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(54) **APPARATUS AND METHODS FOR WRAPPING FOOD PRODUCTS**

VORRICHTUNG UND VERFAHREN ZUM EINWICKELN VON NAHRUNGSPRODUKTEN

APPAREIL ET PROCEDES POUR EMBALLER DES DENREES ALIMENTAIRES

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Description

Field

[0001] Apparatus and methods for wrapping food products are described herein and, in particular, apparatus and methods for wrapping food products in films that are at least partially sealed about the food product.

Background

[0002] One type of packaging for a food product, such as a chocolate, bonbon or other confectionary, is made by wrapping a sheet of film about the food product to form a tube and then twisting the open ends of the tube closed. For some purposes, this type of packaging is adequate and acceptable. However, this type of package is not sealed. Instead, it relies upon the twisting of the ends to keep the package closed.

[0003] As described in EP773163(A1) one type of machinery used for forming this type of unsealed packaging for the food product includes a feed wheel for moving a food product into position beneath a sheet of film. An elevator is provided for lifting the food product and hence the film past a stationary downstream folding bar and a stationary upstream folding bar to fold the film into a U-shaped configuration about the food product. A counter elevator is also provided for supporting the film on the food product during the lifting by the elevator. A pair of grippers can grasp the food product from the top to enable the elevator to retract. A moveable upstream folding bar can be moved toward the stationary downstream folding bar and beneath the food product to cause the depending leading and trailing edge portions of the film to overlap beneath the food product and form an unsecured tube. The grippers can then rotate to advance the food product to where a pair of twisting devices grasp the open ends of the tube and twist the film to enclose the food product. One example of this type of equipment is Model No. CMY55CD, available from Carle & Montanari S.p.A., Rozzano, Italy.

[0004] In order to provide a package that is sealed, a pre-applied adhesive pattern can be applied to the sheet of film prior to wrapping about the food product. The pre-applied adhesive pattern can have one or more adhesive deposits positioned such that opposing edge portions of the film can be pressed together to form a fin seal during the course of forming the tube about the food product. The same or different adhesive deposits can cooperate to form a seal during the twisting of the ends of the food product. Different types of suitable adhesive patterns are described in U.S. Appl. No. 12/408,513, filed March 23, 2009. While the above-described machinery is suitable for forming the unsealed packaging for food products described above, it is not configured for forming the sealed packages using the sheets of film having pre-applied adhesives in high speed commercial production.

[0005] The shape of the food product and the type of food product can also complicate packaging operations. For example, a bonbon may be generally round, but having a flattened bottom and an irregular surface. This shape can make the bonbon difficult to consistently maintain in proper orientation during packaging. Furthermore, the manipulation of the bonbon and contact with surfaces of the equipment can generate chocolate dust, which can impede packaging equipment operation.

Summary

[0006] A method of wrapping a food product is provided that includes positioning a sheet of film over the food product. The method further includes lifting the food product and the film and folding leading and trailing edge portions of the film about the food product using a downstream folding bar and upstream folding bar during the step of lifting the food product and the film, supporting the food product by gripping the food product between an upstream and downstream gripper and moving a sealing bar against the downstream folding bar to seal the leading and trailing edge portions of the film about the food product wherein the step of moving the sealing bar against the downstream folding bar includes biasing the sealing bar relative to the support for the sealing bar to accommodate variations in the size and orientation of the food product during sealing of the leading and trailing edge portions of the film about the food product. The method may-further include twisting open ends of the tube to enclose the tube.

[0007] The method may include supporting the bottom of the food product to lift both the food product and the film. The method may also include supporting the sides of the food product prior to the step of moving the sealing bar against the leading folding bar to seal the leading and trailing edge portions of the film about the food product. The method may include passing the sealing bar beneath at least a portion of the food product during the sealing of the edge portions of the film. The method may also include removing support for the bottom of the food product prior to the step of passing the sealing bar beneath at least a portion of the food product. The method may also include advancing the food product in a downstream direction using the upstream and downstream grippers after the step of moving a sealing bar against the leading folding bar to seal the leading and trailing edge portions of the film about the food product. The method may also include the step of folding lateral sides of the film about the food product when the sealing bar is advancing. The method may also include, biasing the sealing bar relative to a support for the sealing bar to accommodate variations in the size of the food product and/or orientation of the food product during sealing of the leading and trailing edge portions of the film about the food product.

[0008] Equipment for wrapping a food product includes a retractable lift for contacting a bottom of the food product and lifting the food product from a first position to a second position. Also included is a pair of lateral supports

for supporting a sheet of film above the food product in the first position and having a gap between the supports for the food product to pass through. An upstream folding bar and a downstream folding bar are positioned to fold leading and trailing portions of the film about the food product when the food product is lifted from the first position to the second position. The equipment also includes a pair of grippers for contacting sides of the food product with the film thereabout to support the food product in the second position, when the lift is retracted. A sealing bar is provided that is movable against the downstream folding bar and beneath the food product in the second position for sealing the leading and trailing portions of the film together to form a tube about the food product.

[0009] The sealing bar can optionally be spring-biased relative to a sealing bar support and the sealing bar support can be rotatable about a pivot axis to move the sealing bar against the downstream folding member. The grippers can be mounted to arms that are rotatable about the same pivot axis to move the food product with the film thereabout from the second position to a third position whereby a twisting mechanism twists opposing open ends of the tube to enclose the food product in the film. A segmented feed roller can be positioned upstream of the lateral supports for feeding the film to the lateral supports. The lateral supports may be coated with a friction-reducing material to facilitate movement of the film thereover.

[0010] The film may have a pre-applied adhesive pattern in the leading and trailing edge portions such that the adhesive pattern cooperates to form a fin seal following the step of moving the sealing bar against the leading folding bar to seal the leading and trailing edge portions of the film about the food product. The pre-applied adhesive pattern can surround an adhesive- free space that is sized to accommodate the food product and the adhesive pattern does not extend to at least one edge of the film. The film may be twisted on opposite sides of the food product in areas that include the adhesive pattern to form end seals.

Brief Description of the Drawings

[0011]

FIGURE 1 is a diagrammatic view of a sealing station, including a pair of lateral supports for a sheet of film, a lifting device for lifting a food product from beneath the film, an upstream and a downstream folding bar, a pair of upper grippers and a sealing bar, showing the food product in a first position beneath the sheet of film supported by the pair of lateral supports;

FIGURE 2 is a diagrammatic view of the sealing station of FIGURE 1, showing the lifting device lifting the food product to a second position to fold the film using the folding bars into an inverted U-shape about the food product;

FIGURE 3 is a diagrammatic view of the sealing station of FIGURE 1, showing the grippers moving to support the food product;

FIGURE 4 is a diagrammatic view of the sealing station of FIGURE 1, showing the lifting device retracting, the food product supported by the grippers, and the sealing bar moving toward the downstream folding bar to seal leading and trailing edge portions of the film together to form the film into a tube about the food product having a fin seal;

FIGURE 5 is a diagrammatic view of the sealing station of FIGURE 1, showing the sealing bar retracting, the grippers moving the tube with the food product therein away from the sealing station;

FIGURE 6 is a diagrammatic view of the food product and film during the steps associated with wrapping of the food product in the film;

FIGURE 7 is a schematic view of a pre-applied adhesive pattern on one of the sheets of film suitable for use in wrapping the food product;

FIGURE 8 is a perspective view of the sealing station represented diagrammatically in FIGURE 1, showing a turret rotatable about a pivot axis and having multiple grippers mounted thereon for rotation, as well as an arm for supporting the sealing bar and also rotatable about the pivot axis, with a sheet in-feed area disposed beneath a cover;

FIGURE 9 is a perspective view of the sealing station of FIGURE 8, showing the cover removed to depict the sheet in-feed area;

FIGURE 10 is a bottom plan view of the sealing bar of FIGURE 8;

FIGURE 11 is a top plan view of a roller, a first plate and a second plate associated with the sheet in-feed area;

FIGURE 12 is a top plan view of a third plate corresponding to the lateral supports depicted diagrammatically in FIGURE 1; and

FIGURE 13 is a perspective view of a film unwind station positioned upstream of the sheet in-feed area.

Detailed Description

[0012] Apparatus and methods are provided for forming a sealed package about a food product. While any suitable type of food product can be contained in the sealed package, the apparatus and methods are particularly suitable for use with confectionaries, such as candies, chocolates and bonbons, including generally round confectionaries. Unlike conventional apparatus and methods, described above, for wrapping a film around a food product, a sheet of film having a pre-applied adhesive is wrapped around the food product. The adhesive is positioned on the film so that a fin seal is formed between leading and trailing edge portions of the film in the course of forming a tube about the food product. In order

to form the fin seal, a sealing bar is pressed against a downstream one of a pair of folding bars when the film is partially wrapped around the food product in an inverted U-shape to press opposing sealing zones of the film together between the sealing bar and the downstream folding bar. Adhesive is also positioned on the film so that during the twisting of the open ends of the tube to enclose the food product a seal is formed at each end.

[0013] To form the wrapper, and with reference to FIGURE 6, a sheet of film 10 is cut from a spool of film (not shown), as is conventional in the art. The cut sheet of film 10 is advanced through a sheet in-feed until it is disposed above the food product 12 in a first position. The food product 12 is moved into its first position using a food product wheel (not shown), as is known in the art. The food product 12 is then lifted to a second position, elevated from the first position. By virtue of lifting the food product 12, the overlying sheet of film 10 is also lifted. During the course of lifting the food product 12 to the second position, leading and trailing edge portions 10a and 10b of the film 10 are folded downwardly about the food product 12 such that the film 10 is in an inverted U-shape. Next, the leading and trailing edge potions 10a and 10b of the film 10 are pressed together while the food product is in the second position. Due to the pre-applied adhesive pattern on the film 10, pressing together the leading and trailing edge portions 10a and 10b of the film 10 forms a tube 10c having a fin seal 10d and disposed about the food product 12. As the tube 10c is advanced, this fin seal 10d folds against the portion of the tube 10c beneath the food product 12. Finally, the open ends of the tube 10c are twisted to form a twist closure 10f on either side of a food compartment 10e. Due to the pre-applied adhesive pattern, a seal is also form between each twist closure 10f and the food compartment 10e. Accordingly, a sealed food compartment 10e is formed.

[0014] Turning now to the equipment used to enclose the food product 12 in the film 10, a sealing station generally includes a pair of lateral supports 32 for supporting the cut sheet of film 10 above the food product 12 in its first position, as illustrated in FIGURE 1. A lifting device 14, such as an elevator, is disposed beneath the food product 12 and can move upward to lift the food product 12 and hence the film 10 overlying the food product. A counter-elevator 15, illustrated in FIGURE 8 and as provided with the aforementioned Carle & Montanari machinery, can be brought into contact with the top of the food product 12, with the film 10 therebetween, to support the food product 12 and the film 10 as they are being lifted by the lifting device 14. The use of the lifting device 14 on the bottom of the food product 12 and the counter-elevator 15 on the top of the food product 12 can hold the food product 12 therebetween in a secure manner. Securely holding the food product 12 and film 10 is particularly advantageous when the food product 12 is rounded in shape, as the film 10 can tend to slide off of a preferred orientation on the food product 12 unless sufficiently held in place, which is particularly important when the food product 12 is to be aligned with an adhesive pattern on the film 10.

[0015] The sealing station also includes a stationary upstream folding bar 16 and a stationary downstream folding bar 18. The folding bars 16 and 18 include portions that are positioned to contact the leading and trailing 10a and 10b edge portions of the film 10 when the film 10 is lifted upwardly during the course of moving the food product 10 from the first position to the elevated second position, as illustrated in FIGURE 2. The folding bars 16 and 18 are preferably formed from a material and have a configuration that permits ready sliding of the film 10 there past during the folding of the film 10. For instance, the folding bars 16 and 18 preferably lack any sort of vacuum device which could become increasingly blocked during use and necessitate a high cleaning frequency due to the material of the food product 12, such as chocolate dust from a bonbon.

[0016] In order to fold the film 10, the lifting device 14 lifts the food product 12 by contacting the underside of the food product 12. Because the film 10 is disposed above the food product 12 and initially supported on the lateral supports 32, upward movement of the food product 12 from its first position toward its second position will cause the overlying film 10 to also move upwardly. During upward movement of the food product 12 using the lifting device 14, the trailing edge portion 10b of the film 10 contacts the upstream folding bar 16 and the leading edge portion 10a of the film 10 contacts the downstream folding bar 18 to cause the film 10 to fold about the food product into an inverted U-shape, as illustrated in FIGURE 2, with the leading and trailing edge portions 10a and 10b of the film 10 depending on the upstream and downstream sides, respectively, of the food product 12.

[0017] The sealing station also includes a pair of grippers 20. The grippers 20 are positioned to contact the front and rear food product 12 (via the intermediary film 10) to grasp the food product 12 therebetween, as illustrated in FIGURE 3. The grippers 20 are positioned so that the lifting device 14 can be withdrawn back to its initial position, thereby leaving the underside of the food product 12 unsupported. Preferably, the grippers 20 are each attached to a respective arm 34 that extends upwardly when the food product 12 is in the second position and pivot about a central axis 44 of the equipment, as will be described in greater detail herein.

[0018] The sealing station further includes the sealing bar 22. The sealing bar 22 is attached in a biased manner relative to a sealing bar support 24, as will be described in greater detail herein. The sealing bar support 24 is in turn mounted to an arm 26 that pivots about the central axis 44 of the equipment. Once the lifting device 14 is sufficiently removed from beneath the food product 12, the sealing bar 22 is moved beneath the food product 12 to press the depending leading and trailing edge portions 10a and 10b of the film 10 together, as illustrated in FIGURE 4, while the food product 12 is supported by the

grippers 20. More specifically, the sealing bar 22 contacts the trailing edge portion 10b of the film 10 and presses it against the leading edge portion 10a of the film 10 and presses both against a backstop 30 of the upstream folding bar 18. Due to the pre-applied adhesive pattern on the film 10, the leading and trailing edge portions 10 and 10b of the film 10 are then sealed together to form the fin seal 10d, resulting in the tube 10c disposed about the food product 12.

[0019] After the fin seal 10d has been formed in the film 10 about the food product 12, the sealing bar 24 rotates back away from the downstream fold bar 18 and the grippers 20 holding the food product 12 within the tube 10c rotate in a downstream direction, as illustrated in FIGURE 5. As the tube 10c is rotated, the fin seal 10d will contact the backstop 30 of the downstream folding bar 18 and be folded thereby to a position disposed beneath the food product 12 and against the tube 10c. While this is occurring, a next sheet of film 10 is advanced to the lateral supports 32 and another food product 12 is moved into the first position beneath the next sheet of film 10 and the process repeats itself. The grippers 20 continue to rotate the food product 12 within the tube 10c to a twisting station, whereby a pair of twisting mechanisms each grab an open end portion of the tube 10c and rotate to twist the tube 10c to form a pair of twists 10f on either side of a food compartment 10e. The pre-applied adhesive pattern on the film 10 is preferably such that the formation of the twists 10f adheres facing portions of the film 10 together to form end seals on opposite sides of the food compartment 10e. The end seals at the twists 10f and the fin seal 10d combine to sealingly enclose the food compartment 10e and the food product 12 therein.

[0020] Turning now to more details of the sealing station 10, the pair of grippers 20 are rotatable about the central axis 44, as illustrated in FIGURE 8. Furthermore, four such pairs of grippers 20 and attached arms 34 are provided as part of a rotating turret. Also rotating about the central axis is the sealing bar 22, via the connection with the sealing bar support 24 and the arm 26, as also illustrated in FIGURE 8. This arrangement permits the sealing bar 22 to be substituted in place of the moveable upstream folding bar of the aforementioned Carle & Montanari equipment, while advantageously retaining the same drive mechanism. This permits existing machinery used to wrap food products in non-adhesive film to be readily adapted to accommodate film with the pre-applied adhesive pattern principally by substituting the sealing bar 22 for the existing upstream folding bar and providing the downstream sealing bar with sufficient area for the sealing bar 22 to press against during sealing of the film.

[0021] The in-feed station, disposed under a cover in FIGURE 8 but depicted with the cover removed in FIGURE 9, includes a series of plate and a roller positioned to feed the sheets of film 10 to the lateral supports 32. More specifically, the in-feed station includes a first plate 46 disposed upstream from a roller 48. The roller 48 includes a plurality of grooves 50, and preferably six grooves such that seven segments of the roller 48 are present, as illustrated in FIGURE 11. Downstream of the roller 48 is a second plate 52 having integrated fingers 54 extending upstream and at least partially through the grooves 50 of the roller 48. Downstream of the first and second plates 46 and 52 is a third plate 56 having a pair of fingers 58 extending downstream for providing the lateral supports 32, as illustrated in FIGURE 12. The fingers 58 are spaced by a gap 60 that is sized to permit the food product 12 to pass therethrough when moved from the first position to the second position by the lifting device 14.

[0022] Upstream of the in-feed station is an unwind station 70, illustrated in FIGURE 13, which unwinds a web 9 from a roll of film (not shown). A plurality of rollers or dancers 72 are provided for tensioning the web 9 as it is unwound. The web 9 is fed through downstream rollers 76. As the web 9 transitions from the rollers 72 to the downstream rollers 76, a web plate 74 is positioned to contact the web 9 for applying tension thereto and guiding prior to the downstream rollers 76.

[0023] Each of the plates 46, 52, 56 and 74 is preferably configured for reducing the coefficient of friction between the plates 46, 52 and 56 and the sheet of film 10 to permit the film 10 to readily be advanced thereon (or web 9, in the case of the web plate 74). This is particularly important due to the pre-applied adhesive on the underside of the web 9 and thus the film 10, which can cause the film 10 to not readily slide along the plates 46, 52, 56 and 74. The configuration of the plates 46, 52, 56 and 74 can include raised ridges and/or a surface treatment, such as plasma treatment, PlasmaCoat (available from Impreglon Italia srl, Origgio, Italy), Teflon coating or other such friction-reducing methods and materials.

[0024] Due to variations that exist in the outer dimensions of the food product 12, the depending leading and trailing edge portions 10a and 10b are not always be spaced the exact same distance apart. Furthermore, the food product 12 and hence the edge portions 10a and 10b of the film 10 are not always in the same precise location of relative to the backstop 30 of the downstream folding bar 18. To accommodate these variations while being able to apply sufficient pressure to cause the seal to form between the pre-applied adhesive portions of the edge portions 10a and 10b of the film, the sealing bar 22 is biased from the sealing bar support 24 using springs. A pair of spring mounts 64 are disposed on the underside of the sealing bar support 24, as illustrated in FIGURE 10. The spring mounts 64 each have a through bore with a bolt 66 extending therethrough. A spring 68 is positioned about the end of the bolt 66 extending through the bore and between the mount 64 and the sealing bar 22 to bias the sealing bar 22 from the sealing bar support 24. The sealing bar support 24 also includes a pair of inverted U-shaped loops 28 on its upper-facing side. The U-shaped loops 28 are formed from bent bolts, the threaded ends of which extend through apertures in the sealing bar support 24 and are secured using nuts 62. The U-shaped loops are rotatable about their threaded

ends and are positioned to assist in folding the film 10 about the lateral sides of the food product 12 during the advancement of the sealing bar 22. This can advantageously assist in ensuring sufficient alignment of the leading and trailing edge portions 10a. and 10b of the film 10 and the pre-applied adhesive thereon during the formation of the fin seal 10d.

[0025] In an exemplary embodiment, the film 10 has the pre-applied adhesive 36 disposed in a pattern that surrounds an adhesive-free space 42 that is sized to accommodate the food product 12. The adhesive 36 preferably, though not necessarily, does not extend to at least one edge of the film 10 and, optionally, all edges of the film 10. Portions of the adhesive 36 contact other portions of the adhesive such that the sheet of film 10 can be wrapped to encapsulate the food product 12, and the film 10 is twisted in at least one area, and preferably two areas, that includes the adhesive 36. By one approach, the adhesive pattern 36 is at least partially arcuate in shape. By another approach, the adhesive pattern 36 is substantially oval-shaped. The sheet of film 10 may be folded about the food product 12 to form a folded edge or fin seal 10d. So configured, food products 12 may be economically and efficiently wrapped, shipped, and offered to the consumer in packaging that resembles the traditional packaging appearance of such food products 10. Such sealing may be hermetic or close to hermetic, thereby affording the food product 12 improved shelf life without the need for an additional, secondary package. At the same time, the resemblance to the typical double-twist package can be maintained.

[0026] The pattern of adhesive 36 can be substantially oval-shaped, as illustrated in FIGURE 7. The pattern of adhesive 36 may be approximately 10 mm to approximately 25 mm in width. By one approach suitable for many application settings of interest, the pattern is approximately 15 mm in width. As will be well understood by those skilled in the art, the width of the adhesive 36 may vary based on factors such as the desired tightness of the seal or the amount and/or size of the food product 12 disposed within the sheet of film 10. For instance, a smaller-sized food product may require a smaller width of adhesive, while a large-sized food product or a plurality of food products may require a larger width of adhesive. The pattern of adhesive 36 may also optionally include one or more additional areas of adhesive 38 on the outer edges of the pattern of adhesive 36. The additional areas of adhesive 38 may provide another sealing point to increase the sealing area and thus the effectiveness (and hermeticity) of the seal. By one approach, these additional areas of adhesive 38 are substantially shaped as half circles. The additional areas of adhesive 38 may be approximately 3.5 cm^2 to 5 cm^2. Generally speaking, additional areas of less than approximately 2 cm^2 do not noticeably increase the strength or integrity of the seal, while additional areas of greater than 6 cm^2 typically results in wasted adhesive without additional benefit. By one approach, additional areas of adhesive substantially-shaped as half circles with areas of approximately 4.35 cm^2 may be used. By another approach, one or more second additional areas of adhesive 40 may be placed in one or more corners of the sheet of film 10. These second additional areas of adhesive 40 enhance the twist-wrapping process by providing another area that seals when pressure is applied by the twist. Those skilled in the art will recognize that different shapes may be used in other approaches to maximize the seal strength and integrity in the same manner as described here.

[0027] Regardless of the particular pattern of adhesive 36 employed, the pattern defines the adhesive-free space 42 that is sized to accommodate the food product 12. The size of the adhesive-free space 42 will vary in relation to the pattern of adhesive 36, and the shape, size, and/or quantity of food product 12 to be wrapped. The adhesive-free space 42, however, preferably should be sized such that the pattern of adhesive 36 does not contact the edible substance when wrapped. By one approach, an oval-shaped pattern of adhesive 36 defines an adhesive-free space 42 that is approximately 55 cm^2 to 62 cm^2 in area. As a more specific, non-limiting example of interest, the oval-shaped pattern defines an adhesive-free space 42 of approximately 58.8 cm^2 in area.

[0028] The sheet of film 10 may be comprised of any material suitable for wrapping food products. For example, it may comprise a barrier film or coating with a high level of impermeability to moisture ingress to preserve the freshness of the edible substance contained within it. The level of impermeability that is acceptable will vary based upon the food product contained within the sheet of film, as well as the ratio of packaged surface area of a product to volume of the product. Impermeability may be measured, for instance, using the water vapor transmission rate of ASTM (American Society for Testing and Materials) test method F1249-90, measured at 38°C and 85% relative humidity. By one approach, a barrier film with a water vapor transmission rate of less than about 1 $mg/m^2/day$ is used to wrap a product such as a bonbon. However, where a product larger than a bonbon is wrapped, or where the product has a lower surface area to volume ratio, a water vapor transmission rate as high as 5 $mg/m^2/day$ may be acceptable. By another approach, a product that is fairly insensitive to moisture may tolerate a water vapor transmission rate of about 10 $mg/m^2/day$ or higher. The sheet of film 10 may optionally also be comprised of a material with dead fold characteristics. Dead fold is a term used to describe the ability of a material to take and hold a fold without springing back to its original form. Materials may be used that cover a spectrum of dead fold properties. For instance, aluminum foil has excellent dead fold capabilities while polypropylene has little to no dead fold. Those skilled in the art will appreciate that the material selected will vary based upon the objectives to be achieved.

[0029] These barrier films or coatings may be monofilms, laminates, waxes, paper, cast films, biaxially-oriented polyester films, biaxially-oriented polypropylene

films, high-density polyethylene (HDPE) films, low-density polyethylene (LDPE) films or the like. The type of barrier used may be product-dependent. A laminate may also serve a decorative function in addition to (or in place of) a barrier function. In one embodiment, the film 10 comprises a metallic laminate.

[0030] The adhesive may be any known in the art, such as a cold-sealing adhesive, a heat-sealing adhesive, a pressure-sensitive adhesive (permanent or non-permanent), and the like. For the purposes of this illustrative example, and without intending any limitations in these regards, it will be presumed here that a cold-sealing adhesive is used. The cold-sealing adhesive may be natural latex rubber-based or synthetic. Using synthetic adhesive avoids complications arising from latex allergies if there is contact with the food product; however, either type of cold-sealing adhesive is acceptable. The cold-sealing adhesive is pressure-responsive (i.e., the adhesive will bond when placed under pressure), and may comprise an adhesive component and an elastomer as well as other additives. By one approach, the adhesive may comprise a reclosable adhesive. Cold-sealing adhesives comprising a relatively high rubber content and a relatively low polymer content may be especially useful for certain application settings of interest. As will be well understood by those skilled in the art, the application of the adhesive to the discrete sheet will vary depending upon the type of adhesive used. By one approach, a cold-sealing adhesive is disposed upon the discrete sheet through use of a disposing film with release properties or by applying a release material on the disposing film itself. By one approach, about 1 g/m^2 of release material may be used. The weight of adhesive applied per area may also vary. By one approach, the weight of adhesive per area may be about 1.5 g/m^2 or about 2.5 g/m^2 to about 8 g/m^2. By another approach, the weight of adhesive per area may be about 4 g/m^2 to about 6 g/m^2.

[0031] Where a reclosable adhesive is desired, a primer may be applied to part or all of the flexible film prior to applying the cold seal adhesive. By one approach, about 0.2 g/m^2 of primer is applied. By another approach, a flame or corona treatment is carried out on the flexible film prior to applying the cold-sealing adhesive. Both approaches improve anchorage of the seal, ensuring that the cold seal adhesive suitably bonds to the flexible film. The reclosability of the adhesive may also be modified from fully reclosable, to partially reclosable, to not reclosable at all.

Claims

1. A method of wrapping a food product (12), the method comprising:

positioning a sheet of film (10) over the food product (12), the film (10) having leading and trailing edge portions (10a, 10b);

lifting the food product (12) and the film (10);

folding the leading and trailing edge portions (10a, 10b) of the film (10) about the food product (12) using a downstream folding bar (18) and an upstream folding bar (16) during the step of lifting the food product (12) and the film (10);

supporting the food product by gripping the food product between an upstream and a downstream gripper; and

moving a sealing bar (22) against the downstream folding bar (18) to seal the leading and trailing edge portions (10a, 10b) of the film (10) about the food product (12), wherein the step of moving the sealing bar (22) against the downstream folding bar (18) includes biasing the sealing bar (22) relative to a support (24) for the sealing bar (22) to accommodate variations in the size and orientation of the food product (12) during sealing of the leading and trailing edge portions (10a, 10b) of the film (10) about the food product (12).

2. The method of claim 1, wherein the step of lifting the food product (12) and the film (10) includes supporting the bottom of the food product (10) to lift both the food product (12) and the film (10).

3. The method of claim 2, wherein the step of supporting the food product further includes the step of supporting the sides of the food product (12) prior to the step of moving the sealing bar (22) against the downstream folding bar (18) to seal the leading and trailing edge portions (10a, 10b) of the film (10) about the food product (12).

4. The method of claim 3, wherein the step of moving the sealing bar (22) against the downstream folding bar (18) to seal the leading and trailing edge portions (10a, 10b) of the film (10) about the food product (12) includes passing the sealing bar (22) beneath at least a portion of the food product (12).

5. The method of claim 4, further including the step of removing support for the bottom of the food product (12) prior to the step of passing the sealing bar (22) beneath at least a portion of the food product (12).

6. The method of claim 5, further including the step of advancing the food product (12) in a downstream direction using the upstream and downstream grippers (20) after the step of moving a sealing bar (22) against the upstream folding bar (18) to seal the leading and trailing edge portions (10a, 10b) of the film (10) about the food product (12).

7. The method of claim 4, wherein the step of moving the sealing bar (22) against the downstream folding bar (18) includes the step of folding lateral sides of

the film (10) about the food product (12).

8. The method of any of the preceding claims, further including the step of providing the film (10) with a pre-applied adhesive pattern in the leading and trailing edge portions (10a, 10b) of the film (10) such that the adhesive pattern cooperates to form a fin seal (10d) following the step of moving the sealing bar (22) against the downstream folding bar (18) to seal the leading and trailing edge portions (10a, 10b) of the film (10) about the food product (12).

9. The method of claim 8, wherein the pre-applied adhesive pattern surrounds an adhesive-free space (42) that is sized to accommodate the food product (12) and the adhesive pattern does not extend to at least one edge of the film (12).

10. The method of claim 9, further including the step of twisting the film (10) on opposite sides of the food product (12) in areas that include the adhesive pattern.

11. An apparatus for wrapping a food product (12), the apparatus comprising:

a retractable lift (14) for contacting a bottom of the food product (12) and lifting the food product (12) from a first position to a second position;
a pair of lateral supports (32) for supporting a sheet of film (10) above the food product (12) in the first position and having a gap (60) between the supports (32) for the food product (12) to pass through;
an upstream folding bar (16) and a downstream folding bar (18) positioned to fold leading and trailing portions (10a, 10b) of the film (10) about the food product (12) when the food product (12) is lifted from the first position to the second position;
a pair of grippers (20) for contacting sides of the food product (12) with the film (10) thereabout to support the food product (12) in the second position when the lift (14) is retracted; and
a sealing bar (22) movable against the downstream folding bar (18) and beneath the food product (12) in the second position for sealing the leading and trailing portions (10a, 10b) of the film (10) together to form a tube about the food product (12), the sealing bar (22) being biased relative to a support (24) for the sealing bar (22) to accommodate variations in the size and orientation of the food product (12) during sealing of the leading and trailing edge portions (10a, 10b) of the film (10) about the food product (12).

12. The apparatus of claim 11, wherein the sealing bar (22) is spring-biased relative to a sealing bar support (24);
and/or wherein the grippers (20) are mounted to arms (34) that are rotatable about the central pivot axis, the grippers (20) being rotatable about the central pivot axis to move the food product (12) with the film (10) thereabout from the second position to a third position whereby a twisting mechanism twists opposing open ends of the tube to enclose the food product (12) in the film (10).

13. The apparatus of any of claims 11 to 12, wherein a segmented feed roller is positioned upstream of the lateral supports (32) for feeding the film (10) to the lateral supports (32);
and/or wherein the lateral supports (32) are coated with a friction-reducing material to facilitate movement of the film (10) thereover;
and/or further comprising a feed member for moving the food product (12) into place above the lift (14) and in the first position.

14. The apparatus of any of claims 11 to 13, wherein the film (10) has a pre-applied adhesive pattern in the leading and trailing edge portions (10a, 10b) and the downstream folding bar (18) and the sealing bar (22) are configured to apply pressure to form a fin seal (10d) between the leading and trailing edge portions (10a, 10b) of the film (10) using the adhesive pattern.

15. The apparatus of claim 14, wherein the pre-applied adhesive pattern surrounds an adhesive-free space (42) that is sized to accommodate the food product (12) and the adhesive pattern does not extend to at least one edge of the film (10), the pair of lateral supports (32) positioned to support the adhesive-free space (42) of the film (10) over the food product (12) in the first position.

Patentansprüche

1. Verfahren zum Einwickeln eines Lebensmittelprodukts (12), wobei das Verfahren umfaßt:

Positionieren einer Schicht eines Films (10) über dem Lebensmittelprodukt (12), wobei der Film (10) einen führenden und einen nachlaufenden Kantenbereich (10a, 10b) hat;
Anheben des Lebensmittelprodukts (12) und des Films (10);
Falten der führenden und der nachlaufenden Kantenbereiche (10a, 10b) des Films (10) um das Lebensmittelprodukt (12) herum unter Verwendung einer stromabwärtigen Faltstange (18) und einer stromaufwärtigen Faltstange (16) während des Schritts des Anhebens des Lebensmittelprodukts (12) und des Films (10);

Stützen des Lebensmittelprodukts durch Ergreifen des Lebensmittelprodukts zwischen einem stromaufwärtigen und einem stromabwärtigen Greifer; und

Bewegen einer Siegelstange (22) gegen die stromabwärtige Faltstange (18) zum Siegeln des führenden und des nachlaufenden Kantenbereichs (10a, 10b) des Films (10) um das Lebensmittelprodukt (12) herum, wobei der Schritt des Bewegens der Siegelstange (22) gegen die stromabwärtige Faltstange (18) ein Vorspannen der Siegelstange (22) relativ zu einer Stütze (24) für die Siegelstange (22) umfaßt, um Variationen der Größe und der Orientierung des Lebensmittelprodukts (12) während des Siegelns des führenden und des nachlaufenden Kantenbereichs (10a, 10b) des Films (10) um das Lebensmittelprodukt (12) herum zu kompensieren.

2. Verfahren nach Anspruch 1, wobei der Schritt des Anhebens des Lebensmittelprodukts (12) und des Films (10) das Stützen des Bodens des Lebensmittelprodukts (12) zum Anheben sowohl des Lebensmittelprodukts (12) als auch des Films (10) umfaßt.

3. Verfahren nach Anspruch 2, wobei der Schritt des Stützens des Lebensmittelprodukts ferner den Schritt des Stützens der Seiten des Lebensmittelprodukts (12) vor dem Schritt des Bewegens der Siegelstange (22) gegen die stromabwärtige Faltstange (18) zum Siegeln des führenden und des nachlaufenden Kantenbereichs (10a, 10b) des Films (10) um das Lebensmittelprodukt (12) herum umfaßt.

4. Verfahren nach Anspruch 3, wobei der Schritt des Bewegens der Siegelstange (22) gegen die stromabwärtige Faltstange (18) zum Siegeln des führenden und des nachlaufenden Kantenbereichs (10a, 10b) des Films (10) um das Lebensmittelprodukt (12) herum ein Vorbeiführen der Siegelstange (22) unter wenigstens einem Teil des Lebensmittelprodukts (12) umfaßt.

5. Verfahren nach Anspruch 4, ferner umfassend den Schritt des Entfernens der Unterstützung für den Boden des Lebensmittelprodukts (12) vor dem Schritt des Vorbeiführens der Siegelstange (22) unter wenigstens einem Teil des Lebensmittelprodukts (12).

6. Verfahren nach Anspruch 5, ferner umfassend den Schritt des Vorwärtsbewegens des Lebensmittelprodukts (12) in einer stromabwärtigen Richtung unter Verwendung des stromaufwärtigen und des stromabwärtigen Greifers (20) nach dem Schritt des Bewegens einer Siegelstange (22) gegen die stromaufwärtige Faltstange (18) zum Siegeln des führenden und des nachlaufenden Kantenbereichs (10a, 10b) des Films (10) um das Lebensmittelprodukt (12) herum.

7. Verfahren nach Anspruch 4, wobei der Schritt des Bewegens der Siegelstange (22) gegen die stromabwärtige Faltstange (18) den Schritt des Faltens lateraler Seiten des Films (10) um das Lebensmittelprodukt (12) herum umfaßt.

8. Verfahren nach einem der vorhergehenden Ansprüche, ferner umfassend den Schritt des Bereitstellens des Films (10) mit einem zuvor aufgebrachten Haftmuster in dem führenden und dem nachlaufenden Kantenbereich (10a, 10b) des Films (10) derart, dass das Haftmuster zum Bilden eines Siegelrands (10d) zusammenwirkt, und zwar im Anschluß an den Schritt des Bewegens der Siegelstange (22) gegen die stromabwärtige Faltstange (18) zum Siegeln des führenden und des nachlaufenden Kantenbereichs (10a, 10b) des Films (10) um das Lebensmittelprodukt (12) herum.

9. Verfahren nach Anspruch 8, wobei das zuvor aufgebrachte Haftmuster einen Haftmittel-freien Raum (42) umgibt, der so bemessen ist, dass er das Lebensmittelprodukt (12) unterbringt und sich das Haftmuster nicht bis zu wenigstens einer Kante des Films (12) erstreckt.

10. Verfahren nach Anspruch 9, ferner umfassend den Schritt des Verdrehens des Films (10) an gegenüberliegenden Seiten des Lebensmittelprodukts (12) in Flächen, die das Haftmuster umfassen.

11. Gerät zum Einwickeln eines Lebensmittelprodukts (12), wobei das Gerät umfaßt:

eine zurückziehbare Hebevorrichtung (14) zum Kontaktieren eines Bodens des Lebensmittelprodukts (12) und Anheben des Lebensmittelprodukts (12) von einer ersten Position zu einer zweiten Position;

ein Paar von lateralen Stützen (32) zum Stützen einer Schicht eines Films (10) über dem Lebensmittelprodukt (12) in der ersten Position und mit einer Lücke (60) zwischen den Stützen (32) zum Hindurchführen des Lebensmittelprodukts (12);

eine stromaufwärtige Faltstange (16) und eine stromabwärtige Faltstange (18), die zum Falten eines führenden und eines nachlaufenden Bereichs (10a, 10b) des Films (10) um das Lebensmittelprodukt (12) herum positioniert sind, wenn das Lebensmittelprodukt (12) von der ersten Position zu der zweiten Position angehoben wird;

ein Paar von Greifern (20) zum Kontaktieren von Seiten des Lebensmittelprodukts (12) mit dem Film (10) dortherum zum Unterstützen des Lebensmittelprodukts (12) in der zweiten Position,

wenn die Hebevorrichtung (14) zurückgezogen ist; und

eine Siegelstange (22), die gegen die stromabwärtige Faltstange (18) bewegbar und unter dem Lebensmittelprodukt (12) in der zweiten Position ist, zum Zusammensiegeln des führenden und des nachlaufenden Bereichs (10a, 10b) des Films (10) zum Bilden einer Röhre um das Lebensmittelprodukt (12) herum, wobei die Siegelstange (22) relativ zu einer Stütze (24) für die Siegelstange (22) vorgespannt ist, um Variationen der Größe und der Orientierung des Lebensmittelprodukts (12) während des Siegelns des führenden und des nachlaufenden Kantenbereichs (10a, 10b) des Films (10) um das Lebensmittelprodukt (12) herum zu kompensieren.

12. Gerät nach Anspruch 11, wobei die Siegelstange (22) relativ zu einer Siegelstangenstütze (24) federvorgespannt ist;

und/oder wobei die Greifer (20) an Armen (34) montiert sind, die um die zentrale Drehachse drehbar sind, wobei die Greifer (20) um die zentrale Drehachse herum zum Bewegen des Lebensmittelprodukts (12) mit dem Film (10) dortherum von der zweiten Position zu einer dritten Position drehbar sind, wobei ein Verdrehungsmechanismus gegenüberliegende offene Enden der Röhre verdreht, um das Lebensmittelprodukt (12) in dem Film (10) einzuschließen.

13. Gerät nach einem der Ansprüche 11 bis 12, wobei eine segmentierte Zuführrolle stromaufwärts der lateralen Stützen (32) zum Zuführen des Films (10) an die lateralen Stützen (32) positioniert ist;

und/oder wobei die lateralen Stützen (32) mit einem reibungsverringernden Material beschichtet sind, um die Bewegung des Films (10) über sie zu erleichtern;

und/oder ferner umfassend ein Zuführelement zum Bewegen des Lebensmittelprodukts (12) an seine Position über der Hebevorrichtung (14) und in die erste Position.

14. Gerät nach einem der Ansprüche 11 bis 13, wobei der Film (10) ein zuvor aufgebrachtes Haftmuster an dem führenden und dem nachlaufenden Kantenbereich (10a, 10b) hat, und wobei die stromabwärtige Faltstange (18) und die Siegelstange (22) dazu ausgelegt sind, Druck auszuüben zum Bilden eines Siegelrands (10d) zwischen dem führenden und dem nachlaufenden Kantenbereich (10a, 10b) des Films (10) unter Verwendung des Haftmusters.

15. Gerät nach Anspruch 14, wobei das zuvor aufgebrachte Haftmuster einen Haftmittel-freien Raum (42) umgibt, der so bemessen ist, dass er das Lebensmittelprodukt (12) unterbringt und sich das Haftmuster nicht bis zu wenigstens einer Kante des Films (10) erstreckt, wobei das Paar von lateralen Stützen (32) dazu positioniert ist, den Haftmittel-freien Raum (42) des Films (10) über dem Lebensmittelprodukt (12) in der ersten Position zu stützen.

Revendications

1. Procédé pour emballer un produit alimentaire (12) comprenant :

positionner une feuille de film (10) sur le produit alimentaire (12) le film (10) ayant un bord d'attaque et un bord de fuite (10a, 10b) ;

lever le produit alimentaire (12) et le film (10),

plier les parties bord d'attaque et bord de fuite (10a, 10b) du film (10) autour du produit alimentaire (12) en utilisant une barre de pliage aval (18) et une barre de pliage amont (16) pendant l'étape de lever le produit alimentaire (12) et le film (10),

soulever le produit alimentaire en saisissant le produit alimentaire entre un organe de préhension amont et un organe de préhension aval, et déplacer une barre de fermeture (22) contre la barre de pliage aval (18) pour sceller les parties bord d'attaque et bord de fuite (10a, 10b) du film (10) autour du produit alimentaire (12) dans lequel l'étape de déplacer la barre de fermeture (22) contre la barre de pliage aval (18) comprend l'action de presser la barre de fermeture (22) par rapport au support (24) de façon à ce que la barre de fermeture (22) tienne compte des variations de taille et d'orientation du produit alimentaire (12) pendant la phase de scellement des parties bord d'attaque et de fuite (10a,10b) du film (10) autour du produit alimentaire (12).

2. Procédé selon la revendication 1 dans lequel l'étape de lever le produit alimentaire (12) et le film (10)comporte l'action de supporter le fond du produit alimentaire (12) de façon à soulever à la fois le produit alimentaire (12) et le film (10).

3. Procédé selon la revendication 2 dans lequel l'étape de supporter le produit alimentaire comporte en outre l'étape de supporter les côtés du produit alimentaire (12) avant l'étape de déplacer la barre de fermeture (22) contre la barre de pliage aval (18) pour sceller les parties bord d'attaque et bord de fuite (10a, 10b) du film (10) autour du produit alimentaire (12).

4. Procédé selon la revendication 3 dans lequel l'étape de déplacer la barre de fermeture (22) contre la barre de pliage aval (18) pour sceller les parties de bord

d'attaque et de fuite(10a,10b) du film (10) autour du produit alimentaire (12) comporte l'action de faire passer la barre de fermeture (22) en-dessous d'au moins une partie du produit alimentaire (10).

5. Procédé selon la revendication 4 comportant en outre l'étape d'enlever le support pour le fond du produit alimentaire (10) avant l'étape de faire passer la barre de fermeture en-dessous d'au moins une partie du produit alimentaire (12).

6. Procédé selon la revendication 5 comportant en outre l'étape de faire avancer le produit alimentaire (12) vers l'aval en utilisant les organes de préhension amont et aval (20) après l'étape de déplacer la barre de fermeture (22) contre la barre de pliage amont (18) de façon à sceller les parties bord d'attaque et de fuite(10a, 10b) du film (10) autour du produit alimentaire (12).

7. Procédé selon la revendication 4 dans lequel l'étape de déplacer la barre de fermeture (22) contre la barre de pliage aval (18) comporte l'étape de plier les côtés latéraux du film (10) autour du produit alimentaire (12).

8. Procédé selon l'une quelconque des revendications précédentes comportant en outre l'étape de munir le film (10) d'un dépôt pré-positionné d'un adhésif sur les parties bord d'attaque et de fuite (10a,10b) du film (10) tel que ce traçage d'adhésif coopère pour former un joint (10d) après l'étape de déplacer la barre de fermeture (22) contre la barre de pliage aval (18) de façon à sceller les parties bord d'attaque et de fuite (10a, 10b) du film (10) autour du produit alimentaire (12).

9. Procédé selon la revendication 8 dans lequel le dépôt pré-positionné d'adhésif entoure un espace sans adhésif (42) dimensionné pour faire en sorte que le produit alimentaire (12) et le traçage d'adhésif ne s'étendent pas jusqu'au moins un bord du film (10).

10. Procédé selon la revendication 9 comportant en outre l'étape de tordre le film (10) aux deux côtés opposés du produit alimentaire (12) dans des zones où se trouve le traçage d'adhésif.

11. Dispositif pour emballer un produit alimentaire (12), le dispositif comportant un élévateur rétractable (14) pour entrer en contact avec le fond du produit alimentaire (12) et soulever le produit alimentaire (12) depuis une première position jusqu'à une deuxième position ;
une paire de supports latéraux (32) pour supporter une feuille de film (10) au-dessus du produit alimentaire (12) dans la première position et ménageant un espace (60) entre les supports (32) permettant au produit alimentaire (12) de passer entre eux ;
une barre de pliage amont (16) et une barre de pliage aval (18) disposés de façon à plier les parties de bords d'attaque et de fuite (10a,10b) du film (10) autour du produit alimentaire (12) lorsque le produit alimentaire (12) est soulevé de la première position à la seconde ;
une paire d'organes de préhension (20) pour entrer en contact avec les côtés du produit alimentaire (12), le film (10) s'y trouvant pour porter le produit alimentaire (12) dans la seconde position quand l'élévateur (14) est rétracté ; et
une barre de fermeture (22) pouvant se déplacer contre la barre de pliage aval (18) et en dessous du produit alimentaire (12) dans la deuxième position pour sceller l'une à l'autre les parties avant et arrière du film (10) afin de former un tube autour du produit alimentaire (12), la barre de fermeture (22) étant disposée par rapport à un support (24) pour permettre à la barre de fermeture (22) de tenir compte des variations en taille et orientation du produit alimentaire (12) pendant le collage des parties de bord d'attaque et de fuite (10a,10b) du film (10) autour du produit alimentaire (12).

12. Dispositif selon la revendication 11 dans lequel la barre de fermeture (22) est contre-tenue par un ressort par rapport au support (24) de la barre de fermeture ;
et/ou dans lequel les organes de préhension (20) sont montés sur des bras (34) pouvant pivoter autour de l'axe de pivotement central, les organes de préhension (20) pouvant pivoter autour de l'axe de pivotement central pour déplacer le produit alimentaire (12) avec le film autour depuis la seconde position vers une troisième position dans laquelle un mécanisme de torsion tords les extrémités opposées du tube pour enfermer le produit alimentaire (12) dans le film (10).

13. Dispositif selon l'une ou l'autre des revendications 11 ou 12 dans lequel un rouleau d'alimentation segmenté est mis en place en amont des supports latéraux (32) pour alimenter le film (10) aux supports latéraux (32),
et/ou dans lequel les supports latéraux sont revêtus d'un matériau anti-friction pour faciliter le déplacement du film (10) dessus,
et/ou le dispositif comporte en outre un élément d'alimentation pour placer le produit alimentaire (12) au-dessus l'élévateur (14) et dans la première position.

14. Dispositif selon l'une des revendications 11 à 13 dans lequel le film (10) est muni aux bords d'attaque et de fuite (10a,10b) d'un dépôt adhésif pré-positionné et la barre de pliage aval (18) et la barre de fermeture (22) sont configurées de façon à appliquer une pression pour former un joint (10d) entre les par-

ties de bord d'attaque et de fuite (10a,10b) du film (10) en utilisant le dépôt adhésif.

15. Dispositif selon la revendication 14 dans lequel le dépôt adhésif pré-positionné entoure un espace sans adhésif (42) qui est dimensionné pour faire en sorte que le produit alimentaire (12) et le dépôt adhésif ne s'étendent pas jusque au moins un bord du film (10), la paire de supports latéraux (32) étant positionnée de façon à porter l'espace sans adhésif (42) du film (10) au-dessus du produit alimentaire (12) dans la première position.

FIG. 1

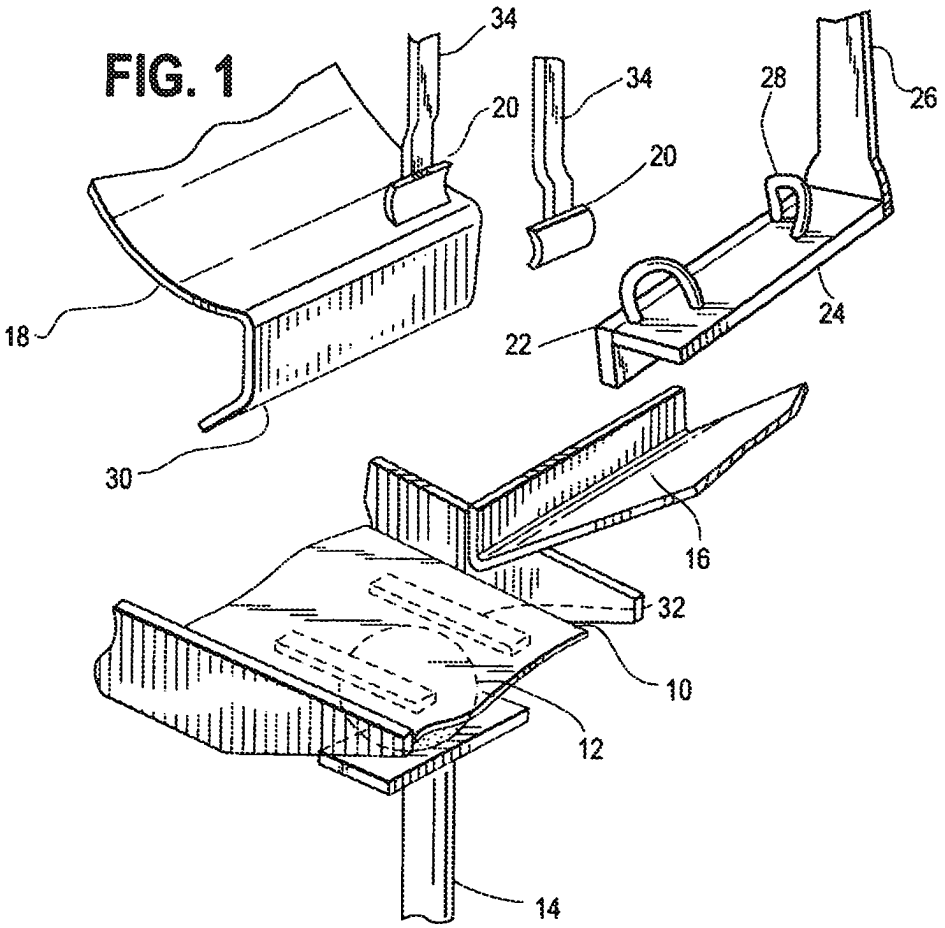

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12
14

FIG. 2

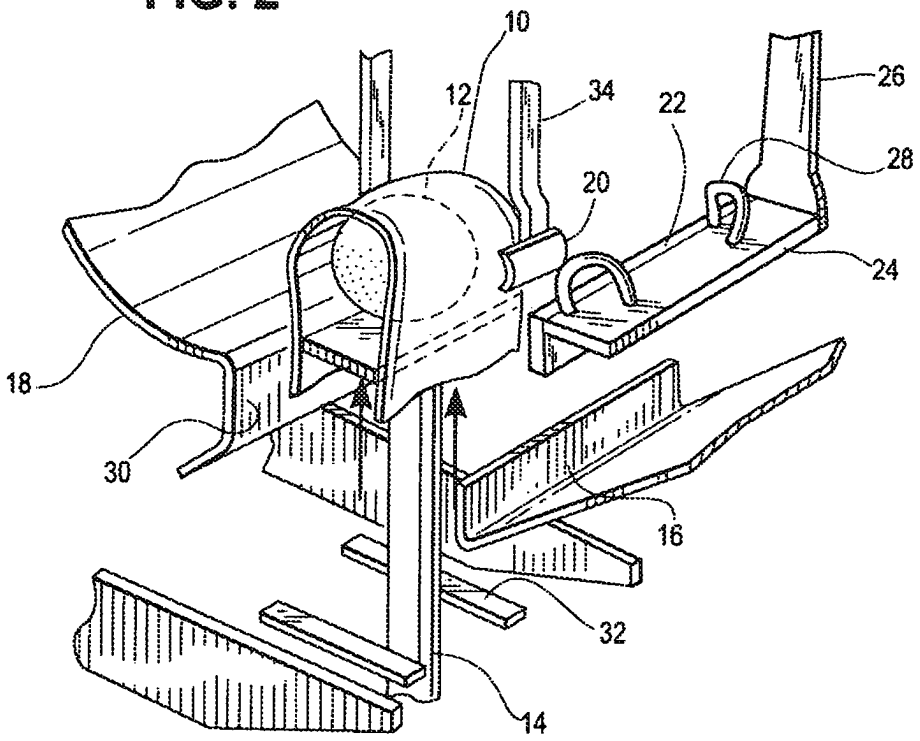

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FIG. 3

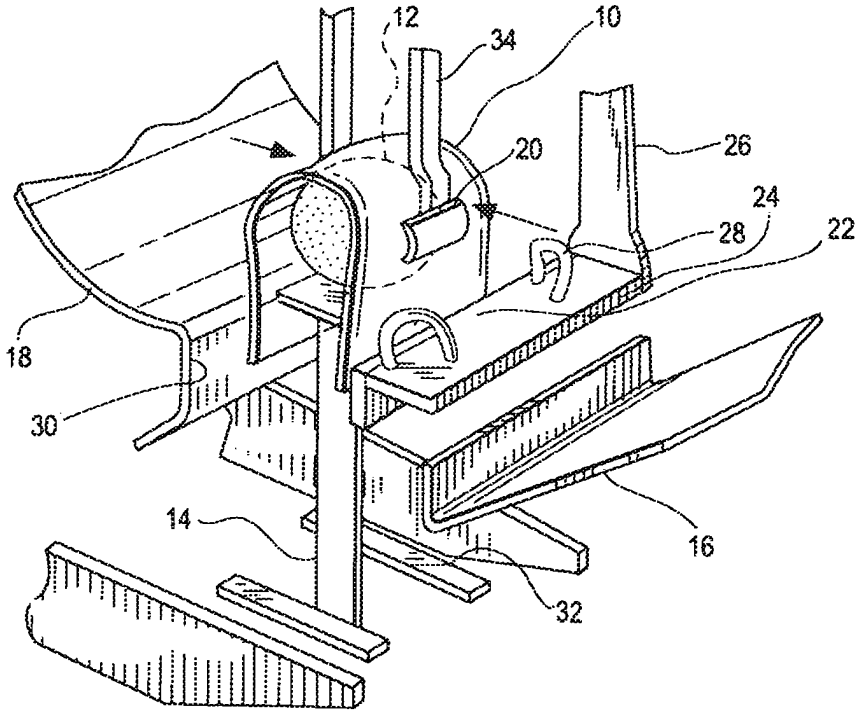


FIG. 4

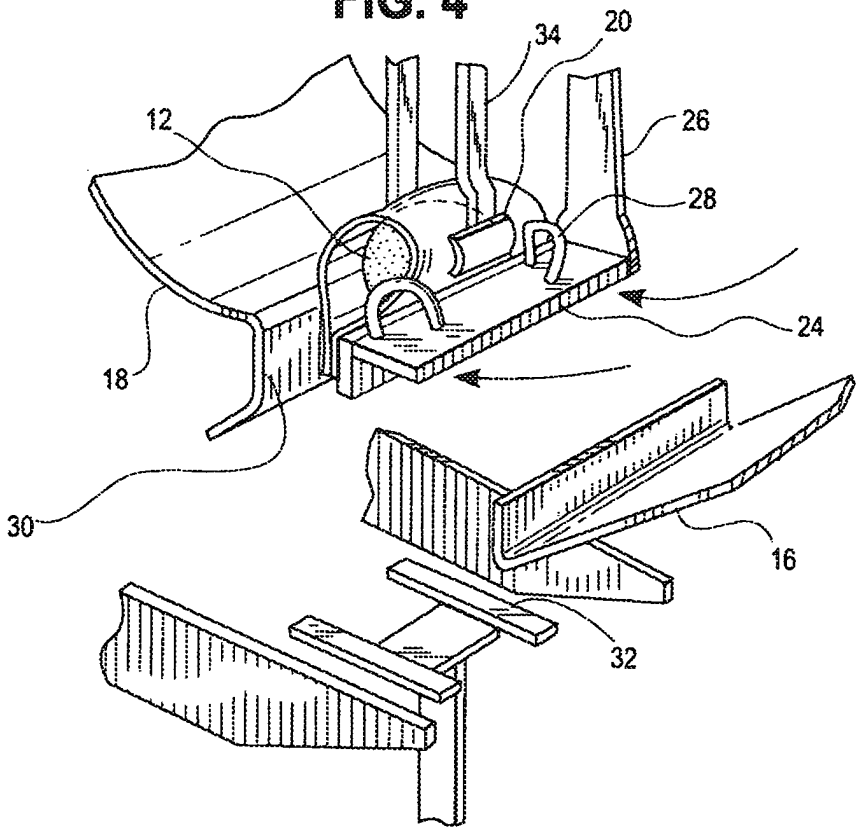


FIG. 5

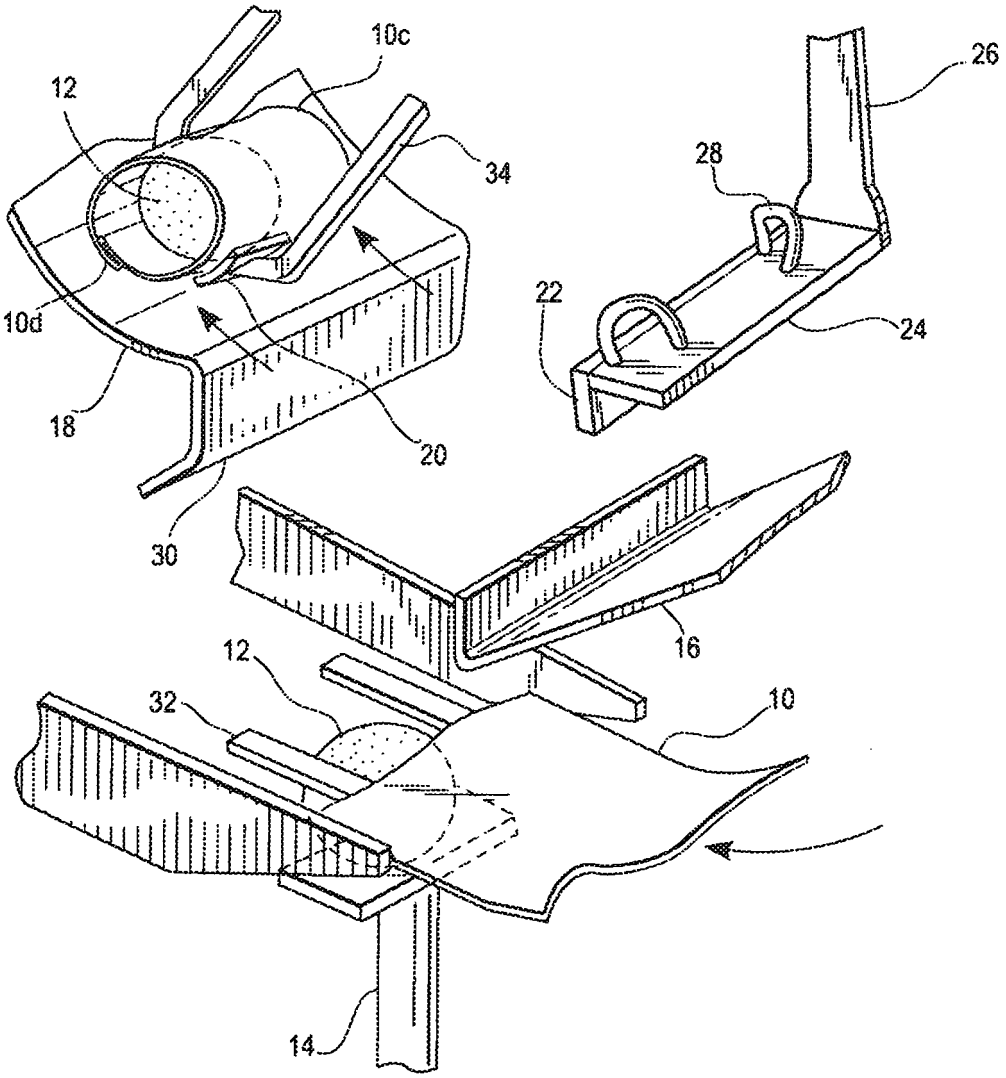


FIG. 6

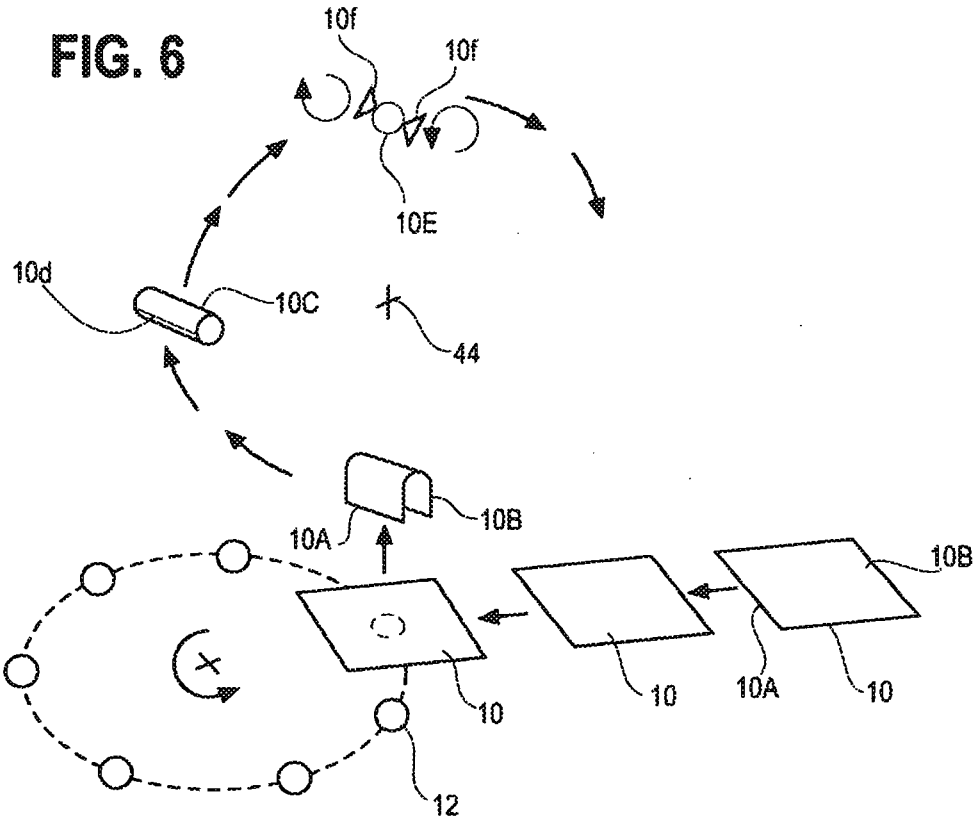

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10d
10C
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10A
10B
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10
10A
10
12

FIG. 7

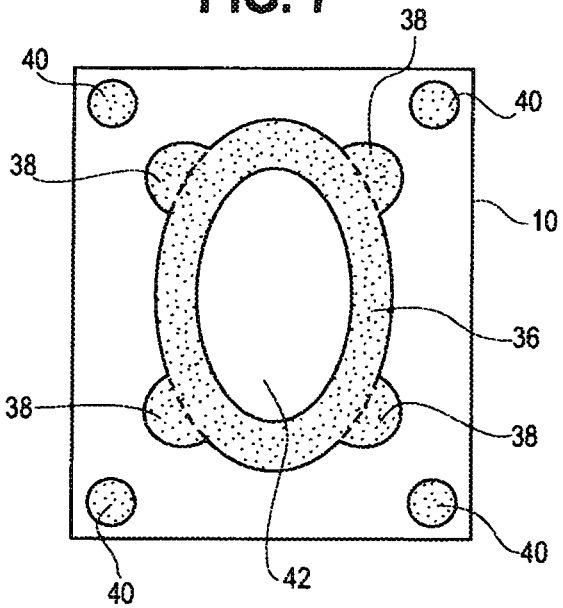

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FIG. 8

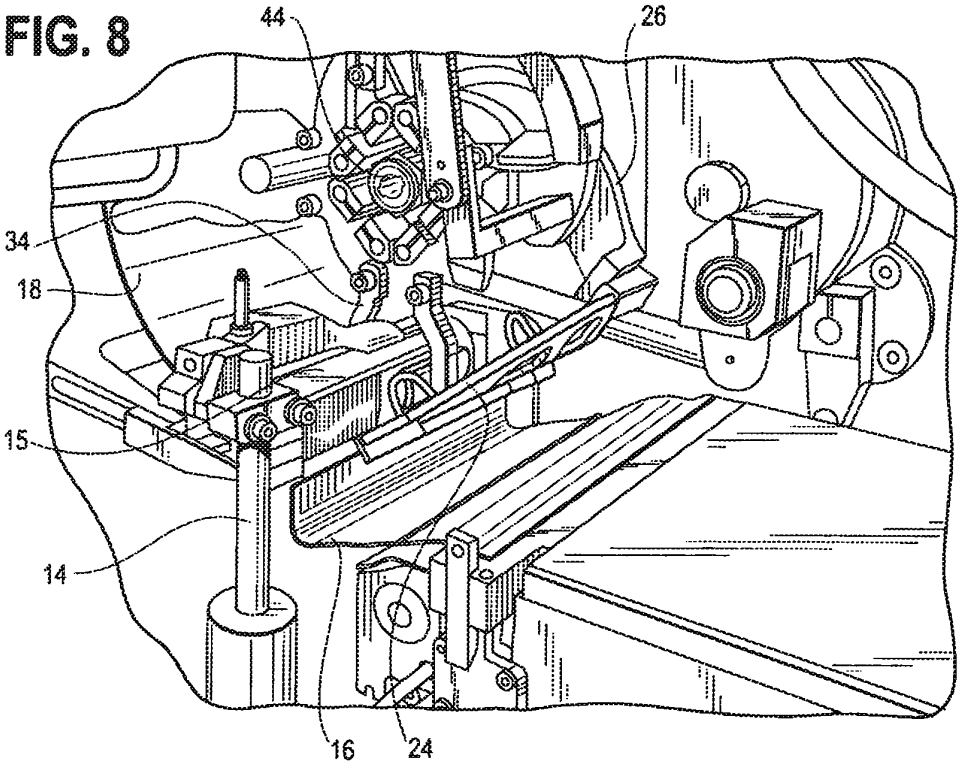


FIG. 9

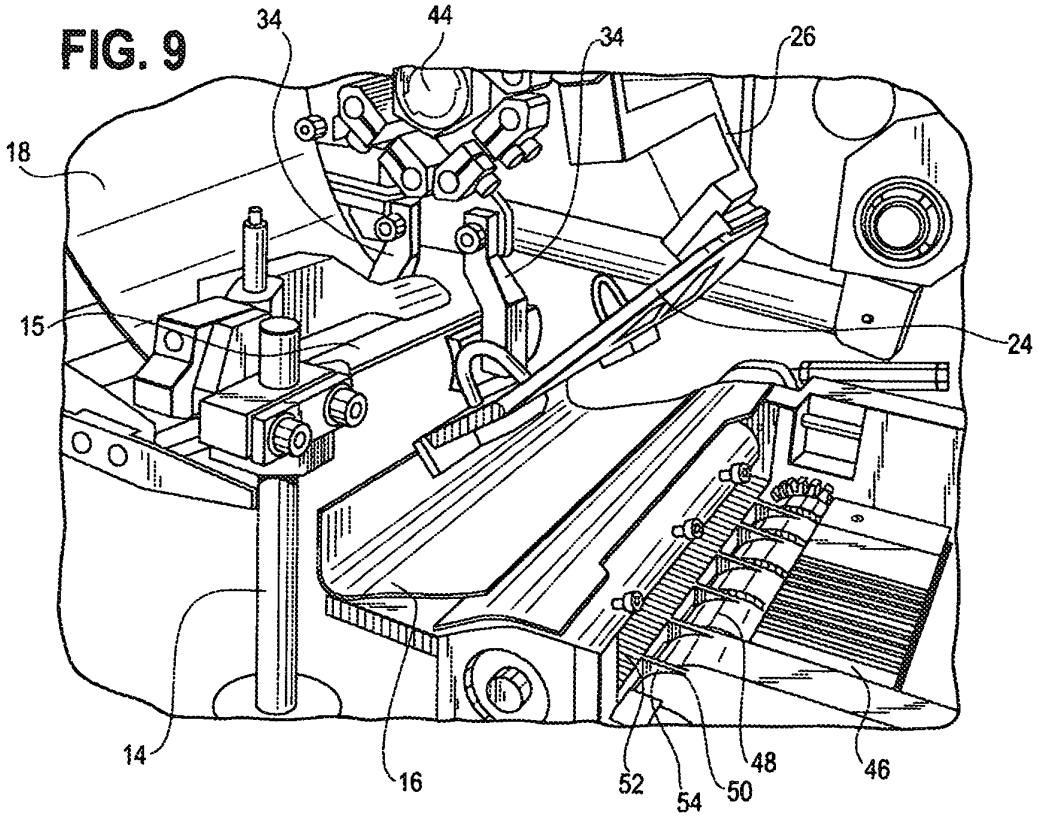


FIG. 10

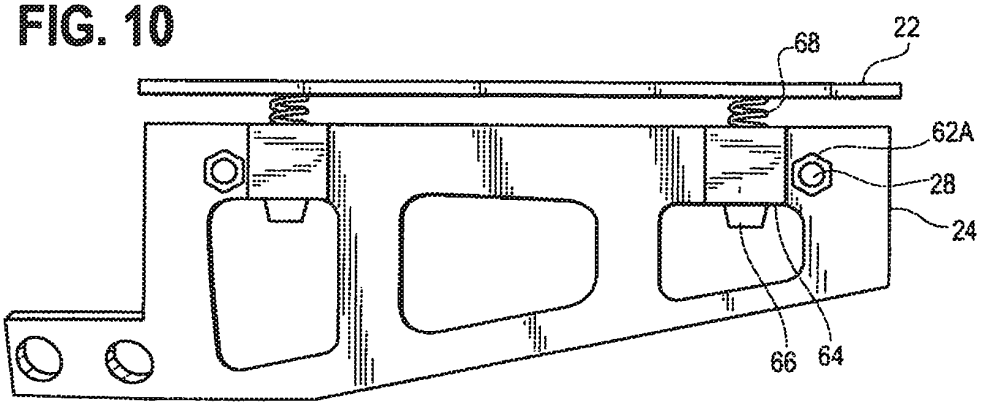


FIG. 11

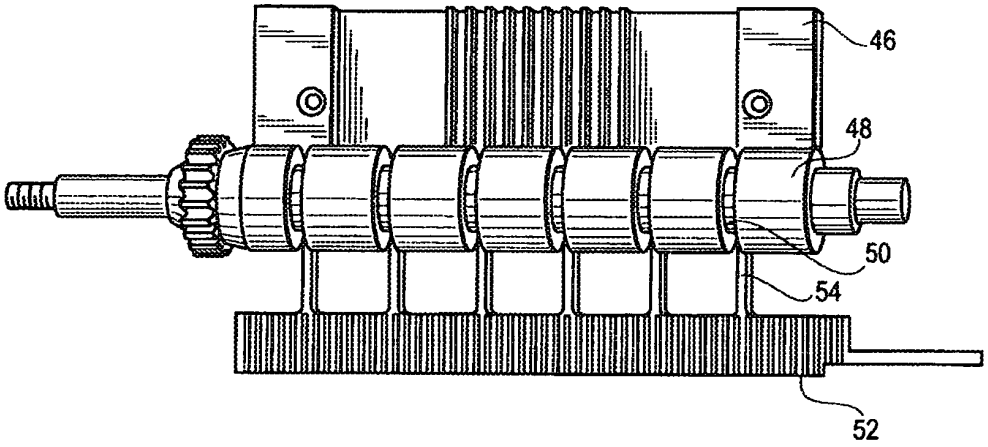


FIG. 12

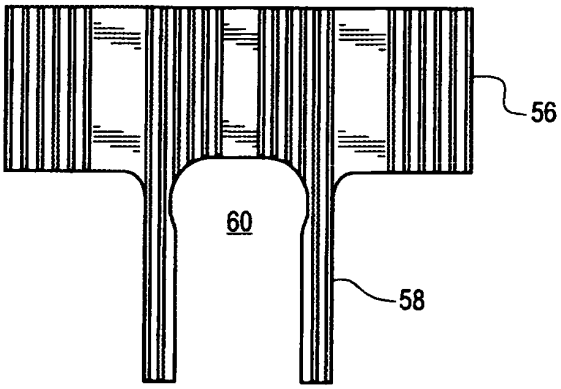
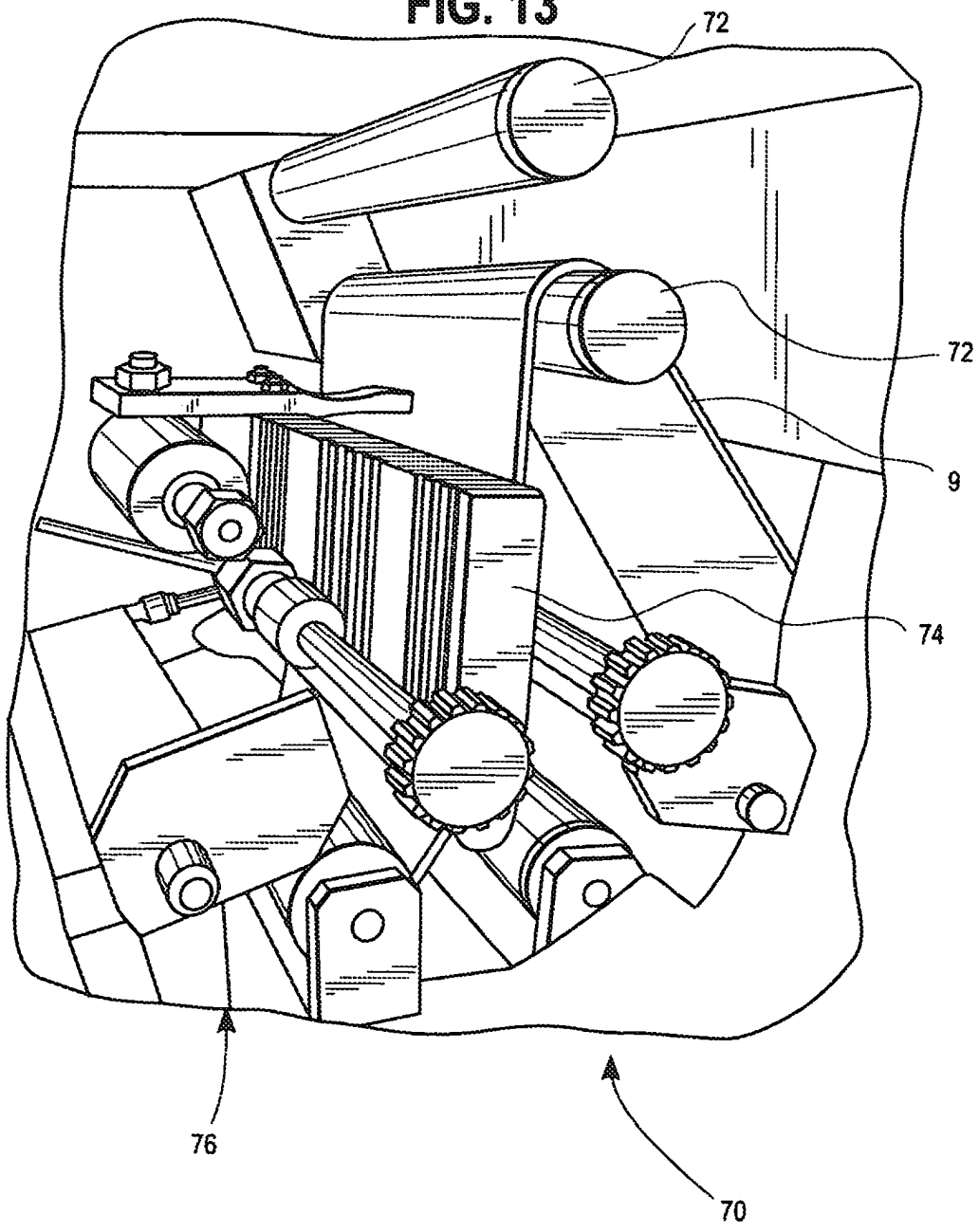


FIG. 13



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 773163 A1 **[0003]**
- US 40851309 A **[0004]**