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(54) **Vegetable cutting system**

Gemüseschneidesystem

Système pour la coupe de légumes

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Description

Background of the Invention

[0001] This invention relates to a mechanism that delivers vegetables to a cutter for slicing them.

[0002] Potatoes and other vegetables may be sliced transversely, for example, into helical strips. One type of prior-art system comprises a mechanical device to deliver the vegetables to the cutter. In another prior-art system, the vegetables are mixed with water, and are hydraulically delivered horizontally through a tapered, elastomeric conduit to a cutter. A third type of prior-art system hydraulically delivers the potatoes vertically, through a tapered, elastomeric conduit to a mechanically rotated cutter. A fourth type of prior art system is disclosed in U.S. patent no. 5,168,784.

[0003] The performance of these prior art systems is not as high as it could be. "Performance" is dictated by three criteria. The first criterion is referred to as "throughput" which basically refers to the quantity of vegetables that is cut. It is important that the throughput be as high as possible. However, two other considerations can limit the throughput. One is quality, and the other is yield. Besides the cut quality criteria normally employed in french fry processing, an additional quality aspect is considered in the processing of helical french fries. This additional quality aspect relates to the number of coils produced of one turn or greater versus the smaller segments less than one complete coil, or the smaller pieces produced. The fewer the smaller pieces and segments less than one coil, the higher the quality. The second consideration, yield, has the normal meaning when used in french fry processing, that of acceptable quality produced versus the amount of incoming raw potatoes to the process line.

[0004] EP 0510866 relates to a system for producing helical vegetable strips. The system utilises a pump to entrain vegetables in a jet of water. The jet is directed along a closed conduit to a turbine driven cutter. Alignment of the vegetables with respect to the cutter is achieved by a narrowing of the closed conduit ahead of the cutter.

[0005] In the prior art systems identified above, the throughput is generally maintained low in order to maximize the quality of the cut and the yield.

Summary of the Invention

[0006] It is, therefore, an important object of the present invention to improve the throughput without adversely affecting the quality of the cut and the yield.

[0007] It is an important object to provide a delivery mechanism whereby potatoes are applied to the cutter more gently and at the same time maintaining high throughput, cut quality and yield.

[0008] Another object is to provide a system which will cut vegetables into slices, such as helical strips, in an improved way.

[0009] Another object is to stabilize or orient the vegetables as they proceed to and through the cutter.

[0010] Another object is to stabilize, orient and centralize the vegetables as they proceed to and through the cutter.

[0011] According to the present invention, there is provided a vegetable cutting system comprising a conveyor for conveying vegetables one at a time to a point defining the start of a predetermined path, a cutter at the end of said path, and an orientor characterized by at least one set of nozzles arranged around said path for generating jets of water intersecting at a point in said path for guiding, orientating and centralizing the vegetables with respect to said cutter.

[0012] The invention is hereinafter fully described in detail and illustrated in the accompanying drawings, it being understood that various changes in the details may be made without departing from the scope, or sacrificing any of the advantages or the present invention as defined in the appended claims.

Brief Description of the Drawings

[0013] For the purpose of facilitating an understanding of the invention, there is illustrated in the accompanying drawings a preferred embodiment thereof, from an inspection of which, when considered in connection with the following description, the invention, its construction and operation, and many or its advantages should be readily understood and appreciated.

FIG. 1 is a side elevational view of a system for producing helical potato strips incorporating the features of the present invention;

FIG. 2 is a view like FIG. 1 but with the guiding system and manifold in their retracted positions to enable access to the turbine;

FIG. 3 is an enlarged sectional view taken along the line 3-3 of FIG. 1;

FIG. 4 is an enlarged sectional view taken along the line 4-4 of FIG. 1;

FIG. 5 is a perspective view on an enlarged scale of the top one of the rings of the guiding system;

FIG. 6 is an enlarged view in vertical section taken along the line 6-6 of FIG. 1 with the turbine shown in phantom;

FIG. 7 is an enlarged sectional view of one of the nozzles and its associated ring;

FIG. 8 is an enlarged plan view of the guiding system and the water delivery system taken along the line 8-8 of FIG. 1, but with the hoses shown fragmented;

FIG. 9 is an exploded view of the orienter;

FIG. 10 is an exploded view of the cutting structure;

FIG. 11 is a plan view of another embodiment of an orienter;

FIG. 12 is a perspective view of a portion of the orienter of FIG. 11;

FIG. 13 is a perspective view of yet another embodiment of the orienter;

FIG. 14 is a perspective view of the vegetable cutting system with its housing in place.

Detailed Description of the Preferred Embodiment

[0014] Turning now to FIG. 1, there is depicted a system 20 for cutting potatoes into generally helically shaped strips and incorporating the features of the present invention. It is to be understood that vegetables other than potatoes could be processed in system 20 and they could be cut into shapes other than helically shaped strips. Potatoes 21 are preferably of a variety having a long axis and a generally round cross section, for example, like the Russet Burbank variety of potato. Of course, many kinds of potatoes may be processed by system 20. Before being applied to system 20, the potatoes may be fed via a typical french fry process line which may or may not include cleaning, washing, devining, peeling, scrubbing, brushing, preheating, defect removal, and any other processing steps which may be appropriate preparation prior to the cutting of the potatoes into helical strips. After being cut into helical strips, they are further processed, including one or more of grading, blanching, sugar flume, drying, frying, freezing, grading and packaging. The system herein is not limited to only these processing steps, and additional processing steps can be added which may be deemed appropriate to the production of the product. Potatoes 21 may be sized into various groups depending on their cross dimensions.

[0015] System 20 comprises a conveying mechanism 25 which includes a trough 26 that is tapered in order to singulate the potatoes, that is, placed in single file. An endless main belt 27 lies on the bottom of trough 26 and passes around a large main wheel 28, an outlet pulley 29 and additional pulleys 30 and 31. The outer surface of wheel 28 can be dished or concave as can be seen in FIG. 3. Belt 27 has ribs 27a which mate with V-grooves in main wheel 28, as show in FIG. 3. Conveying mechanism 25 also includes a secondary belt 33 which extends around an outlet pulley 34 and additional pulleys 35 and 36. Belt 33 has ribs 33a which mate with grooves in pulleys 34, 35 and 36. One or more of pulleys 34 and 35 and 36 can actually consist of a pair of pulleys in tandem. Ribs 33a would respectively reside in the V-grooves of such pulley pairs. The location of pulleys 34 and 35 is such as to cause secondary belt 33 to continuously bear against the adjacent portion of main belt 27. Pulley 36 is laterally movable, as shown by the dotted line, and, therefore, provides a means for controlling the force by which belt 33 presses against belt 27. The farther out pulley 36 is, the greater the pressure between belts 27 and 33. One or more of the pulleys are driven so that both belts are continuously moving. As shown in FIG. 4, the singulated potatoes rest upon main belt 27 which brings them toward the nip between belts 27 and 33.

[0016] The potatoes are held by the two belts as they are projected or fall along a predetermined path 37. The path may be horizontal or the path may be vertical as in the embodiment depicted in the drawings. The path may be at any angle between horizontal and vertical. It is substantially straight if vertical and curved to some extent because of the force of gravity when it is other than vertical. The moving belts 27 and 33 fling or project the potatoes along such path. The potatoes are projected from conveying mechanism 25 at a speed related to the speed of the cutter, as will be described. In a particular embodiment, the speed is about 270 feet per minute. It is understood, however, that the speed can be varied and adjusted to suit optimum flow conditions of maximizing throughput at good yield and cut quality.

[0017] The potatoes are projected or delivered into a water-guide mechanism including a series of four rings 40, 50, 60 and 70. Each ring carries a plurality of nozzles, which will be described in further detail, that serve to guide, orient and centralize the potatoes as they move along path 37. The series of rings 40, 50, 60 and 70 is mounted on a carriage 80 which includes a long base 81 that is U-shaped in transverse cross section (FIG. 6). Base 81 is movable on a track system (not shown) carried by supports 82 (FIG. 1). A cylinder 83 is mounted on frame 22, its associated piston 84 being attached at its forward end to base 81 by means of a flange 85. When it is desired to move carriage 80 to the left, cylinder 83 is operated, causing piston 84 to move to the left and thereby move carriage 80 also to the left, as can be seen in FIG. 2.

[0018] System 20 further comprises a water delivery system 120 which includes a manifold 121 having its inlet connected by a hose 122 to a source of water (not shown). Manifold 121 also includes four outlets 123, two of which are visible in FIG. 1. The four outlets are connected by means of hoses 124 to rings 40, 50, 60 and 70, respectively. Water delivery system 120 is mounted on base 81 by means of saddles 125.

[0019] A stabilizer or orienter 140 orients and stabilizes the potatoes passing through it.

[0020] At the end of path 37 is a cutter 150 which can be rotated by a water-driven turbine 170 having a construction such as described in U.S. patent no. 5,179,881 assigned to the assignee of this application. Turbine 170 has a water outlet 171 and a product outlet 172. Water delivered by the guide mechanism, consisting of the series of the four rings, is, in part, directed laterally, as indicated by arrows 173, along with potato scraps. Water with potato scraps entrained therein fall into chaff flume 174. Water with the cut potatoes is directed through product outlet 172 to product flume 175.

[0021] Turning now to FIGS. 5 and 6, further details

of the water-guide mechanism (rings 40-70) will be described. Ring 40 is located at the top of the series or stack and is generally ovoid shaped in plan view. It includes a top wall 41 and a bottom wall 42 which are essentially congruent and are each ovoid shaped. An outside wall 43 closes the outside of ring 40. An inside ring-like wall 44, which is essentially V-shaped in transverse cross section, closes the inside of ring 44 thereby defining a chamber 46. The lower surface of wall 44 is inclined and has a set of six equiangularly spaced threaded bores 47 (FIG. 7). Protruding from bottom wall 42 and attached thereto is an elbow 48 having a passageway which communicates with chamber 46. Welded to outside wall 43 are three bushings 49a, b and c.

[0022] Referring to FIG. 7, associated with ring 40 are six nozzles 90, each of which has a threaded body 91 and a wrenching surface 92. Nozzles 90 are mounted within bores 47 in ring 40. Nozzle 90 has a bore 93 defined by a frustoconical surface at an angle 94, of 12° in the embodiment depicted.

[0023] Referring back to FIG. 6, water under pressure exits mouth 95 to create a water jet 130. Nozzles 90 are preferably equiangularly spaced about wall 44 and, therefore, there is a 60° spacing between them. The other three rings 50, 60 and 70 have substantially the same construction as ring 40. The parts of rings 50, 60 and 70 bear corresponding reference numerals to those of ring 40 to the extent these parts are visible in any of the figures. There are some differences. The orientations of elbows 48, 58, 68 and 78 differ, as can be seen in FIG. 8. Elbows 48, 58, 68 and 78 are located such that the axes of their horizontal portions are substantially parallel as can be seen in FIG. 8. Also, the elbows 48 and 58 of the top two rings 40 and 50 are directed downwardly, whereas, for rings 60 and 70, the respective elbows 68 and 78 are directed upwardly.

[0024] Rings 40, 50, 60 and 70 are held together by four threaded rods 110. One rod passes through all four bushings 49a, 59a, 69a and 79a. A second one of the rods 110 passes through all four bushings 49b, 59b, 69b and 79b. In the particular embodiment depicted, a third rod passes through bushing 49c of ring 40 and the corresponding bushing of ring 60. A fourth threaded rod 110 passes through the third bushings respectively of the rings 50 and 70. The four rods 110 extend through holes 81a (FIG. 9) of base 81 and are attached thereto by means of nuts 111 and 112 (FIG. 6). Nuts 114 are also applied to the upper ends of rods 110, and nuts 113 are applied to such rods beneath the series of rings, thereby firmly attaching the series of rings to carriage 80. It is understood that the above-described manner of connecting the series of rings together and to the carriage is just an example of how mounting can be accomplished.

[0025] In an actual embodiment, nozzles 90 in rings 40 and 60 were respectively vertically aligned and nozzles 90 in rings 50 and 70 were respectively vertically aligned. The vertical axes defined by each pair of vertically aligned nozzles 90 in rings 40 and 60 alternated with the vertical axes defined by each pair of vertically aligned nozzles 90 in rings 50 and 70. Nozzles 90 in rings 40 and 60 were 30° offset from those in rings 50 and 70.

[0026] As previously described, water through manifold 121 is directed through elbows 48, 58, 68 and 78 of the four rings, into chambers 46, 56, 66 and 76 of the rings and from there is forced under pressure out of nozzles 90. Referring to FIG. 6, the six nozzles 90 create water jets 130. The six water jets from ring 40 intersect substantially at point 131 in path 37. Similarly, water jets from nozzle 90 in ring 50 intersect at point 132 in vertical path 37, the nozzles in ring 60 produce water jets that intersect at point 133 in such path and the nozzles in ring 70 produce six water jets that intersect at point 134 in vertical path 37. Each water jet 130 is directed toward the cutter, preferably at an acute angle with respect to path 37. It is to be understood, however, that the nozzles need not be all at the same angle nor need they be directed toward the cutter. Certain of the nozzles could be directed away from the cutter. Different nozzles in the same ring could have different inclinations. In an actual embodiment, the angle was 30°. The angle of each water jet with path 37 is substantially the same. The reason that the phantom lines in FIG. 6 are not parallel is because of the 30° offset of the nozzles in rings 40 and 60 with respect to the nozzles in rings 50 and 70.

[0027] Each potato is discharged by conveying mechanism 25 down vertical path 37, through rings 40, 50, 60 and 70. Each potato is forced towards a central position and oriented with its longitudinal axis coincident with the center line axis of the rings and the orienter by means of the water jets.

[0028] Referring to FIG. 9, orienter 140 includes an upper collar 141, a lower retainer 142 and a plurality of vertical rods 143 arranged substantially in a circle. Each rod may have any cross section, such as round or rectangular. Orienter 140 guides and orients the potato as it engages cutter 150. Preferably, rods 143 are welded to collar 141 and retainer 142. Orienter 140 includes a plate 145 having a cut-out 146 therein. Cut-out 146 removably receives collar 141. Rods 110 pass through holes 145a in plate 145. Plate 145 carries bolts 144 that pass through holes in collar 141. Nuts 147 are applied to bolts 144, thereby attaching orienter 140 to plate 145. Referring to FIG. 6, plate 145 is secured in place by means of nuts 115 and 116 on rods 110. The height of plate 145 and the orienter 140 of which plate 145 is a part can readily be adjusted by means of these nuts.

[0029] In one embodiment of the invention, different orienters 140 were used, depending on the size of the transverse dimension of the potatoes. Thus, the potatoes may be grouped according to size. When those within a predetermined small range of cross dimensions are processed, an orienter 140 with a relatively small

internal diameter ("ID") is used to process potatoes. To process those within a medium range of cross dimensions, the orienter with a medium ID is employed and with the largest potatoes, an orienter with the largest ID is employed. Furthermore, rings 30, 40, 50 and/or 60 may have different sizes depending on the size of the transverse dimension of the potatoes. Thus, with smaller potatoes a smaller set of rings could be used, while with larger potatoes a larger set would be employed. Furthermore, the system may have means to adjust the axial position of the rings to optimize performance.

[0030] Orienter 140 maintains the potatoes oriented so that their axes are along path 37, vertical in the particular embodiment depicted. Orienter 140 accommodates passage of the potato therethrough while maintaining its proper orientation, yet accommodating passage of the water from rings 40, 50, 60 and 70, transversely through rods 143.

[0031] Referring to FIG. 10, cutter 150 has a portion 151 which is substantially flat and lies in a plane substantially perpendicular to the direction of potato movement, that is, path 37. In other words, portion 151 is substantially horizontal in the particular embodiment depicted in FIGS. 1 to 10. Cutter 150 has a second portion 153, which is inclined upwardly, from fold line 152. In an operating embodiment, portion 151 had an extent of 225° and portion 153 had an extent of 135°. Cutter 150 is slit radially to produce a pair of edges 154 and 155 which are substantially parallel and axially displaced. Edge 154 is sharpened to create a blade. A quill 156 projects axially from the center. Mounted on the upstream face of flat section 151 are five slitter blades 157. Cutter 150 has a number of openings 158 which accommodate passage of water. Also, cutter 150 has mounting holes 159.

[0032] Cutter 150 is mounted in a cutter carrier 160, sandwiched between elements 161 and 162. The upper surface of element 161 matches the lower surface of cutter 150 and the lower surface of element 162 matches the upper surface of cutter 150. Pins 163 on elements 161 project through aligned holes 159 in cutter 150 and holes 164 in element 162. Carrier 160 includes a main body 165 keyed into element 161 as indicated. Cutter 150 and cutter carrier 160 mounting same are mounted in turbine 170.

[0033] The potatoes are thrown against cutter 150 so that the potato becomes impaled on quill 156. As cutter 150 is rotated by turbine 170, cutting edge 154 slices the potato into a helix and slitter blades 157 slit the helical slice into strips. These strips are delivered through product outlet 172 to the next processing station in the line (FIG. 1).

[0034] The speed of the potatoes from conveyor mechanism 25 is adjusted to match the speed of cutter 150. Preferably, the potatoes travel at a higher velocity than they would be processed through cutter 150, in order to impale them on quill 156 and also to push the last piece of the preceding potato through the cutter.

[0035] It is important to note that conveying mechanism 25 is the means by which the potatoes are conveyed to cutter 150 along path 37. Rings 40-70 and orienter 140 guide and orient the potatoes along that path. The jets from the nozzles on rings 40-70 prevent or resist rotation of the potato as it is being cut by cutter 150. While rings 40-70 and orienter 140 are depicted as being arranged to orient and guide the potatoes along a vertical path 37, it is to be understood that the configuration of these elements can be modified to orient and guide the potatoes along a path that is horizontal, vertical or any angle inbetween. Orienter 140 also helps to prevent excess tilt of the potato as it is being cut.

[0036] When it is desired to replace cutter 150, cylinder 83 is operated to move carriage 80 to the left. As can be seen in FIG. 2, this procedure exposes cutter 150 and cutter carrier 160 (FIG. 10) carrying same. The assembly can then be removed and cutter 150 replaced.

[0037] A second embodiment of an orienter which may be used in system 20 is depicted in FIGS. 11 and 12. Orienter 180 depicted therein includes three substantially identical sections 181, each including an arcuate upper ring segment 182, an arcuate lower ring segment 183 and a plurality of vertical rods 184 therebetween. Attached to each upper ring segment 182 is a plate-like arm 185 having a slot 186. Fasteners are used to attach arms 185 to a mounting plate (not shown). Slots 186 enable ready radial adjustment of each section 181. To process potatoes having a larger transverse dimension, sections 181 could be moved radially to that diameter which best matches the incoming potato size range.

[0038] FIG. 13 depicts yet another embodiment of an orienter 190 also having three sections 191. Each section 191 is defined by an upper arcuate ring segment 191, an arcuate plate 194 depending from each section 191, a plurality of rods 195 depending from each plate 194 and arcuate lower ring segments 196 attached to the rods. Orienter 190 may be mounted in the same way as orienter 180, using a set of arms 185.

[0039] FIG. 14 depicts cutting system 20 within a removable housing 200 to minimize splashing water during operation.

[0040] What has been described therefore is an improved system for slicing vegetables, having specific applicability to cutting potatoes into helical strips. Both the water jet mechanism and the orienter center and align the potatoes as they are delivered to and through the cutter. The combination delivers potatoes to the cutter more gently than prior art systems, in order to provide a better quality cut and higher yield.

[0041] While preferred embodiments of the invention have been described, it is to be understood that the scope of the invention is defined by the following claims.

Claims

1. A vegetable cutting system (20) comprising a conveyor (25) for conveying vegetables (21) one at a time to a point defining the start of a predetermined path (37), a cutter (150) at the end of said path (37), and an orientor (140, 180,190) characterized by at least one set of nozzles (90) arranged around said path (37) for generating jets of water (130) intersecting at a point (131,132,133,134) in said path (37) for guiding, orientating and centralizing the vegetables (21) with respect to said cutter (150).

2. The vegetable cutting system (20) of claim 1, characterized by a series of rings (40,50,60,70) surrounding said path (37), a plurality of nozzles (90) carried by each of said rings (40,50,60,70) arranged around said path (37) for respectively generating jets of water (130) intersecting at said path (37).

3. The vegetable cutting system (20) of claim 1 or claim 2, characterized by the orientor (140,180,190) being positioned between said nozzles (90) and said cutter (150) for guiding the vegetables (21) thereto and for accommodating transverse passage of water.

4. The vegetable cutting system (20) of any preceding claim characterized by said path (37) being substantially straight and vertical.

5. The vegetable cutting system (20) of any preceding claim characterized by each nozzle (90) being at an acute angle with respect to said path (37) and directed toward said cutter (150).

6. The vegetable cutting system (20) of claim 5, characterized by said acute angle being about 30°.

7. The vegetable cutting system (20) of claims 1, 2 or 3, characterised by at least two spaced-apart sets of nozzles (90) for generating jets of water intersecting respectively at two points in said path.

8. The vegetable cutting system (20) of claim 7, characterized by six nozzles (90) in each set.

9. The vegetable cutting system (20) of claim 7, characterized by said nozzles (90) of each set being substantially equiangularly spaced apart.

10. The vegetable cutting system (20) of claims 1, 2 or 3, characterized by a plurality of spaced-apart sets of said nozzles (90) for generating jets of water (130) intersecting respectively at a plurality of points (131,132,133,134) in said path (37).

11. The vegetable cutting system (20) of claim 10, characterized by four sets of said nozzles (90).

12. The vegetable cutting system (20) of claim 11, characterized by six nozzles (90) in each set.

13. The vegetable cutting system (20) of claim 12, characterized by first and second and third and fourth spaced apart sets of said nozzles (90) for generating jets of water (130) intersecting respectively at four points (131,132,133,134) in said path (37), the nozzles (90) of said first and third sets being aligned and the nozzles (90) of said second and fourth sets being aligned.

14. The vegetable cutting system (20) of claim 13, characterized by the nozzles (90) of said first and second sets being about 30° out of phase with the nozzles (90) of said second and fourth sets.

15. The vegetable cutting system (20) of claim 2, characterized by each of said rings (40,50,60,70) being generally ovoid shaped.

16. The vegetable cutting system (20) of claim 2 or claim 15, characterized by a manifold (121) coupled to said rings (40,50,60,70) for delivering water under pressure thereto.

17. The vegetable cutting system (20) of claims 2, 15 or 16, characterized by each of said rings (40,50,60,70) has an input conduit (48,58,68,78,124) for receiving water.

18. The vegetable cutting system (20) of any preceding claim, characterized by said orientor (140,180,190) including a plurality of rods (143,184,195) arranged substantially in a circle and extending substantially parallel to said path (37).

19. The vegetable cutting system (20) of claim 18, characterized by the radius of said circle being fixed.

20. The vegetable cutting system (20) of claim 18, characterized by the radius of said circle being adjustable.

21. The vegetable cutting system of any preceding claim, characterized by said orientor (140,184,195) being readily removable.

Patentansprüche

1. Gemüseschneidsystem (20) mit einem Förderer (25), um Gemüse (21), eines nach dem anderen, zu einer Stelle zu transportieren, welche den Anfang einer vorbestimmten Bahn (37) definiert, einem Schneider (150) am Ende der genannten

Bahn (37) und einem Ausrichter (140, 180, 190), gekennzeichnet durch zumindest eine Gruppe von Düsen (90), die um die genannte Bahn (37) herum angeordnet sind, um Wasserstrahlen (130) zu erzeugen, die sich an einer Stelle (131, 132, 133, 134) in der genannten Bahn (37) schneiden, um das Gemüse (21) relativ zu dem genannten Schneider (150) zu führen, auszurichten und zu zentrieren.

2. Gemüseschneidsystem (20) von Anspruch 1, gekennzeichnet durch eine Reihe von Ringen (40, 50, 60, 70), die die genannte Bahn (37) umgeben, eine Mehrzahl von Düsen (90), die durch jeden der genannten Ringe (40, 50, 60, 70) getragen sind, die um die genannte Bahn (37) herum angeordnet sind, um jeweils Wasserstrahlen (130) zu erzeugen, die sich an der genannten Bahn (37) schneiden.

3. Gemüseschneidsystem (20) von Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß der Ausrichter (140, 180, 190) zwischen den genannten Düsen (90) und dem genannten Schneider (150) angeordnet ist, um das Gemüse (21) diesem zuzuleiten und den Querdurchtritt von Wasser aufzunehmen.

4. Gemüseschneidsystem (20) von irgendeinem vorausgehenden Anspruch, dadurch gekennzeichnet, daß die genannte Bahn (37) im wesentlichen gerade und vertikal ist.

5. Gemüseschneidsystem (20) von irgendeinem vorausgehenden Anspruch, dadurch gekennzeichnet, daß jede Düse (90) in einem spitzen Winkel relativ zu der genannten Bahn (37) angeordnet und gegen den genannten Schneider (150) hin gerichtet ist.

6. Gemüseschneidsystem (20) von Anspruch 5, dadurch gekennzeichnet, daß der genannte spitze Winkel ungefähr 30° beträgt.

7. Gemüseschneidsystem (20) von Anspruch 1, 2 oder 3, gekennzeichnet durch zumindest zwei im Abstand voneinander befindliche Gruppen von Düsen (90), um Wasserstrahlen zu erzeugen, die sich jeweils an zwei Stellen in der genannten Bahn schneiden.

8. Gemüseschneidsystem (20) von Anspruch 7, gekennzeichnet durch sechs Düsen (90) in jeder Gruppe.

9. Gemüseschneidsystem (20) von Anspruch 7, dadurch gekennzeichnet, daß die genannten Düsen (90) jeder Gruppe im wesentlichen um gleiche Winkel voneinander entfernt sind.

10. Gemüseschneidsystem (20) von Anspruch 1, 2 oder 3, gekennzeichnet durch eine Mehrzahl im Abstand voneinander befindlicher Gruppen genannter Düsen (90), um Wasserstrahlen (130) zu erzeugen, die sich jeweils an einer Mehrzahl von Stellen (131, 132, 133, 134) in der genannten Bahn (37) schneiden.

11. Gemüseschneidsystem (20) von Anspruch 10, gekennzeichnet durch vier Gruppen der genannten Düsen (90).

12. Gemüseschneidsystem (20) von Anspruch 11, gekennzeichnet durch sechs Düsen (90) in jeder Gruppe.

13. Gemüseschneidsystem (20) von Anspruch 12, gekennzeichnet durch erste, zweite, dritte und vierte voneinander entfernte Gruppen der genannten Düsen (90), um Wasserstrahlen (130) zu erzeugen, die sich jeweils an vier Stellen (131, 132, 133, 134) in der genannten Bahn (37) schneiden, wobei die Düsen (90) der genannten ersten und genannten dritten Gruppe miteinander fluchten und die Düsen (90) der genannten zweiten und genannten vierten Gruppe miteinander fluchten.

14. Gemüseschneidsystem (20) von Anspruch 13, dadurch gekennzeichnet, daß die Düsen (90) der genannten ersten und genannten zweiten Gruppe ungefähr 30° außer Phase mit den Düsen (90) der genannten zweiten und genannten vierten Gruppe sind.

15. Gemüseschneidsystem (20) von Anspruch 2, dadurch gekennzeichnet, daß jeder der genannten Ringe (40, 50, 60, 70) im wesentlichen eiförmig ist.

16. Gemüseschneidsystem (20) von Anspruch 2 oder Anspruch 15, gekennzeichnet durch eine Sammelleitung (121), die mit den genannten Ringen (40, 50, 60, 70) gekuppelt ist, um diesen Wasser unter Druck zuzuführen.

17. Gemüseschneidsystem (20) von Anspruch 2, 15 oder 16, dadurch gekennzeichnet, daß jeder der genannten Ringe (40, 50, 60, 70) eine Einlaßleitung (48, 58, 68, 78, 124) für die Aufnahme von Wasser aufweist.

18. Gemüseschneidsystem (20) von irgendeinem vorausgehenden Anspruch, dadurch gekennzeichnet, daß der genannte Ausrichter (140, 180, 190) eine Mehrzahl von Stäben (143, 184, 195) beinhaltet, die im wesentlichen in einem Kreis angeordnet sind und sich im wesentlichen parallel zu der genannten Bahn (37) erstrecken.

19. Gemüseschneidsystem (20) von Anspruch 18, dadurch gekennzeichnet, daß der Radius des genannten Kreises festliegend ist.

20. Gemüseschneidsystem von Anspruch 18, dadurch gekennzeichnet, daß der Radius des genannten Kreises einstellbar ist.

21. Gemüseschneidsystem von irgendeinem vorausgehenden Anspruch, dadurch gekennzeichnet, daß der genannte Ausrichter (140, 184, 195) leicht herausnehmbar ist.

Revendications

1. Système pour découper des légumes (20) comprenant un convoyeur (25) pour transporter les légumes (21) un à la fois vers un point définissant le début d'un trajet prédéterminé (37), un dispositif de coupe (150) à l'extrémité dudit trajet (37), et un dispositif d'orientation (140, 180, 190), caractérisé par au moins un ensemble d'ajutages (90) agencés autour dudit trajet (37) pour générer des jets d'eau (130) qui s'entrecroisent au niveau d'un point (131, 132, 133, 134) dans ledit trajet (37) pour guider, orienter et centraliser les légumes (21) par rapport audit dispositif de coupe (150).

2. Système pour découper des légumes (20) selon la revendication 1, caractérisé par une série de bagues (40, 50, 60, 70) entourant ledit trajet (37), une pluralité d'ajutages (90) supportés par chacune desdites bagues (40, 50, 60, 70) agencés autour dudit trajet (37) pour générer respectivement des jets d'eau (130) qui s'entrecroisent au niveau dudit trajet (37).

3. Système pour découper des légumes (20) selon la revendication 1 ou la revendication 2, caractérisé en ce que le dispositif d'orientation (140, 180, 190) est positionné entre lesdits ajutages (90) et ledit dispositif de coupe (150) pour guider les légumes (21) vers celui-ci et pour contenir un passage transversal d'eau.

4. Système pour découper des légumes (20) selon l'une quelconque des revendications précédentes, caractérisé en ce que ledit trajet (37) est sensiblement droit et vertical.

5. Système pour découper des légumes (20) selon l'une quelconque des revendications précédentes, caractérisé en ce que chaque ajutage (90) forme un angle aigu avec ledit trajet (37) et est dirigé vers ledit dispositif de coupe (150).

6. Système pour découper des légumes (20) selon la revendication 5, caractérisé en ce que ledit angle aigu est d'environ 30°.

7. Système pour découper des légumes (20) selon la revendication 1, 2 ou 3, caractérisé par au moins deux ensembles séparés d'ajutages (90) pour générer des jets d'eau qui s'entrecroisent respectivement au niveau de deux points dans ledit trajet.

8. Système pour découper des légumes (20) selon la revendication 7, caractérisé par six ajutages (90) dans chaque ensemble.

9. Système pour découper des légumes (20) selon la revendication 7, caractérisé en ce que lesdits ajutages (90) de chaque ensemble sont sensiblement espacés de manière équiangulaire.

10. Système pour découper des légumes (20) selon la revendication 1, 2 ou 3, caractérisé par une pluralité d'ensembles séparés desdits ajutages (90) pour générer des jets d'eau (130) qui s'entrecroisent respectivement au niveau d'une pluralité de points (131, 132, 133, 134) dans ledit trajet (37).

11. Système pour découper des légumes (20) selon la revendication 10, caractérisé par quatre ensembles desdits ajutages (90).

12. Système pour découper des légumes (20) selon la revendication 11, caractérisé par six ajutages (90) dans chaque ensemble.

13. Système pour découper des légumes (20) selon la revendication 12, caractérisé par des premier et second et troisième et quatrième ensembles séparés desdits ajutages (90) pour générer des jets d'eau (130) qui s'entrecroisent respectivement au niveau de quatre points (131, 132, 133, 134) dans ledit trajet (37), les ajutages (90) desdits premier et troisième ensembles étant alignés et les ajutages (90) desdits second et quatrième ensembles étant alignés.

14. Système pour découper des légumes (20) selon la revendication 13, caractérisé en ce que les ajutages (90) desdits premier et second ensembles sont décalés d'environ 30° par rapport aux ajutages (90) desdits second et quatrième ensembles.

15. Système pour découper des légumes (20) selon la revendication 2, caractérisé en ce que chacune desdites bagues (40, 50, 60, 70) est généralement de forme ovoïde.

16. Système pour découper des légumes (20) selon la revendication 2 ou la revendication 15, caractérisé par une tubulure (121) couplée auxdites bagues (40, 50, 60, 70) pour distribuer de l'eau sous pres-

sion à celles-ci.

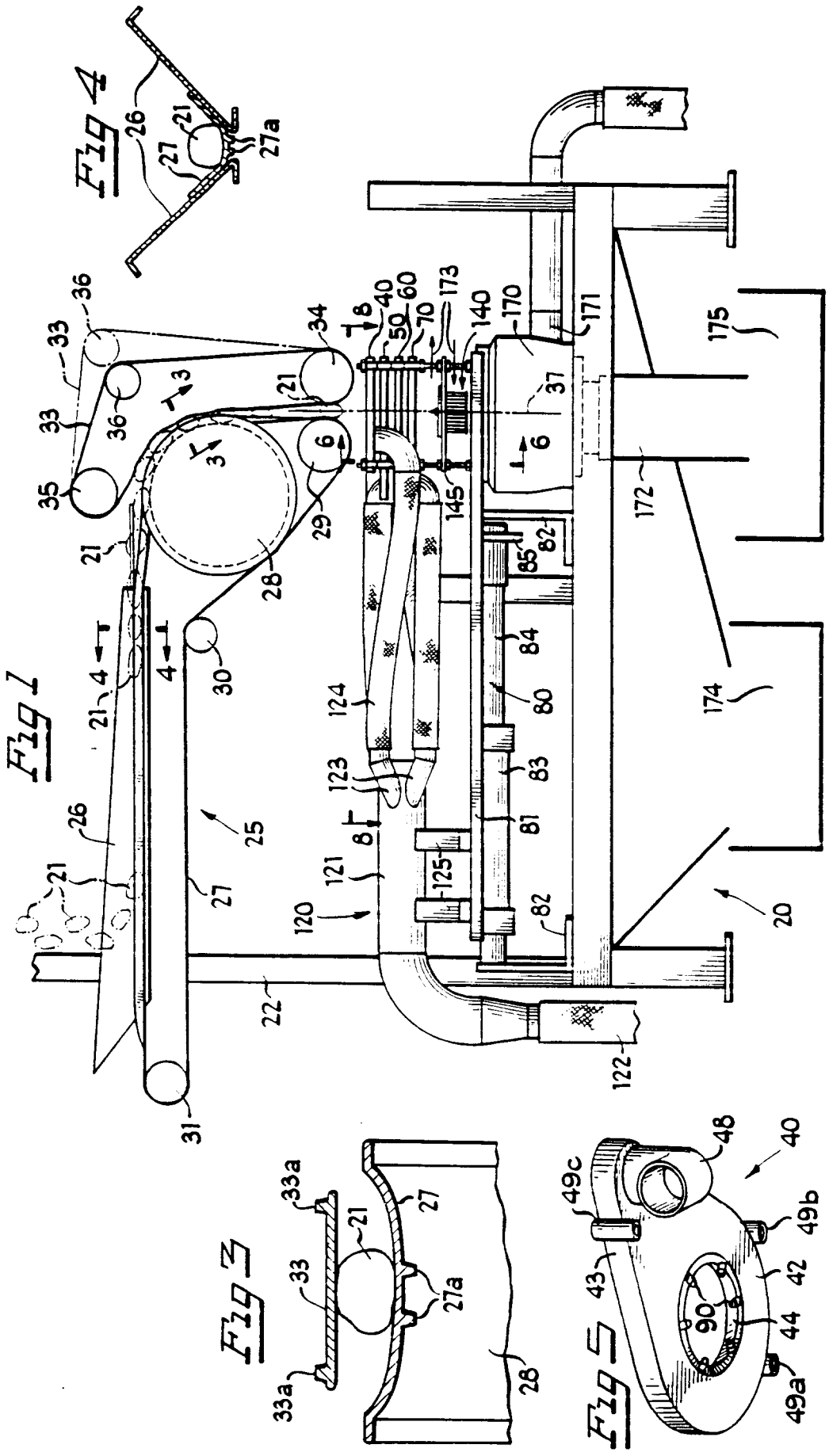
17. Système pour découper des légumes (20) selon la revendication 2, 15 ou 16, caractérisé en ce que chacune desdites bagues (40, 50, 60, 70) comporte un conduit d'entrée (48, 58, 68, 78, 124) pour recevoir l'eau.

18. Système pour découper des légumes (20) selon l'une quelconque des revendications précédentes, caractérisé par ledit dispositif d'orientation (140, 180, 190) comprenant une pluralité de tiges (143, 184, 195) agencées sensiblement en un cercle et s'étendant sensiblement parallèles audit trajet (37).

19. Système pour découper des légumes (20) selon la revendication 18, caractérisé en ce que le rayon dudit cercle est fixe.

20. Système pour découper des légumes (20) selon la revendication 18, caractérisé en ce que le rayon dudit cercle est ajustable.

21. Système pour découper des légumes selon l'une quelconque des revendications précédentes, caractérisé en ce que ledit dispositif d'orientation (140, 184, 195) peut être enlevé facilement.



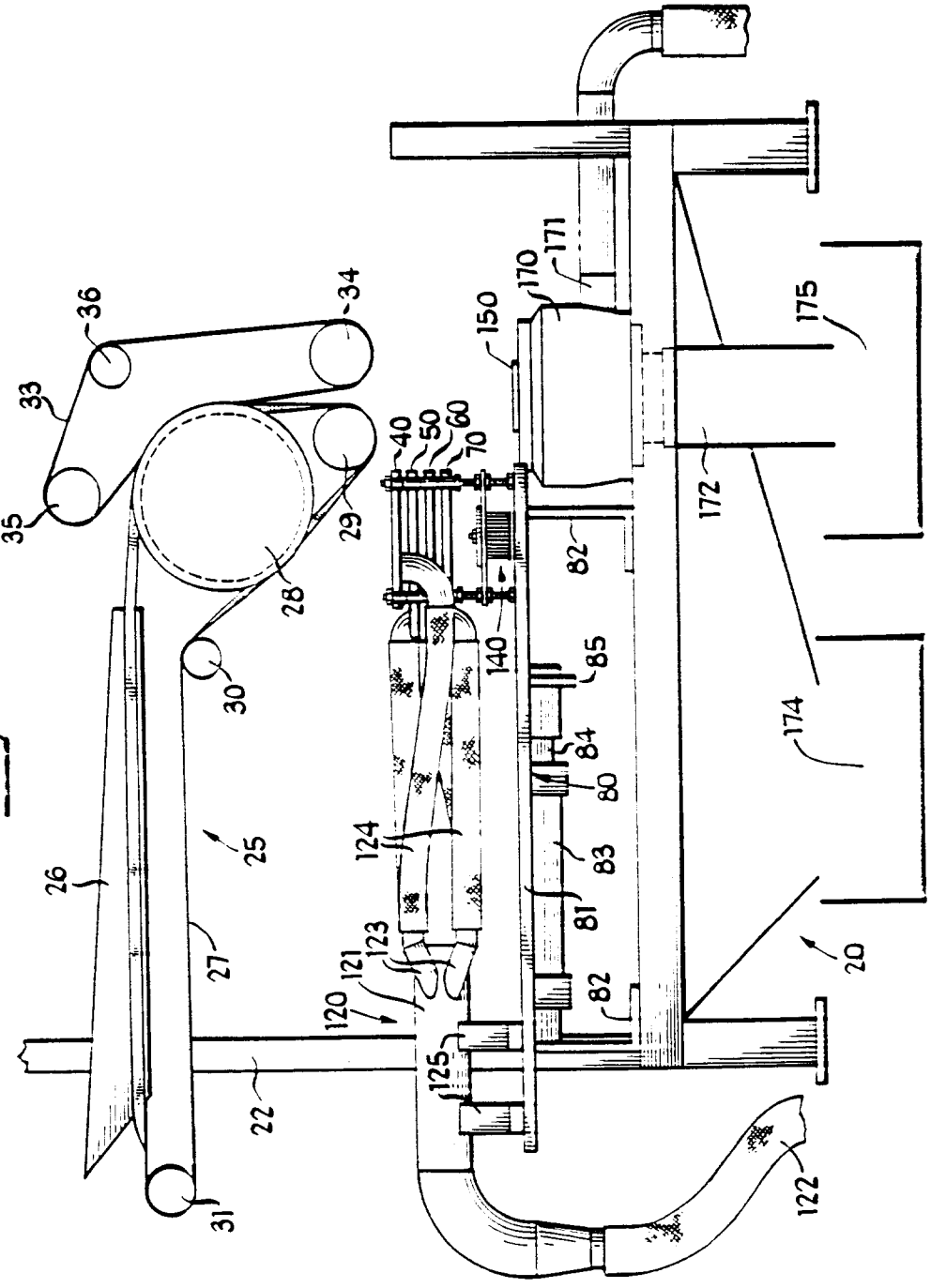

Fig 2
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Fig 6

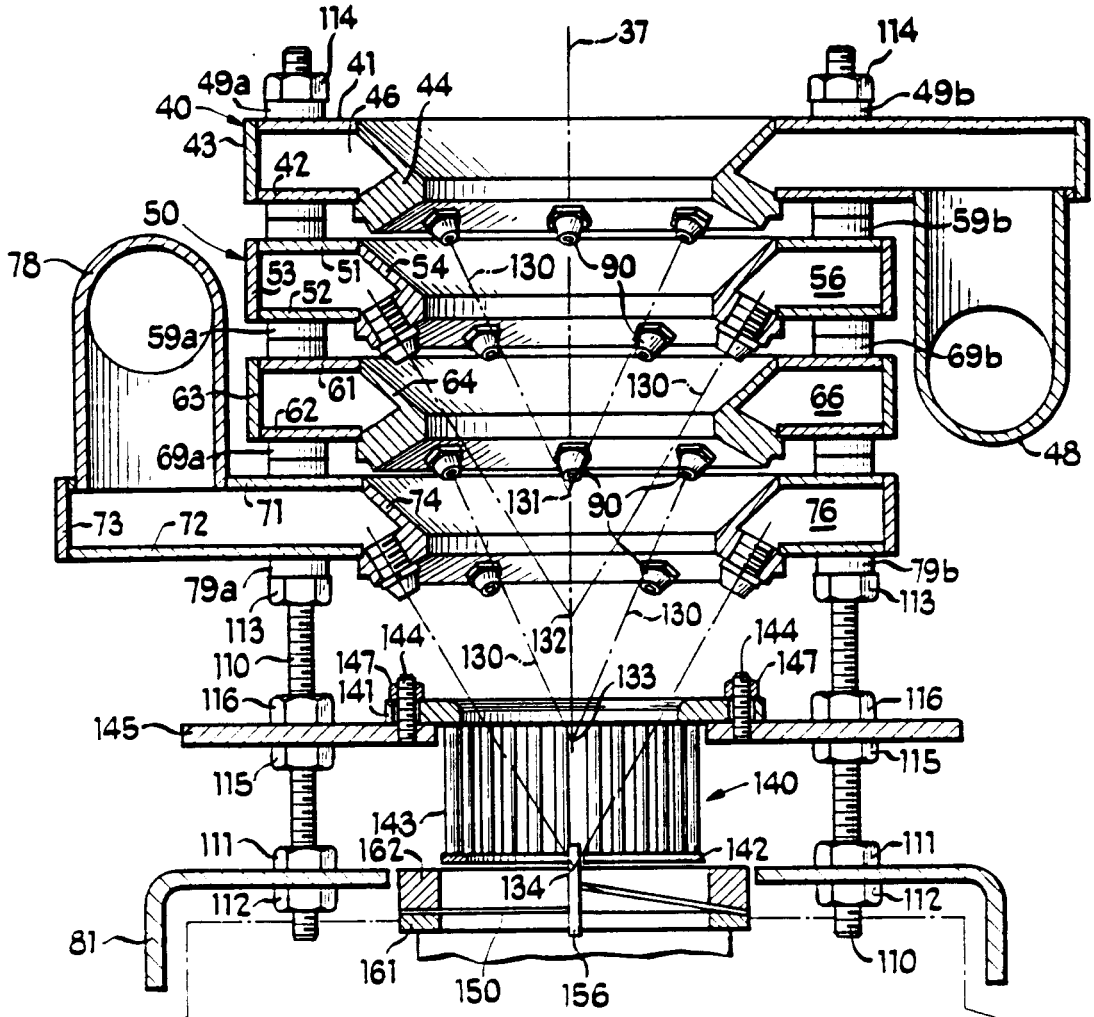

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Fig 7

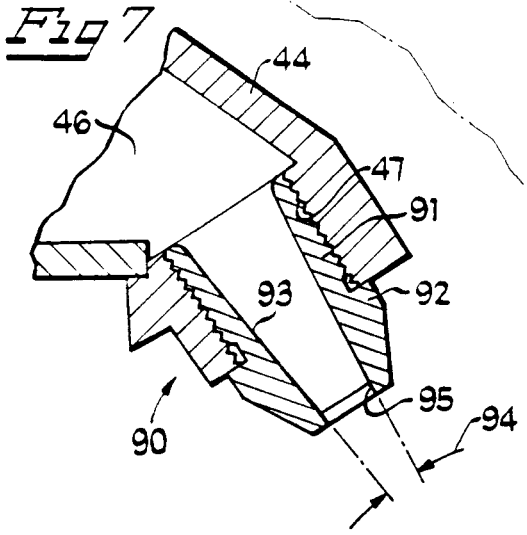
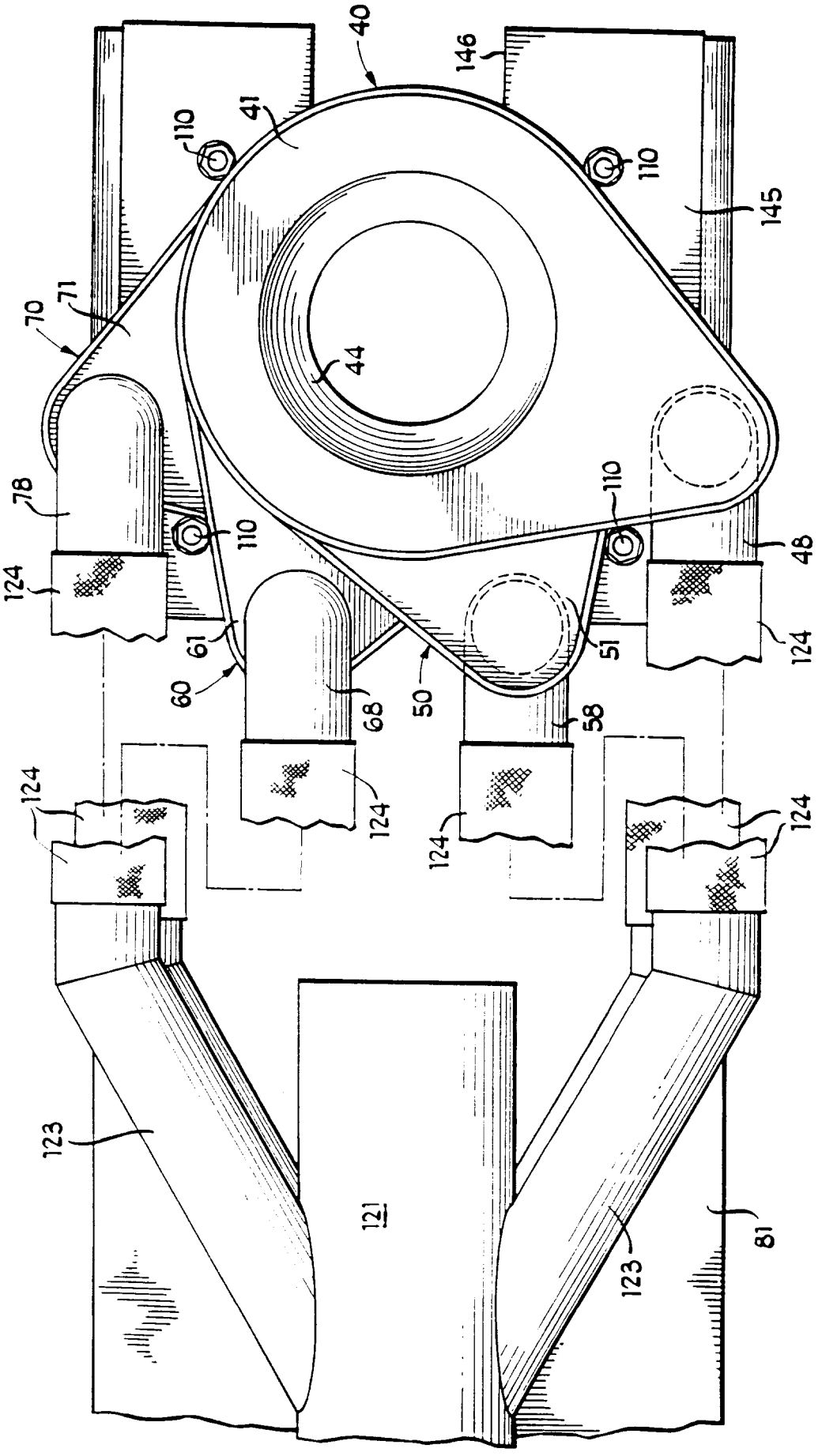

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Fig 8


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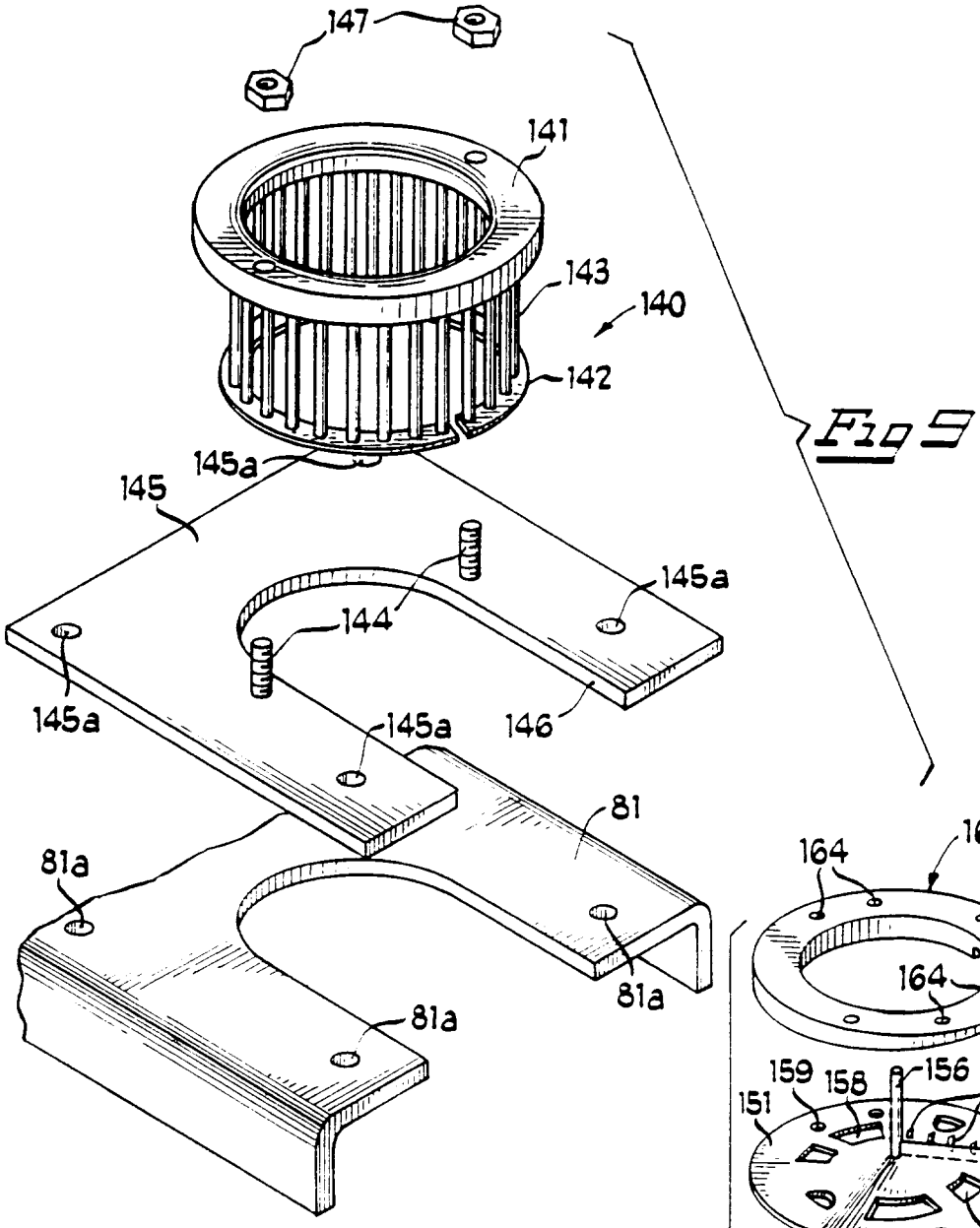

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Fig 9

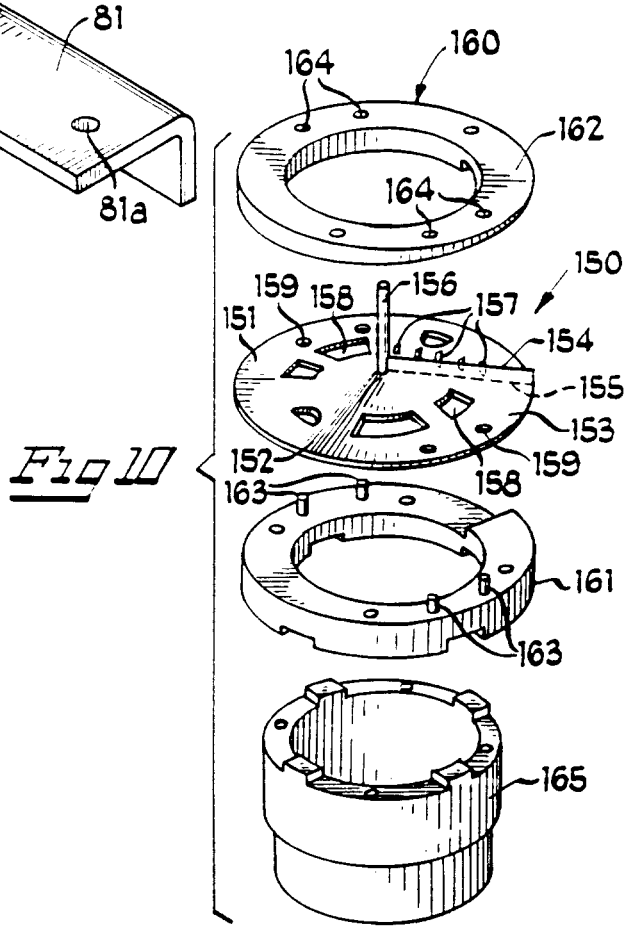

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Fig 10

Fig 11

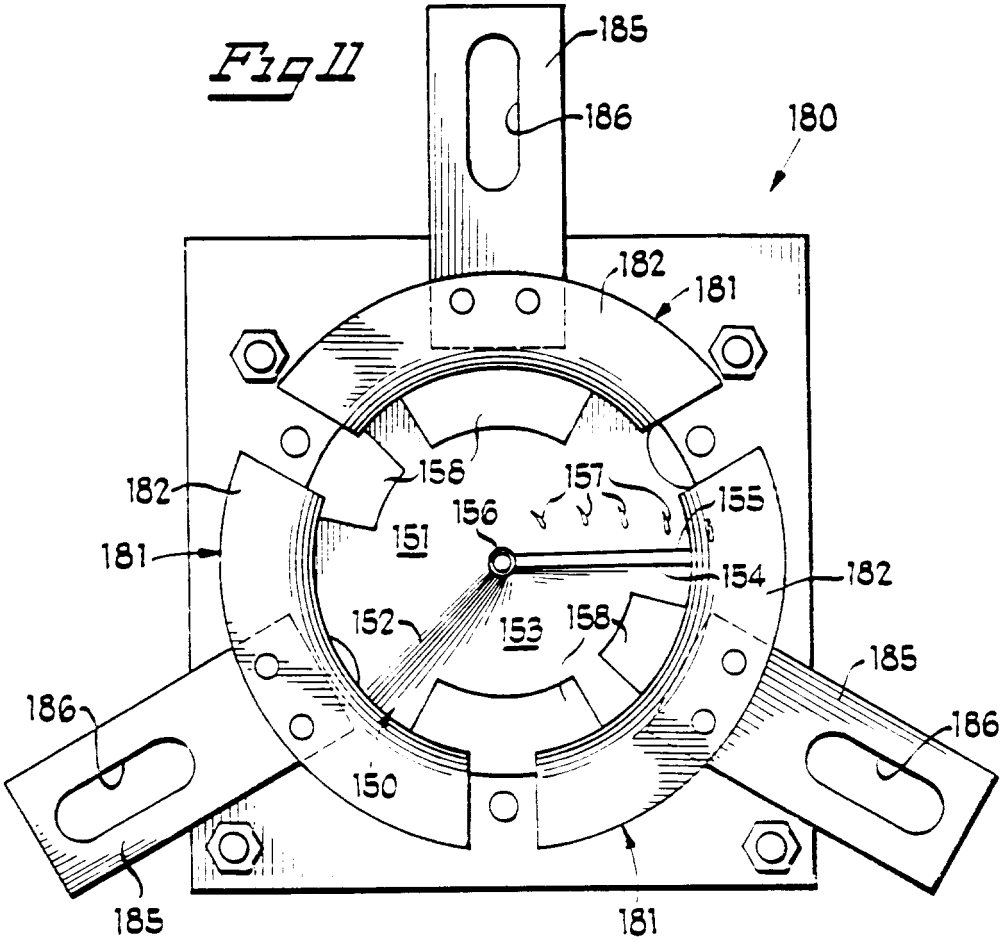


Fig 12

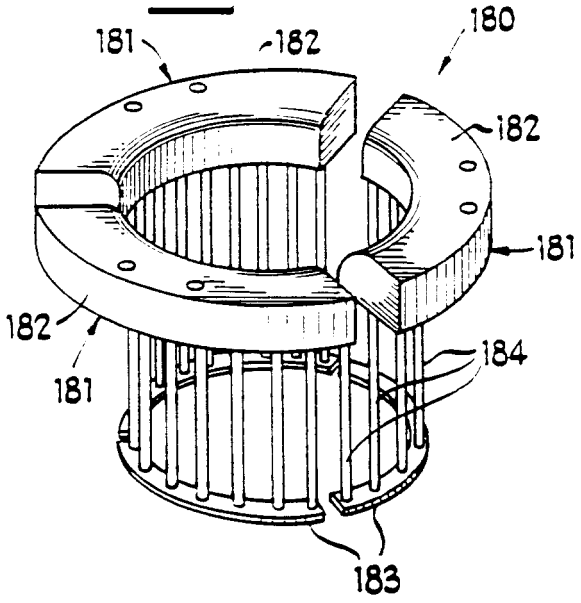


Fig 13

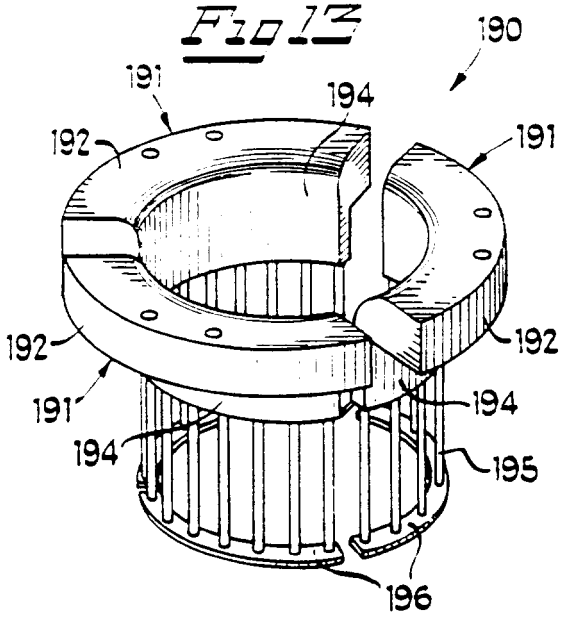


Fig 14

