



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.11.2016 Bulletin 2016/45

(51) Int Cl.:
B65B 61/06 (2006.01) **B26D 1/08 (2006.01)**
B26D 5/08 (2006.01) **B65B 9/04 (2006.01)**

(21) Application number: **16000932.0**

(22) Date of filing: **26.04.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(30) Priority: **08.05.2015 US 201562158739 P**
15.03.2016 US 201615070596

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(54) **CUTTING STATION FOR A WEB PACKAGING MACHINE**

(57) A cutting station is provided for separating a plurality of packages from a continuous chain of sealed packages formed on an indexing motion packaging machine. The cutting station includes a plurality of cutting blades configured in a nested arrangement to form closed curved contours for producing curved cuts in the continuous chain of sealed packages to form severed individual sealed packages having contours corresponding to the contours of the blades with a minimum of waste of the severed joined webs. A blade receiving plate is provided for receiving the severed sealed packages, and is mounted for movement relative to the cutting blades and formed with a plurality of recesses configured in a nesting arrangement of closed curved contours aligned with and corresponding in shape to the closed curved contours of the cutting blades.

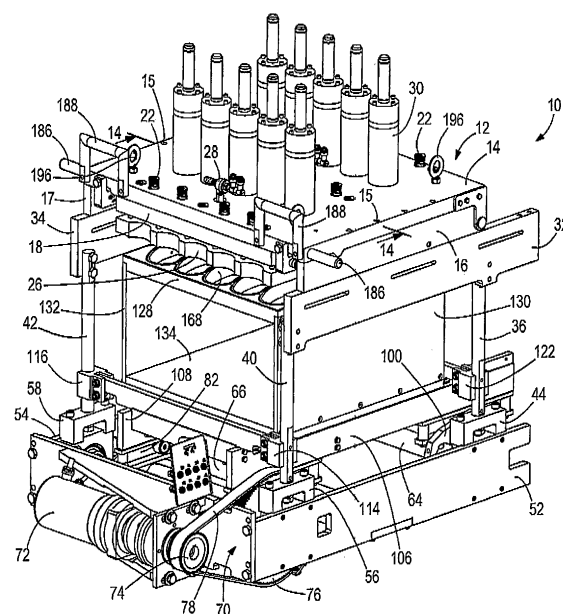


FIG. 2

Description

[0001] The present disclosure relates to assemblies and methods for contour cutting of a continuous chain of packages formed and sealed in an automated web packaging machine. In particular this invention relates to a cutting station for separating a plurality of packages from a continuous chain of sealed packages according to claim 1. The invention also relates to an indexing motion packaging machine comprising such a cutting station according to claim 14. The invention finally relates to a method of producing a plurality of severed packages according to claim 15.

[0002] Web packaging machines are known in the prior art as disclosed, for example, in US 5,170,611 A and US 5,205,110 A which are herein incorporated by reference in entirety. In these machines, a web transport conveyor transports a lower flexible web from upstream to downstream through a series of stations receiving a product in a lower web package at a loading station, and closing the package with an upper flexible web at a closing station. Typically, side by side closed product filled packages are separated at a cutting station into individually formed rectangular or substantially rectangularly-shaped packages by longitudinal and cross cutting mechanisms. In some cases, it is desirable to use the packaging machine described above to form product filled packages which are contour cut at the cutting station in a single cutting or punching motion where each cutting blade has the outer contour of the package. Such contour cutting is particularly useful when joining packages which are round, curved or irregularly shaped. One of the challenges faced in providing contour cut packages is the expense of wasted web material incurred in the cutting and separating process.

[0003] The present invention arose during development efforts directed towards the provision of a contour cutting station in a web packaging machine which forms packages in an efficient and economical manner with a focus on reducing the amount of waste or trim scrap incurred during cutting and separating of the packages.

[0004] The object of the present invention is to design and construct a cutting station for an automated packaging machine which provides a more efficient web material utilization and reduced waste.

[0005] The object of the present invention is met with a cutting station comprising the features of claim 1.

[0006] The cutting station according to the invention includes a cutting head having a top plate, a blade holder movably mounted relative to the top plate and formed with a plurality of cutting blades configured in a nested arrangement to form closed curved contours for producing curved cuts in the continuous chain of sealed packages, and an upper clamping plate for receiving the cutting blades. A lifting arrangement having a lower clamping plate is mounted for movement relative to the upper clamping plate for clamping the continuous chain of sealed packages between the upper clamping plate and the lower clamping plate. The lower clamping plate is constructed to receive the cutting blades such that the cutting blades cut through the continuous chain of sealed packages to form severed individual sealed packages having contours corresponding to the contours of the blades. The lower clamping plate is formed with a plurality of recesses configured in a nested arrangement of closed curved contours continuously aligned with and corresponding in shape to the closed curved contours of the cutting blades for receiving the severed sealed packages.

[0007] Preferred modifications, improvements and alternatives of the cutting station according to the invention are the subject matter of dependent claims 2 to 13.

[0008] The present invention also relates to an indexing motion packaging machine according to claim 14 having a web transport conveyor transporting a web of packaging material through a series of stations including a forming station for forming at least one pocket in the web. A loading station is provided for placing a product in the pocket and a closing station is provided for closing and joining the web with another web of packaging material so that the joined webs form a continuous chain of sealed packages. A cutting station according to claim 1 and, optionally, any one of the claims 2 to 13 is provided for separating the continuous chain of sealed packages.

[0009] Finally, the present invention also relates to a method of producing a plurality of severed packages from a continuous chain of sealed packages according to claim 18. The method steps of this method are:

positioning the continuous chain of sealed packages between the upper clamping plate and the lower clamping plate in the open position,
moving the lower clamping plate to the closed position to clamp the chain of sealed package between the upper clamping plate and the lower clamping plate such that the sealed packages are received in the recesses,
moving the cutting blades through the upper clamping plate into the blade receiving grooves of the lower clamping plate to sever the chain of sealed packages into severed individual sealed packages with the closed curved contours, and
forcing the severed individual sealed packages with the closed curved contours through the recesses of the lower clamping plate.

[0010] The drawings illustrate the best mode presently contemplated of carrying out the disclosure. In the drawings:

Fig. 1 is a perspective view of an indexing motion packaging machine incorporating a contour cutting station in accordance with the present disclosure.

- Fig. 2 is an enlarged rear perspective view of the contour cutting station in accordance with the present disclosure.
 Fig. 3 is a front perspective view of the cutting station.
 Fig. 4 is a front end view of the cutting station shown in Fig. 3.
 Fig. 5 is an exploded view of the cutting station shown in Fig. 3.
 Fig. 6 is a perspective view of an inverted blade holder and nested cutting blades used in the cutting station.
 Fig. 7 is a partially exploded representation of the nested cutting blades used in the cutting station.
 Fig. 8 is an exploded view of a portion of the cutting station.
 Fig. 9 is a sectional view of a portion of the cutting station taken on line 9-9 of Fig. 8.
 Fig. 10 is a sectional view of a portion of the cutting station showing a blade in a cutting position.
 Fig. 11 is a bottom perspective view of upper and lower clamping plates of the cutting station shown in Fig. 1.
 Fig. 12 is a partial sectional view of a cutting head of the cutting station as taken on line 12-12 of Fig. 11.
 Fig. 13 is an enlarged detail view of the cutting head shown in Fig. 12.
 Fig. 14 is an enlarged sectional view of a bladder used to move the blade holder as taken on line 14-14 of Fig. 2.
 Fig. 15 is a top view of a further embodiment of nested cutting blades.

[0011] Referring to Fig. 1, an indexing motion packaging machine 2 includes a web transport conveyor for transporting a lower web of flexible packaging material along a direction of transport from upstream to downstream locations through a series of stations including a forming station 4 for forming at least one pocket in the web, a loading station 6 for placing food product in the pocket and a closing station 8 for closing the pocket with an upper web of flexible packaging material to form a continuous chain of sealed packages. The machine 2 also includes a cutting station 10 for separating the closed pockets into individual food containing packages.

[0012] As is well known, the various components of the machine 2 are mounted to a frame supported above the ground by a series of legs. A supply roll supplies each web by means of an unwind shaft. An unwind motor drives sets of rollers to safely pull the web from the supply roll and along the conveyor in an indexing manner and to allow a series of operations at the forming station 4, the loading station 6, the closing station 8 and the cutting station 10 for creating a packaged product.

[0013] Referring now to the drawings, Figs. 2-5 illustrate the cutting station 10 used to cut and separate a continuous chain of sealed product filled packages into individual contour cut packages by means of a singular cutting motion.

[0014] In accordance with the present disclosure, the cutting station 10 includes a cutting head 12 having a planar top plate 14 connected, such as by fasteners 15, to depending side members 16, 17. A blade holder 18 carrying a plurality of dependent cutting blades 20 (Figs. 3 and 4) is mounted on rods 21 for selective vertical movement beneath the top plate 14. The blade holder 18 is normally held upwardly against the bottom of the top plate 14 by a series of springs 22 passing through the top plate 14 and operatively connected to the blade holder 18. In addition, a number of other spring biased devices 24 (Figs. 4 and 11) are positioned between the top plate 14 and the blade holder 18. An upper clamping plate 26 is suspended on rods 21 from the blade holder 18, and is configured to receive the blades 20 in a cutting operation to be described below in detail. An air valve 28 and a series of pneumatic cylinders 30 are provided on the top plate 14 for purposes to be further understood hereafter.

[0015] The side members 16, 17 of the cutting head 12 are stationarily supported and fixed to a four post lifting arrangement including a pair of upper support bars 32, 34. The upper support bars 32, 34 are fixed to upper ends of a pair of front upright posts 36, 38 and a pair of rear upright posts 40, 42. Lower ends of the posts 36, 38 are connected to front support blocks 44, 46 positioned on front bearing blocks 48, 50 fixed to front ends of lower support bars 52, 54 which are anchored inside the frame of the packaging machine. Similarly, lower ends of the rear posts 40, 42 are connected to rear support blocks 56, 58 mounted on rear bearing blocks 60, 62 fixed to rear ends of the support bars 52, 54. A front shaft 64 has opposite ends mounted for rotation in the front bearing blocks 48, 50. A rear shaft 66 has opposite ends mounted for rotation in the rear bearing blocks 60, 62. A transverse support member 68 extends between mid-portions of the lower support bars 52, 54.

[0016] As best seen in Fig. 2, a mounting plate arrangement 70 is provided across the rear ends of the lower support bars 52, 54. A servo motor 72 is positioned on the mounting plate arrangement 70, and is configured to selectively drive a pulley 74. A drive gear 76 is mounted on the rear shaft 66, and is connected in driving relationship with the pulley 74 by a belt 78 such that operation of the servo motor 72 will rotate the rear shaft 66 back and forth. A rear drive lever 80 is keyed to the rear shaft 66 inboard of drive gear 76, and a rear drive lever 82 is keyed to the rear shaft 66 opposite the drive lever 80.

[0017] Referring to Fig. 5, the rear drive lever 80 has a cam follower 84 which rides between upper and lower rails of a rear track 86. The rear drive lever 82 has a cam follower 88 which rides between upper and lower rails of a rear track 90. An upper end of rear drive lever 82 is connected to a rear end of a turnbuckle shaft 92 extending forwardly to a front follower lever 94 which is keyed to the front shaft 64. The front follower lever 94 has a cam follower 96 which rides between upper and lower rails of a front track 98. A rear follower lever 100 is also keyed to the front shaft 64, and provided with a cam follower 102 which rides between upper and lower rails of a front track 104. Each of the rear tracks 86, 90

and the front tracks 98, 104 is secured to lower rear and front portions of a pair of vertically moveable, longitudinally extending lifting bars 106, 108.

[0018] A rear lower crossbar 110 connects rear ends of the lifting bars 106, 108. A rear upper cross bar 112 is joined to the rear lower crossbar 110, and has opposite ends connected to rear wear pieces 114, 116 which are configured to travel along rear posts 40, 42. A front lower cross bar 118 connects front ends of the lifting bars 106, 108. A front upper crossbar 120 is mounted on the front lower crossbar 118, and has opposite ends attached to front wear pieces 122, 124 which are designed to move along front posts 36, 38. A transverse support member 126 is provided between mid-portions of the lifting bars 106, 108.

[0019] A lower clamping plate 128 is joined to a pair of depending sidewalls 130, 132 which are interconnected at lower ends by a bed 134. Connecting rails 136, 138 are provided on the bottom of the bed 134, and are joined to inside surfaces of the lifting bars 106, 108 between the rear crossbars 110, 112 and the front crossbars 118, 120.

[0020] By the aforescribed arrangement, operation of the servo motor 72 rotates the drive gear 76 which rotates the rear shaft 66 and the rear drive levers 80, 82. Rotation of drive lever 82 is translated by linear movement of the turnbuckle shaft 92 so that the follower levers 94, 100 are rotated with front shaft 64. Rotation of the levers 80, 82, 94, 100 causes the cam followers 84, 88, 96, 102 to ride in the respective tracks 86, 90, 98, 104 resulting in vertical movement of the lifting bars 106, 108, the bed 134, the sidewalls 130, 132 and the lower clamping plate 128.

[0021] As will be further discussed, the lower clamping plate 128 is movable towards and away from the upper clamping plate 26. More specifically, the lower clamping plate 128 is movable between a closed position and an open position into and out of clamping engagement with a continuous chain of sealed product filled packages 137 conveyed between the upper clamping plate 26 and the lower clamping plate 128 in the direction of arrow A (Fig. 5) after which a cutting operation occurs to provide separate individual packages 139.

[0022] Referring now to Figs. 6 and 7, a key feature of the present disclosure resides in the provision of a nested and contiguous arrangement of the cutting blades 20 mounted on the blade holder 18. The blades 20 are maintained in a desired alignment by means of guide blocks 140 which are engaged against rear walls 20f of the blades 20. The blades 20 are also held in aligned position by rods 142 which are passed through a series of recesses 144 formed in the blades 20. Although not shown, it is envisioned that nuts are provided on the ends of the rods 142. Each blade 20 is formed with a serrated cutting edge 146 completely around its periphery.

[0023] In the example illustrated, the blades 20 are formed as particularly bent kidney-shaped guillotine blades which are arranged in a two-by-five die pattern matrix or array to provide ten individual packages with peripheral contours shaped similar to the blades 20 in a single cutting motion upon indexing and clamping the continuous chain of sealed packages between the upper and lower clamping plates 26, 128.

[0024] As seen in Fig. 7, each longitudinally extending row of nested and contiguous blades 20 in the example shown include open crescent-shaped blades 20a, 20b, 20c, 20d, and a closed kidney-shaped blade 20e. Rear walls 20f of the blades 20b, 20c, 20d are nested and project into mouths 20g of adjacent blades 20a, 20b, 20c. The rear wall 20f of closed blade 20e is nested and projects into the mouth 20g of blade 20d. As will be understood below, similarly shaped receiving structure for the particularly shaped blades 20 is formed in the upper clamping plate 26 and the lower clamping plate 128 to enable the desired separation of the contour cut packages.

[0025] Turning to Figs. 8-14, the upper clamping plate 26 is formed with two large contoured recesses 148, 150 suitably configured to matingly receive the nested arrangement of blades 20 which depend from the blade holder 18. A kidney-shaped internal clamping plate 152 is designed to be matingly received within the inner surface of each blade 20, and is connected to lower rod casing 154 (Figs. 12 and 13) on each pneumatic cylinder 30. The bottom of each internal clamping plate 152 is formed with an annular groove 156 for receiving and retaining a gasket 158 (Figs. 9-13). An extractor plate 160 is normally held within a recess 162 formed in the bottom surface of each internal clamping plate 152. The extractor plate 160 is connected to a rod 164 of each pneumatic cylinder 30, and passes through an opening 166 (Figs. 9 and 10) formed in the internal clamping plate 152.

[0026] The lower clamping plate 128 is constructed with a plurality of kidney-shaped recesses 168 which are designed to be continuously aligned beneath the internal clamping plates 152, and the extractor plates 160 mounted in the upper clamping plates 26. As best seen in Figs. 9, 10 and 14, the lower clamping plate 128 is provided with blade receiving grooves 170 for receiving the cutting edges 146 of the blades 20 during a cutting and separating operation on the sealed packages formed on the packaging machine. Upper edges 172 of the lower clamping plate 128 located inwardly of the grooves 170 define clamping surfaces which are aligned with the gaskets 158 positioned in the upper clamping plate 26. Upper planar surface 174 (Fig. 14) of the lower clamping plate 128 forms a further clamping surface which is aligned with a lower planar surface 176 on the upper clamping plate 26.

[0027] As best seen in Fig. 14, the air valve 28 is mounted on the top plate 14, and provides, by means of a conduit 178, a source of pressurized air to a bladder 180 located between the bottom of the top plate 14 and the top of the blade holder 18. Adding pressurized air to the bladder 180 inflates and expands the bladder 180.

[0028] The outer surfaces of the bladder 180 push the blade holder 18 away from the top plate 14 which simultaneously compresses the springs 22 and the spring biased devices 24, and forces the blades 20 downwardly into the grooves

170 in the lower clamping plate 128. Evacuating pressurized air from the bladder 180 deflates and contracts the bladder 180 such that the blades 20 are retracted from the grooves 170 and the blade holder 18 is returned towards the top plate 14 aided by the return force of the springs 22 and the devices 24.

[0029] When it is desired to perform a contour cutting and separating action for the exemplary embodiment shown, the packaging machine indexes and temporarily fixes in position the continuous chain of side-by-side closed and connected packages 137 in the two-by-five array as formed and sealed at the forming and closing stations 4, 8, respectively, upstream of the packaging machine 2 between the upper clamping plate 26 and the lower clamping plate 128 in its open position as depicted in Fig. 5. When the connected packages are ready to be cut, each of the packaged products is aligned with a blade 20, an internal clamping plate 152, and an extractor plate 160 in the upper clamping plate 26, and a recess 168 in the lower clamping plate 128.

[0030] Servo motor 72 is then operated as described above to move the lower clamping plate 128 upwardly so that the continuous chain of sealed packages is clamped between the upper clamping plate 26 and the lower clamping plate 128 in the closed position. Here, the upper web of the sealed packages is tightly clamped by the lower planar surface 176 of the upper clamping plate 26 as well as by the gaskets 158. At the same time, the lower web of the sealed packages is tightly clamped against the inside edges 172 and the upper planar surface 174 of the lower clamping plate 128.

[0031] Once the sealed packages are secured between the upper clamping plate 26 and the lower clamping plate 128, air is delivered to the bladder 180 causing the blade holder 18 to move downwardly. This motion causes the blades 20 to be simultaneously and collectively moved downwardly around the internal clamping plates 152 so that the blade cutting edges 146 will sever the sealed packages as the cutting edges 146 move into the grooves 170. With cutting finished, air is deflated from the bladder 180 and the blade holder 18 and the blades 20 are returned upwardly to their initial positions by return forces of the springs 22 and the devices 24. At this point, the pneumatic cylinders 30 are actuated to move the rod 164 and the connected extractor plates 160 downwardly so that the severed individual contoured cut packages 139 will drop by gravity through the recesses 168 of the lower clamping plate 128. The individual contoured cut packages 139 are designed to fall upon a discharge conveyor (not shown) which runs longitudinally along the top of bed 134.

[0032] The inventors have found that greater efficiency and economy is achieved in providing the individual contoured cut packages as a direct result of the nested die pattern of blades 20 which requires less film or web material, and results in a substantial reduction in trim scrap waste and operating cost. The magnitude of the yearly savings in using the apparatus and method of the present disclosure can be understood by a typical example in which an existing die pattern comprised of similar kidney-shaped blades arranged in a two by five spaced apart matrix is compared with the two by five nested blade arrangement as disclosed above. With the existing die pattern of spaced apart blades, a total of 1,187.29 square inches of web material per index is required versus a total of 1,047.34 square inches of web material per index of the nested die pattern formed by the blades 20. This results in a difference of 139.954 square inches per index of web material or an 11.78% web material savings. If the package machine is programmed for fourteen indexes per minute times fifty minutes per hour of operation for an eight hour shift times six days per week times fifty weeks per year this results in 3,360,000 indexes per year. At a typical cost of .06 per index, a significant yearly savings of \$201,600 can be realized to underscore the importance of the invention in the packaging industry.

[0033] The cutting station 10 is configured for ease of maintenance when, for example, it is desired to inspect or replace the blades 20 or other operating elements in the cutting head 12. With reference to Figures 2-5, the top plate 14 is pivotally mounted at a front edge relative to the side members 16, 17 by means of hinges 182 and hinge pins 184. Laterally extending handles 186 and U-shaped handles 188 are provided at a rear end of the top plate 14. As seen in Figure 11, a pair of gas ballasted cylinder assemblies 190, 192 is mounted between inner surfaces of the side members 16, 17 and the bottom of the top plate 14. Once fasteners 15 are removed from the top plate 14, a service operator can grasp the handles 186, 188 and pivot the top plate 14 with the blade holder 18 and the upper clamping plate 26 upwardly about the axes of the hinge pins 184. Beveled edges 194 (Figure 11) are formed on the front ends of the side members 16, 17 to facilitate the pivoting motion. In addition, the top plate 14 is provided with eye bolts 196 which can be connected to a lifting device when it is desired to remove the entire cutting head 12 from the cutting station 10.

[0034] The nested blade arrangement of the present disclosure has been found to be particularly useful in certain food and medical product packaging. The present disclosure illustrates the nested arrangement of the blades 20 oriented such that web travel occurs in a direction oriented along lengths of the blades 20. However, the present disclosure contemplates a similar nested arrangement of the blades 20 wherein web travel flows in a direction transverse to the lengths of the blades 20 as depicted in Figure 15. In addition, the present disclosure further contemplates other nested arrangements of blades having other contours than described and illustrated herein which correspond to the desired contours of packages formed and sealed on the packaging machine.

Reference numbers:

2 packaging machine 66 rear shaft

(continued)

	4	forming station	68	transverse support member
	6	loading station	70	mounting plate arrangement
5	8	closing station	72	servo motor
	10	cutting station	74	pulley
	12	cutting head	76	drive gear
	14	top plate	78	belt
10	15	fasteners	80, 82	rear drive levers
	16, 17	side members	84	cam follower
	18	blade holder	86	rear track
	20	cutting blades	88	cam follower
	21	rods	90	rear track
15	22	springs	92	turnbuckle shaft
	24	spring biased devices	94	front follower lever
	26	upper clamping plate	96	cam follower
	28	air valve	98	front track
20	30	pneumatic cylinders	100	rear follower lever
	32, 34	upper support bars	102	cam follower
	36, 38	front upright posts	104	front track
	42	rear upright posts	106, 108	lifting bars
	44, 46	front support blocks	110	rear lower crossbar
25	48, 50	front bearing blocks	112	rear upper crossbar
	52, 54	lower support bars	114, 116	rear wear pieces
	56, 58	rear support blocks	118	front lower crossbar
	60, 62	rear bearing block	120	front upper crossbar
30	64	front shaft	122, 124	front wear pieces
	126	support member	164	rod
	128	lower clamping plate	166	opening
	130, 132	depending sidewalls	168	recesses
	134	bed	170	grooves
35	136, 138	rails	172	upper edges
	139	packages	174	upper planar surface
	140	guide blocks	176	lower planar surface
	142	rods	178	conduit
40	144	recesses	180	bladder
	146	cutting edges	182	hinges
	148, 150	contoured recesses	184	hinge pins
	152	clamping plate	186	laterally extending handles
	154	lower rod casing	188	U-shaped handles
45	156	groove	190, 192	gas ballasted cylinder assemblies
	158	gasket		
	160	extractor plate	194	beveled edges
	162	recess	196	eye bolts

Claims

1. A cutting station for separating a plurality of packages from a continuous chain of sealed packages comprising:

a cutting head having a top plate, a blade holder movably mounted relative to the top plate and formed with a plurality of cutting blades configured in a nested arrangement to form closed curved contours for providing curved cuts in the continuous chain of sealed packages, and an upper clamping plate for receiving the cutting blades; and

a lifting arrangement having a lower clamping plate mounted for movement relative to the upper clamping plate for clamping the continuous chain of sealed packages between the upper clamping plate and the lower clamping plate,

the lower clamping plate being constructed to receive the cutting blades such that the cutting blades cut through the continuous chain of sealed packages to form severed individual sealed packages having contours corresponding to the contours of the blades,

the lower clamping plate being formed with a plurality of recesses configured in a nested arrangement of closed curved contours continuously aligned with and corresponding in shape to the closed curved contours of the cutting blades for receiving the severed sealed packages.

2. The cutting station of claim 1, characterized in that

the top plate includes a plurality of cylinders, and a fluid valve for providing a source of pressurized fluid, wherein, preferably, a bladder is provided between the top plate and the blade holder, and is in fluid communication with the fluid valve and the pressurized fluid to selectively cause movement of the blades relative to the upper clamping plate and the lower clamping plate.

3. The cutting station according to claim 2, characterized in that the upper clamping plate includes a plurality of internal clamping plates surrounded by the cutting blades and connected with fixed portions of the cylinders.

4. The cutting station of claim 3, characterized in that

extractor plates are provided on the bottom surfaces of the internal clamping plates and are connected to movable rods of the cylinders such that the extractor plates push the severed sealed packages through the recesses of the lower clamping plate.

5. The cutting station according to claim 3 or 4, characterized in that the internal clamping plates are provided with gaskets engageable with the continuous chain of sealed packages.

6. The cutting station according to any one of the preceding claims, characterized in that the upper clamping plate is fixed relative to the top plate.

7. The cutting station according to any one of the preceding claims, characterized in that the cutting blades and the recesses are formed with a kidney-shaped contour.

8. The cutting station according to any one of the preceding claims, characterized in that

at least one of the cutting blades has an open crescent shape formed with a mouth, and at least another one of the cutting blades has a closed kidney shape having a rear wall which is nested into the mouth of the at least one of the cutting blades.

9. The cutting station according to any one of the preceding claims, characterized in that

the cutting blades have cutting edges that are movable into and out of blade receiving grooves formed in the lower clamping plate.

10. The cutting station of claim 9, characterized in that

the receiving grooves formed in the lower clamping plate are located outwardly of the recesses.

11. The cutting station according to any one of the preceding claims, characterized in that

spring biased devices are provided between the top plate and the blade holder.

12. The cutting station according to any one of the preceding claims, characterized in that

the upper clamping plate is suspended on rods from the blade holder.

13. The cutting station according to any one of the preceding claims, characterized in that

the lower clamping plate is joined to a pair of sidewalls which are interconnected by a bed adapted to carry a conveyor for receiving the severed sealed packages,

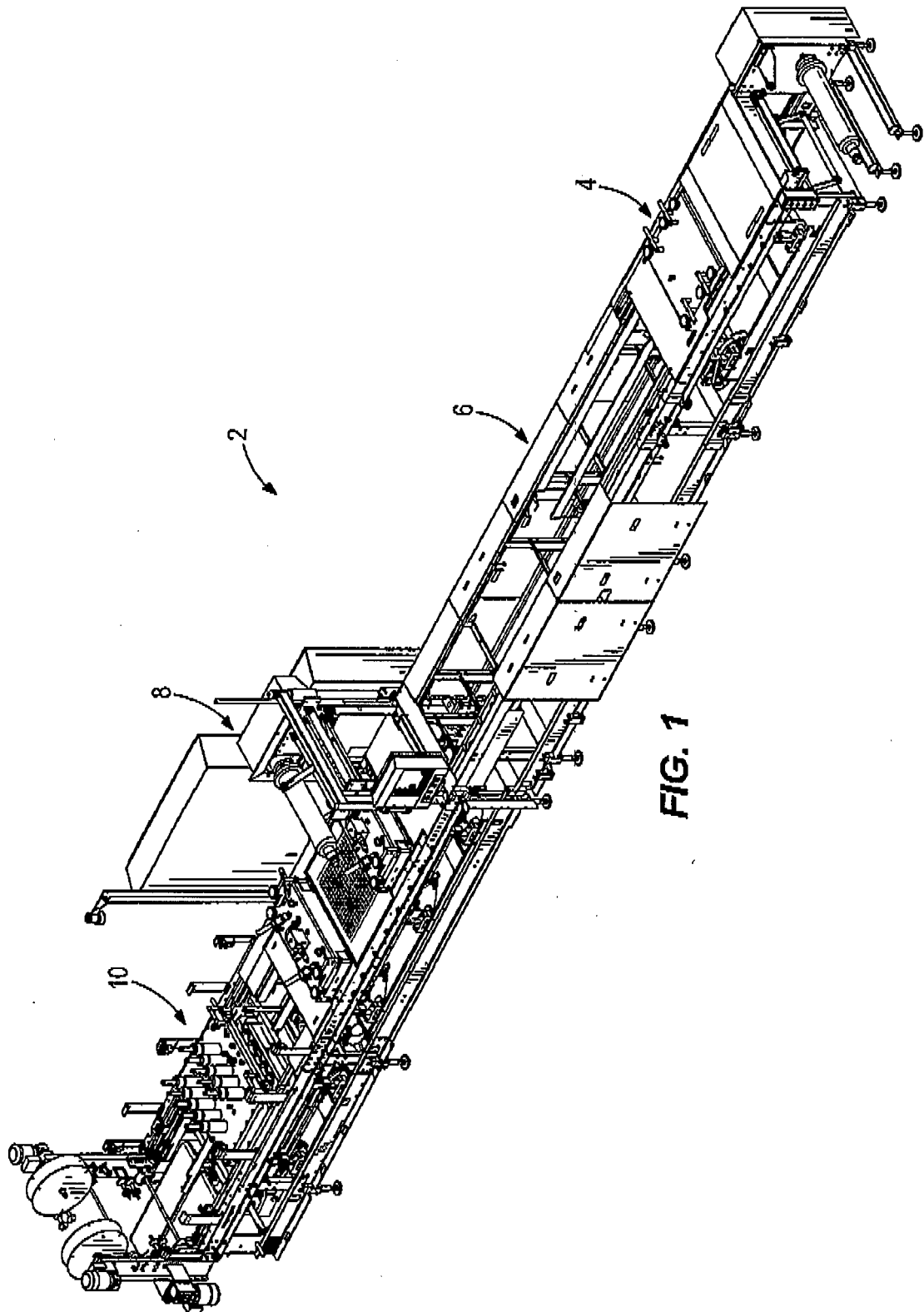
wherein, preferably, the lower clamping plate, the pair of sidewalls, and the bed are movable along the lifting arrangement defined by a four post structure adapted to be fixed within a frame of a packaging machine.

14. Indexing motion packaging machine comprising a web transport conveyor transporting a web of packaging material

through a series of stations including a forming station for forming at least one pocket in the web,
a loading station for placing a product in the pocket,
a closing station for closing and joining the web with another web of packaging material so that the joined webs
form a continuous chain of sealed packages and
a cutting station for separating the continuous chain of sealed packages,
characterized in that
the cutting station is a cutting station according to any one of the preceding claims.

- 15.** A method of operating a cutting station according to claim 10 and, optionally, claims 11, 12, 13, or of an indexing
motion packaging machine according to claim 14.
characterized in that
the method comprises the following method-steps:

- a) positioning the continuous chain of sealed packages between the upper clamping plate and the lower clamping
plate in the open position,
- b) moving the lower clamping plate to the closed position to clamp the chain of sealed packages between the
upper clamping plate and the lower clamping plate such that the sealed packages are received in the recesses,
- c) moving the cutting blades through the upper clamping plate into the blade receiving grooves of the lower
clamping plate to sever the chain of sealed packages into severed individual sealed packages with the closed
curved contours, and
- d) forcing the severed individual sealed packages with the closed curved contours through the recesses of the
lower clamping plate.



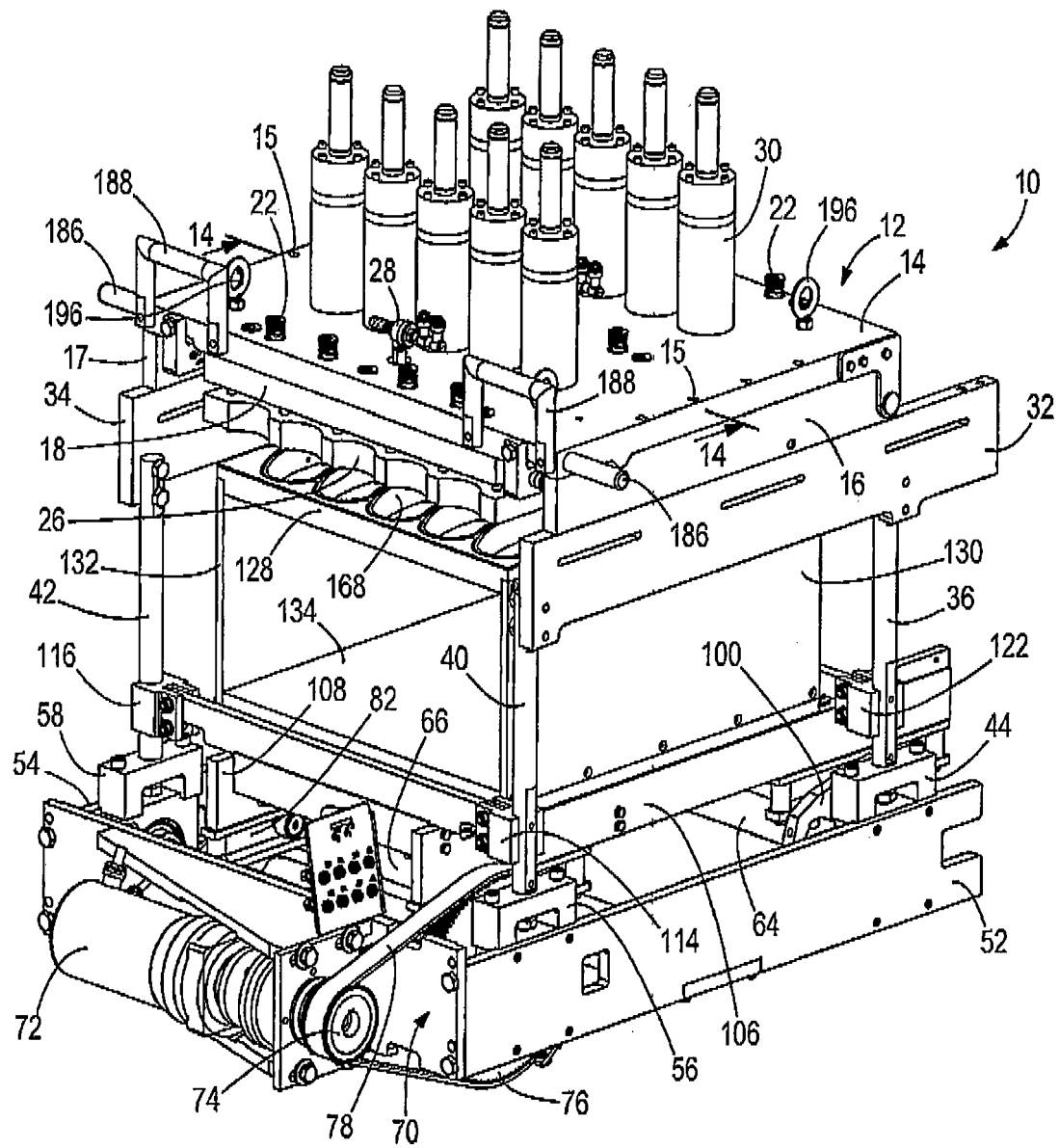


FIG. 2

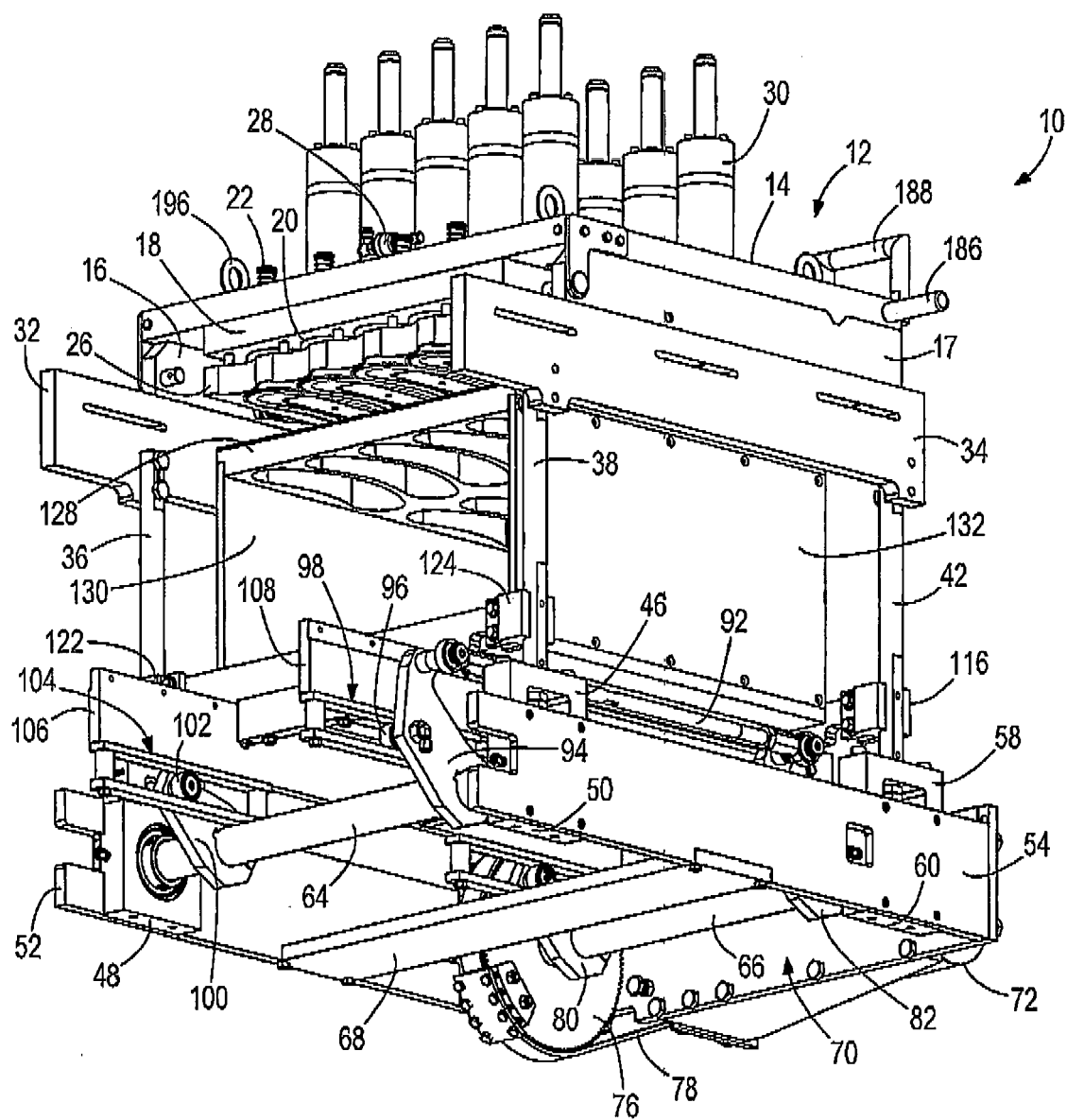


FIG. 3

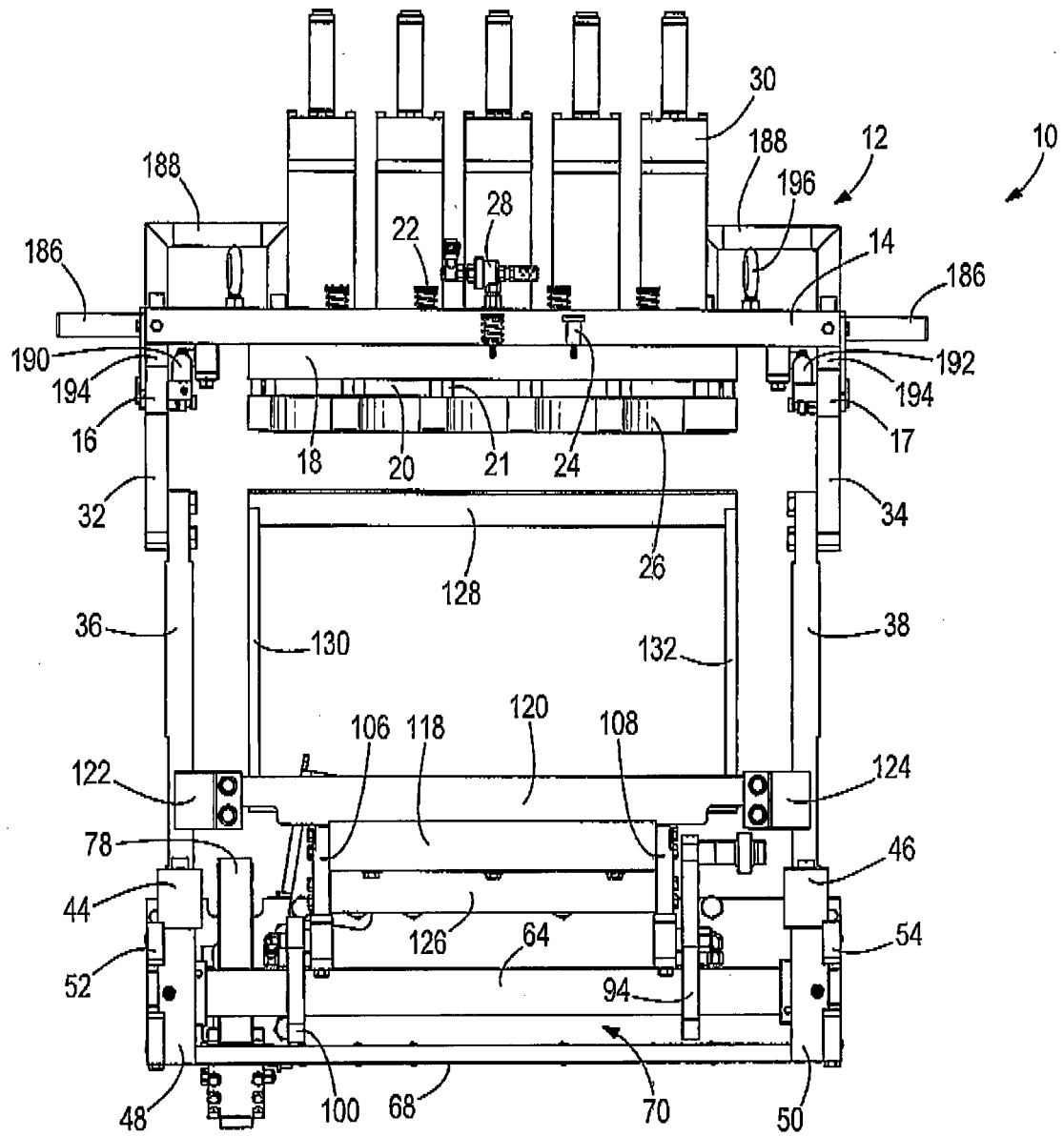
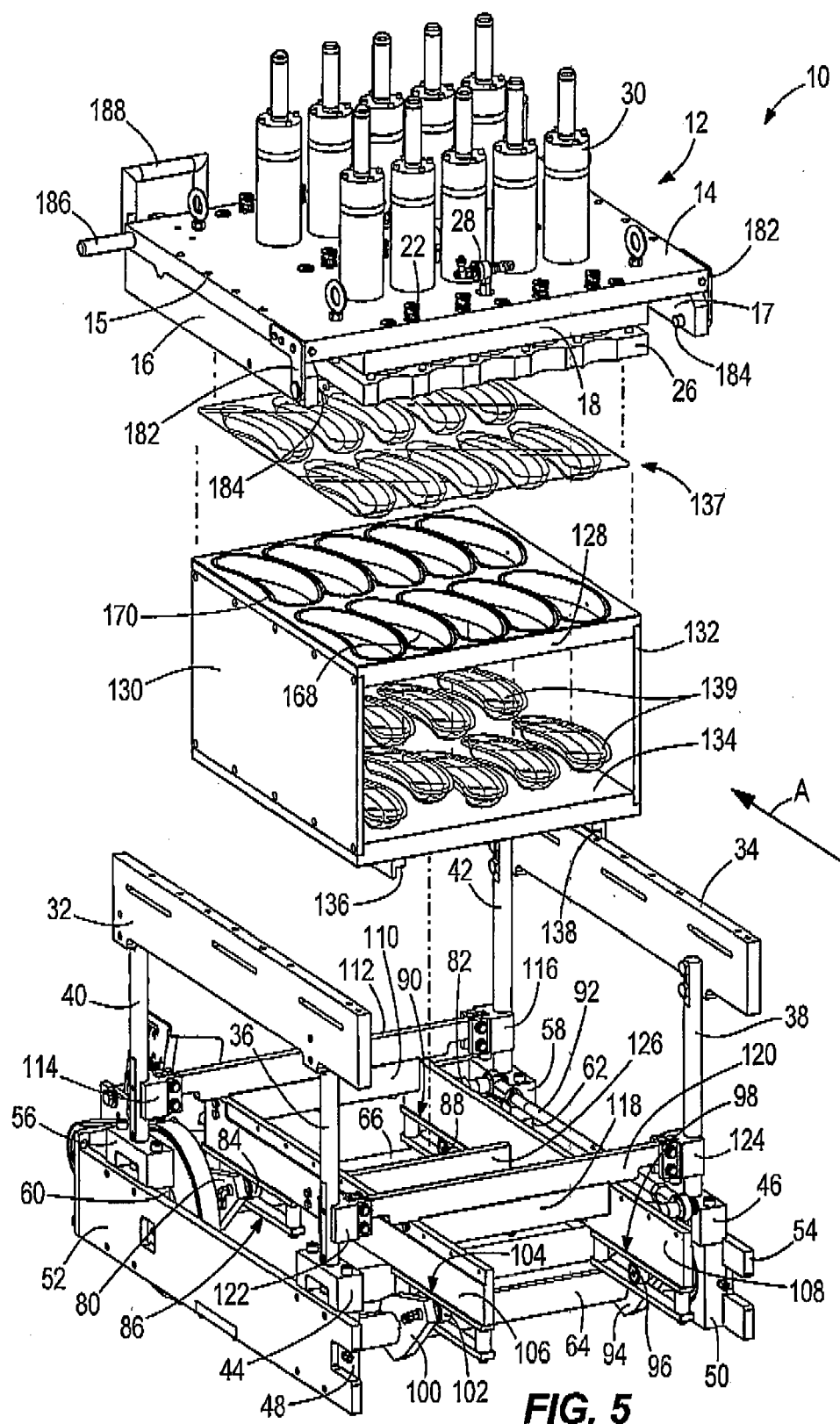


FIG. 4



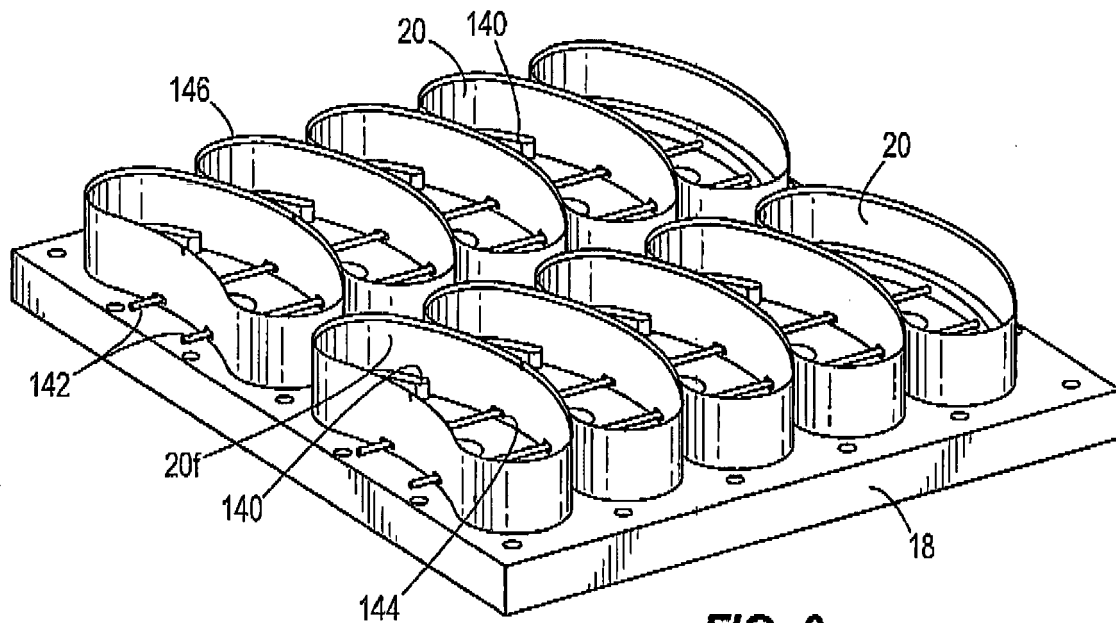


FIG. 6

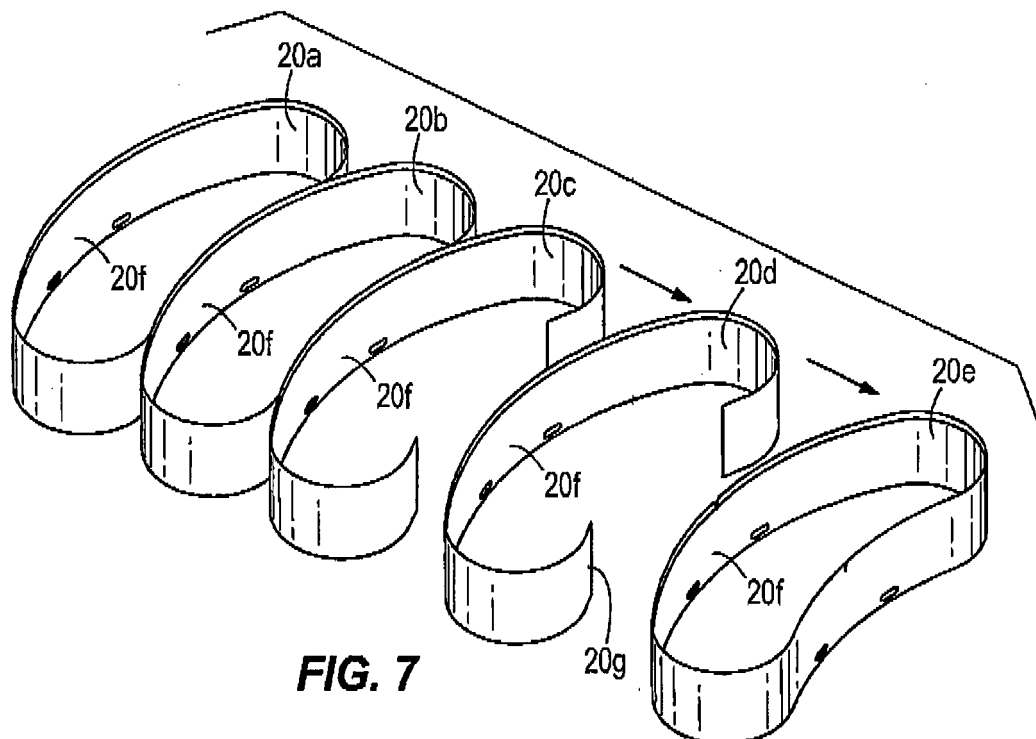


FIG. 7

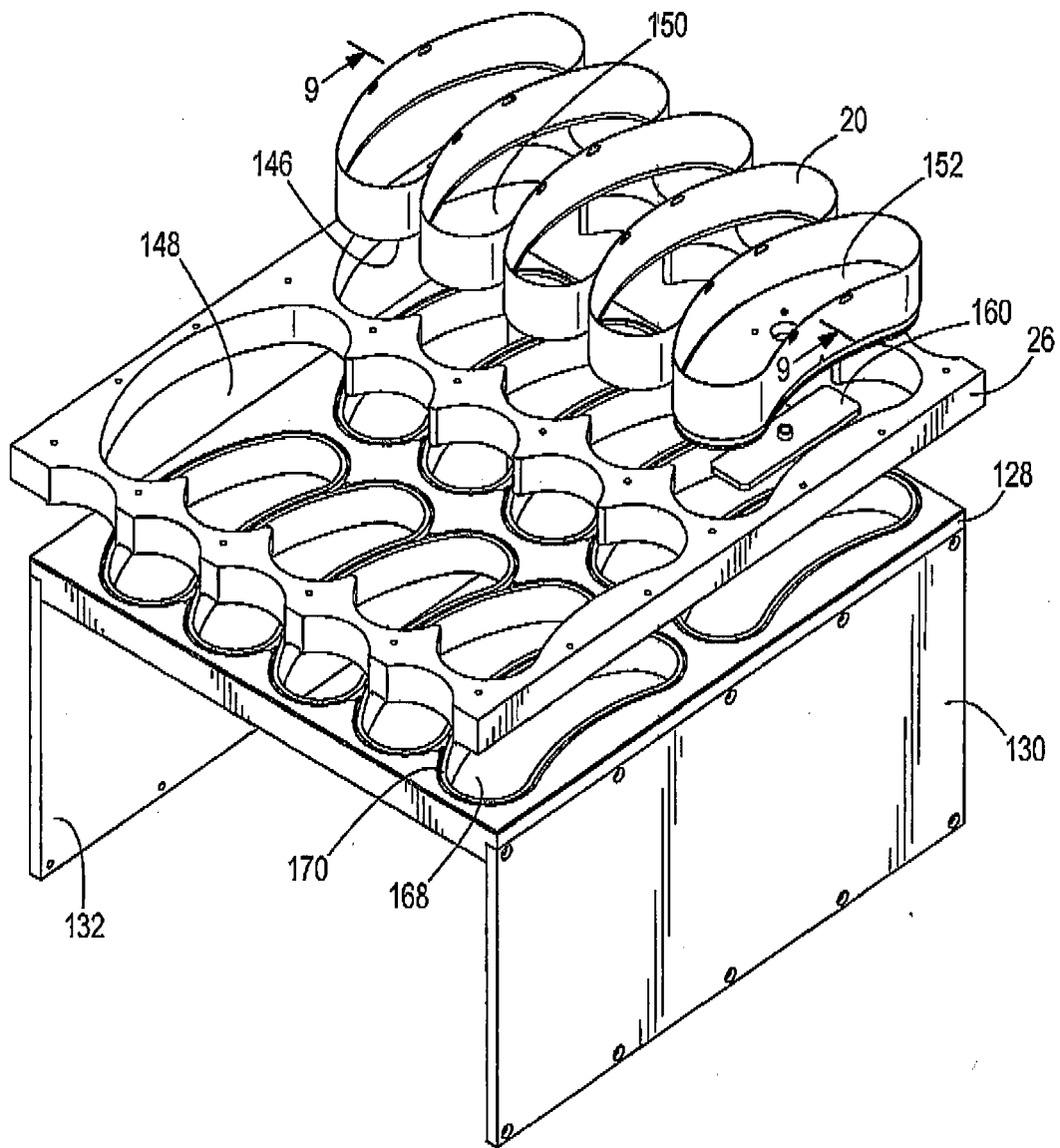
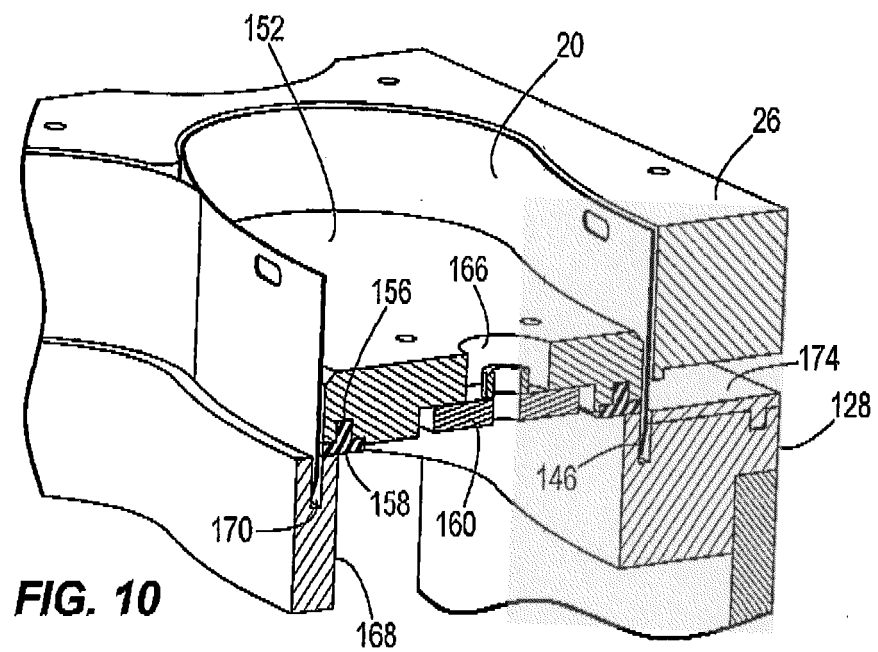
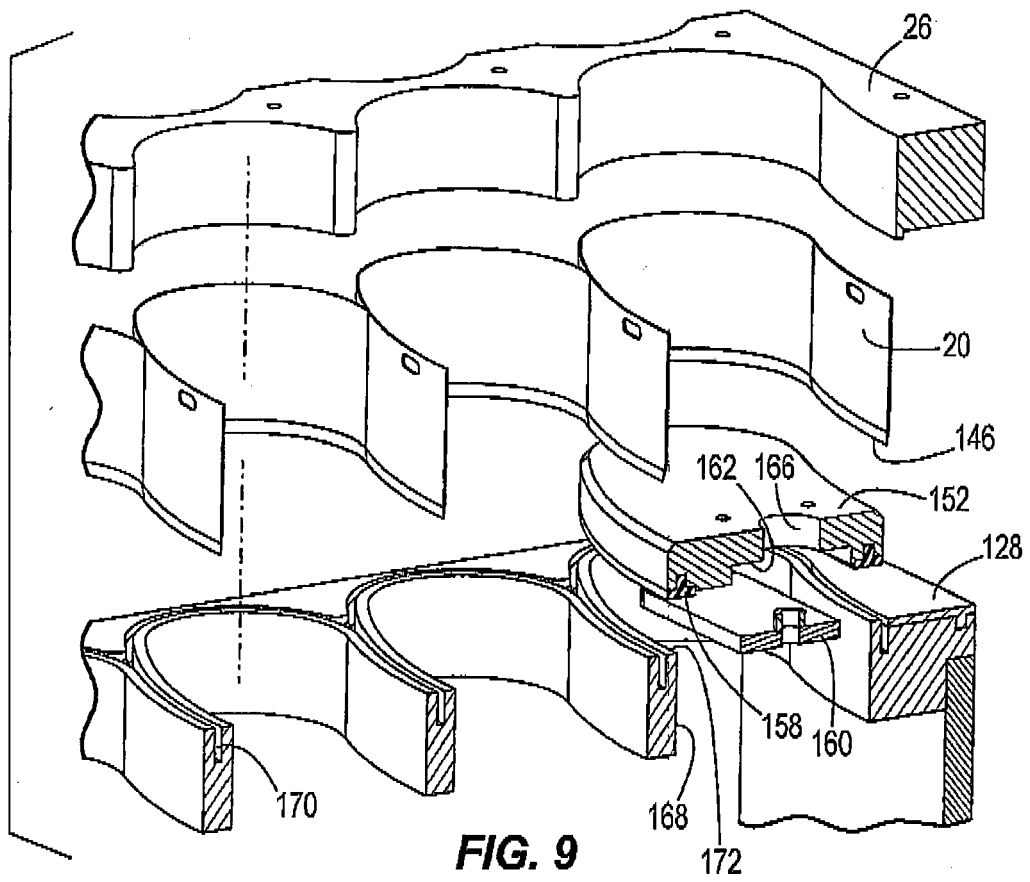
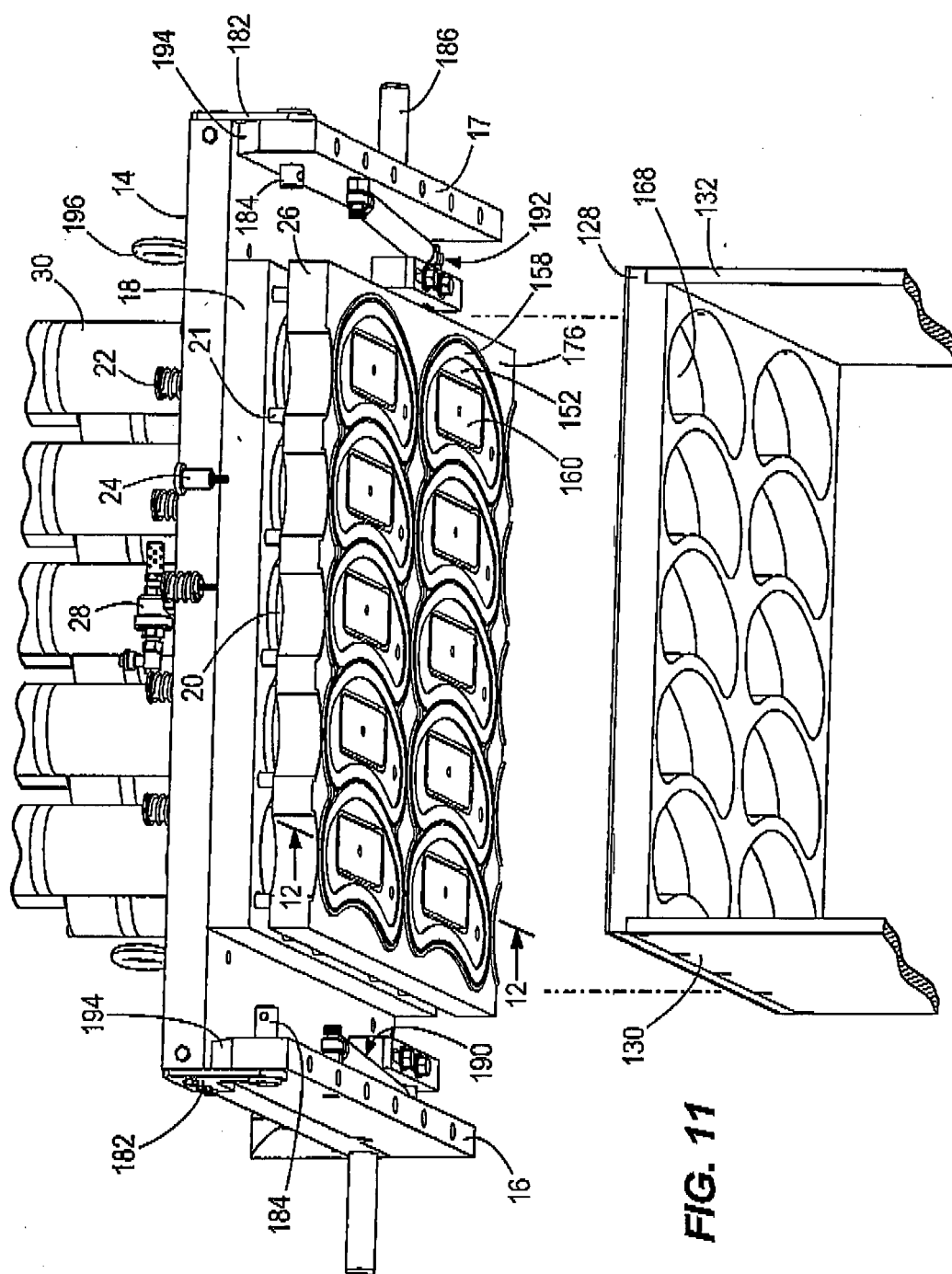


FIG. 8





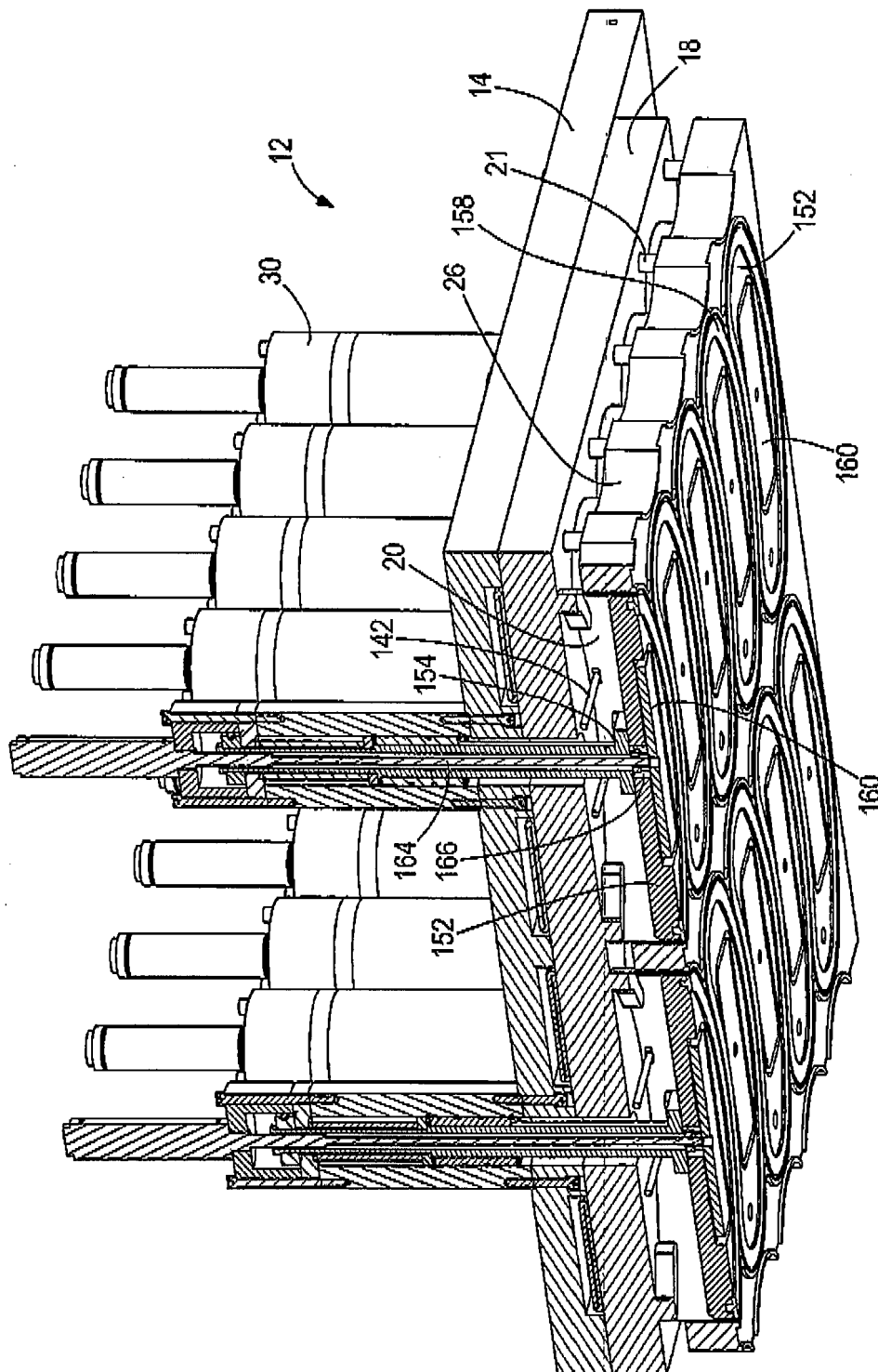


FIG. 12

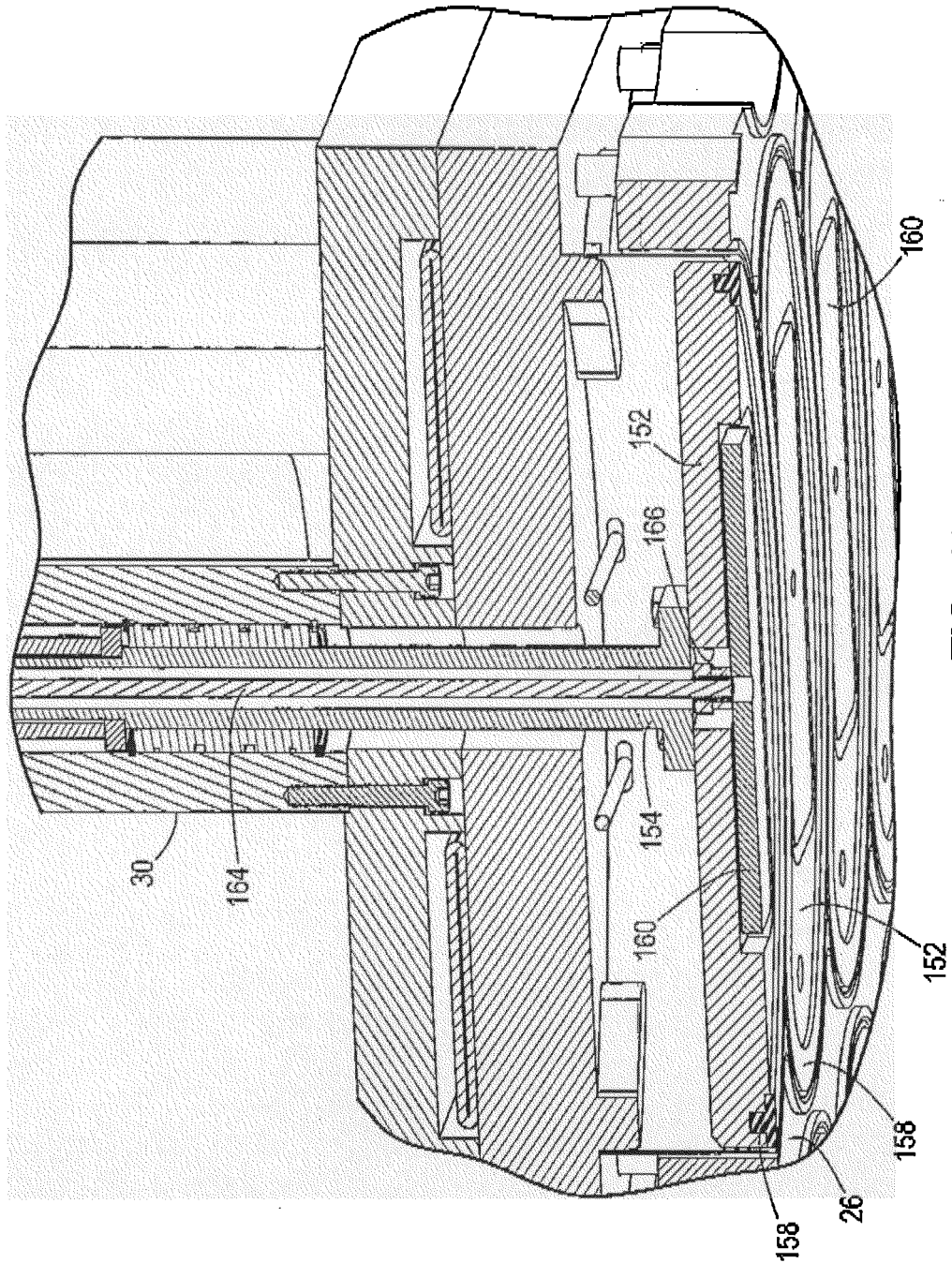


FIG. 13

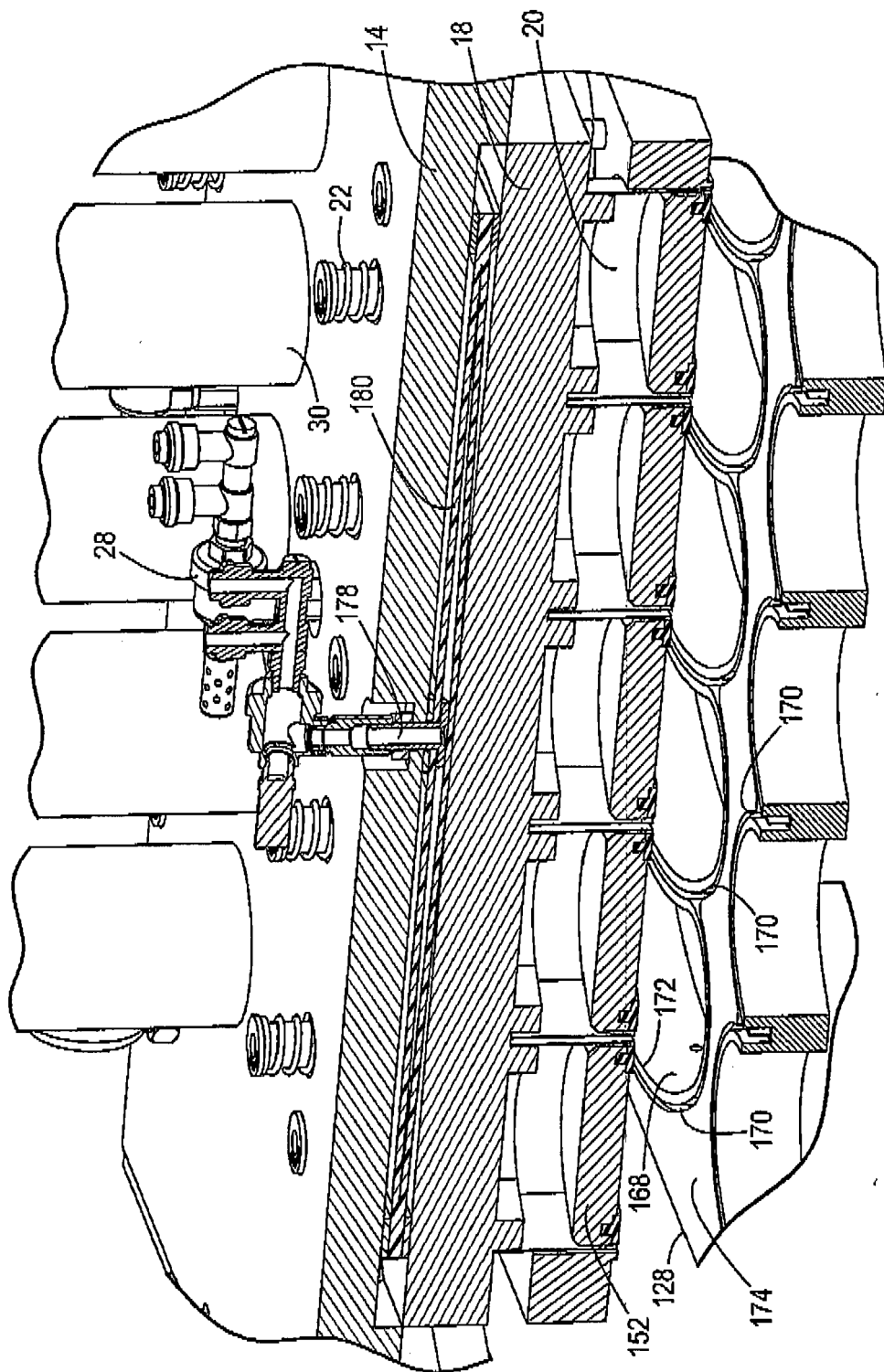


FIG. 14

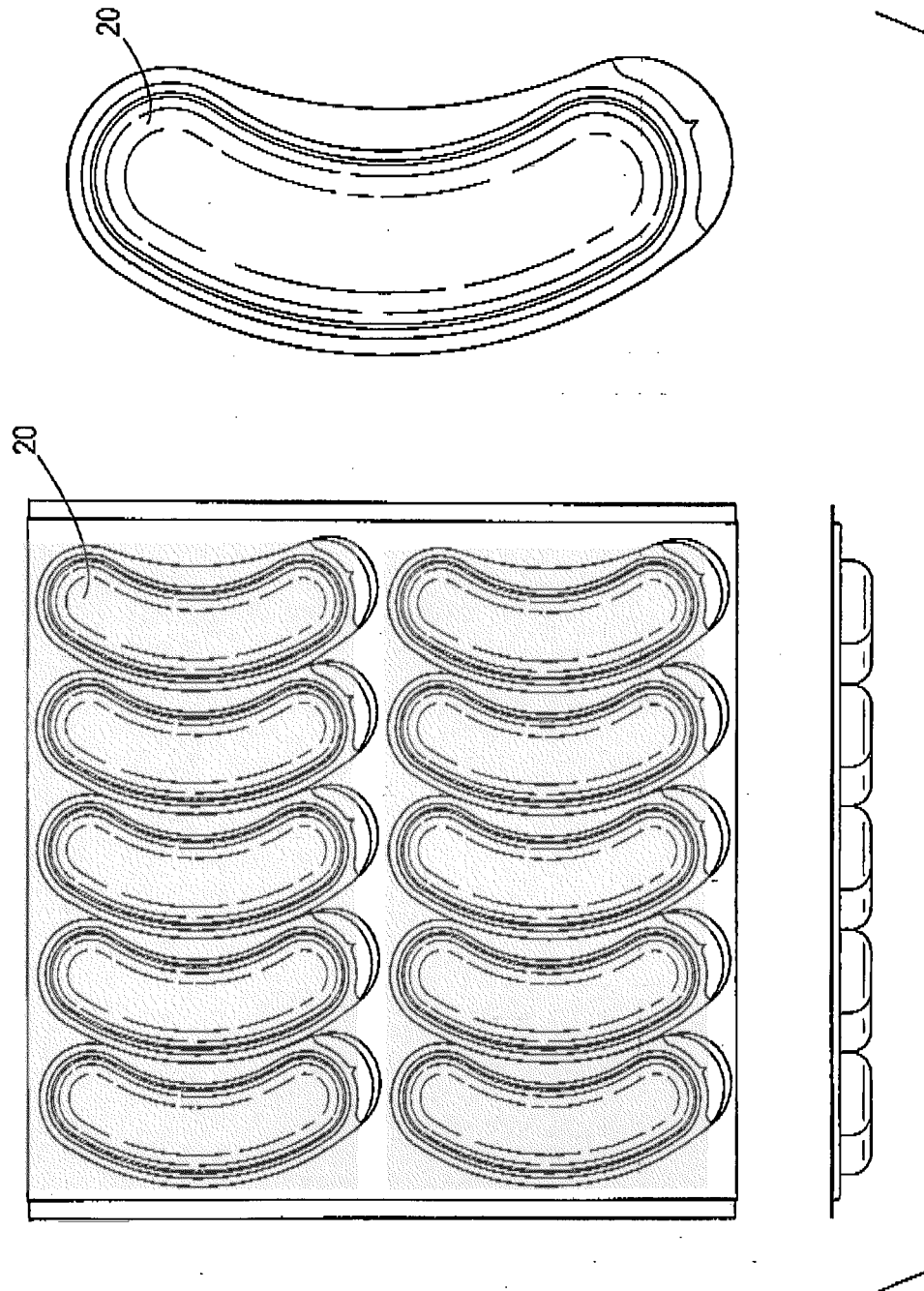


FIG. 15



EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP S54 140379 U (-) 29 September 1979 (1979-09-29) * the whole document *	1	INV. B65B61/06 B26D1/08 B26D5/08 B65B9/04
A	DE 28 53 267 A1 (APPLIC PLASTIQUE MEC ELEC) 24 July 1980 (1980-07-24) * figures *	1-15	
A	US 2003/014945 A1 (DANBY HAL C [GB]) 23 January 2003 (2003-01-23) * figure 1 *	1-15	
A	US 2003/221535 A1 (KRAUS GERALD L [US] ET AL) 4 December 2003 (2003-12-04) * figures *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65B B26D B26F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 1 September 2016	Examiner Lawder, M
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 00 0932

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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01-09-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP S54140379 U	29-09-1979	JP S5711759 Y2 JP S54140379 U	08-03-1982 29-09-1979
DE 2853267 A1	24-07-1980	DE 2853267 A1 FR 2443386 A1 IT 1125801 B	24-07-1980 04-07-1980 14-05-1986
US 2003014945 A1	23-01-2003	CA 2452699 A1 EP 1409346 A1 JP 2005521599 A KR 20040016997 A MX PA04000406 A US 2003014945 A1 US 2004006949 A1 US 2004007588 A1 WO 03008270 A1	30-01-2003 21-04-2004 21-07-2005 25-02-2004 18-03-2004 23-01-2003 15-01-2004 15-01-2004 30-01-2003
US 2003221535 A1	04-12-2003	NONE	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5170611 A [0002]
- US 5205110 A [0002]