



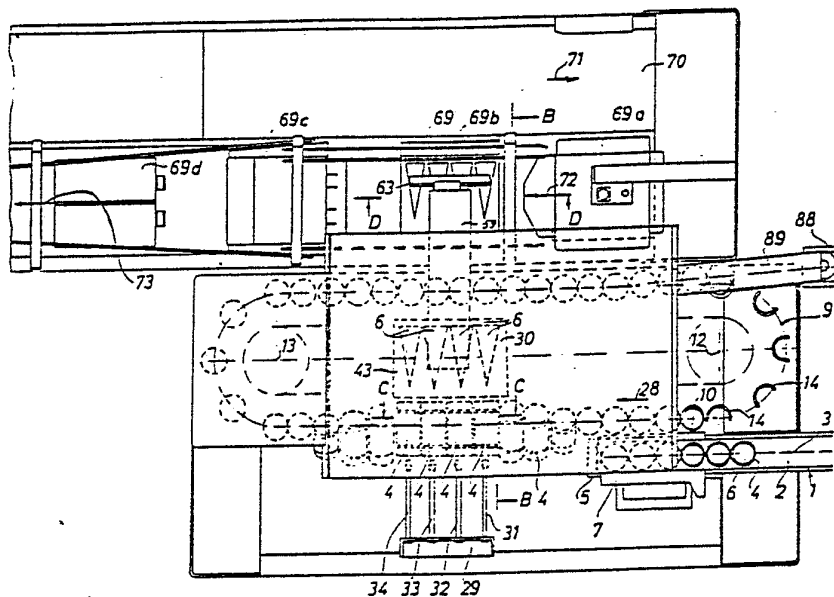
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(54) Title: A METHOD OF GROUPING, ORIENTING, AND PACKING OBJECTS AND A SYSTEM FOR CARRYING OUT THE METHOD

(57) Abstract

By a method of grouping, orienting, and packing objects of a nonuniform cross section decreasing towards one end, the objects (6) are advanced on conveying means, stopped at a stop and gripped by a gripping device transferring the objects into a packing box (69). In order to ensure a quick and efficient packing of such objects in layers within a packing box, the objects (6) are advanced in their respective loose, sleeve-shaped carriers (4) on a first conveyor (1). From this first conveyor, the carriers are transferred in groups onto a second conveyor (9) adapted to position the carriers (4) horizontally. Subsequently, the objects are pressed onto a supporting device by means of a pusher (29), said supporting device temporarily supporting the objects (6) until they are gripped by a gripping device (59) lifting said objects over and into an open packing box (69). A system for carrying out this method comprises a first conveyor (1) and a second conveyor (9) receiving the carriers from the first conveyor (1) in their respective advancing means. These advancing means are adapted so as during the further advancing of the second conveyor to turn the carriers (4) into a horizontal direction, in which the pusher (29) by means of pushing bars (31-34) pushes the objects (6) out of their respective carriers (4) and onto a supporting device (30). This supporting device is adapted to retain the objects (6) until a gripping device (59) collect said objects and transfer them into a packing box (69) advanced on a third conveyor (70).



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A Method of Grouping, Orienting, and Packing Objects and a System for Carrying Out the Method

Technical Field

The invention relates to a method of grouping, orienting,
5 and packing objects of a nonuniform cross section substantially decreasing towards one end, and whereby the objects are advanced in a row on conveying means, stopped by a stop, and gripped by a gripping device carrying said objects into a packing box preferably of cardboard. The
10 invention furthermore relates to a system for carrying out the method.

Background Art

Methods of grouping, orienting, and packing objects are known, but the objects such as ice-cream cones with a
15 nonuniform cross section decreasing towards one end cause problems with providing a guiding and orienting of said objects so that they are automatically packed in a quick and efficient manner.

Disclosure of Invention

20 The method according to the invention is characterised in that the objects are advanced on a first endless conveyor in their respective sleeve-shaped carriers receiving said object in a vertical position with the broadest end at the top, that the carriers with the objects are
25 stopped by the stop extending across said first conveyor, and that the further advancing of the carriers is subsequently taken over by a second conveyor, which while retaining said carriers positions said carriers substantially horizontally, that the carriers are subsequently
30 stopped again by means of the second conveyor, whereafter a pusher pushes the objects in groups substantially hori-

zontally out of the carriers and onto a supporting device retaining said objects substantially in the same orientation, and that the objects are subsequently gripped in groups by a gripping device and transferred
5 to the open packing box.

As a result, the objects may be completely automatically packed in appropriate packing boxes in a quick and efficient manner. This is especially due to the fact that the carriers always ensure a correct and uniform transfer of the objects onto the supporting device in such a
10 manner that they may be gripped easily by the gripping device and situated possibly in layers within the packing box.

According to the invention it is particularly preferred that the mutual distance of the objects situated on the supporting device is adjusted to the gripping device, whereby it is rendered possible to adjust the mutual distance of the objects during their transfer to the supporting device. Simultaneously, the space in the
15 packing box is efficiently utilized, the gripping device being adapted to ensure said efficient utilization at the arrangement of the objects.
20

Furthermore according to the invention, the packing box may be advanced on a third conveyor comprising means for opening and later on closing the box, whereby it is
25 possible automatically to remove filled up packing boxes and to feed empty boxes.

The invention furthermore relates to a system for carrying out the method and it comprises conveying means advancing the objects in a row, a stop temporarily stopping the objects, and a gripping device transferring the objects to a packing box. This system is characterised
30 in that it comprises a first endless conveyor travelling

about horizontal axes of rotation and being adapted to receive loose, vertical, sleeve-shaped carriers, each with an object situated vertically with the broadest end at the top, and to advance said carriers in a row towards a stop extending across the advancing path of the first conveyor, said system being adapted to feed the carriers in groups from the first conveyor so that said carriers engage an advancing means on a second endless conveyor, that the advancing means during the further advancing of the filled carriers retain and transfer said carriers in groups into a horizontal position, and that the movements and construction of the first conveyor and the second conveyor are synchronized in such a manner that each group of carriers is horizontally positioned and stopped at the same time as a new group of carriers from the first conveyor are advanced so as to engage the second conveyor, that the system comprises a second pusher adapted so as simultaneously to push the objects out of each group of the horizontally positioned carriers and onto a supporting device, which in turn is adapted to retain the objects substantially in the same orientation, and that the gripping device is adapted so as simultaneously to grip said objects and to situate them in an open packing box. As a result, a simple and efficient system is obtained permitting packing of objects such as filled, packed ice-cream cones in layers in packing boxes.

The sleeve-shaped carriers may according to the invention be of such an interior shape, that the objects are substantially centrally retained in the carriers, whereby the object is protected against impacts as well as they remain centered so as to be uniformly and centrally actuated by the second pusher in a direction towards the longitudinal central axis of the objects.

Moreover according to the invention, the system may com-

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prise a first pusher adapted to push the carriers in groups off the first conveyor and onto the second conveyor, whereby a particularly reliable system is obtained.

Furthermore according to the invention, the supporting device may comprise a supporting means for each object, and said supporting means may be mutually displaceable between two adjustable positions, of which said means in one position receive the objects transferred in groups from the second conveyor, whereas the means in the second position are adjusted for direct gripping by the gripping means of the gripping device. In this manner the mutual distance of the objects during the filling up of the packing box is such that the space therein is efficiently utilized.

According to the invention, each supporting device may comprise two symmetrically shaped loops shaped and situated in such a manner that each object may rest substantially immovably thereon until they are gripped by the gripping device.

According to the invention, the gripping device may comprise a vertically displaceable, oblong gripping beam adapted to turn 180° on a vertical axis of rotation, and which at each end comprises sucking heads gripping their respective objects in the group situated on the supporting device, said sucking heads at one end of the gripping beam in the lower position thereof gripping the objects from the supporting device, whereas the sucking heads at the other end of the beam transfer the preceding group of objects to the packing box. As a result, a particularly simple gripping device is obtained.

Furthermore according to the invention, the sucking heads may at each end of the gripping beam be mounted on a carrying means, of which at least one is adapted to turn

180° on a vertical axis at the same time as the gripping beam is turned 180° for delivering and receiving new groups of objects. As a result, it is rendered possible in a simple manner to situate each layer of objects alternately with the broadest end facing their respective direction, whereby the arrangement within the packing box is particularly compact.

According to the invention, the system may comprise a third conveyor advancing the packing boxes and temporarily keeping said boxes open during their filling up with objects, whereby an automatic replacement of filled boxes by empty boxes is obtained.

Finally according to the invention, the third conveyor may co-operate with a platform supporting the packing box during its filling up with objects; said platform being vertically displaceable and retained at least in a position at a level above the advancing path of the third conveyor. In this manner it is possible to situate each packing box at an appropriate level for such a delivery of objects from the gripping device that the falling distance of the objects is maintained at a minimum at the same time as damage to previously delivered objects is avoided.

Brief Description of Drawings

25 The invention will be described below with reference to the accompanying drawings, in which

Fig. 1 is a top view of a preferred embodiment of a system according to the invention,

Fig. 2 is a side view of part of the system of Fig. 1,

30 Fig. 3 is an end view of the system of Fig. 1, whereby



parts have been removed for the sake of clarity,

Fig. 4 is a sectional view taken along the line A-A of Fig. 2 and illustrating part of the second conveyor of the system as well as a carrier with an object indicated
5 by dotted lines,

Fig. 5 is a top view of the conveyor and the carrier of Fig. 4,

Fig. 6 is a sectional view taken along the line B-B of Fig. 1 and illustrating a supporting device temporarily
10 retaining the objects prior to their transfer to a packing box by means of a gripping device,

Fig. 7 is a sectional view taken along the line C-C of Fig. 1 through the supporting device,

Fig. 8 is a diagrammatic, sectional view corresponding
15 to Fig. 6, but closer to the packing box and with parts removed for the sake of clarity,

Fig. 9 is a diagrammatic, sectional view taken along the line D-D of Fig. 1 of a platform supporting a packing box, whereby parts have been removed for the sake of
20 clarity,

Fig. 10 is an axial, sectional view taken along the line E-E of Fig. 11 through a preferred embodiment of a sleeve-shaped carrier according to the invention, and

Fig. 11 is an end view of the sleeve-shaped carrier.

25 Mode for Carrying Out the Invention

The system illustrated in Figs. 1 to 3 comprises a first conveyor generally designated by the reference numeral

1. This first conveyor comprises an endless conveyor belt 2 travelling about horizontal axes and adapted so as to advance vertical sleeve-shaped carriers 4 individually in a direction indicated by an arrow 3, cf. Fig. 1, until a stop 5, cf. Fig. 1. The stop 5 extends across the advancing path of the first conveyor. As especially illustrated in Fig. 2, an object in the form of an ice-cream cone is situated in each carrier 4 at a filling machine (not shown). From this filling machine, the carriers are transferred onto the first conveyor 1 by means of a generally known system for grouping objects in rows.

As illustrated in Fig. 4, the sleeve-shaped carrier 4 is of such an interior form that the ice-cream cone is maintained in a vertical position with the broadest end at the top.

A first pusher 7 is located at one side of the advancing path of the first conveyor, cf. Fig. 1. The pusher extends in the longitudinal direction of the first conveyor from a position immediately adjacent the stop 5. This pusher is adapted to push a group of carriers 4 with objects 6 adjacent the stop 5 aside and off the first conveyor 1, whereby these carriers engage their respective advancing means 14 on a second conveyor generally designated by the reference numeral 9. In Fig. 1, this second conveyor has only been indicated by dotted lines. A partition 10 is arranged between the advancing path of the first conveyor 1 and the advancing path of the second conveyor 9 opposite the first pusher 7. In a manner not shown in detail, this partition is vertically displaced below the plane of the conveyor belt 2 while the first pusher 7 transfers carriers onto the second conveyor 9. The partition 10 displaced in such a manner prevents the carriers 4 abutting the stop from interfering with the second conveyor 9 since said carriers are continuously biased by the first conveyor 1 due to its continuous

running.

The second conveyor 9 comprises an endless chain 11 travelling about vertical shafts 12, 13 through appropriate sprockets. The endless chain 11 carries a plurality of
5 advancing means generally designated by the reference numeral 14 in Fig. 4. As illustrated in Figs. 4 and 5, such an advancing means comprises a C-shaped supporting member 15 fixed on the endless chain 11 and secured to each chain link of said endless chain 11 by means of angular
10 members 16, 17. A holder 19 is secured to the supporting member 15 by means of an appropriate hinge 18. At the hinge, this holder is adapted to turn 90° clockwise from the position illustrated in Fig. 4 in the direction indicated by means of an arrow 20. The holder 19 carries
15 two curved loops 21, 22 being adapted as shown to engage a carrier 4. These curved loops 21, 22 are secured to the holder 19 in any appropriate manner such as for instance by welding. As also illustrated in Figs. 4 and 5, the C-shaped supporting member of the advancing means is
20 adapted at each end to slide along a pair of parallel supporting slides 23, 24 extending parallel to the advancing path of the second endless conveyor in at least the major part of the path half extending from a position immediately adjacent the first conveyor and past the
25 gripping device described more detailed below. These supporting slides 23, 24 ensure a reliable support of the endless chain 11 when being transversely loaded withing the said portion of its path.

Figs. 4 and 5 furthermore illustrate that the holder 19
30 at the bottom carries a pivotally mounted roll 25 abutting a guiding slide 26. This guiding slide is of such a shape that the holder 19 is moved from the vertical position illustrated in Fig. 4 in the direction indicated by the arrow 20 and into a horizontal position opposite
35 the gripping device described in greater details below.

A retaining slide 27 extends on the other side of the roll 25 and substantially parallel to the guiding slide. This retaining slide 27 ensures that said roll 25 remains immediately adjacent the guiding slide 26 during
5 its entire movement along said guiding slide 26.

As illustrated in Figs. 1 to 3, an advancing means 14 is present for each carrier 4, and during the further movement of the second conveyor in the direction indicated by an arrow 28 in Fig. 1, the holder 19 of each advancing means 14 is gradually guided into a horizontal
10 position. As illustrated in Figs. 1 and 2, the number of holders 19 with carriers 4 in the horizontal position always corresponds to the number of carriers transferred onto the second conveyor 9 by means of the first pusher
15 7. In the embodiment illustrated, it is a group of four carriers 4.

The guiding slide 26 ensuring the above arrangement of the carriers 4 in a horizontal position is shaped in such a manner that this horizontal position is positioned between a second pusher 29 and a supporting device 30.
20

The second pusher 29 comprises pushing bars 31, 32, 33, 34, cf. Fig. 1, which extend in horizontal direction parallel to each other and towards the horizontally arranged carriers 4 on the second conveyor 9. The second
25 conveyor 9 is driven in a generally known manner, and its driving means are adapted to stop the second conveyor temporarily each time a new group of carriers 4 has been transferred into the horizontal position opposite the second pusher 29. Besides, the system is constructed in such a manner that the pushing bars 31-34
30 of the pusher 29 are axially situated opposite the stopped carriers 4. Furthermore, the system is constructed in such a manner that a new group of empty advancing means 14 is simultaneously stopped opposite the first

pusher 7.

When the second conveyor 9 has stopped, the driving means of the system are adapted to advance the second pusher 29 towards the second conveyor 9. During this advancing, the
5 objects in the carriers 4 are axially pushed out of the associated carriers 4 through the driving means of the system and onto the supporting device 30 at the same time as the partition 10 is removed and the first pusher
7 pushes a new group of carriers 4 off the first conveyor
10 1 and onto the second conveyor 9.

On the supporting device 30, cf. Figs. 1, 3, and 6 to 8, the group of transferred objects 6 is temporarily re-
tained by their respective pairs of loops 35, 36. These
15 loops are symmetrically shaped about a vertical plane coinciding with the longitudinal axes of the objects 6. Each pair of loops 35, 36 are furthermore shaped in such a manner that they follow the exterior outline of each
object. As a result, the object is immovably retained
in the space between the pair of loops in a required po-
20 sition both as to axial direction and to inclination.

As illustrated in Figs. 6 and 7, each pair of loops is arranged on their respective carrying block 37, 38, 39, 40 slidably mounted on two transverse horizontal shafts 41 and 42. These horizontal shafts extend between parts
25 of a stationary frame 43. In this connection it is noted that the sectional view in Fig. 7 through the supporting device 30 follows the horizontal shaft 41 within the part of the sectional view extending through the two outer
blocks, whereas at the two intermediate blocks it fol-
30 lows a vertical plane extending between the two horizontal shafts 41 and 42.

As illustrated in Figs. 6 and 8, each object 6 is stopped in front by a transverse loop portion 44 extending be-

tween the two loops 35 and 36 on each carrying block 37, 38, 39, 40. In order to ensure a good stability, the loops 35 and 36 are integrally shaped at the ends.

5 Detachable spacer rings 45, 46, and 47 are arranged between the four carrying blocks of Fig. 7 and on one of the two shafts 41, 42. These spacer rings are used for determining the minimum distance between the carrying blocks. The greatest mutual distance of the carrying blocks is determined partly by the frame 43 and partly
10 by distance bars 48 and 49 mounted on said frame and extending substantially parallel to the shafts 41 and 42 from each end of the frame and towards the centre of the supporting device. At the centre of the supporting device, the spacer bars are adapted to engage stops 50
15 and 51, respectively, on the underside of the two intermediate carrying blocks 38 and 39. The carrying blocks are moved forward and backward on the shafts 41 and 42 by means of a pneumatic piston and cylinder assembly 52 secured between parts 53 and 54 projecting downwards on
20 the two outer carrying blocks 37 and 40, respectively. The piston rod of the piston-cylinder assembly is secured to the part 53 projecting downward, cf. Fig. 7, whereas the cylinder is secured on the part 54 projecting downward.

25 A short shaft 55 extends between the two intermediate carrying blocks 38 and 39 and is secured to one carrying block 38 and adapted to pass through a bore 56 in the second carrying block. A compression spring 57 extends between the two carrying blocks 38 and 39 and about the
30 short shaft 55. This compression spring is adapted to press the two intermediate carrying blocks 38 and 39 away from each other and into engagement with the spacer bars 49 and 48 when the pneumatic piston-cylinder assembly 52 presses the two outer carrying blocks 37 and 40
35 outwards into engagement with the frame 43. By activating

the pneumatic piston-cylinder assembly such that the piston rod is pulled into the cylinder, the carrying blocks are approached each other until their shortest mutual distance has been reached, said distance being
5 determined by means of the spacer rings 45, 46, and 47. When the supporting device is to receive a new group of objects 6, the pneumatic piston-cylinder assembly and the compression spring 57 transfer the carrying blocks into a position in which each carrying block is in
10 alignment with the carriers 4 horizontally arranged on the second conveyor and ready to deliver their objects 6. Having received the objects 6, the piston-cylinder assembly 52 of the supporting devices ensures that the carrying blocks are further approached each other so
15 that the objects are spaced in such a manner that they are ready to be received by their respective sucking head 58 on a gripping device described in greater details below and generally designated by the reference numeral 59. Fig. 7 diagrammatically illustrates the ob-
20 jects by means of dotted lines both in the position in which they are transferred to the supporting device, and in the position in which they are ready to be gripped by the gripping device 59. By replacing the spacer rings 45 to 47 and the spacer bars 48 and 49, the spacing be-
25 tween the carrying blocks may be regulated as desired.

The gripping device 59 comprises a shaft 60, cf. Fig. 8, adapted to be vertically displaced, cf. the direction indicated by the arrow 61. At its lower end, the shaft 60 carries a horizontal gripping beam 62 which at each
30 end carries a carrying means 63 and 64. In turn, each carrying means carries four sucking heads 58 located at such a mutual distance and with such an inclination that in the lower position of the shaft 60 they are able to grip their respective object 6 on the supporting device.
35 One 63 of the carrying means carrying the sucking heads 58 is as indicated by an arrow 65 connected with a ro-

tary cylinder (not shown) in a manner known per se and such that the carrying means 63 may turn 180° on a vertical axis 66. The vertical shaft 60 is also connected to a rotary member (not shown) in such a manner that
5 this shaft also may turn 180° on its vertical axis 67 when positioned in the upper position. As indicated in Fig. 8 at the right end of the gripping beam, the sucking heads are supplied with vacuum through hoses 68. The gripping device 59 is constructed and adapted in such a
10 manner that initially when the shaft 60 is in its lower position it sucks the objects 6 from the supporting device 30, then lifts said objects in a vertical position above the supporting device 30, and finally swings them over an open packing box 69 by turning the shaft 60
15 180° on its vertical axis. The gripping device 59 is furthermore adapted and constructed in such a manner that at the following lowering by the gripping beam 62, it releases the objects 6 positioned over the bottom of the open packing box 69. At the same time, the collecting
20 of new objects 6 at the opposite end of the gripping device is repeated. The carrying means 63 of the gripping device 59 is adapted to turn 180° on a vertical axis 66 and is controlled in such a manner that it performs said movement during the moving from the support-
25 ing device 30 to the level above the open packing box 69. In this manner it is ensured that the groups of objects 6 as desired may be located alternately with the broadest end turning in opposite directions, cf. Fig. 8. The packing boxes 69 are automatically advanced on a
30 third conveyor 70, cf. Fig. 1, along a path shown by means of arrows 71, 72, and 73. In a generally known manner, this conveyor is adapted such that the packing boxes are automatically opened and stopped in the filling up position. As illustrated in Fig. 1, whereby
35 four boxes 69a, 69b, 69c, and 69d appear, the third conveyor 70 is also provided with guiding bars not described in greater details, which ensure that automati-

cally the packing box is open during the filling up and closed during the further advancing on the conveyor 70.

During the filling up, the packing box 69 is stopped and retained under one end of the gripping device 59 so as
5 to be ready to receive the objects to be filled therein. As illustrated in Fig. 8 and especially in Fig. 9, the packing box 59 is retained and supported partly by gripping means 71 pressing against the box from each side, partly by an elevator device generally designated by the
10 reference numeral 72.

The elevator device 72 comprises U-shaped plates 73 vertically located with one on each side of the advancing means of the third conveyor 70. On the underside of the advancing path of the third conveyor 70, cf. the reference numeral 74 in Fig. 9, the U-shaped plates 73 are
15 connected with a connecting member 75. Through two vertical bars 76 and 77 and a transverse beam 79, this connecting member communicates with the cylinder of a pneumatic piston-cylinder assembly 78. The piston rod 80
20 of the piston-cylinder assembly 78 is secured to a stationary part 81 of the frame of the third conveyor 70. As indicated by means of dotted lines, the bars 76 and 77 extend vertically through slide bearings 82 and 83 in the stationary frame part 81. By activating the piston-
25 cylinder assembly, the gripping means 71 and the U-shaped plates 73 are vertically displaced up and down. As a result, it is ensured that the platform formed by the gripping means 71 and the elevator device 72 at the upper end is vertically displaced up and down together
30 with the packing box 69 supported by this platform. The system is adjusted in such a manner that the packing box 69 is arranged at a level always being the most advantageous level for the filling in of objects. Thus the platform is arranged in an upper position during the
35 beginning of the filling up of a new box 69, whereas

it is arranged in a lower position at the end of the filling up of the box 69.

Fig. 9 also illustrates a dog 83 permanently connected to the advancing means of the third conveyor 70, said
5 advancing means advancing the dog 83 in the direction indicated by an arrow 84. A stop 85 displaceable both horizontally and vertically is used for stopping a packing box 69 above the elevator device 72 during the
10 advancing on the third conveyor 70. The stop 85 is displaced into the path of the packing box 69 by means of a pneumatic cylinder 86 which in advance has been adjusted to the desired horizontal position depending on the size of the box.

The gripping means 71 reciprocate transversely to the
15 advancing direction 84 of the third conveyor by means of a pneumatic cylinder 90 secured to the transverse beam 75 of the elevator device 72. This pneumatic cylinder is adapted to displace a slider 91 forward and backward on the two vertical bars 76 and 77. The stroke
20 of the pneumatic cylinder 90 is adjusted by means of an adjustment screw 92. The slider 91 is in a manner not described in details connected to the gripping means 71 by means of a connecting means 93. As a consequence of the mutual displacement of the connecting member 93 and
25 a second connecting member 94 fixedly mounted on the remaining portion of the elevator device, such a mutual displacement is produced that a link connection (not described in details) with the gripping means 71 ensures that said gripping means are pressed against a packing
30 box 69 from each side or removed again depending on the activation of the pneumatic cylinder 90.

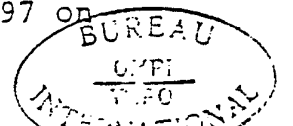
The function of the above system has already been described, and it operates mainly as follows. The first conveyor 1 advances the carriers 4 each with an object

6 until a stop 5, where they are retained until a pair of advancing means 14 on the second conveyor 9 are ready to receive a new group of carriers 4. Subsequently, the partition 10 is automatically removed and the first
5 pusher 7 pushes a group of four carriers 4 into engagement with four advancing means 14 on the second conveyor 9. During the further advancing by means of the second conveyor 9, the carriers 4 are gradually horizontally positioned, the following advancing means 14
10 gradually being filled with new groups of carriers 4 during a temporary stopping of the second conveyor 9. When a group of objects reaches the horizontal position between the second pusher 29 and the supporting device 30, and when the second conveyor 9 stops again, the ob-
15 jects 6 are pushed out of these carriers 4 and into temporary support on the loops of the supporting device 30. Subsequently, the pneumatic piston-cylinder assembly 52 in the supporting device 30 ensures that the objects 6 are displaced at such a mutual distance that they are
20 ready to be gripped by the sucking heads 58 of a gripping device 59. These sucking heads 58 are mounted at one end of the gripping beam 62 of the gripping device 59. Then the gripping beam 62 is lowered, and in its lower position the sucking heads 58 at one end of the
25 gripping beam 62 suck the objects on the supporting device 30, whereafter the gripping beam 62 is lifted again and the objects just collected are swung over the open packing box 69. Upon lowering of the gripping beam 62, these objects are again released and located on top of
30 previously arranged layers of objects within the packing box 69. Depending on the end of the gripping beam 62 which collects the objects 6 from the supporting device 30, the objects may be turned 180° as desired in the air during the transfer to the packing box. As a result,
35 the objects are arranged with the broadest end turning in alternating directions in each layer. As the packing box is filled up, the packing box is lowered to a lower

level by means of the elevator device 72, whereby previously arranged layers of objects are not damaged by new objects and the sucking heads 58 in question. When the box is filled up, the third conveyor 70 advances a
5 new box 69a at the same time as the box filled up is removed while its flaps are being closed.

Upon emptying the carriers 4 of objects, the second conveyor 9 again positions the carriers 4 in the vertical position by means of the guiding slide 26 and the retaining
10 ing slide 27, whereafter said carriers are further advanced by the second conveyor 9 so as to be supplied to a fourth conveyor 88. On this fourth conveyor 88, the carriers are returned for refilling of objects. The transfer of the carriers 4 from the second conveyor onto
15 the fourth conveyor 88 is performed gradually by means of guiding slides or grooves 89 pressing the carriers out of the engagement with the advancing means 14. In order to ensure additionally that the carriers do not inadvertently fall out of engagement with the advancing
20 means 14, a guide 95, cf. Fig. 3, may be provided. This guide 95 extends along the path of the carriers on the side of said carriers facing away from the second conveyor 9. The system is controlled in a generally known manner by means of compressed air and electric and me-
25 chanical control means in such a manner that all steps are completely automatically performed in an exact succession.

The preferred embodiment of a sleeve-shaped carrier according to the invention and illustrated in Fig. 10
30 comprises an interior outline corresponding to the exterior outline of the object in such a manner that the carrier when situated on one end surface 96 retains the objects in an almost immovable position with the broadest end at the top. As illustrated in Figs. 10 and 11,
35 the carrier is provided with longitudinal grooves 97 on



the inside, said grooves implying that the ambient temperature, e.g. at a freezing plant, may easily reach the sides of the objects.

According to the embodiment illustrated in Figs. 10 and 5 11, the carrier 4 is especially adapted to be used in connection with ice-cream cones or the like conical objects. When other shapes are involved, the interior outline may, of course, be shaped in accordance therewith. At each end the carriers 4 are provided with radial 10 flanges 98, 99 permitting an automatic handling of the carriers by means of guiding bars or the like engaging the flanges 98, 99.

The invention has been described with reference to a preferred embodiment. Many modifications may be performed 15 without thereby deviating from the scope of the invention. The carriers may for instance be of many various shapes, as well as the advancing means 14 may be of various shapes corresponding thereto. The gripping device may also be adapted in many various ways, as well 20 as more than one sucking head for each object may be used. The supporting device may be secured in many ways such as for instance by means of adjustment screws instead of spacer stops and bars.

Finally, the pusher bars 31-34 may vary in length at the 25 same time as the loops 35, 36 on the carrying blocks are mutually displaced in such a manner that the ice-cream cones are collected mutually displaced in axial direction.

In the illustrated embodiment, the second conveyor is 30 present in the form of an endless conveyor with vertical axes of rotation. It may, however, also be present in the form of an endless conveyor belt travelling about horizontal axes, the advancing path of said belt extend-

ing perpendicular to the advancing path of the first conveyor. The second conveyor may then be provided with sections extending across the advancing direction. On these sections, each group of objects is inserted directly from the first conveyor and retained by means of advancing means in the form of appropriate guideways or the like receiving their respective group of objects. During the further advancing, the carriers are horizontally positioned in groups at the end of the second conveyor for the release of the objects and subsequently vertically positioned on the underside of the second conveyor, where the carriers are again removed from this conveyor in a direction perpendicular to the advancing direction. The moving direction of the first conveyor here extends parallel to the axes of rotation of the second conveyor, and the transfer onto the second conveyor is performed in groups each time another guideway is aligned with the first conveyor. The permanent stop 5 extending across the moving path of the first conveyor is in this embodiment positioned at the end of each guideway being farthest from the first conveyor, and therefore it is positioned on the second conveyor.

Claims:

1. A method of grouping, orienting, and packing objects (6) of a nonuniform cross section substantially decreasing towards one end, and whereby the objects are
5 advanced in a row on conveying means, stopped by a stop, and gripped by a gripping device (59) carrying said objects into a packing box (69) preferably of cardboard, c h a r a c t e r i s e d in that the objects (6) are
10 advanced on a first endless conveyor (1) in their respective sleeve-shaped carriers (4) receiving said object (6) in a vertical position with the broadest end at the top, that the carriers (4) with the objects (6) are stopped by the stop (5) extending across said first
15 conveyor (1), and that the further advancing of the carriers is subsequently taken over by a second conveyor (9), which while retaining said carriers (4) positions said carriers substantially horizontally, that the carriers
20 (4) are subsequently stopped again by means of the second conveyor (9), whereafter a pusher (29) pushes the objects in groups substantially horizontally out of the carriers (4) and onto a supporting device (30) retaining said objects substantially in the same orientation, and that
25 the objects are subsequently gripped in groups by a gripping device (59) and transferred to the open packing box (69).

2. A method as claimed in claim 1, c h a r a c t e r i s e d in that the mutual distance of the objects (6) situated on the supporting device (30) is adjusted to the gripping device (59).

30 3. A method as claimed in claim 1, c h a r a c t e r i s e d in that the packing box (69) is advanced on a third conveyor (70) comprising means for opening and later on closing the box.

4. A system for carrying out the method according to claim 1, and which comprises conveying means advancing the objects (6) in a row, a stop (5) temporarily stopping the objects, and a gripping device (59) transferring the objects to a packing box (69), c h a r a c t e r -
5 i s e d in that it comprises a first endless conveyor (1) travelling about horizontal axes of rotation and being adapted to receive loose, vertical, sleeve-shaped carriers (4), each with an object (6) situated vertical-
10 ly with the broadest end at the top, and to advance said carriers (4) in a row towards a stop (5) extending across the advancing path (3) of the first conveyor (1), said system being adapted to feed the carriers (4) in groups from the first conveyor so that said carriers engage an
15 advancing means (14) on a second endless conveyor (9), that the advancing means (14) during the further advancing of the filled carriers retain and transfer said carriers in groups into a horizontal position, and that the movements and construction of the first conveyor (1)
20 and the second conveyor (9) are synchronized in such a manner that each group of carriers is horizontally positioned and stopped at the same time as a new group of carriers (4) from the first conveyor (1) are advanced so as to engage the second conveyor (9), that the system
25 comprises a second pusher (29) adapted so as simultaneously to push the objects (6) out of each group of the horizontally positioned carriers (4) and onto a supporting device (30), which in turn is adapted to retain the objects (6) substantially in the same orientation, and that
30 the gripping device (59) is adapted so as simultaneously to grip said objects and to situate them in an open packing box (69).

5. A system as claimed in claim 4, c h a r a c t e r -
i s e d in that the sleeve-shaped carriers (4) are of
35 such an interior shape, that the objects (6) are substantially centrally retained in the carriers (4).

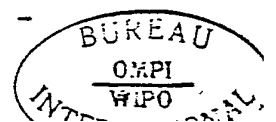
6. A system as claimed in claim 4, c h a r a c -
t e r i s e d in that it comprises a first pusher (7)
adapted to push the carriers (4) in groups off the first
conveyor (1) and onto the second conveyor (9).

5 7. A system as claimed in claim 4, c h a r a c -
t e r i s e d in that the supporting device (30) com-
prises a supporting means for each object, and that
said supporting means are mutually displaceable between
two adjustable positions, of which said means in one
10 position receive the objects (6) transferred in groups
from the second conveyor (9), whereas the means in the
second position are adjusted for direct gripping by
the gripping means of the gripping device (59).

8. A system as claimed in claim 7, c h a r a c -
15 t e r i s e d in that each supporting device comprises
two symmetrically shaped loops (35, 36) shaped and si-
tuated in such a manner that each object may rest sub-
stantially immovable thereon until they are gripped by
the gripping device.

20 9. A system as claimed in claim
4, c h a r a c t e r i s e d in that the grip-
ping device (59) comprises a vertically displaceable
oblong gripping beam (62) adapted to turn 180° on a
vertical axis of rotation, and which at each end com-
25 prises sucking heads (58) gripping their respective ob-
jects (6) in the group situated on the supporting de-
vice (30), said sucking heads (58) at one end of the
gripping beam (62) in the lower position thereof grip-
ping the objects from the supporting device (30),
30 whereas the sucking heads (58) at the other end of the
beam transfer the preceding group of objects (6) to the
packing box (69).

10. A system as claimed in claim 9, c h a r a c -



t e r i s e d in that the sucking heads at each end of the gripping beam (62) are mounted on a carrying means (63, 64), of which at least one (63) is adapted to turn 180° on a vertical axis at the same time as the gripping
5 beam (62) is turned 180° for delivering and receiving new groups of objects (6).

11. A system as claimed in claim 4, c h a r a c t e r i s e d in that it comprises a third conveyor (70) advancing the packing boxes (69)
10 and temporarily keeping said boxes open during their filling up with objects.

12. A system as claimed in claim 11, c h a r a c - t e r i s e d in that the third conveyor (70) co-operates with a platform supporting the packing box (69)
15 during its filling up with objects (6), said platform being vertically displaceable and retained at least in a position at a level above the advancing path (74) of the third conveyor.

13. A carrier for conveying objects of a nonuniform
20 cross section, c h a r a c t e r i s e d in that it is shaped as a sleeve with an interior outline corresponding to the exterior outline of each object in such a manner that the carrier (4) when situated on one end surface (96) retains the object (6) in an almost unmovable
25 position with the broadest end at the top.

14. A carrier as claimed in claim 13, c h a r a c - t e r i s e d in that it is provided with longitudinal grooves (97) on the inside.

15. A carrier as claimed in claim 13, c h a r a c -
30 t e r i s e d in that on the outside it comprises contact surfaces engaging guiding slides and dogs on a handling system.

16. A carrier as claimed in claim 13, c h a r a c -
t e r i s e d in that it is cylindrical and symmetrical-
ly shaped about a plane perpendicular to its longitudi-
nal axis.

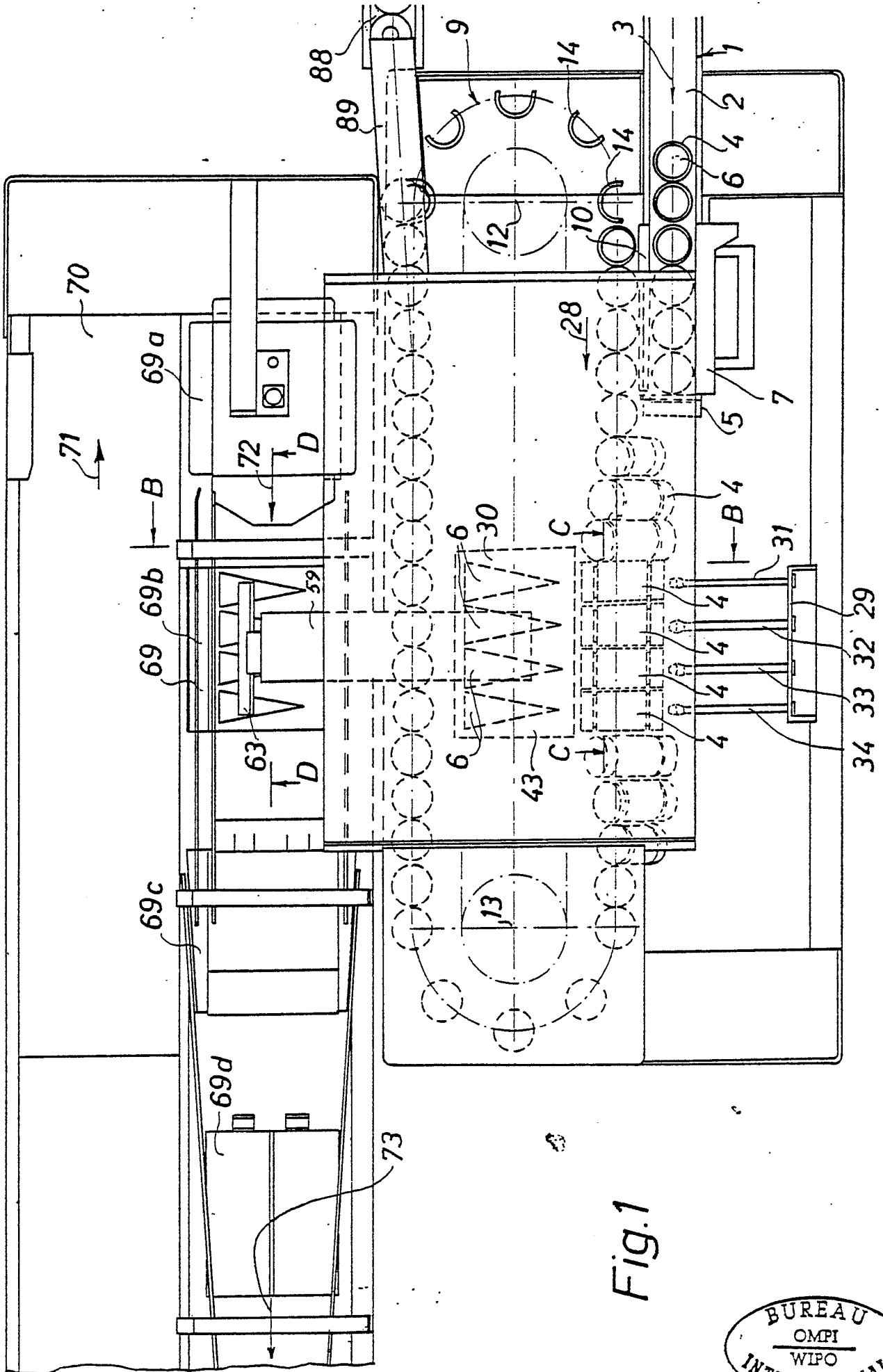


Fig.1



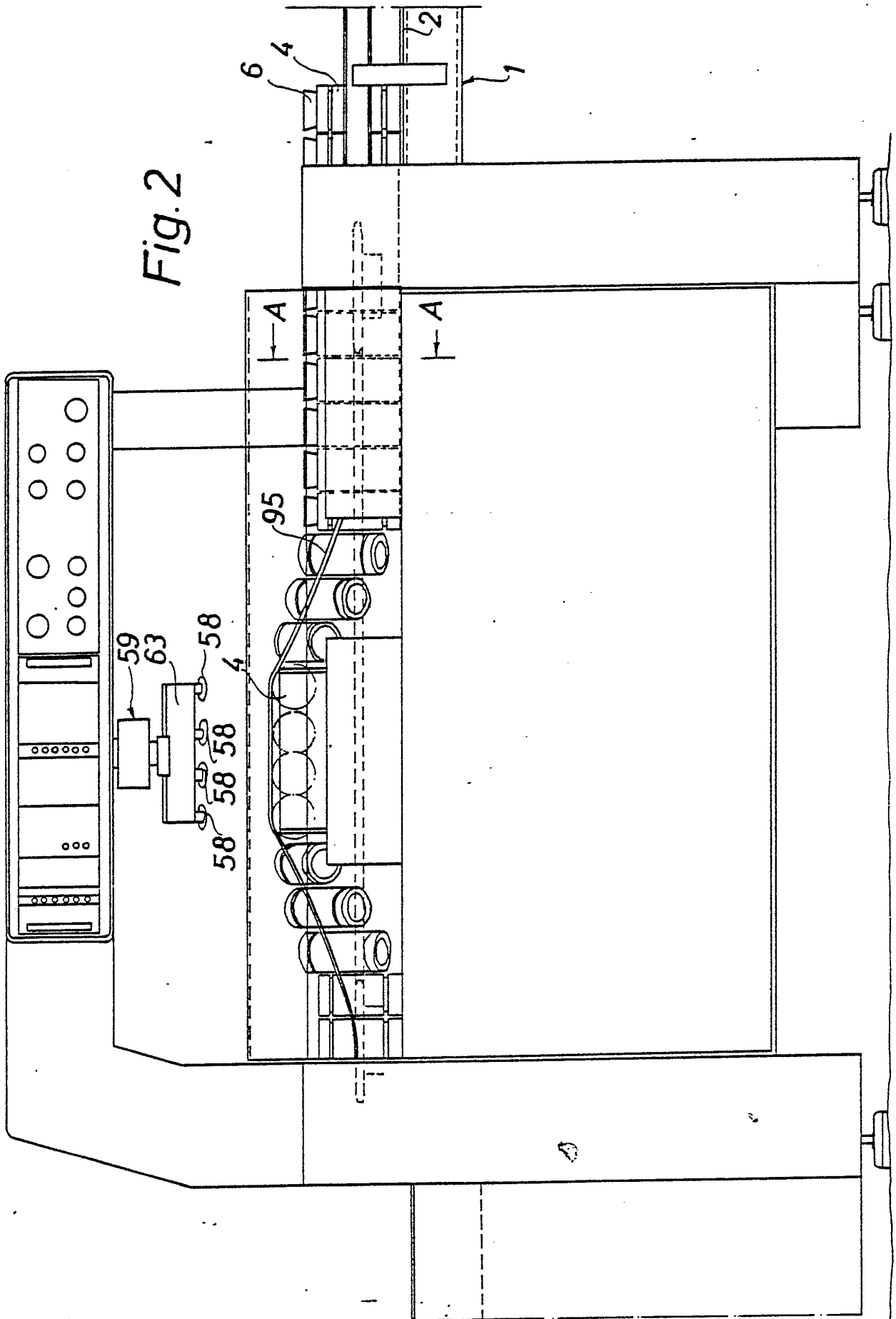
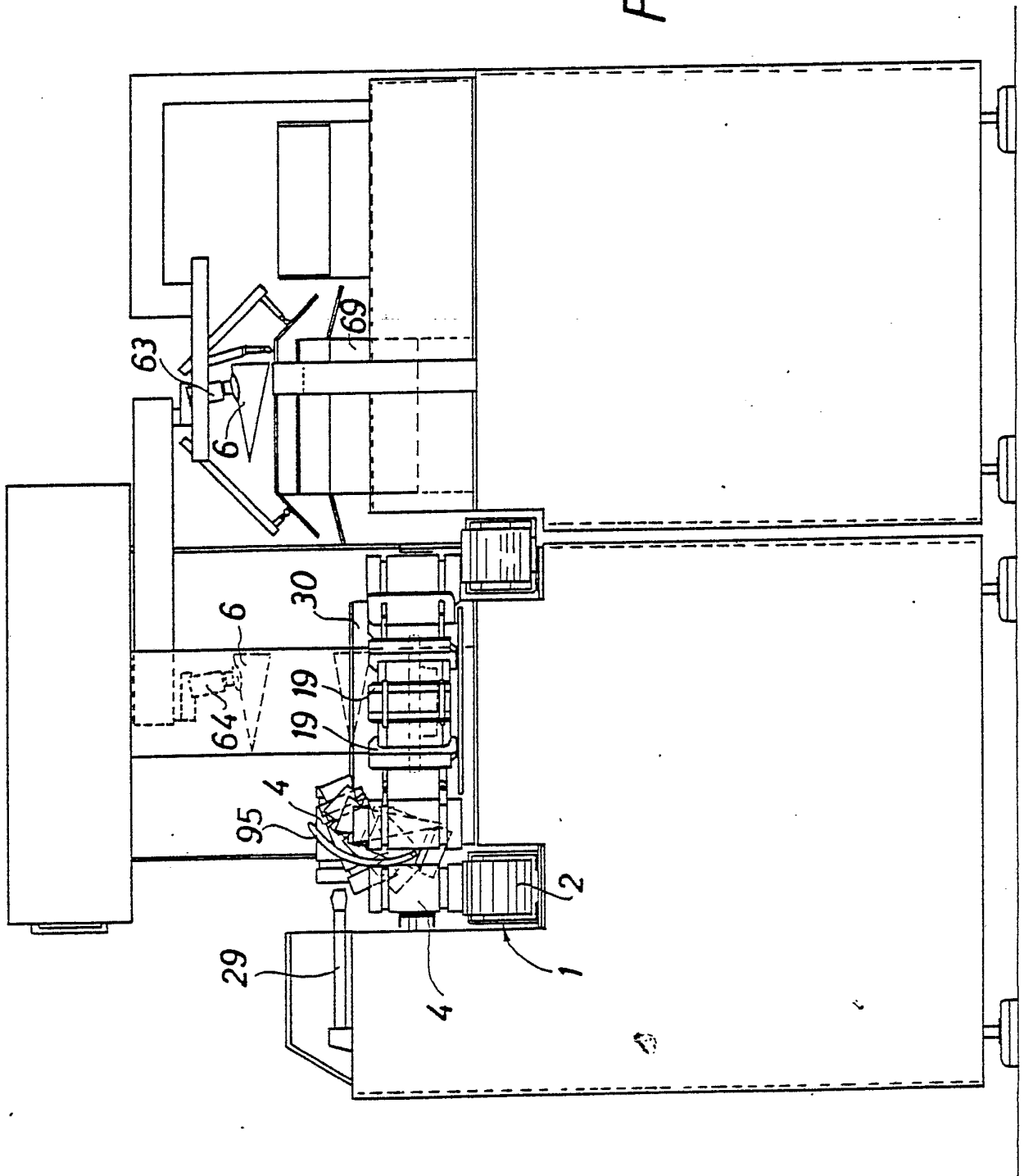


Fig. 2

Fig. 3



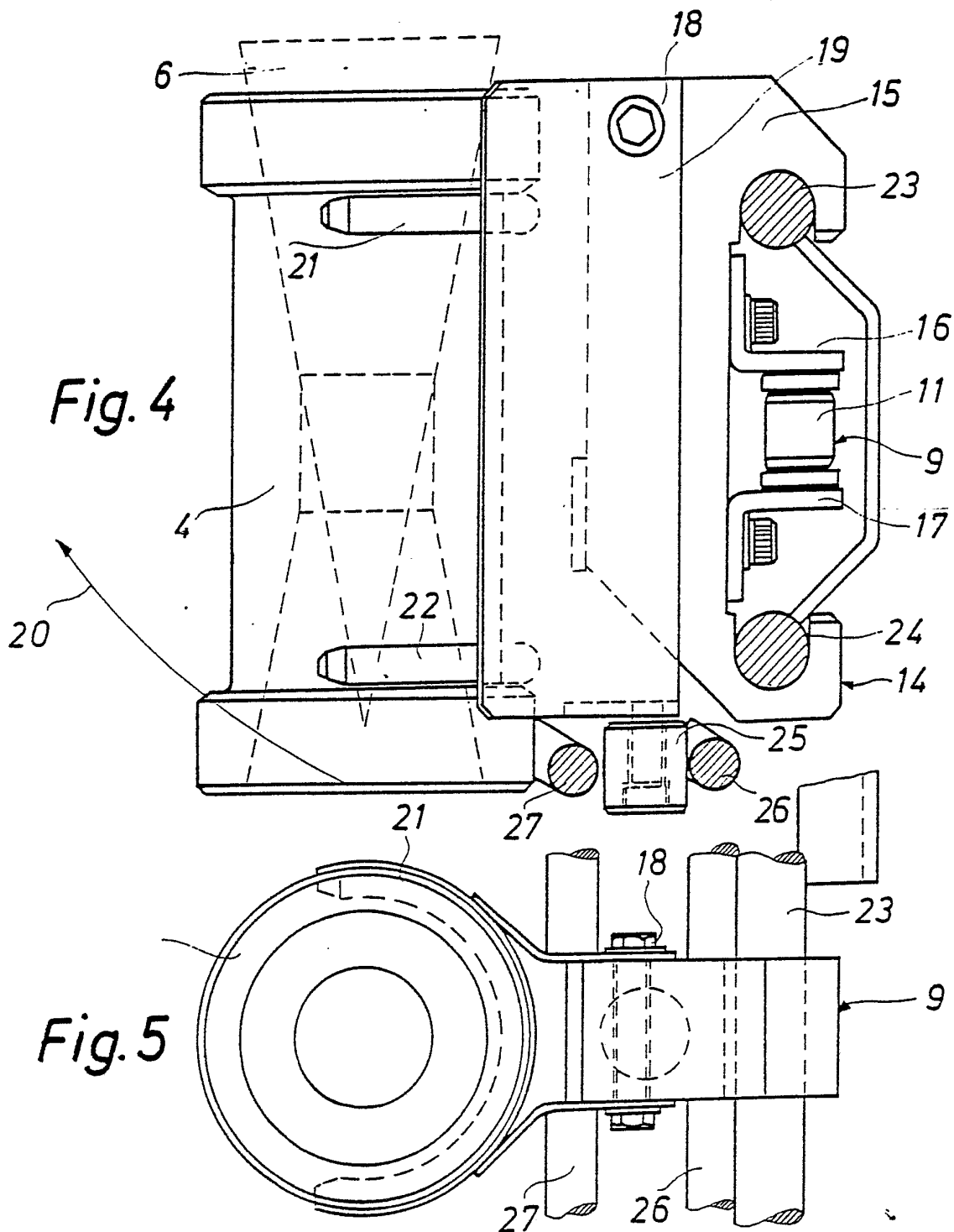


Fig. 4

Fig. 5

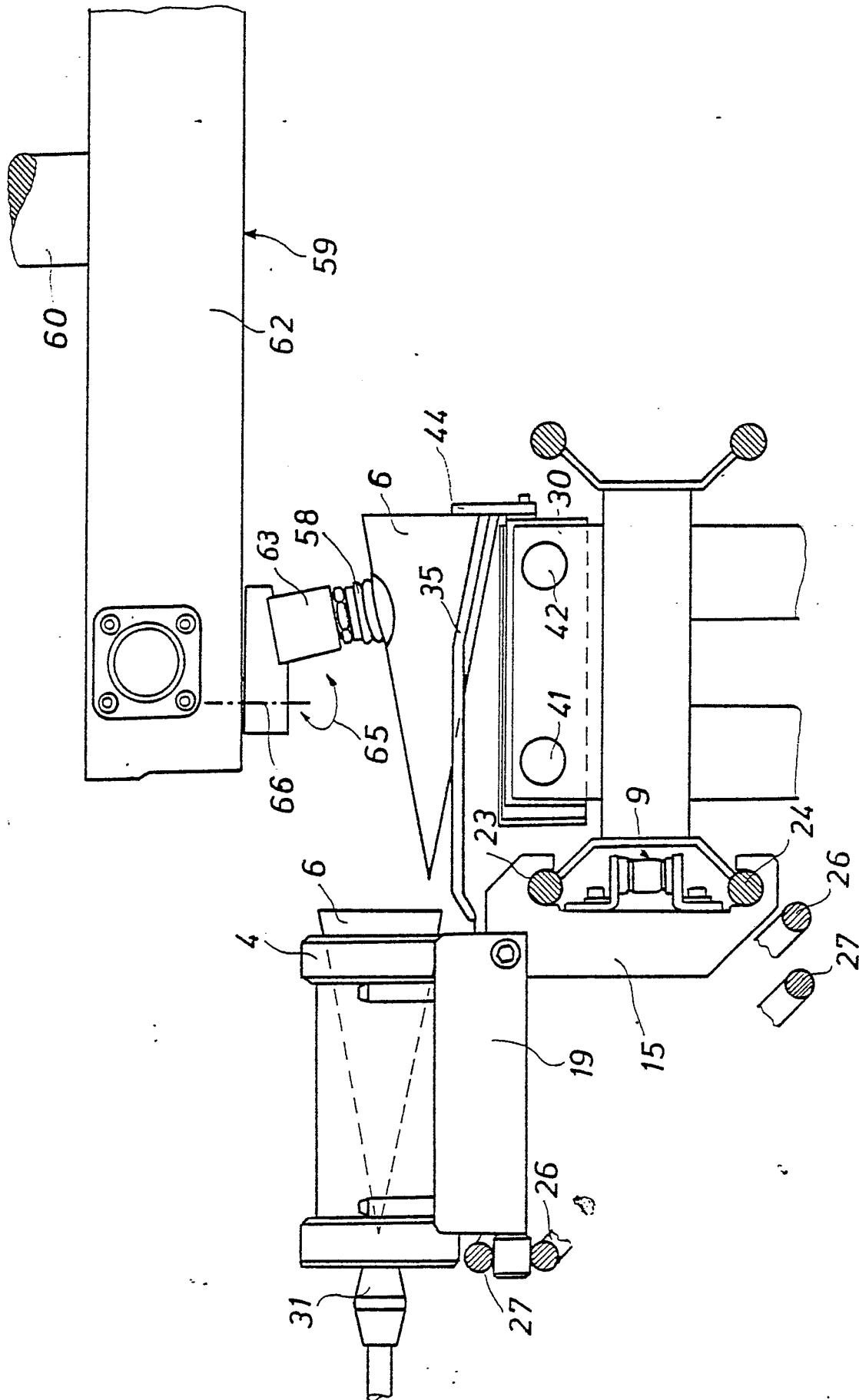


Fig.6

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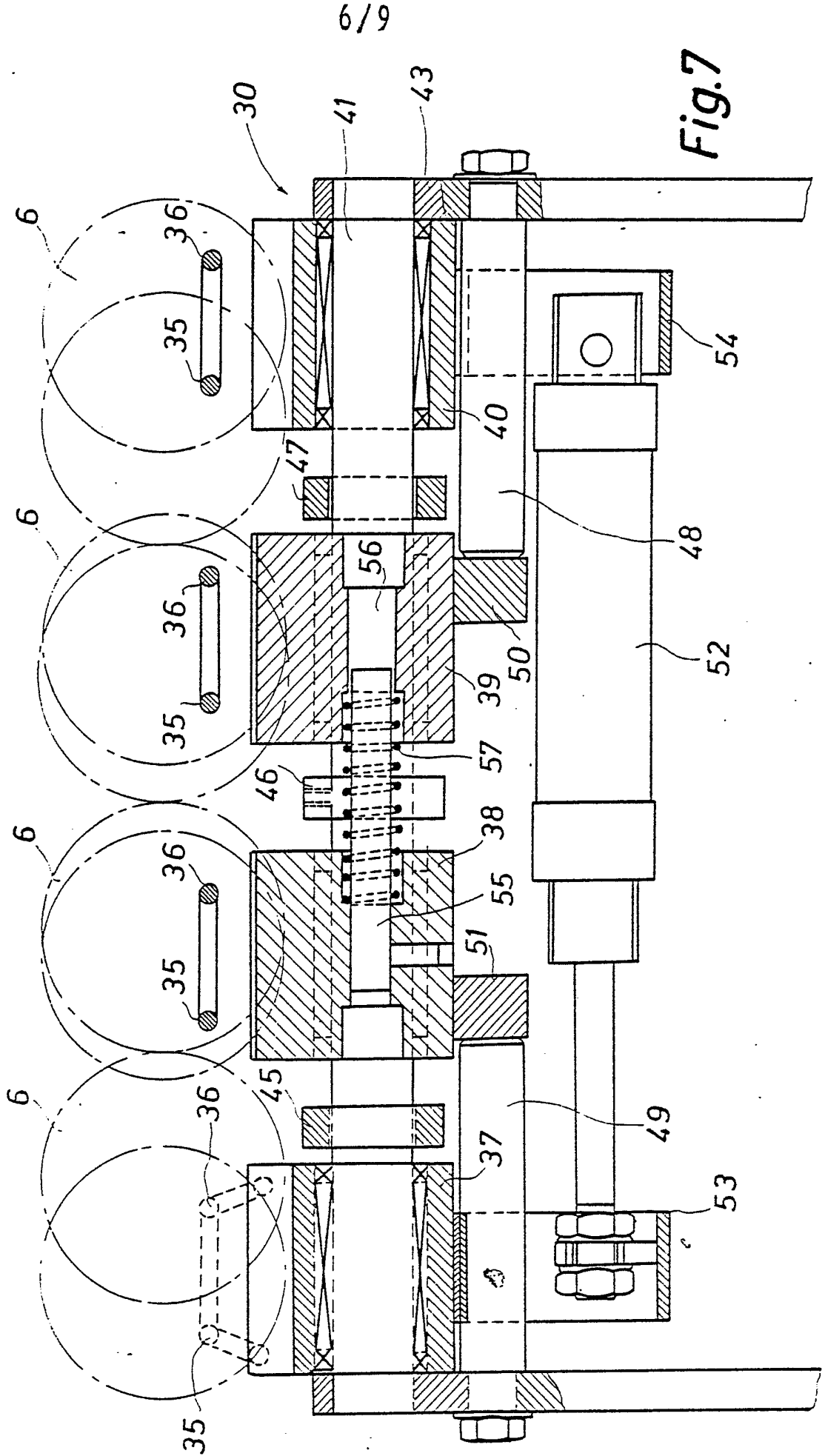


Fig. 7

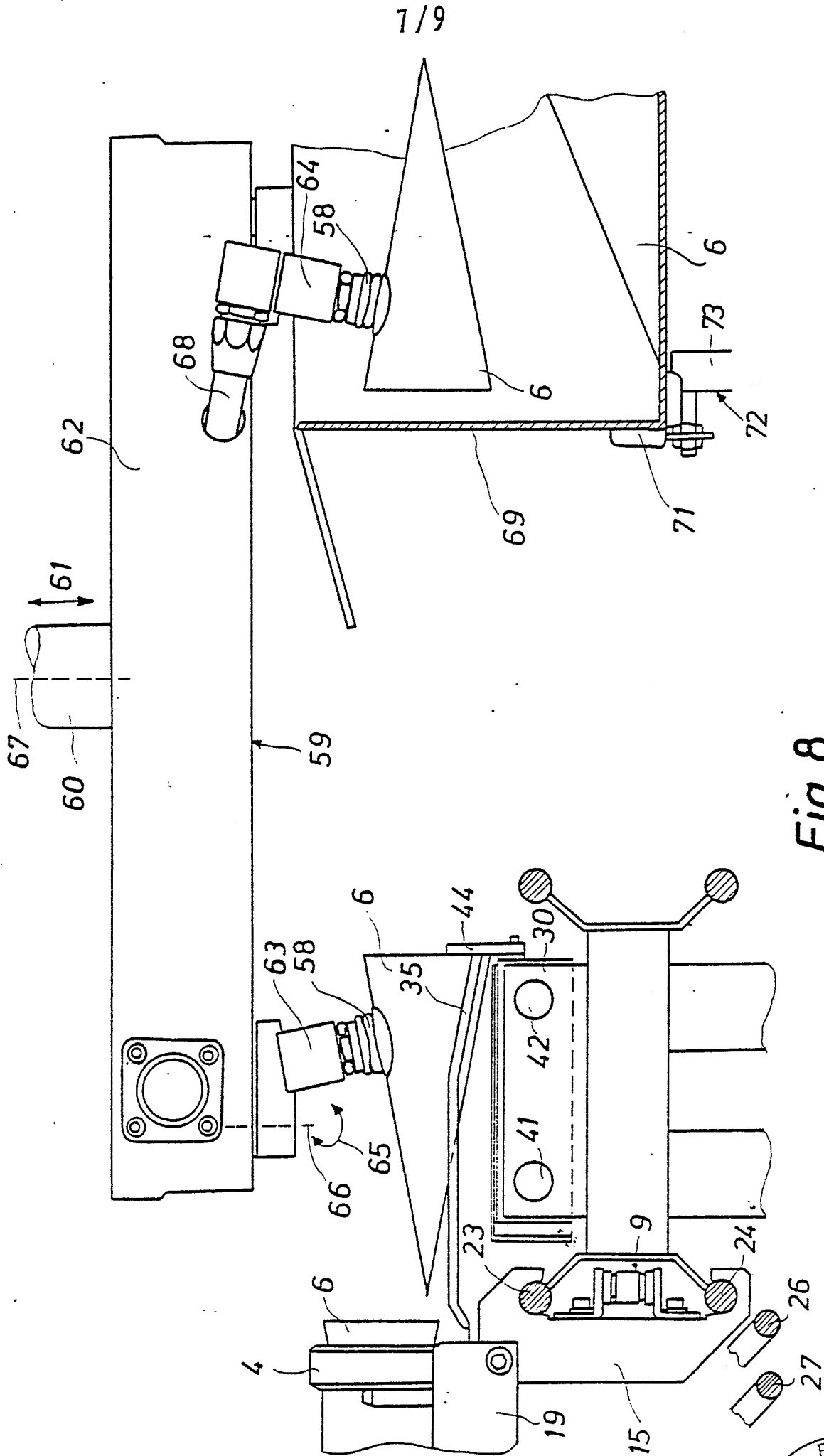


Fig. 8

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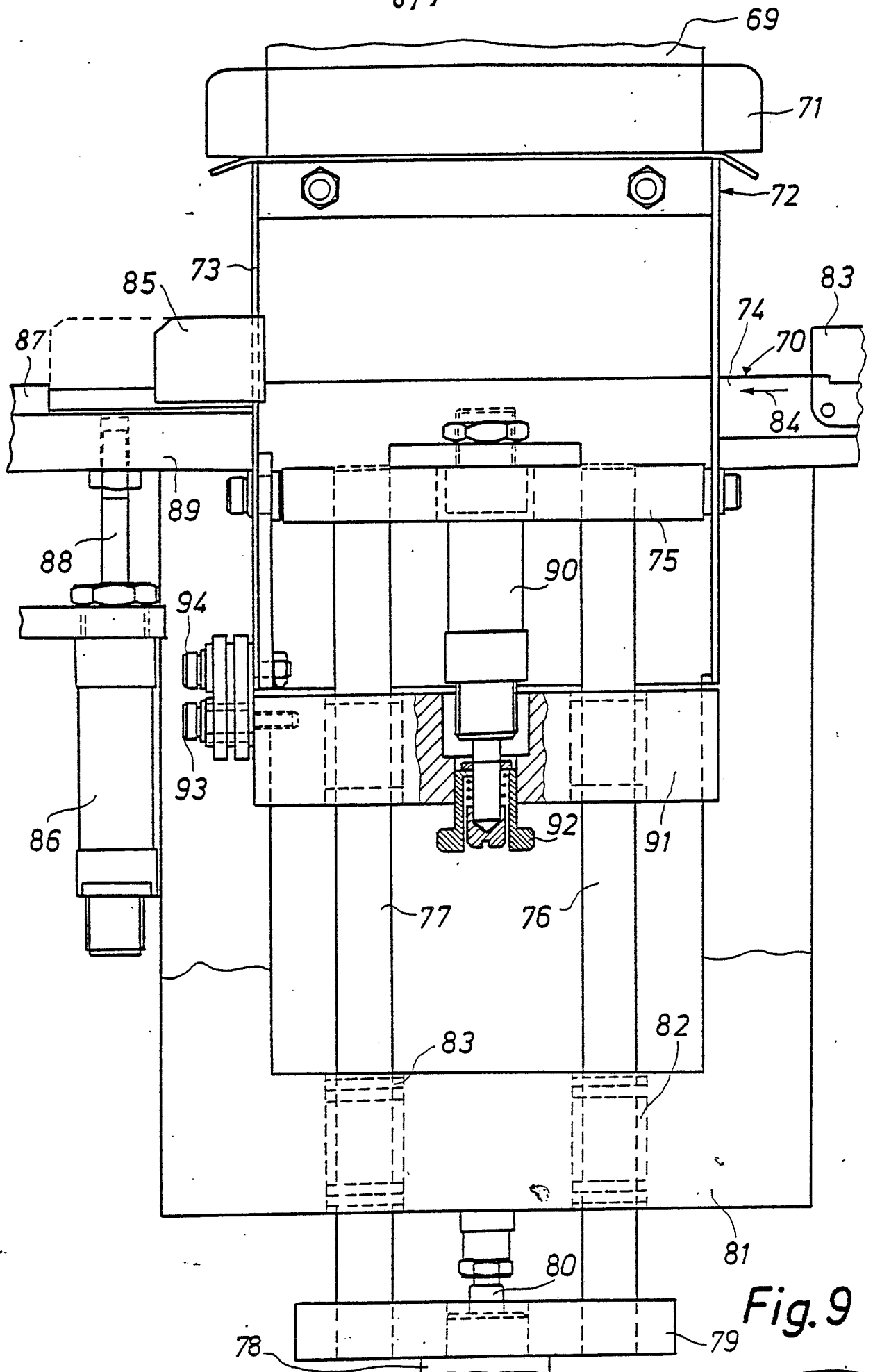


Fig. 9



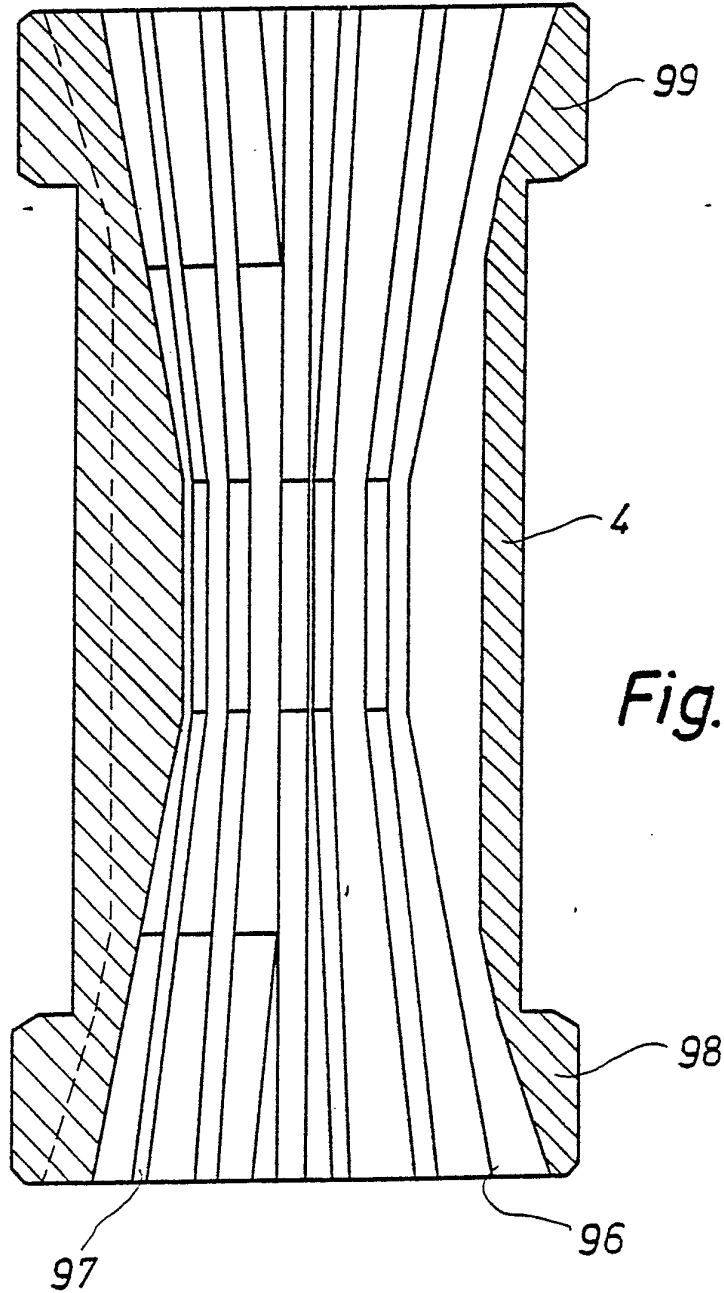


Fig. 10

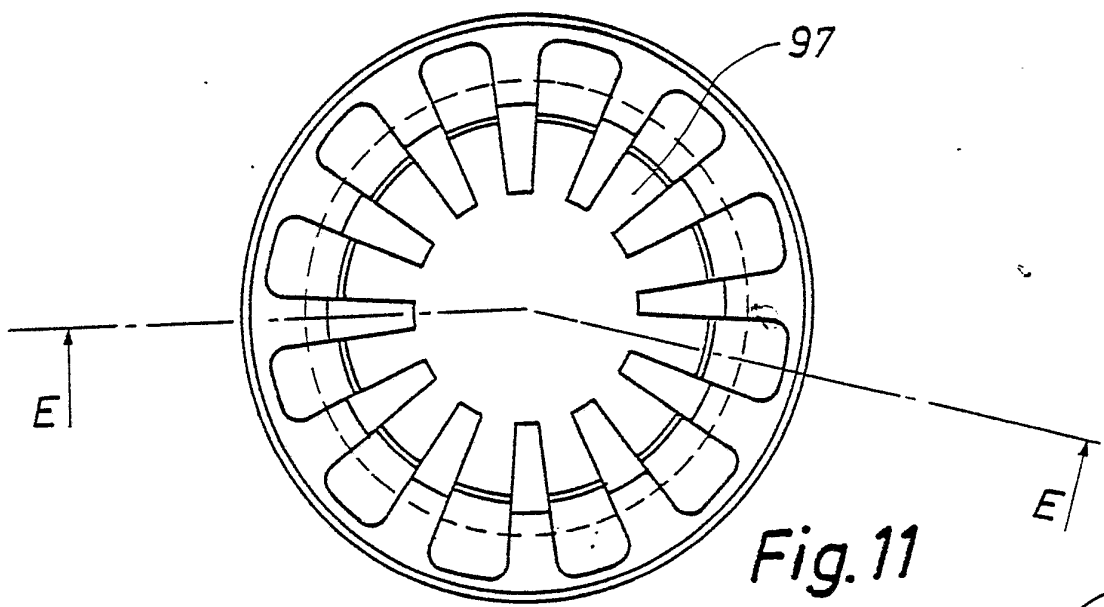


Fig. 11



FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II

Fields Searched (cont)

US CI 53:26,29,147,159,160,161,164,235,244,
247,534,537-539,542
198:424,426,428

V. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹⁰

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. Claim numbers because they relate to subject matter ¹² not required to be searched by this Authority, namely:

2. Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out ¹³, specifically:

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ¹¹

This international Searching Authority found multiple inventions in this international application as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. As all searchable claims could be searched without effort justifying an additional fee, the international Searching Authority did not invite payment of any additional fee.

Remark on Protest

- The additional search fees were accompanied by applicant's protest.
 No protest accompanied the payment of additional search fees.