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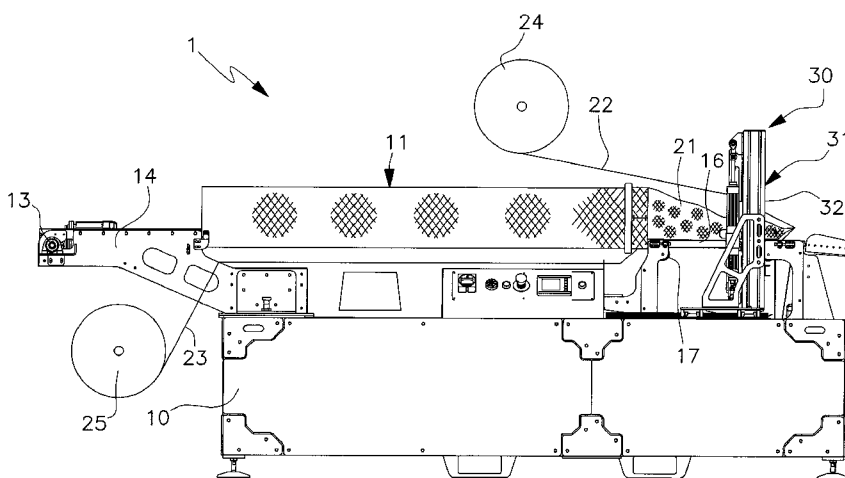


Fig.4

(57) Abstract: The method for packaging products in tubular net provide for performing the closing by means of welding of the ends of a tract of tubular net (21) inside of which is introduced the product (2) to be packaged. At said ends of the tract of tubular net (21), at the zones of closing by means of welding, are attached the ends of a couple of ribbons (22, 23) of thermoplastic material, extending longitudinally with respect to the same tract of tubular net (21). The ribbons (22, 23) of thermoplastic material are arranged above and at the bottom of the packaged product (2).

DescriptionMETHOD AND APPARATUS FOR PACKAGING PRODUCTS IN TUBULARNETTechnical Field

- [01] The present invention regards a method for packaging products in a tubular net wrapping, in particular for packaging punnets of fruit and vegetable products and the like, as well as an apparatus for carrying out such a method.

Background Art

- [02] Packaging of fruit and vegetable products in punnets contained inside a tubular net wrapping has been known for a while. More particularly, such packages are generally made of a punnet for containing the products, made of plastic material, contained inside a tubular net wrapping which is closed, at the opposite ends, through clipping with respective metal clips; often such metal clips also tighten the opposite ends of a thin strip of plasticized paper designed to serve as handle for transporting the package. Usually with the punnet is associated a label made of paper or similar material, containing the data suitable to identify the product put on sale. Also such a label is maintained by one of the cited metal clips.
- [03] To realize the cited packages, so-called netting automatic machines have been known; such machines provide to introduce single punnets, filled with a predetermined quantity of products, inside the tubular net, closed beforehand through clipping downstream of the tract engaged by the punnet, and to close and cut the aforesaid tract of tubular net upstream of the same punnet. The tubular net unwinds on the external surface of a pipe

which also serves as a feeding way for the punnets to package. At the end of such feeding pipe, the punnet to be packaged hits the tract of tubular net closed downstream, and is moved forward, together with such tract of tubular net, until it goes beyond a clipping device which accomplishes the cited closing upstream of the punnets. With the clipping device are associated suitable cutting means which provide to cut the tubular net, for shaping the wrapping. Practically, the cutting of the tubular net occurs in an intermediate position between two different metal clips simultaneously applied by the clipping device, so as to prearrange the tubular net for packaging the successive punnet. A netting machine of this type is illustrated in European patent application no. EP 123 655.

- [04] The described solution, although still widely used, does not fully satisfy the exigencies of the users. In fact the so realized package turns out to be insufficiently ecologic and determines sensible problems for the disposal, in particular where the sorting of waste is required. On this matter, it is to be observed that the presence of metal parts, such as clips, is generally not appreciated by the consumers, further to representing an additional cost for the producers. Furthermore in the complete package three different typologies of materials are present, that is the plastic material of the punnet and of the tubular net, the metallic material of the clips and the plasticized paper or similar material of the label and of the small strip that serves as an handle, with a consequent multiplication of the collection and recycling costs of such various materials.

Disclosure

- [05] The task of the present invention is that of solving the aforementioned

problems, devising a method that allows to perform the packaging of products in a tubular net wrapping, in particular providing a package which is relatively cheap and easy to recycle.

[06] Within such task, it is a further scope of the present invention that of providing an apparatus that enables to realize in an optimal way the aforesaid method for packaging products in a tubular net wrapping.

[07] Another object of the invention is that of providing an apparatus for packaging products in a tubular net wrapping able to ensure a high production rate.

[08] A further scope of the invention is that of providing an apparatus for packaging products in a tubular net wrapping of simple structural and functional conception, equipped with a certainly reliable functioning and of versatile use, as well as relatively economic cost.

[09] The above mentioned scopes are attained, according to the present invention, by the method for packaging products in a tubular net wrapping according to claim 1.

[10] According to the present invention, the method for packaging products in a tubular net wrapping provides for performing the closing through welding of the ends of a tract of tubular net inside which is introduced the product to be packaged.

[11] Preferably, the method provides for attaching to said ends of the tract of tubular net, at the closing areas obtained through welding, the ends of at least one strip of thermoplastic material, extended longitudinally with respect to the same tract of tubular net.

[12] The present invention also concerns an apparatus for packaging products

in a tubular net wrapping according to the method in hand.

Description of Drawings

- [13] Details of the invention shall be more apparent from the detailed description of a preferred embodiment of the method for packaging products in a tubular net wrapping, according to the invention, illustrated for indicative purposes in the attached drawings, wherein:
- [14] figure 1 shows a perspective view of the apparatus in hand for packaging products in a tubular net wrapping;
- [15] figure 2 shows, in the same perspective view, an enlarged portion of an operating area of the apparatus;
- [16] figure 3 shows a perspective view from a different angle of such an operating area;
- [17] figures 4 and 5 respectively show a lateral view and a plan view of the apparatus;
- [18] figure 6 shows a perspective view of an operating member of the apparatus, with removed parts;
- [19] figure 6a shows an enlarged detail thereof;
- [20] figures 7 and 8 show the same operating member in various operating steps;
- [21] figures 9, 10, 11, 12 and 13 respectively show a lateral view of the aforesaid operating area of the apparatus in successive steps of the method in hand;
- [22] figure 14 shows a schematic perspective view of a package realized according to the method in hand.

Best Mode

- [23] With particular reference to such figures, the apparatus for packaging products in an extruded tubular net wrapping is indicated in its entirety with 1. In the illustrated case, the products to be packaged consist of punnets 2 of fruit and vegetable products and the like, but it is obviously possible to provide for packaging products of different type. The punnet is made of plastic material, for example polypropylene or similar materials.
- [24] The apparatus 1 has, above a base 10, a tubular member 11 arranged with horizontal axis. On the external surface of the tubular member 11, in use, a tubular net 21 made of plastic material, for example polyethylene or similar materials, unwinds.
- [25] The tubular member 11 is longitudinally crossed at its own inside, in a known way, by a conveyor belt 12 suitable to perform the feed of the products 2 to be packaged. The conveyor belt 12 is wound at the opposite ends on a couple of wheels 13, respectively driving and driven, which are supported rotatable by a framework 14 constrained to the base 10 of the apparatus. The framework 14 also supports, at the opposite ends, the tubular member 11. The conveyor belt 12 is operated by a suitable electric motor member 15.
- [26] Downstream of the tubular member 11, according to the feed direction of the products 2, are arranged further conveyor means 16 suitable to receive the products 2 to be packaged exiting from the same tubular member 11. Such conveyor means 16 are suitably constituted by a further conveyor belt which is wound on wheels 17 suitably motorized; preferably the active branch of such conveyor belt 16 is separated in two consecutive tracts of variable length, such that to a lengthening of one corresponds a shortening

of the other, and vice versa. Such active branch of the conveyor belt 16 is substantially overlapped to the conveyor belt 12 for feeding the products 2, in order to facilitate the advancement of the same products 2.

[27] Above the conveyor means 16 is placed a closing and cutting device 30 for the tubular net 21, to perform the separation of the single packages 20. The closing device 30 comprises a frame 31 which is mobile with alternated motion in direction longitudinal to the tubular member 11, and which carries suitable sealing means and cutting means suitable to operate the closing and the separation of the aforesaid packages 20, in suitable step relation with the feed of the products 2 which, exiting from the tubular member 11, are introduced inside the tubular net 21.

[28] More precisely, the frame 31 comprises a couple of posts 32 placed side by side which extend from a trolley 33 provided with opposite couples of sliding blocks 34; the sliding blocks 34 are mounted sliding on a guide rail 35 fixed on the base 10. The frame 31 is actuated in alternated motion by suitable actuator members, for example an electric motor member acting through a transmission member 36 or alternatively actuator means of the pneumatic type, or again a linear electric motor and the like.

[29] The frame 31 carries mobile, on a vertical plane transverse to the longitudinal axis of the apparatus, a first unit 40 and a second unit 50 for closing the tubular net 21, respectively upper and lower, mounted sliding through respective sliding blocks 41, 51 on guide means 37 associated with the posts 32 (see in particular fig. 6). The closing units 40, 50 are preferably mobile relative to each other, with an alternated motion of reciprocal approaching and departing, upon control of respective actuator members

42, 52 for example of pneumatic type or by means of a crank gear driven by an electric motor preferably of the brushless type. It is obviously possible to provide that the aforesaid relative motion is determined by the driving of one only of the closing units 40, 50, for example the upper closing unit 40.

[30] The upper closing unit 40 provides a couple of blades 43 placed beside at a suitable distance from each other and constrained at the opposite sides to the aforesaid sliding blocks 41; for greater clarity, only one of the blades 43 is represented in figures 6, 7 and 8. The blades 43 are suitable to act substantially as a guillotine to operate the closing of the tubular net 21, as better specified in the following. To such an end, the blades 43 have at the lower part thereof an analogous shaped profile 43a with opposite tracts converging upwards, so as to act as a draft for collecting the tubular net 21 at a central zone 43b of the same profile. The central zone 43b of the lower profile of the blades 43 shapes a flat bottom cavity of suitable width.

[31] Between the blades 43, a sealing member 44 preferably of the thermal type is vertically mobile; obviously it is possible to provide the use of sealing means of a different type, for example ultrasonic or with electric impulses. The sealing member 44 is actuated by a couple of actuator members 45, for example pneumatic, carried by a crossbar 46 fixed between the blades 43.

[32] The lower closing unit 50 has a couple of blades 53 placed beside at a suitable distance from each other and constrained at the opposite sides to the aforesaid sliding blocks 51. The blades 53 are suitable to cooperate with the opposite blades 43 of the upper closing unit 40 to perform the closing of the tubular net 21. To this aim, the blades 53 have at the upper

part an analogous shaped profile 53a with opposite tracts converging downwards, so as to act as a draft for collecting the tubular net 21 at a central zone 53b of the same profile, having a width substantially corresponding to the central zone 43b of the profile of the upper blades 43. Such central zone 53b shapes the housing seat for an abutment member 54 suitable to abut, in suitable step relation, the aforesaid upper blades 43 and the sealing member 44.

- [33] It is to be observed that the lower blades 53 are more approached to each other with respect to the upper blades 43, in such a way as to enable the reciprocal joint in the step of approaching of the closing units 40, 50.
- [34] More particularly, the sealing member 44 carries on a median plane a cutting member 47 suitable to perform the cutting of the tubular net 21, for separating the single packages 20. The cutting member 47 penetrates during the cutting step in a corresponding groove 57 practiced on the upper surface of the abutment member 54 (fig. 6a). Suitably it is possible to provide that the abutment member 54 is provided, on the upper surface, with a washer of elastic material, of the type of the silicone rubber, suitable to absorb the pressure of the cutting member 47. A washer of this type can be in any case preferably provided to compensate possible misalignments and to increase the grip of the net.
- [35] The abutment member 54 is preferably made of aluminium or similar materials and has on the upper surface a series of holes 55 in communication, through respective internal channels, with suitable pneumatic means for sending a flow of cooling air (see again fig. 6a). Obviously the cited washer of elastic material has a corresponding series of

holes.

- [36] To the closing device 30 are also fed a first ribbon 22 and a second ribbon 23 of thermoplastic material, respectively upper and lower, extending longitudinally with respect to the tubular net 21 outside the tubular member 11. The ribbons 22, 23 of thermoplastic material unwind from respective reels 24, 25 associated with the structure of the apparatus by means of suitable support means, for simplicity not represented. Usefully are provided tensioner means, known per se and not represented in the drawings, suitable to maintain the tension of the ribbons 22, 23 constant during the displacement steps. Practically, the ribbons 22, 23 of thermoplastic material are fed to the sealing area defined between the sealing member 44 and the abutment member 54 at sides diametrically opposed with respect to the tubular net 21 brought in the same sealing area.
- [37] The method for packaging products in a tubular net wrapping turns out to be easy to understand from the preceding description.
- [38] The products to be packaged, in the illustrated case consisting of punnets 2 of fruit and vegetable products, are fed in ordered sequence, suitably distanced from each other, along the channel defined by the tubular member 11. At the outlet of the tubular member 11, a single product 2 to be packaged is transferred by inertia inside the tract of tubular net 21 protruding, in a known way, from the front part of the tubular member 11 (fig. 9). The front end of such a tract of tubular net 21 turns out to have been previously closed through welding, according to the modality specified thereafter. The product 2 to be packaged is moved forward inside said tract

of tubular net 21 until it reaches said front end closed through welding.

- [39] To the aforesaid front end of the tract of tubular net 21 are also attached, at the sealing area, the ends of the ribbons 22, 23 of thermoplastic material, respectively upper and lower, that unwind from the respective reels 24, 25. Practically, the ribbons 22, 23 of thermoplastic material extend longitudinally to the tubular net, in positions diametrically opposed with respect to such tubular net.
- [40] Suitably the presence of the product 2 to be packaged on the conveyor belt 16 is detected by suitable sensor means, not represented, arranged at the outlet opening of the tubular member 11. Instead the following product 2 is stopped inside the same tubular member 11.
- [41] Then is operated the displacement of the closing device 30 at a first operating station arranged close to the aforesaid outlet opening of the tubular member 11, wherein the closing of the tubular net 21 is realized upstream of the product (fig. 10). More in detail, the closing device 30 is mobile alternatively between said closing station and a second operating station, suitably distanced from the tubular member 11, wherein is released the product packaged in the tubular net wrapping, indicated with 20 for greater clarity.
- [42] In the closing station, is firstly actuated the reciprocal approaching of the blades 43, 53 of the closing units 40, 50, respectively upper and lower, associated with the closing device 30 (see in particular fig. 7). The blades 43, 53 act substantially as a guillotine to perform the closing of the tubular net 21, upstream of the product 2 (fig. 11). Practically the tubular net 21 is obstructed by the opposite shaped profiles 43a, 53a of the blades 43, 53,

until being tighten at the central zone 43b, 53b of the aforesaid shaped profiles of the blades 43, 53. In particular, during such closing step the central zone 43b of the upper blades 43 is brought abutting against the abutment member 54 associated with the lower blades 53.

[43] In suitable step relation, is then operated the actuation of the sealing member 44 and the shifting of the closing device 30 towards the release station, as well as the advancing in the same direction of the product 2 inserted into the tubular net 21 on the conveyor belt 16 (fig. 12); in particular the product 2 and the closing device 30 move with the same linear speed, so as to determine between them a null relative speed. It is to be noted that the closing device 30 draws the tubular net 21 and the ribbons 22, 23 of thermoplastic material that are tightened between the blades 43, 53 of the closing units 40, 50. Such a drawing action determines the extraction of the tubular net 21 from the tubular member 11 and the unwinding of the ribbons 22, 23 from the relative reels 24, 25.

[44] The sealing member 44 comes in abutment of the underneath abutment member 54 and performs the sealing of the portion of the tubular net 21 and of the ribbons 22, 23 of thermoplastic material tightened between the blades 43, 53 of the closing device 30 (fig. 8). In the same time the cutting member 47 associated with the sealing member 44 performs the cutting of the same tubular net 21 and of the ribbons 22, 23 of thermoplastic material, according to a cutting line transverse to the tubular net 21 and to the ribbons 22, 23 of thermoplastic material and substantially median to the aforesaid sealed portion.

[45] When the sealing is completed, during the cited shifting step of the closing

device 30 from the closing station to the release station, the displacement of the sealing member 44 into the lifted disengagement position is actuated, maintaining closed the blades 43, 53 which tighten the sealed portion of the tubular net 21 and of the ribbons 22, 23 of thermoplastic material (see again fig. 7). In the meantime is operated the sending of a flow of cooling air from the holes 55 present on the upper surface of the abutment member 54, in a way as to accelerate the cooling of the sealed area. In such a way a better seal of the package is achieved.

[46] When the closing device 30 reaches the release station, the movement of reciprocal departing of the closing units 40, 50 is actuated, so as to free the sealed portion of the tubular net 21 and of the ribbons 22, 23 of thermoplastic material from the tightening of the blades 43, 53 (fig. 13). In such a way the wrapping results completed and the packaged product 20 can be conveyed to the outlet of the apparatus.

[47] At this point the return of the closing device 30 at the closing station is operated, to perform a new cycle for packaging a successive product 2, in the meantime prearranged inside the tubular net 21, as previously described.

[48] The method and the apparatus in hand attain the scope of performing in an optimal manner the packaging of products in a tubular net wrapping, in particular providing a package of relatively economic cost, highly functional and easy to recycle.

[49] Such a result is obtained essentially thanks to the inventive idea of performing the closing of the tubular net wrapping through welding. This allows to avoid the presence of metal parts, such as the usual clips

commonly used in the prior art. Moreover the closing through welding warrants an efficient seal and prevents the opening of the product contained inside the punnet.

[50] A characteristic of the present invention is that of associating with the wrapping, in the sealing step, at least one ribbon of thermoplastic material and preferably a couple of ribbons 22, 23 of thermoplastic material, which extend shaping an arc respectively above and underneath the wrapping, that is one in the upper part and the other in the bottom of the punnet, being fixed to the respective ends at the sealed portions 26 which close the tubular net wrapping at the opposite ends; nevertheless, according to the typology of product, it is possible to provide the use only of the upper ribbon or only of the lower ribbon. Such ribbons of thermoplastic material can be advantageously used for printing thereon the data suitable to identify the product put on sale. In particular the upper ribbon, which can be used also as handle of the package, can carry the general data of the producer, while on the lower ribbon can be printed the specific data of the product, such as for example the weight and the like, as well as the necessary bar code. It is to observe that the position of the bar code at the bottom of the package facilitates the reading thereof on conventional scanners, avoiding the operators to turn the punnet upside down.

[51] It is to be noted that the width of the ribbons offers a wide surface for printing the aforementioned data. The apparatus is suitably provided with a print device, known per se, suitable in particular to carry out in line the printing of the lower ribbon; obviously if the application of only an upper ribbon is provided, the aforementioned data of the product will be printed by

the print device on such upper ribbon.

- [52] In such a way the necessity of providing the package with a paper label carrying the aforementioned identifying data is overcome. Practically then the package does not require the use of materials different from the plastic material of which the punnet, the tubular net and the upper and lower ribbons are realized, in particular metal material and paper. Being realized with a single material, the package turns out to be entirely recyclable and does not require sorting during the disposal. The package can therefore be easily disposed also where the waste sorting is required.
- [53] The so realized package further has a low production cost, by virtue of the used materials, with respect to the traditional packages.
- [54] Another characteristic of the invention consists in the fact that the sealed portion has a relatively wide width, extended in a direction transverse to the longitudinal axis of the tubular net 21 and corresponding to the width of the upper and lower ribbons associated with the package. Such width can for example be provided at 40 mm or anyway comprised in a range of such an order of magnitude. It is to be noted that such a width is determined by the dimensions of the space defined by the central zone 43b, 53b of the shaped profiles of the blades 43, 53 between which is tightened, in a flattened form, the portion of tubular net 21 in sealing step. The wide sealing zone enables to make the sealing easier and faster, in particular reducing the time of action of the sealing member 44.
- [55] It is to be pointed out the fact that the successive cooling step, through flow of air, allows to complete in a faster time the sealing cycle, at the advantage of the productivity.

- [56] Practically the sealing, the cutting and the cooling of the tubular net are realized in suitable time succession during the transfer step of the closing device 30 from the closing station to the release station. This allows to reach a high productive speed.
- [57] The apparatus described for indicative purpose is susceptible of numerous modifications and variants according to the various exigencies.
- [58] In practice, the embodiment of the invention, the materials used, as well as the shape and dimensions, may vary depending on the requirements.
- [59] Should the technical characteristics mentioned in each claim be followed by reference signs, such reference signs were included strictly with the aim of enhancing the understanding the claims and hence they shall not be deemed restrictive in any manner whatsoever on the scope of each element identified for exemplifying purposes by such reference signs.

Claims

1. Method for packaging products in a tubular net wrapping, comprising the steps of:
 - a. closing by means of sealing a front end of a tract of tubular net (21);
 - b. attaching to said front end of said tract of tubular net (21), at the zone of closing by means of sealing, at least one ribbon (22) of thermoplastic material, extending longitudinally with respect to the said tract of tubular net (21);
 - c. feeding the product (2) to be packaged inside said tract of tubular net (21), until it reaches said front end of the tract of tubular net (21) closed by means of sealing;
 - d. prearranging closing means (40, 50) at a closing station placed at the rear part of said product (2) fed inside said tract of tubular net (21);
 - e. operating said closing means (40, 50) to tighten said tract of tubular net (21) and said ribbon (22) of thermoplastic material in a position rear to said product (2);
 - f. performing the displacement in the same direction of said product (2) fed inside said tract of tubular net (21) and of said closing means (40, 50) tightening said tract of tubular net (21) and said ribbon (22) of thermoplastic material, from said closing station to a release station for the packaged product (20);
 - g. performing, during said displacement step, the sealing of said tract of tubular net (21) and of said ribbon (22) of thermoplastic material tightened by said closing means (40, 50);

- h. in the meantime, performing the cut of said tract of tubular net (21) and of said ribbon (22) of thermoplastic material at the rear sealing zone to separate said packaged product (20).
2. Method according to claim 1, **characterized in that** it provides for attaching to said tract of tubular net (21) an upper ribbon (22) and a lower ribbon (23) of thermoplastic material, extending longitudinally with respect to the said tract of tubular net (21) in diametrically opposed positions.
 3. Method according to claim 1 or 2, **characterized in that** it provides for performing, during said step of simultaneous displacement of said product (2) fed inside said tract of tubular net (21) and of said closing means (40, 50), the cooling of said rear sealing zone.
 4. Method according to claim 1 or 3, **characterized in that** it provides for tightening between said closing means (40, 50) a widened portion of tubular net (21), extending in a direction transverse to the longitudinal axis of the same tubular net (21), having a width corresponding substantially to the width of said ribbon (22) of thermoplastic material.
 5. Apparatus for packaging products in a tubular net wrapping, comprising a tubular member (11) on the external surface of which a tubular net (21) unwinds; feed means (12) for the product (2) to be packaged along said tubular member (11), to introduce the same product (2) inside a tract of said tubular net (21) protruding at the front of said tubular member (11) and previously closed at the front end; a closing and cutting device (30) for said tubular net (21) arranged at the front part of said tubular member (11) and operating to tighten said tract of tubular net (21) at the back of said product (2) introduced in the same tubular net (21), **characterized in that** said closing and cutting device (30) is provided with closing means (40, 50)

operable to tighten a portion of said tract of tubular net (21), at the back of said product (2) introduced in the said tubular net (21), and carrying sealing means (44) to perform the sealing of said portion of tubular net (21) tightened between said closing means (40, 50).

6. Apparatus according to claim 5, **characterized in that** it comprises means (24) for feeding at least one ribbon (22) of thermoplastic material, extending longitudinally with respect to the said tract of tubular net (21) in order to be tightened to said portion of tubular net (21) by said closing means (40, 50) and attached thereto by means of sealing by said sealing means (44).
7. Apparatus according to claim 5 or 6, **characterized in that** said closing and cutting device (30) is mobile with alternated motion between a first operating station arranged approached to said tubular member (11), wherein is performed the closing of said tubular net (21) upstream of said product (2) introduced in the same tubular net (21), and a second operating station, distanced from the same tubular member (11), wherein is performed the release of the packaged product (20) in the tubular net wrapping.
8. Apparatus according to claim 5 or 6, **characterized in that** said closing means (40, 50) comprise a first closing unit (40) and a second closing unit (50), respectively upper and lower, mobile relative to each other, with an alternated motion of reciprocal approach and departing, on a plane transverse to the longitudinal axis of said tubular net (21).
9. Apparatus according to claim 8, **characterized in that** said first closing unit (40) and second closing unit (50) respectively comprise a couple of blades (43, 53) placed beside, suitable to act as a guillotine to tighten said portion of tubular net (21).

10. Apparatus according to claim 9, **characterized in that** said blades (43, 53) have a shaped profile (43a, 53a) with converging tracts in order to act as draft for collecting said portion of tubular net (21) at a central zone (43b, 53b) of the same profile, at least the central zone (43b) of said profile of the upper blades (43) shaping a flat bottom cavity suitable to receive said portion of tubular net (21) during the tightening step.
11. Apparatus according to claim 8, **characterized in that** said sealing means (44) comprise a sealing member which is mobile on said first closing unit (40), upon control of actuator means (45), between a non operating position and an active position wherein the sealing member is brought in abutment of an abutment member (54) associated with said second closing unit (50).
12. Apparatus according to claims 9 and 11, **characterized in that** said abutment member (54) is suitable to abut said blades (43) of the first closing unit (40) in order to tighten said portion of tubular net (21).
13. Apparatus according to claim 11, **characterized in that** said abutment member (54) has on the upper surface a series of holes (55) in communication with means for sending a flow of cooling air following the sealing of said portion of tubular net (21).
14. Package of products in a tubular net wrapping, comprising a tract of tubular net (21) inside which is introduced the product (2) and closed by means of sealing at the front and rear ends; and at least one ribbon (22) of thermoplastic material, extending longitudinally with respect to said tract of tubular net (21) and attached by means of sealing at said front and rear ends of said tract of tubular net (21).

AMENDED CLAIMS

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Claims

1. Method for packaging punnets of fruit and vegetable products in a tubular net wrapping, comprising the steps of:
 - a. closing by means of sealing a front end of a tract of tubular net (21);
 - b. attaching to said front end of said tract of tubular net (21), at the zone of closing by means of sealing, at least one ribbon (22) of thermoplastic material, extending longitudinally with respect to the said tract of tubular net (21);
 - c. feeding the punnet (2) of fruit and vegetable products to be packaged inside said tract of tubular net (21), until it reaches said front end of the tract of tubular net (21) closed by means of sealing;
 - d. prearranging closing means (40, 50) at a closing station placed at the rear part of said (2) fed inside said tract of tubular net (21);
 - e. operating said closing means (40, 50) to tighten said tract of tubular net (21) and said ribbon (22) of thermoplastic material in a position rear to said punnet (2);
 - f. performing the displacement in the same direction of said punnet (2) fed inside said tract of tubular net (21) and of said closing means (40, 50) tightening said tract of tubular net (21) and said ribbon (22) of thermoplastic material, from said closing station to a release station for the packaged punnet (20);
 - g. performing, during said displacement step, the sealing of said tract of tubular net (21) and of said ribbon (22) of thermoplastic material tightened by said closing means (40, 50);

AMENDED SHEET (ARTICLE 19)

- h. in the meantime, performing the cut of said tract of tubular net (21) and of said ribbon (22) of thermoplastic material at the rear sealing zone to separate said packaged punnet (20).
2. Method according to claim 1, **characterized in that** it provides for attaching to said tract of tubular net (21) an upper ribbon (22) and a lower ribbon (23) of thermoplastic material, extending longitudinally with respect to the said tract of tubular net (21) in diametrically opposed positions.
 3. Method according to claim 1 or 2, **characterized in that** it provides for performing, during said step of simultaneous displacement of said punnet (2) fed inside said tract of tubular net (21) and of said closing means (40, 50), the cooling of said rear sealing zone.
 4. Method according to claim 1 or 3, **characterized in that** it provides for tightening between said closing means (40, 50) a widened portion of tubular net (21), extending in a direction transverse to the longitudinal axis of the same tubular net (21), having a width corresponding substantially to the width of said ribbon (22) of thermoplastic material.
 5. Apparatus for packaging punnets of fruit and vegetable products in a tubular net wrapping, comprising a tubular member (11) arranged with horizontal axis on the external surface of which a tubular net (21) unwinds; feed means (12) for the punnet (2) to be packaged along said tubular member (11), to introduce the same punnet (2) inside a tract of said tubular net (21) protruding at the front of said tubular member (11) and previously closed at the front end; a closing and cutting device (30) for said tubular net (21) arranged at the front part of said tubular member (11) and operating to tighten said tract of tubular net (21) at the back of said punnet (2) introduced in the same tubular net (21), **characterized in that** said closing

and cutting device (30) is provided with closing means (40, 50) operable to tighten a portion of said tract of tubular net (21), at the back of said punnet (2) introduced in the said tubular net (21), and carrying sealing means (44) to perform the sealing of said portion of tubular net (21) tightened between said closing means (40, 50).

6. Apparatus according to claim 5, **characterized in that** it comprises means (24) for feeding at least one ribbon (22) of thermoplastic material, extending longitudinally with respect to the said tract of tubular net (21) in order to be tightened to said portion of tubular net (21) by said closing means (40, 50) and attached thereto by means of sealing by said sealing means (44).
7. Apparatus according to claim 5 or 6, **characterized in that** said closing and cutting device (30) is mobile with alternated motion between a first operating station arranged approached to said tubular member (11), wherein is performed the closing of said tubular net (21) upstream of said punnet (2) introduced in the same tubular net (21), and a second operating station, distanced from the same tubular member (11), wherein is performed the release of the packaged punnet (20) in the tubular net wrapping.
8. Apparatus according to claim 5 or 6, **characterized in that** said closing means (40, 50) comprise a first closing unit (40) and a second closing unit (50), respectively upper and lower, mobile relative to each other, with an alternated motion of reciprocal approach and departing, on a plane transverse to the longitudinal axis of said tubular net (21).
9. Apparatus according to claim 8, **characterized in that** said first closing unit (40) and second closing unit (50) respectively comprise a couple of blades

- (43, 53) placed beside, suitable to act as a guillotine to tighten said portion of tubular net (21).
10. Apparatus according to claim 9, **characterized in that** said blades (43, 53) have a shaped profile (43a, 53a) with converging tracts in order to act as draft for collecting said portion of tubular net (21) at a central zone (43b, 53b) of the same profile, at least the central zone (43b) of said profile of the upper blades (43) shaping a flat bottom cavity suitable to receive said portion of tubular net (21) during the tightening step.
 11. Apparatus according to claim 8, **characterized in that** said sealing means (44) comprise a sealing member which is mobile on said first closing unit (40), upon control of actuator means (45), between a non operating position and an active position wherein the sealing member is brought in abutment of an abutment member (54) associated with said second closing unit (50).
 12. Apparatus according to claims 9 and 11, **characterized in that** said abutment member (54) is suitable to abut said blades (43) of the first closing unit (40) in order to tighten said portion of tubular net (21).
 13. Apparatus according to claim 11, **characterized in that** said abutment member (54) has on the upper surface a series of holes (55) in communication with means for sending a flow of cooling air following the sealing of said portion of tubular net (21).
 14. Package of punnets of fruit and vegetable products in a tubular net wrapping, comprising a tract of tubular net (21) inside which is introduced the punnet (2) and closed by means of sealing at the front and rear ends; and at least one ribbon (22) of thermoplastic material, extending longitudinally with respect to said tract of tubular net (21) and attached by means of sealing at said front and rear ends of said tract of tubular net (21).

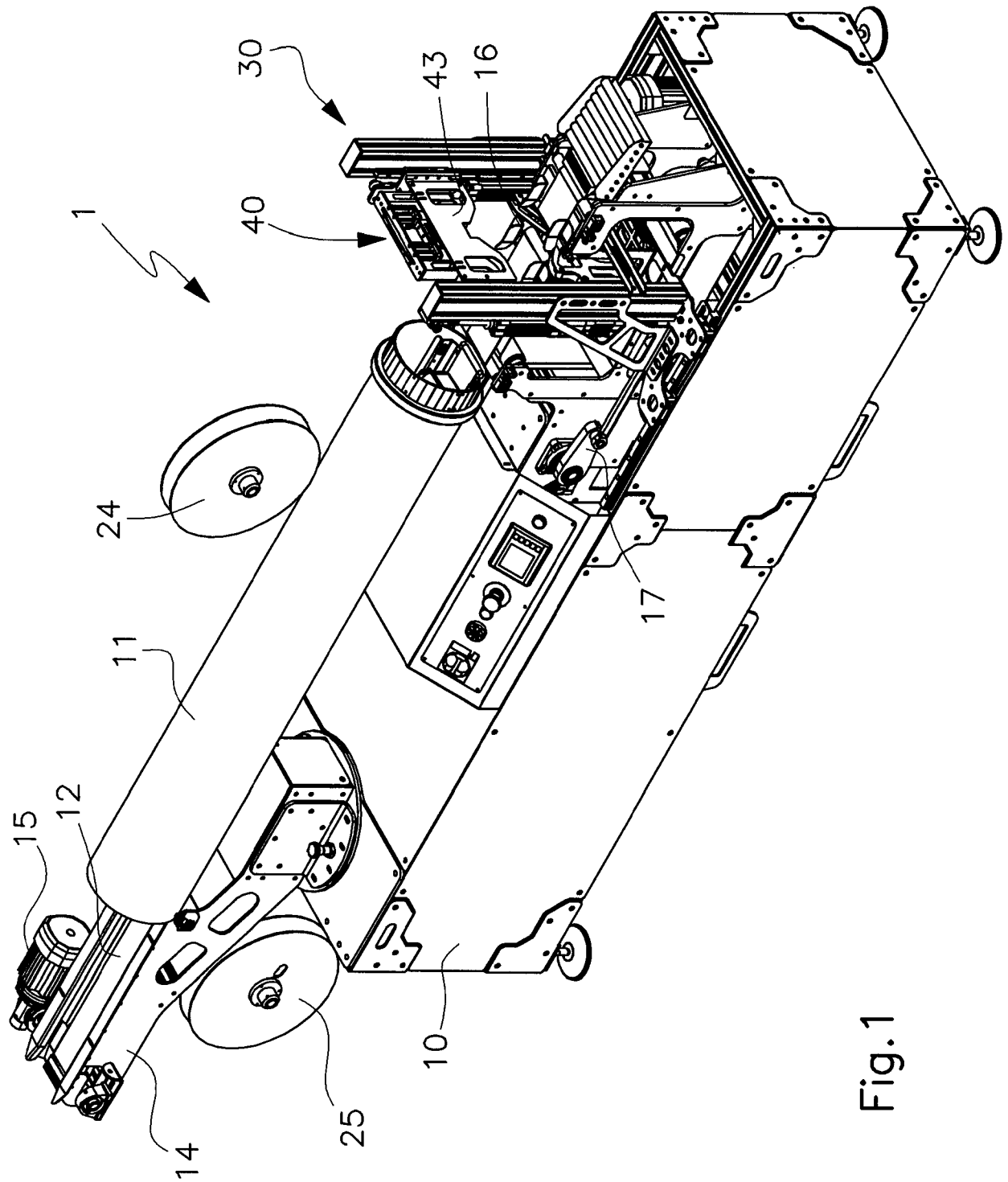


Fig.1

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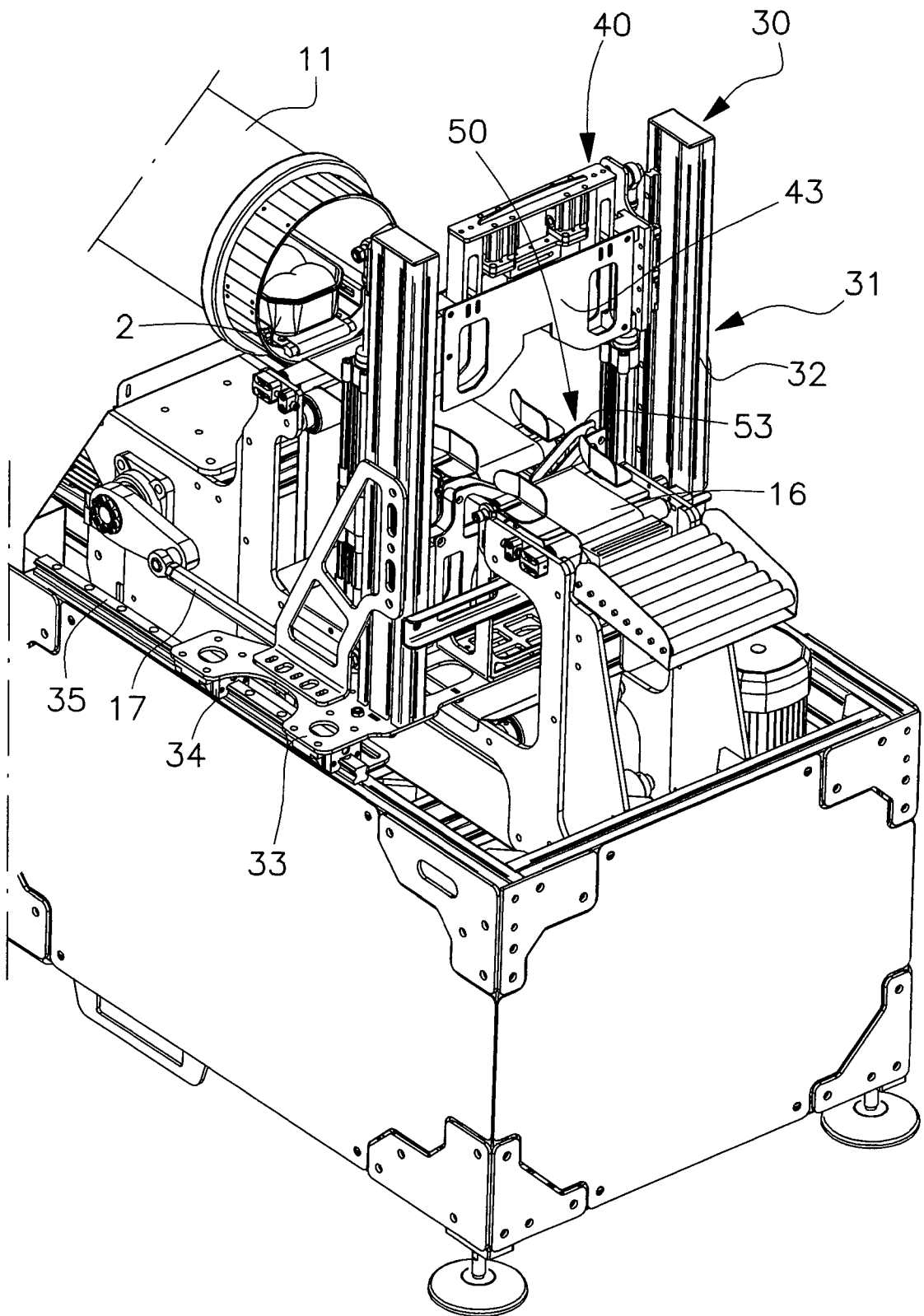


Fig.2

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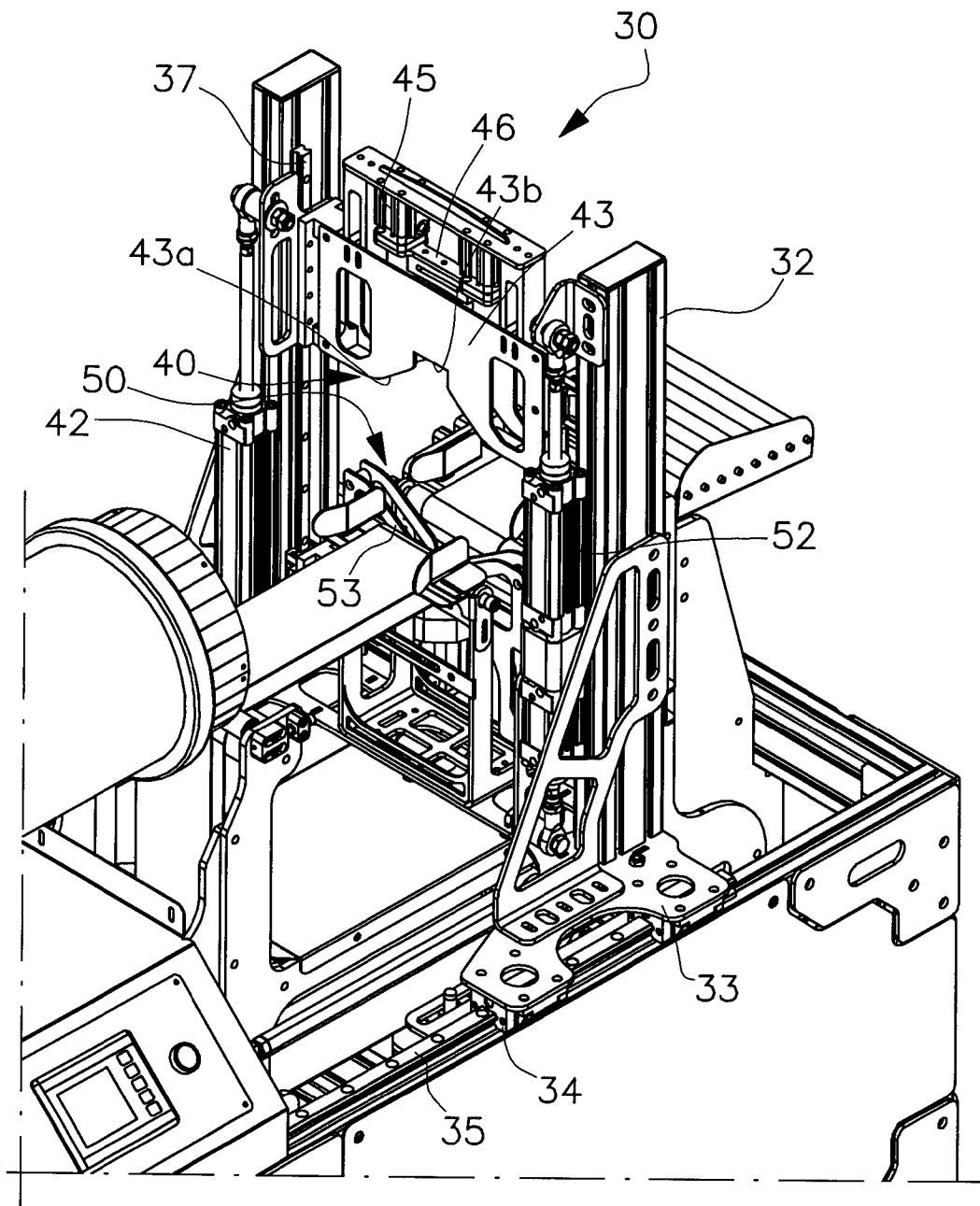


Fig.3

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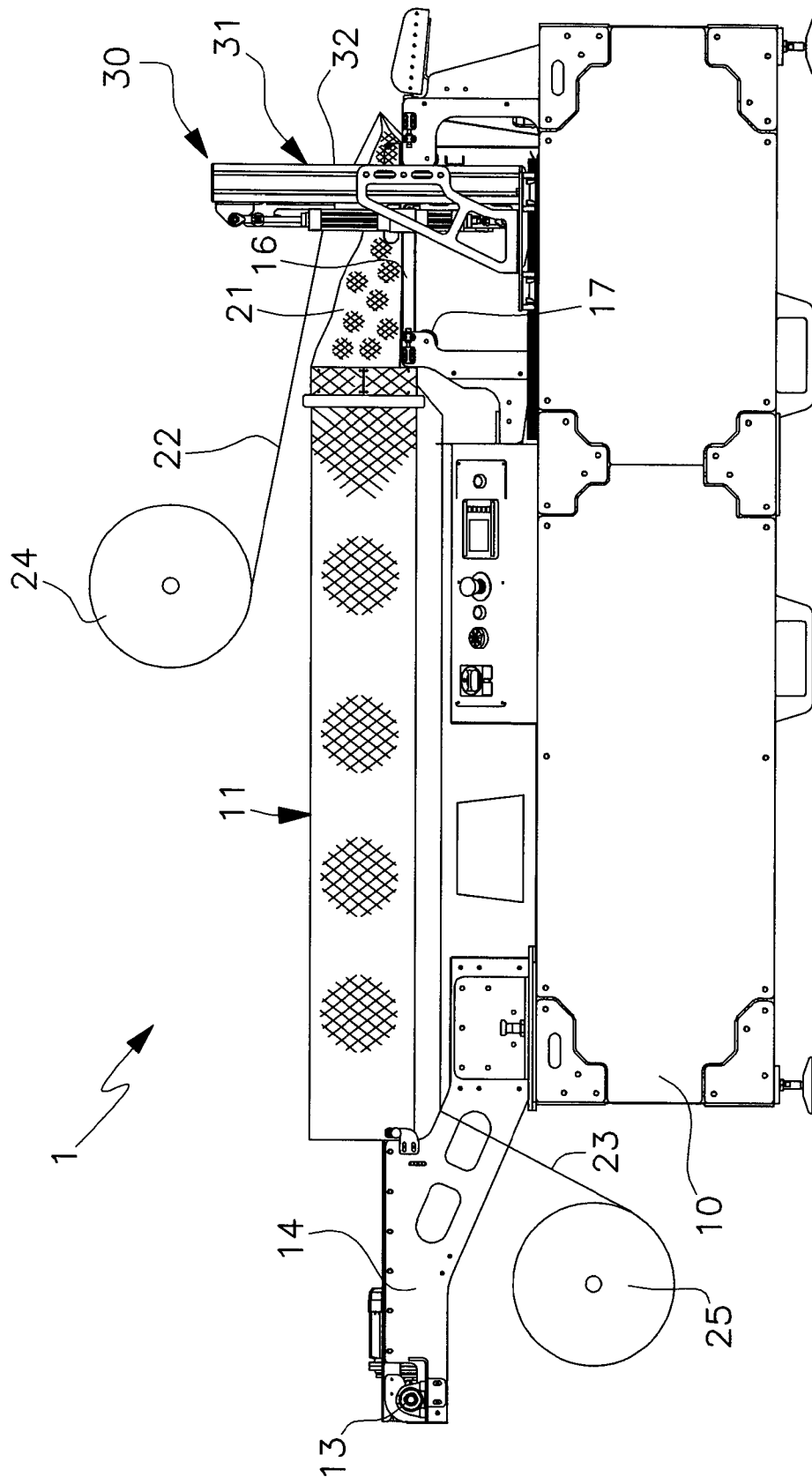


Fig. 4

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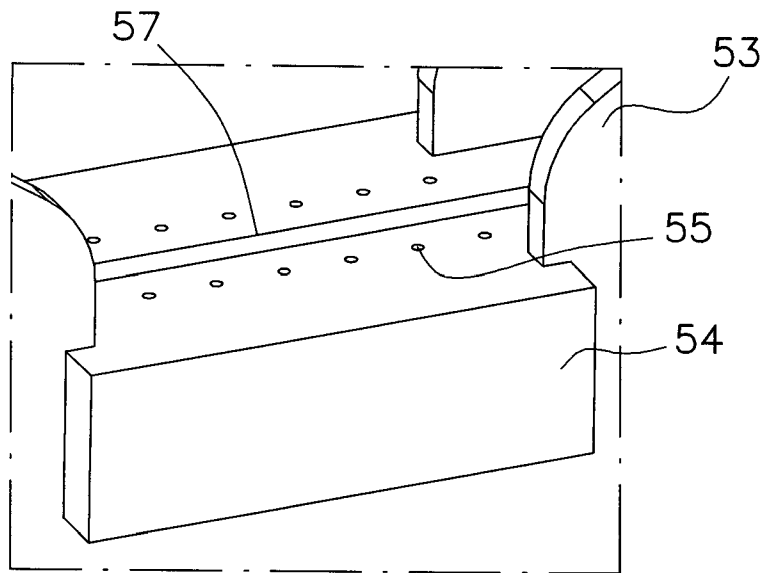


Fig. 6a

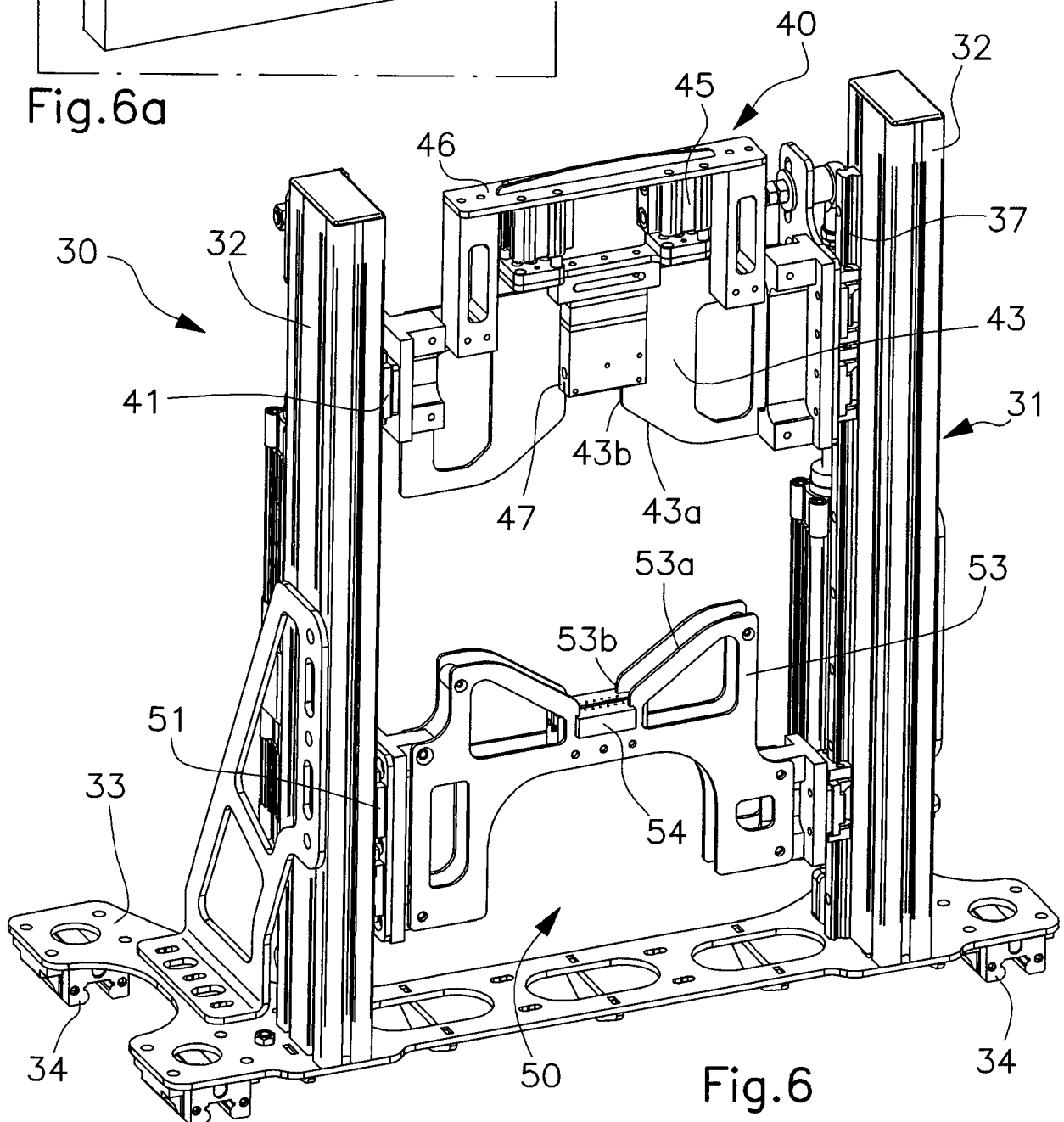


Fig. 6

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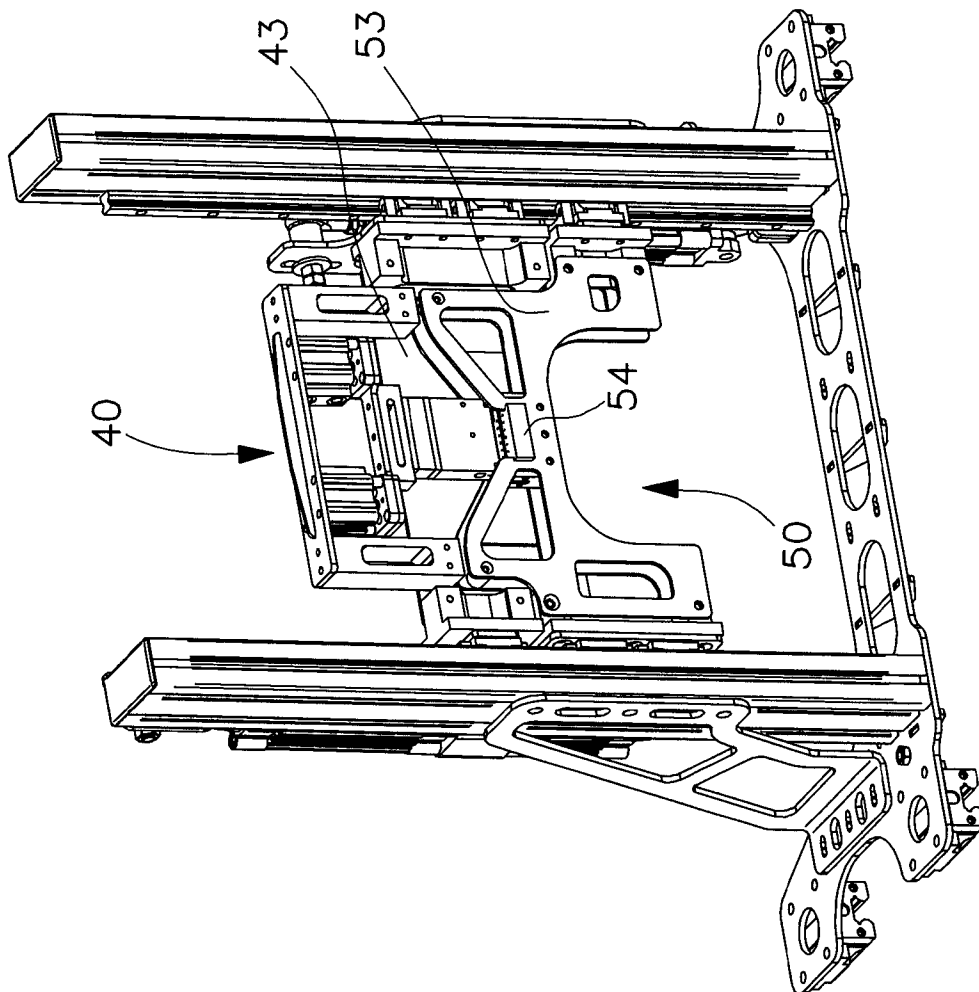


Fig. 7

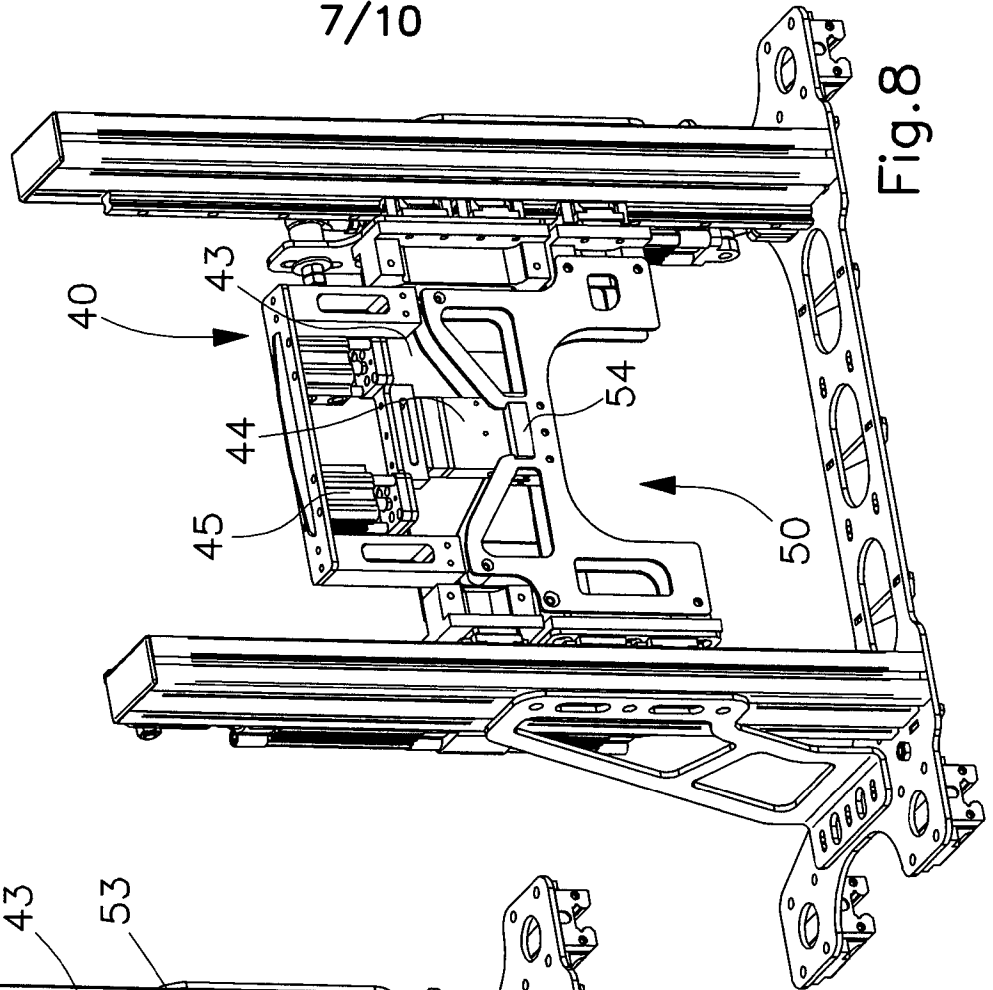


Fig. 8

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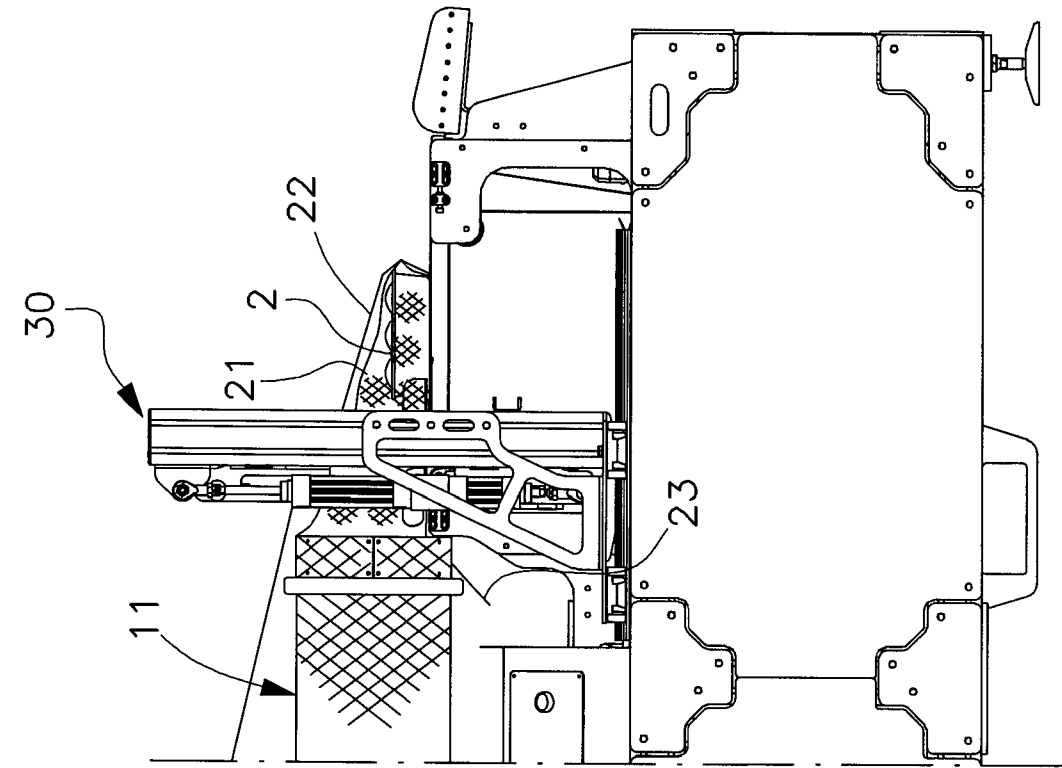


Fig. 10

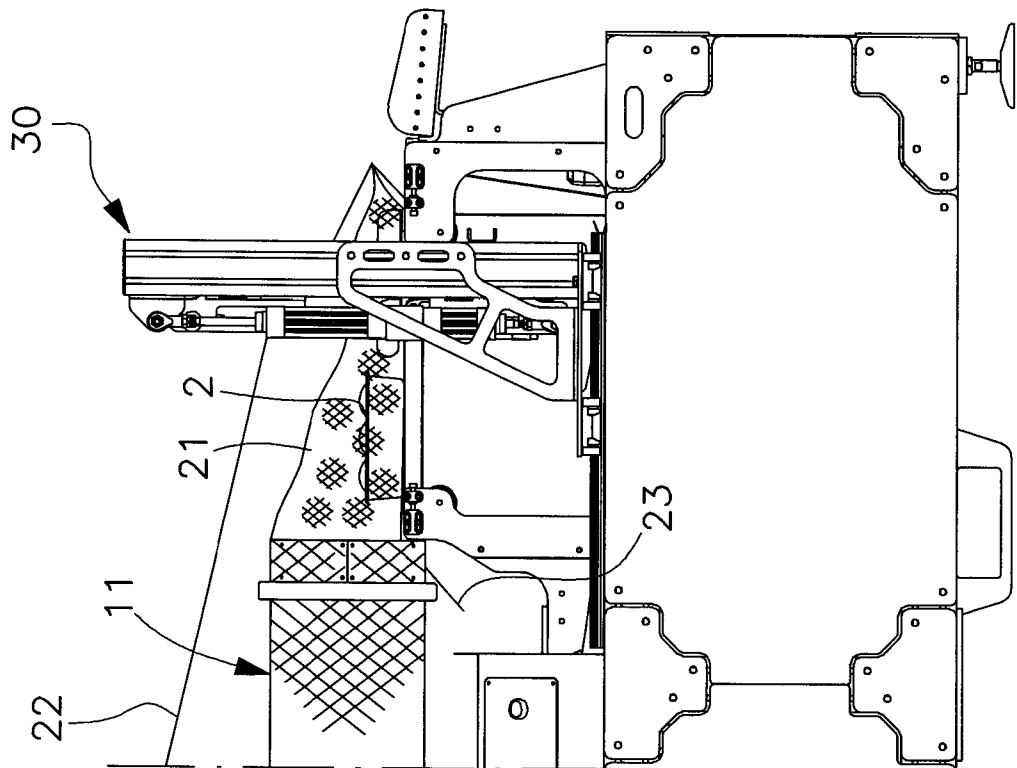


Fig. 9

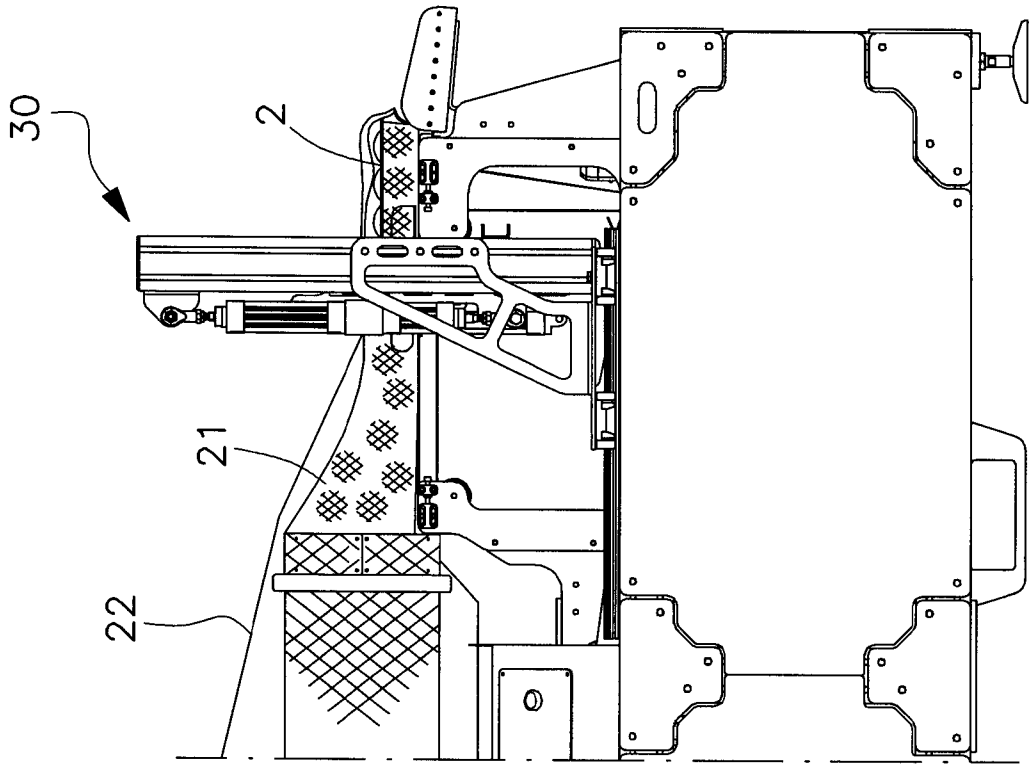


Fig.12

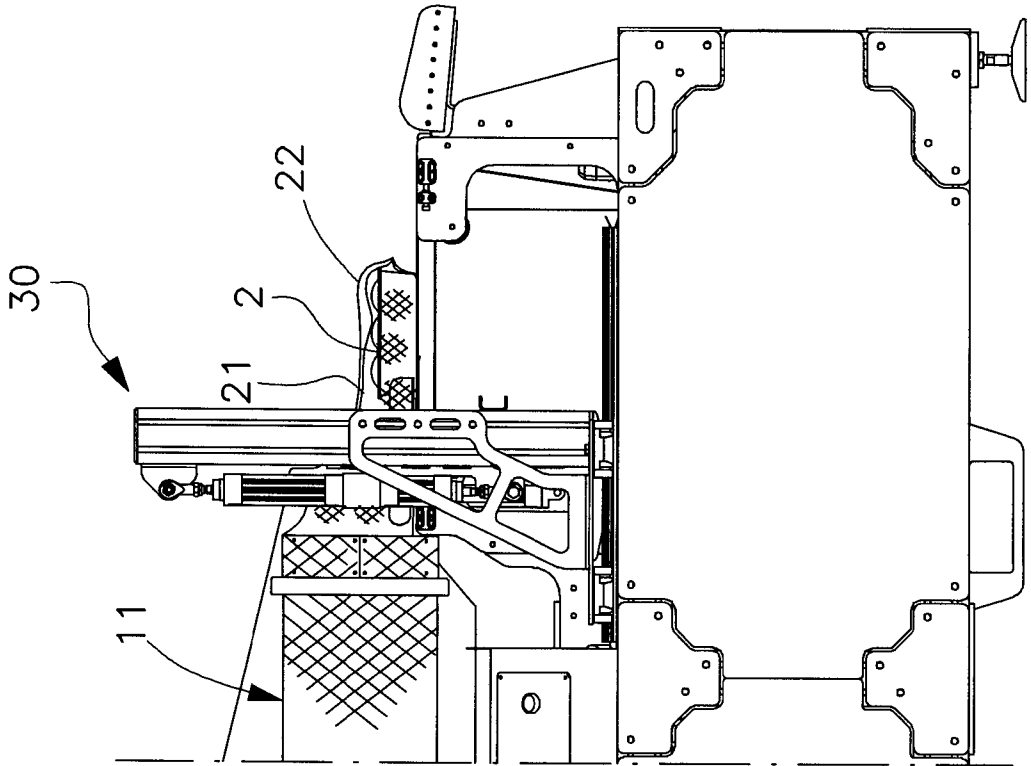


Fig.11

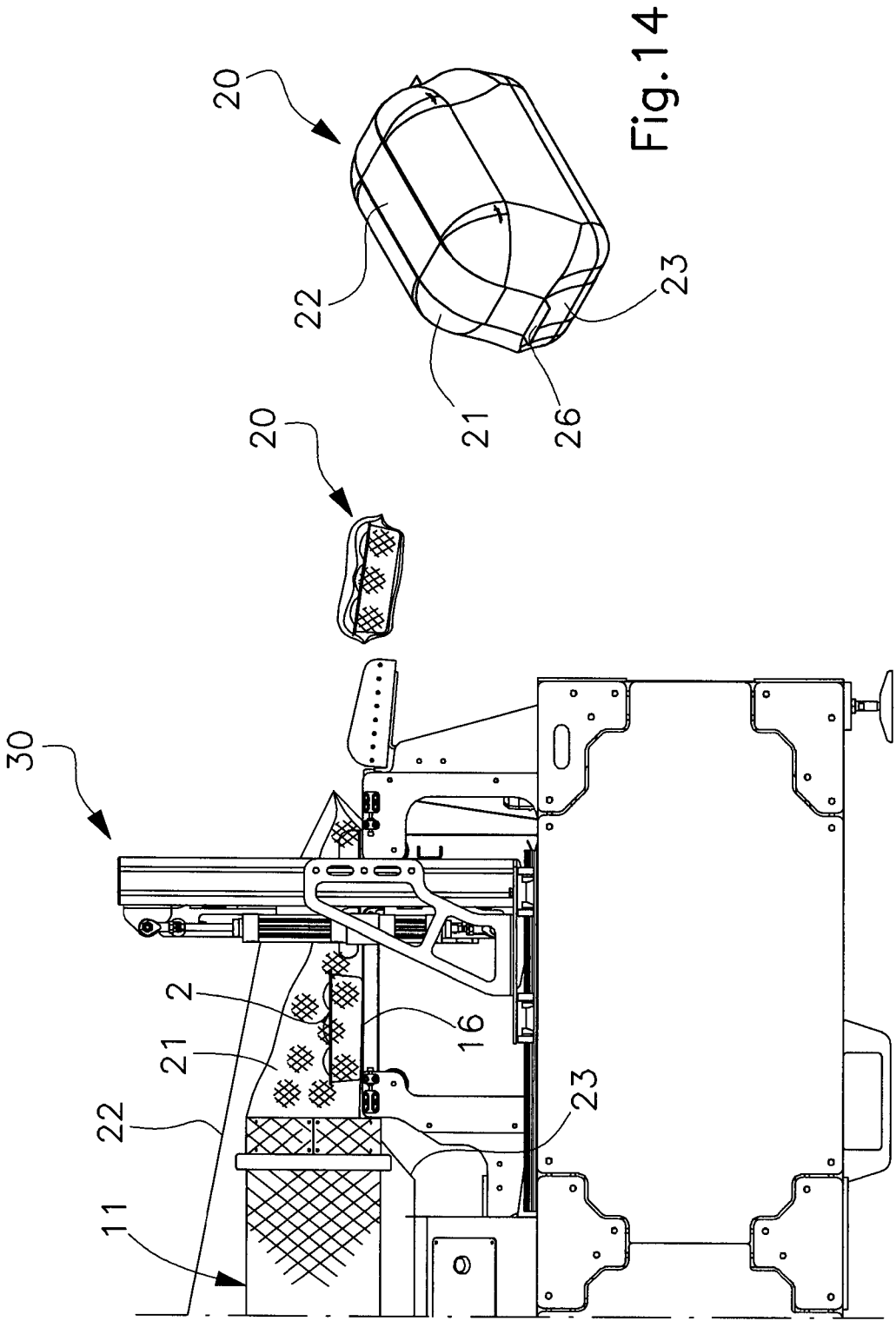


Fig.14

Fig.13

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/061255

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65B9/15 B65B51/30 B65B61/14 B65B61/20
ADD.

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

B. FIELDS SEARCHED

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

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

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Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

30 September 2011

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/061255

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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