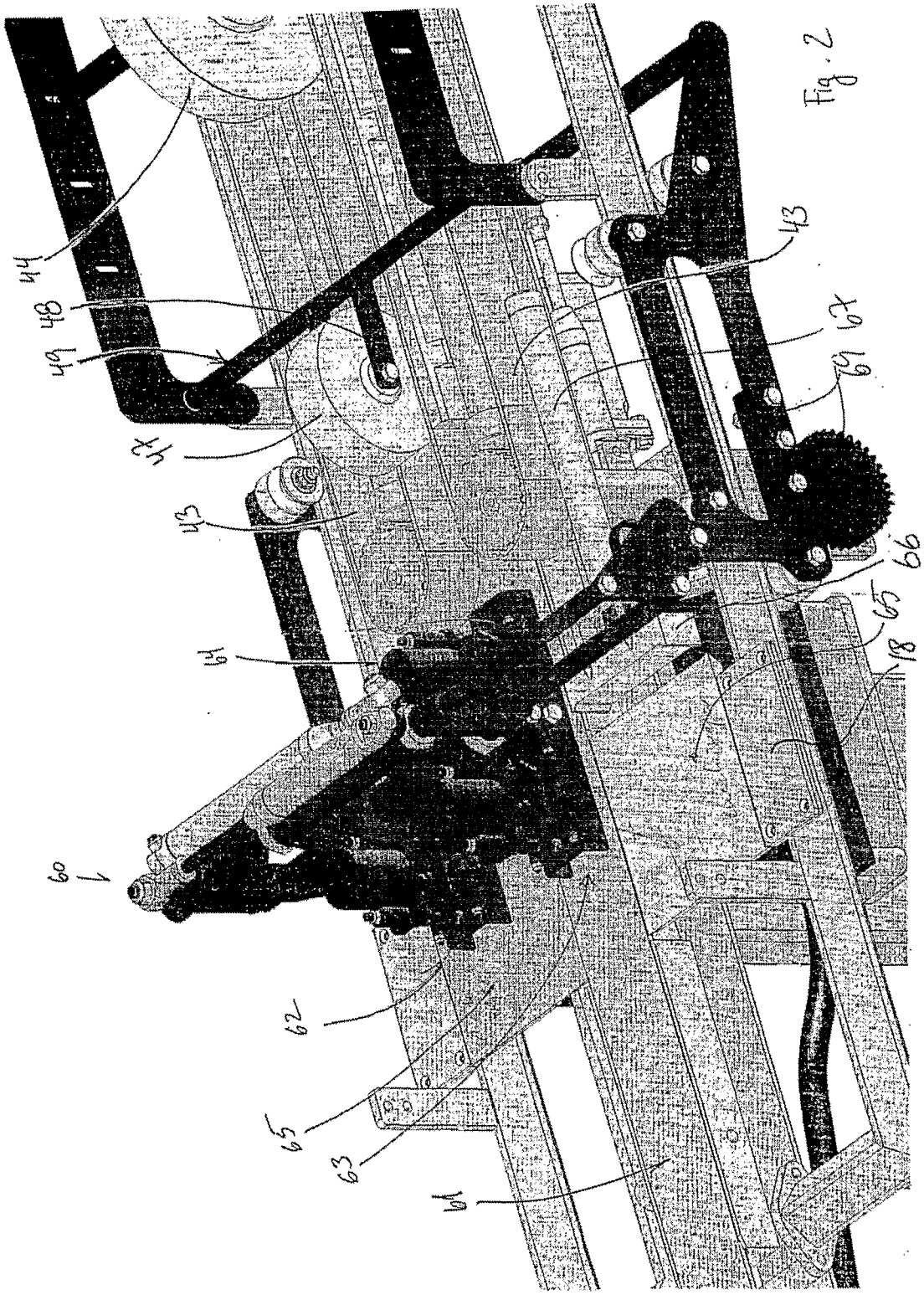
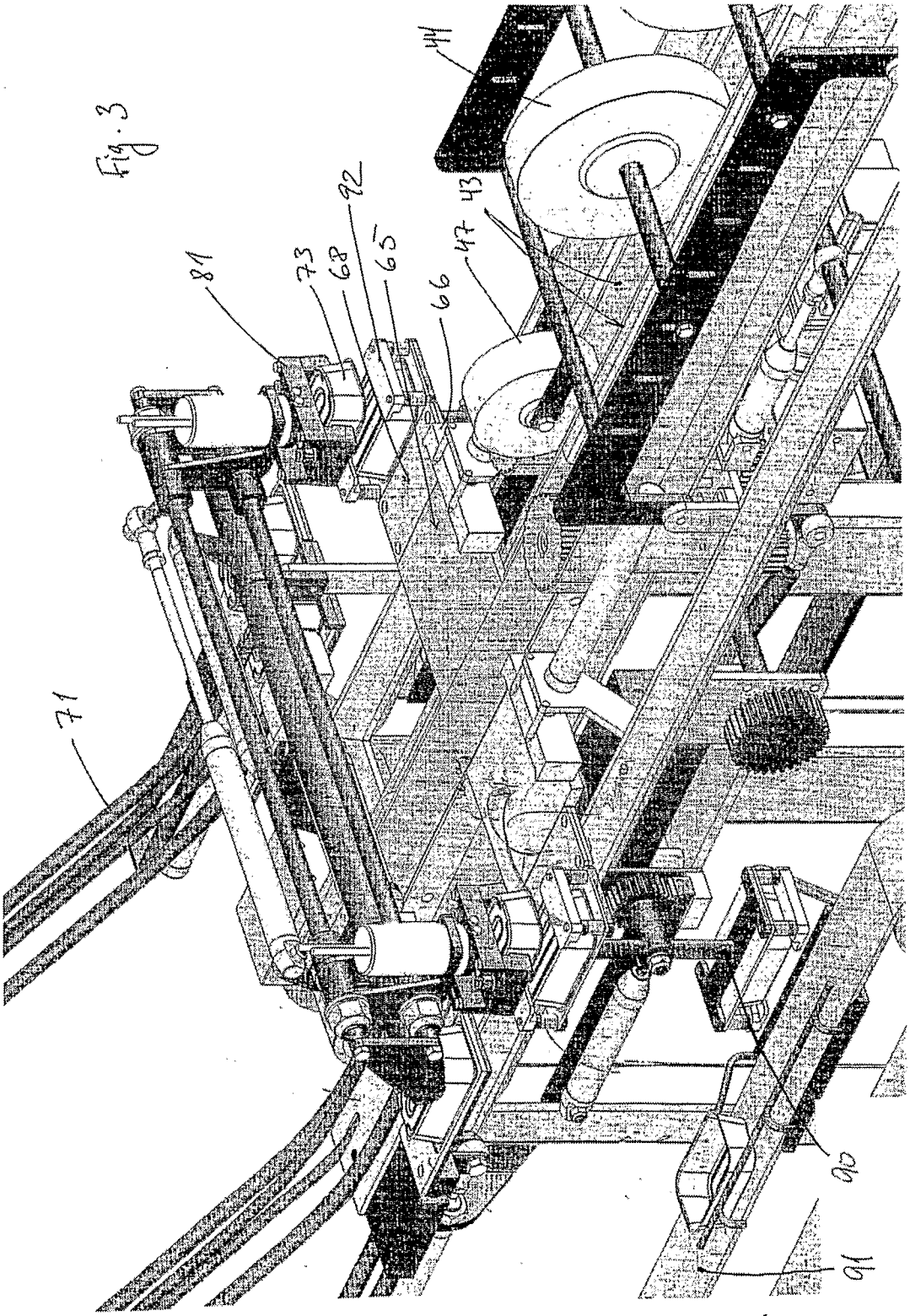


Fig. 2

Fig. 3



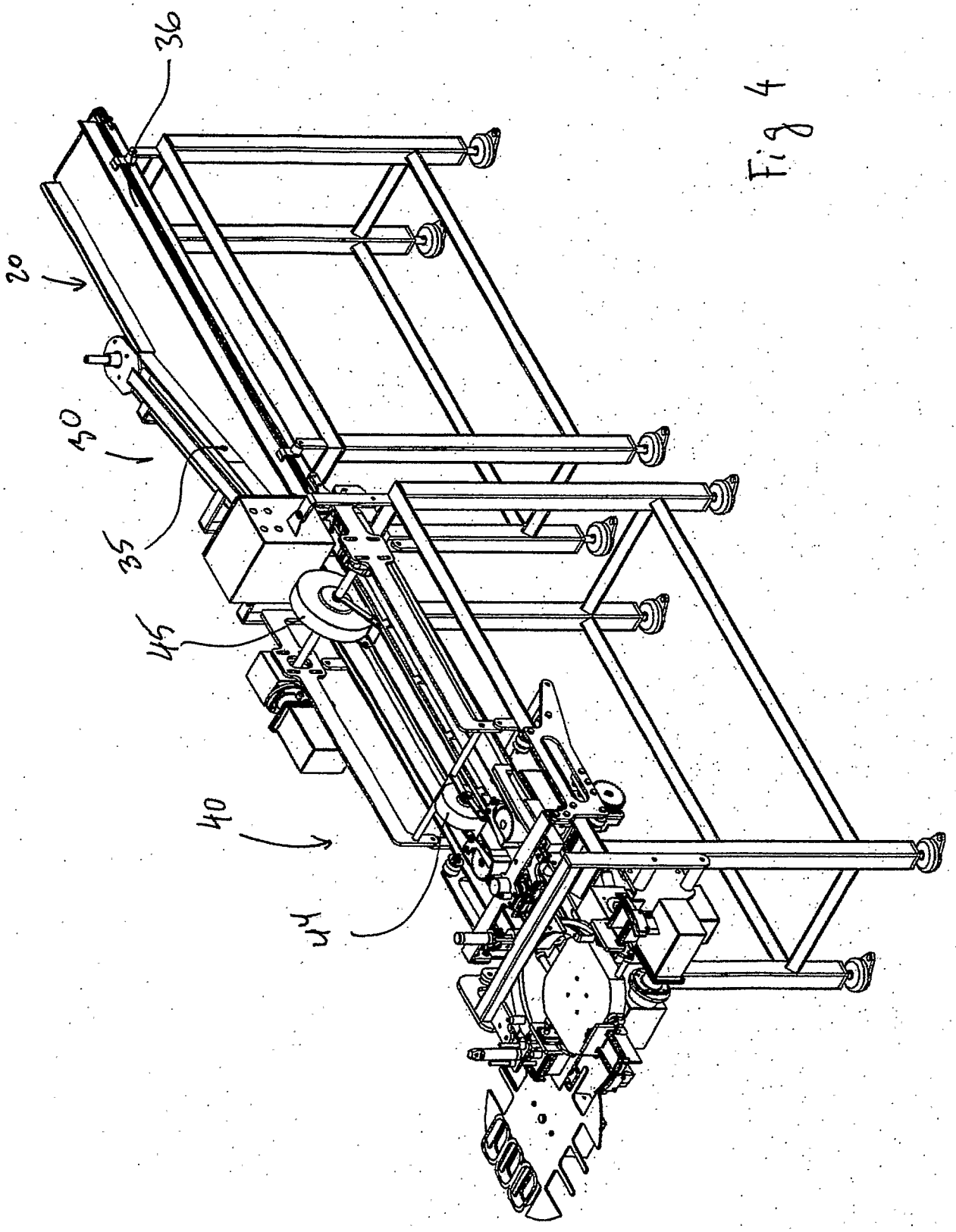


Fig 4

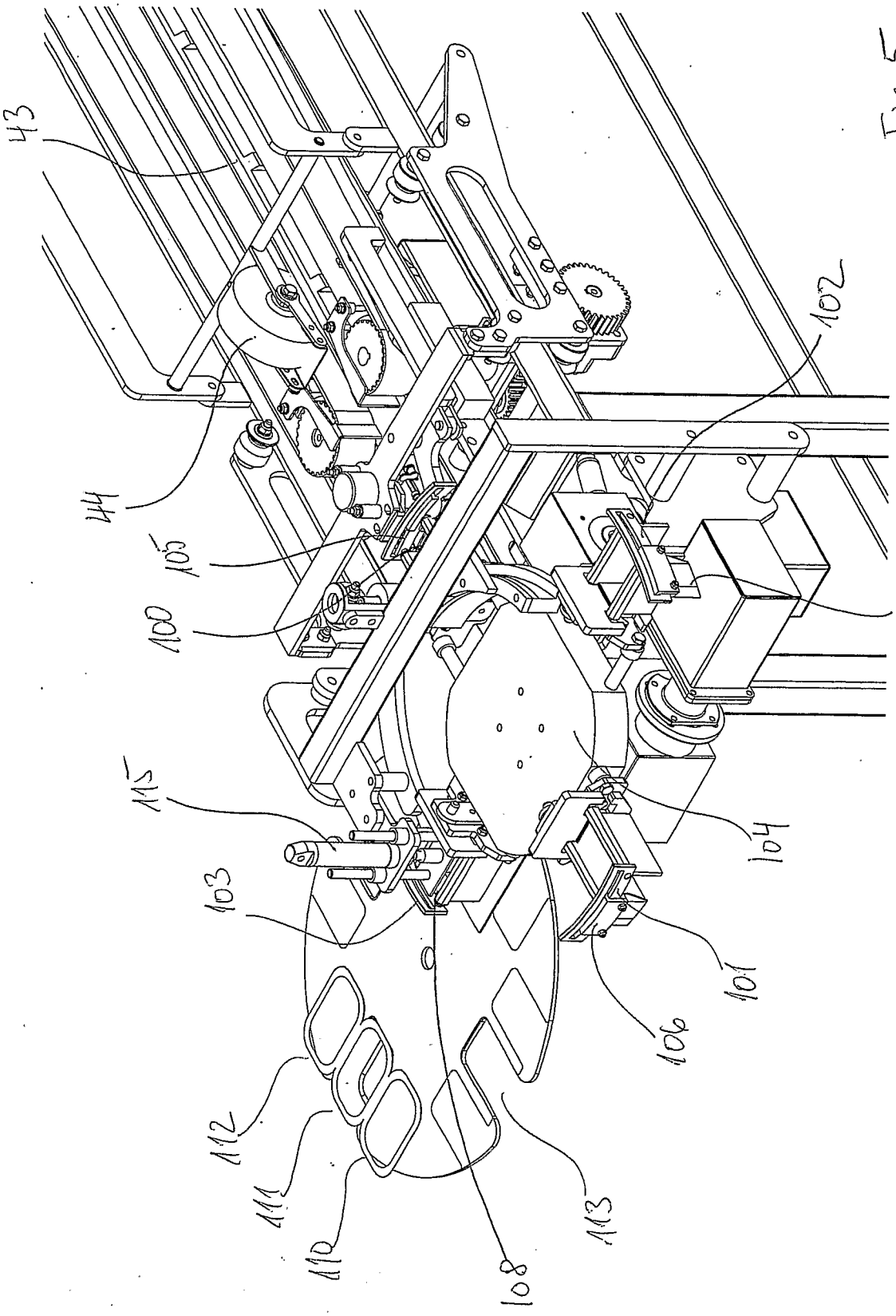


Fig. 5

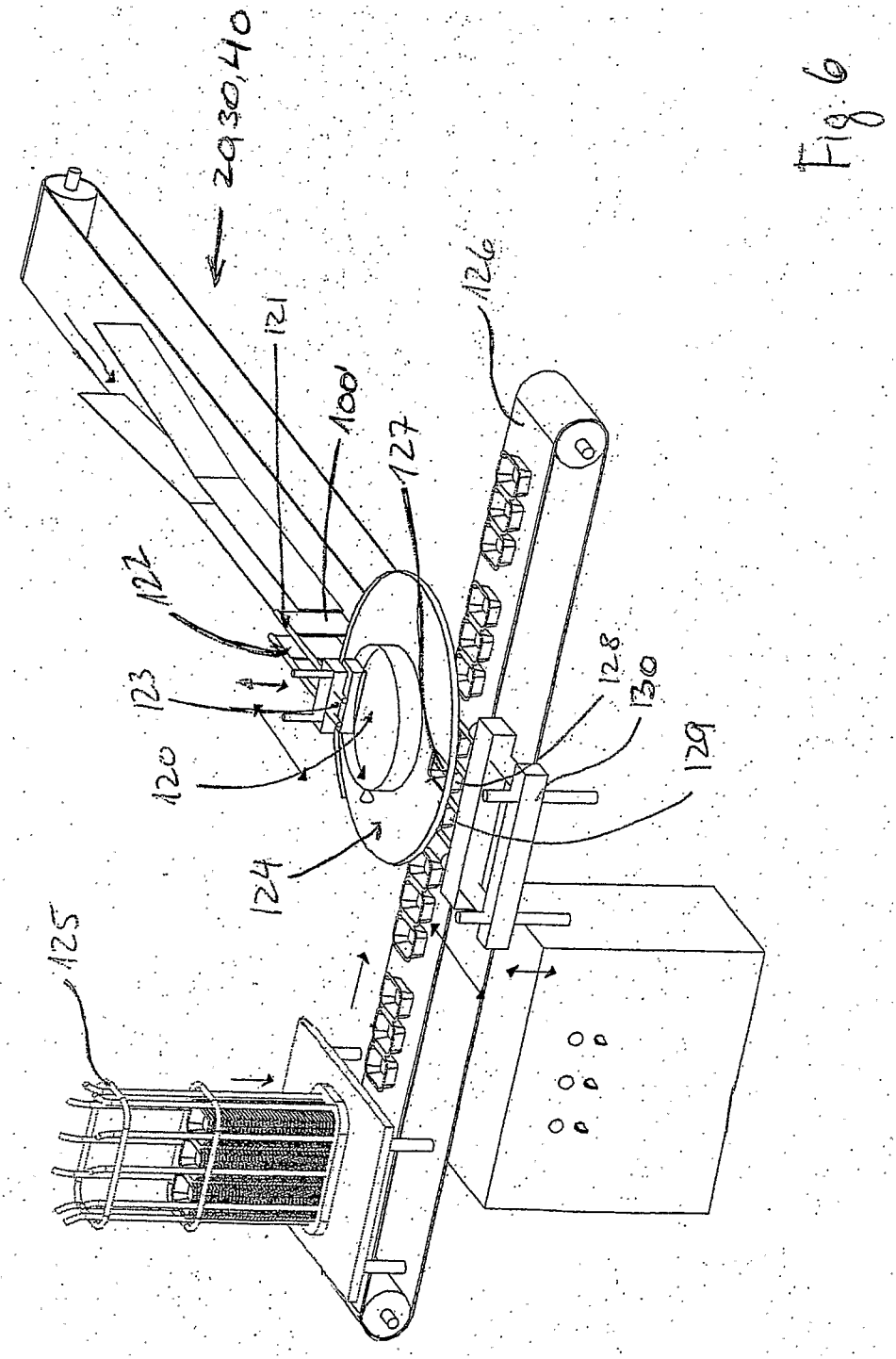


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/DK2007/000039

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65B65/00 B65B25/06 B65B63/02

According to International Patent Classification (IPG) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical search terms used)
EPO-Internal , WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
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A	US 2002/069622 Al (BERCIGA STEFANO [IT] ET AL) 13 June 2002 (2002-06-13) the whole document	
A	WO 00/48909 A (MAREL HF [IS]; HALLDORSSON THORKELL [IS]; ELVARSSON ASGEIR [IS]; THORV) 24 August 2000 (2000-08-24) the whole document	

☐ Further documents are listed In the continuation of Box C

☒ See patent family annex

* Special categories of cited documents

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"O" document referring to an oral disclosure, use, exhibition or other means

[1]P' document published prior to the International filing date but later than the priority date claimed

"T[1] later document published after the international filing date or pnority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y- document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such docu¬ments, such combination being obvious to a person skilled in the art

"&' document member of the same patent family

Date of the actual completion of the International search	Date of mailing of the international search report
10 Apri l 2007	25/04/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P B 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel (+31-70) 340-2040, Tx 31 651 epo nl, Fax (+31-70) 340-3016	Ungureanu, Mirel a

INTERNATIONAL SEARCH REPORT

Information on patent family members

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PCT/DK2007/000039

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