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Packaging System and Method of Packaging Objects

Description

The present invention relates to a horizontal stretch system for packaging at least one object into a plastic sheet bag (plastic bag). Such a horizontal stretch system comprises at least one tubular sheet supply, at least one opening station and at least two gathering brackets for gathering and spreading the plastic bag which is formed of a tubular sheet section from the tubular sheet supply. Furthermore at least one closing station for closing the filled plastic bag is provided. The gathering brackets are traversable between a bag takeup position and a packaging position.

The prior art has disclosed a variety of apparatuses and methods of packaging one or more objects into plastic sheets. Depending on the intended application, packaging one or more objects into stretch sheet is in particular advantageous.

For example, EP 1 597 147 B1 describes a method and a system for wrapping objects, wherein a bag formed of a tubular sheet is pulled onto so-called gathering brackets. The gathering brackets with the gathered bag are subsequently slightly expanded so that the bag is spread apart respectively stretched.

The gathered bag that is kept open by the gathering brackets is subsequently disposed between a pair of conveyors so that an object transported over the first conveyor is conveyed into the opened bag. In this way the bag is pulled over the object and pulled off of the gathering brackets.

Thereafter the bag is welded shut and the packaged object is discharged with the second conveyor.

The drawback of the known systems is that as a rule the construction

requires to provide a relatively large gap between the two conveyors so that the kept-open bag can be brought to the conveying plane so as to allow transporting an object into the bag. In order to ensure sufficient support for the object between the two conveyors in particular in the case of insufficiently rigid objects, some very complicated constructions tend to be called for.

The gap between the conveyors is proportional in length with the length of the objects provided for packaging and with the length of sheet pulled over the gathering brackets. This increases the required length of the gathering brackets and thus also the width of the gap between the conveyors.

WO2016/070883 shows a similar system providing two sheet supplies and two assemblies including gathering brackets to increase the system output.

Another drawback of the known systems is that the machines do not operate continuously since the object packed into the plastic sheet must be stopped on the second conveyor for welding the open side of the bag shut.

It is therefore the object of the present invention to provide an alternative configuration of such a system for packaging objects which at least partially improves the drawbacks described above, in particular when packaging conventionally filled paper bags for weather protection.

This object is solved by a horizontal stretch system having the features of claim 1 and by a method having the features of claim 11.

Preferred specific embodiments of the invention are the subjects of the subclaims. Further advantages and features of the invention can be taken from the exemplary embodiments.

The packaging system respectively horizontal stretch system for packaging at least one object into a plastic bag according to the invention comprises at least one tubular sheet supply, at least one

opening station, at least two gathering brackets for gathering and spreading the plastic bag and at least one closing station for closing the filled plastic bag. The gathering brackets are traversable at least between a bag takeup position and at least one packaging position. A continuous conveyor device having at least one conveying member is provided on which an object intended for packaging is transported into the plastic bag kept open by the gathering brackets in the packaging position. The conveyor device comprises a conveying plane provided with at least one deflecting device which deflects the conveying member downwardly from the conveying plane at least in sections so as to form a free space in the conveying plane in which at least the closing station can be disposed at least in sections.

According to the invention, the horizontal stretch system comprises at least one tubular sheet supply and at least one opening station, wherein at least one welding and cutting station is provided in particular between the tubular sheet supply and the opening station, by means of which a specified length of tubular sheet is cut off of the tubular sheet supply and closed at one end. Thus, a length of tubular sheet, preferably a length of gusseted sheet tube, is formed into a plastic bag open on one side, which is opened up at the open end by means of the opening station and delivered to the gathering brackets. As soon as the plastic bag is delivered to the gathering brackets it is pulled onto respectively gathered on the gathering brackets, which is otherwise known in the prior art.

The welding and cutting station is preferably provided between the tubular sheet supply and the opening station, wherein the welding and cutting station may be an autonomous assembly or may be assigned to the tubular sheet supply and/or the opening station.

The aforementioned welding and cutting station may be omitted in this place depending on the configuration, in particular if prefabricated bags constituting the tubular sheet supply are fed from a supply, as it may be preferred in a system configuration.

For opening the plastic bag and/or for producing a plastic bag closed on one side, the opening station preferably comprises a pair of arms respectively plates, between which the tubular sheet from the tubular sheet supply can be conveyed through.

The opening station comprises, in particular at the end assigned to the gathering brackets, at least one suction device and preferably at least one sucker respectively one suction device at both arms or plates so that, as the plates are spread by means of an actuator, the plastic bag is pulled apart respectively opened up at its open end so that it can be placed on the gathering brackets.

According to the invention, the horizontal stretch system comprises at least two gathering brackets. Alternately it is possible to provide more gathering brackets, for example four. The gathering brackets are preferably equipped with at least one roller for gathering and pulling off the plastic sheet respectively the plastic bag. These gathering brackets are comprehensively known in the prior art and such a configuration is preferred.

The gathering brackets may in particular be at least slightly spread apart. Increasing the distance between the gathering brackets stretches the gathered plastic bag at least slightly. Stretching the plastic bag causes the plastic bag to cling particularly tightly, in particular wrinkle-free, to the packaged object.

The gathering brackets are preferably received on a frame respectively in a framework. The gathering brackets respectively the framework respectively the frame are arranged traversable so that the gathering brackets can be displaced from the bag takeup position to the packaging position. The gathering brackets can in particular traverse upwardly and/or downwardly or also traverse laterally or they may be configured pivotable. In particular if several sheet supplies are provided, lateral motions may be advantageously employed so that sheet supplies are for example disposed to the left and right of the conveyor device and two frameworks with gathering brackets are used in parallel and/or in series for achieving a

particularly high throughput. Then, one frame preferably lies in the packaging position and the second frame with gathering brackets is in the bag takeup position to already take up respectively gather a new plastic bag. In parallel use, the flow of packaged objects may be divided in two lines and two objects may be packaged concurrently or at a short time offset.

According to the invention, the closing station is in particular disposed behind or downstream of the gathering brackets in the conveying direction. Thus in particular the object conveyed into the plastic bag can be welded into the plastic bag by means of the closing station. To this end the closing station preferably comprises at least one clamping device to press the bag preferably as tight-fitting as possible to what is the end surface of the object in the conveying direction and to clamp the open bag end in place. In particular if gusset sheet is used it may prove expedient to provide gusset insets to press the lifted respectively tensioned gussets back in place in the region of the intended weld. A defined weld seam can thus be ensured. Furthermore the clamping mechanism preferably largely maintains the longitudinal tension built up as the plastic bag is pulled off of the gathering brackets to achieve that the plastic bag clings to the object particularly wrinkle-free. At the same time the tractive forces on the weld seam are reduced. Furthermore the closing station preferably comprises at least one welding station for closing the open end of the plastic bag with the object inserted. Depending on the configuration, the closing station may also comprise a cutting station for trimming surplus plastic sheet behind the weld seam which is then preferably forwarded to recycling.

The horizontal stretch system according to the invention offers many advantages. A considerable advantage is that the configuration of the conveyor device according to the invention provides for one single, continuous conveyor for feeding and discharging the objects intended for packaging. The prior art as a rule provides for two separate conveyors, one conveyor in charge of feeding the objects into the plastic bag and a second conveyor disposed downstream of

the gathering brackets for discharging the packaged object.

A particular advantage is the fact that only one drive is required and that the configuration providing for only one conveyor makes the feeding and discharging absolutely synchronous. This allows both to save costs and to achieve particularly reliable packaging of objects since feeding and discharging operate at the same speeds.

Using one single, continuous conveyor is enabled by the deflecting device providing free space in the conveying plane in which at least one section of the closing device may be disposed, according to the configuration.

Thus for example one side of the clamping device and one side of the welding device or what is the lower assembly part may be disposed beneath the plastic bag or beneath the conveying plane. Thus the object intended for packaging is conveyed into the bag and thereafter conveyed through the closing station.

The configuration according to the invention allows to provide a very small free space respectively a very small or narrow gap in the conveying direction in which to dispose the closing device.

This is enabled in particular by the fact that depending on the configuration, relatively short gathering brackets may be used since weather protection for bags is in particular provided according to the present invention. This requires weaker holding forces than e.g. for wrapping in plastic sheet for load securing. This also allows to provide shorter gathering and stretching distances which moreover increases the system output.

Preferably the horizontal distance of the gathering brackets is larger than the width of the conveying member. It is thus achieved that in traversal to the packaging position the gathering brackets may travel downwardly in particular at least slightly laterally past the conveying member so that the gathered plastic bag preferably makes direct contact with the conveying member and is in particular at least briefly substantially tightly drawn over the conveying

member so that the object can be readily conveyed into the plastic bag.

Particularly preferably the conveyor device shows a sliding discharge at least in the region of the gathering brackets. This is in particular understood to mean that for example a gliding plate respectively gliding surface is provided beneath the conveying member in the region of the gathering brackets so that the conveying member glides across the sliding discharge in this region.

In advantageous specific embodiments the sliding discharge is substantially spring-mounted and/or configured yielding. It is in particular provided that the sliding discharge yields at least slightly respectively can be pushed away when the gathering brackets traverse downwardly and the gathered plastic bag contacts the conveyor belt.

Optionally, a yielding respectively springing configuration may be provided without a sliding discharge. Then the gathering brackets respectively the gathered, open sheet end may for example be provided in a free space between two supporting points of the conveying member, e.g. between pairs of support rollers. Then the conveying member slightly yields in this region as needed when the bottom layer of the opened plastic sheet bag makes contact with the conveying member.

Preferably at least one gathering bracket dips at least the gathered plastic bag in the packaging position at least in sections into the free space formed by the deflecting device. Then in particular at least one gathering bracket respectively the gathering brackets may dip into the free space at least in sections. To this end the free space is preferably configured such that both the gathering brackets respectively at least the gathered plastic bag and also the closing station can be accommodated in the free space at least in sections.

Particularly preferably the deflecting device comprises at least in the conveying plane at least one deflection roller which in

particular shows the smallest possible diameter. In the case of a gliding discharge the belt may be guided over a so-called knife edge in front of the gap, meaning a deflection at a particularly small radius to guide the conveying plane as closely as possible toward the gap and thus to support as long as possible any non-rigid objects such as bags. A non-supported length of less than 1/3, particularly preferably less than 1/4 of the packaged object length is preferred to prevent any non-rigid objects from tilting or bending inwardly.

In expedient specific embodiments, at least one deflection roller is configured traversable and/or pivotable. It can thus be achieved that for example the conveying member can traverse between the gathering brackets when the gathering brackets are disposed in the packaging position. Pivoting at least two deflection rollers allows traversal of the conveying member without varying the length of the conveying member. It is in particular also possible to vary the free space even during operation by way of traversing at least two deflection rollers so that for example the closing station can traverse along as the packaged object is discharged, so that the plastic bag can be closed during discharge.

In preferred specific embodiments, at least one supporting device is disposed in the free space. Such a supporting device may in particular be configured as a supporting roller which can preferably also be driven. Such a supporting roller may support the object respectively the gathered plastic bag while the object is moving into the plastic bag to allow particularly reliable filling of the bag. The gathered plastic sheet is preferably guided over the supporting device.

Preferably the supporting device is configured height-adjustable. Thus, for example while the object is being packaged, the height of the supporting device may be varied or adjusted or adapted respectively.

Particularly preferably the closing station is configured

traversable. As has been described, the closing station can traverse in particular in interaction with traversable deflection rollers respectively a traversable conveying member so that for example a bag may be closed during discharge. Thus the horizontal stretch system may in particular operate continuously, eliminating the need for a start-stop operation due to closing the bags.

The free space can preferably be displaced and/or enlarged and/or elongated in accordance with traversal of the closing station. As has been described, the free space can thus be provided to adapt to the various process steps while an object is being packaged, which object is optimally supported at all times so that the closing station for closing the bag can traverse along, wherein while the object is being conveyed into the plastic bag the conveying member is aligned respectively the free space is configured small enough so as to provide a nearly closed gap in the conveying plane, wherein only the closing station can enter the free space.

The opening station according to the invention comprises at least two arms with at least one conveying device, wherein the tubular sheet can be transported from the tubular sheet supply through the two arms. The length of the arms is configured accordingly depending on the configuration, wherein the arms are preferably configured long enough so that at least one entire plastic bag length can be received between the two arms. The tubular sheet respectively the plastic bag closed on one side can then be conveyed between the arms for example by means of driven rollers.

Depending on the orientation of the horizontal stretch system, high-performance versions may for example also provide for a longer opening station so that at least two bag lengths can be received. Then a bag closed on one side may already be gathered onto the gathering brackets while a following bag is pulled into the opening station and closed on one side by means of the welding and cutting station and cut off of the sheet supply. Depending on the configuration, a second prefabricated bag may optionally already be inserted into the opening station.

Preferably at least one suction device is provided at least on one arm. In particular each of the arms is provided with at least one suction device or at least one sucker. Such a suction device is in particular provided at the end of the opening station facing the gathering brackets, wherein the suction device serves to retain the plastic bag on the arms so that for example as the arms spread, the open end of the plastic bag is pulled apart. Then the plastic bag thus opened can be readily placed on the gathering brackets. Preferably the bottom part of the opening station is configured as a stationary gliding table over which the plastic bag is transported and aligned in the direction of the suction device without sag. In the conveying direction of the plastic bags the gliding table preferably shows an inclination corresponding to half the opening angle of the bag in the opening station.

To this end at least one arm is provided with at least one displacement device for spreading the arms apart. Such a displacement device respectively such an actuator may show any desired configuration so that at least one arm is displaceable by means of which the plastic bag disposed between the arms is opened.

In a simple case the arms only consist of one suction cup each in the required width positions to lift up the top sheet layer of the plastic bag and thus to open the plastic bag.

Preferably the opening station is traversable. Then the opening station can be advanced in particular toward, and reversed away from, the gathering brackets.

Depending on the configuration it is also possible for the gathering brackets to be traversable and to advance toward, respectively move away from, the opening station. The cutting and welding station may also be traversable so that in particular in high-performance versions of the horizontal stretch system according to the invention a high throughput can be achieved in particular by overlapping process steps.

The method according to the invention is suitable for packaging objects into plastic bags by means of a horizontal stretch system as it has been described above. The method comprises the following steps in a suitable sequence:

- gathering the plastic bag onto the gathering brackets
- spreading the plastic bag by means of the gathering brackets
- traversing the gathering brackets to the packaging position
- conveying an object into the bag by means of the continuous conveyor device
- welding shut the open end of the filled bag by means of the closing device.

Preferably the method according to the invention further comprises, catching and clamping the open bag end downstream of the object, followed by welding the plastic bag shut by means of the closing station.

The process steps indicated may be performed successively in a suitable sequence and/or at least partially also concurrently. For example welding one bag end shut and placing onto the gathering brackets may take place concurrently. Moreover in particular spreading the bag on the gathering brackets and traversing to the packaging position may be concurrent, respectively may at least partially overlap.

The method according to the invention also offers the advantages described above regarding the horizontal stretch system having a continuous conveyor device according to the invention.

In expedient specific embodiments the method according to the invention furthermore comprises the following steps in a suitable position:

- cutting a tubular sheet section to a specified length
- welding shut one end of the tubular sheet
- taking over the plastic bag by means of the opening station onto the gathering brackets in the bag takeup position

Alternately, prefabricated plastic bags may be fed instead of cutting to length and welding a tubular sheet.

Preferably the conveying member traverses between the gathering brackets respectively into the bag opening after displacing the gathering brackets to the packaging position. To this end in particular at least two deflection rollers of the deflecting device traverse and/or pivot so that the conveying member moves, without varying the total length of the conveying member, between the gathering brackets respectively into the plastic bag.

After the object has passed the packaging position at least in sections and in particular largely, the closing station is particularly preferably displaced along in the conveying direction, wherein the open end of the plastic bag is folded inwardly and then clamped off and closed during the transport, in accordance with the configuration. This allows continuous conveyance of objects over the continuous conveyor device so as to eliminate the need for a start-stop operation since the plastic bag is closed during discharge. It is not necessary to stop the object after conveying it into the plastic bag to then close the bag by means of a stationary closing station.

Concurrent traversal of the closing station may take place, depending on the configuration, above the conveying plane or in a free space in the conveying plane which expands due to a deflecting device lying downstream of the gathering brackets in the conveying direction.

Further advantages and features of the present invention can be taken from the exemplary embodiments which will be discussed below with reference to the enclosed figures.

These show in:

Figure 1 a schematic side view of a first exemplary embodiment of a horizontal stretch system according to the application in a first operative position;

Figure 1a a schematic plan view of an opening station and three side views of an opening station in different positions;

Figure 1b a schematic side view of an opening station;

Figure 2 a schematic side view of the horizontal stretch system according to the application according to Figure 1 in yet another operative position;

Figure 3 a schematic side view of the horizontal stretch system according to the application according to Figure 1 in a following operative position;

Figure 4 a schematic side view of the horizontal stretch system according to the application according to Figure 1 in another operative position;

Figure 5 a schematic side view of the horizontal stretch system according to the application according to Figure 1 in yet another operative position;

Figure 6 a schematic side view of the horizontal stretch system according to the application according to Figure 1 in a following operative position;

Figure 7 a schematic side view of the horizontal stretch system according to the application according to Figure 1 in another operative position;

Figure 8 a schematic side view of the horizontal stretch system according to the application according to Figure 1 in yet another operative position;

Figure 9 a schematic side view of a second embodiment of a horizontal stretch system according to the application in a first operative position;

Figure 10 a schematic side view of the horizontal stretch system according to the application according to Figure 9 in yet another operative position; and

Figure 11 a schematic side view of the horizontal stretch system according to the application according to Figure 9 in a following operative position.

The Figures 1 to 8 schematically illustrate a first exemplary embodiment of a horizontal stretch system 1 according to the application and its functioning in a variety of views.

The horizontal stretch system 1 according to the application is suitable for overwrapping objects 100 into plastic sheet respectively for packaging objects 100 in plastic bags, wherein the packaged objects 100 are transported via a horizontally extending conveyor device 8 into a kept-open plastic bag 2 in which they are enveloped and then discharged.

The horizontal stretch system 1 comprises a tubular sheet supply 3, the tubular sheet supply 3 comprising tubular sheets 17 on a roller 18.

Furthermore the horizontal stretch system 1 comprises an opening station 50 according to the application into which the tubular sheet 17 is inserted in the illustrated exemplary embodiment.

The opening station 50 furthermore has an assigned welding and cutting device 57 which welds the tubular sheet 17 pulled into the opening device 50 at the end facing the tubular sheet supply 3 and thereafter cuts it off of the tubular sheet supply 3. This produces a plastic bag 2 closed on three sides, which is transported through the opening device 50 in the direction of the gathering brackets 4.

In the illustrated exemplary embodiment, one sheet inlet 25 each is assigned to the welding and cutting device 57 and the opening station 50. The sheet inlets 25 each comprise a conveyor drive 26, for conveying the tubular sheet 17 toward the welding and cutting

device 57 and the opening station.

In the exemplary embodiment shown the opening station 50 comprises two arms 51, 52, wherein the lower arm 51 comprises, or is configured as, a supporting device 63 configured as a gliding plate. The tubular sheet 17 respectively the plastic bag 2 closed on one side is conveyed between the arms 51, 52. Due to the supporting device 63, the tubular sheet 17 conveyed through the arms 51, 52 cannot sag.

The exemplary embodiment shown provides for two conveying devices 53, 54 which include driven rollers 58 by means of which the tubular sheet 17 respectively the plastic bag 2 is conveyed in the direction of the gathering brackets 4 between the arms 51, 52.

In the enlarged illustration in Figure 1 one can see that at the end of the opening station 50 respectively the arms 51, 52 facing the gathering brackets 4, holding devices 59 are provided which are configured as suction devices 55 and which can draw in the plastic bag 2 respectively the individual layers of the plastic bag 2.

The position of the plastic bag 2 relative to the gathering brackets 4 is schematically indicated from above in the small illustration on the left.

Figure 1a schematically shows in a top view and several side views how the opening station 50 can process different bag dimensions.

The top view shows that two upper arms 52 are provided which can be spread apart by various distances according to the different bag widths. Thus there is no need for exchanging size elements adapted to the bag dimensions. Alternately one or both of the arms may be plate-like so that only one section of the arm is used in accordance with the bag width.

The three side views schematically show different opening angles of the arms 51, 52. This clearly shows that the different spreading widths of the arms 51, 52 allow processing various bag heights.

Figure 1b schematically illustrates that both of the arms may be provided to be displaceable, wherein the present case only provides for one displacement device 56 respectively one actuator.

The actuator 56 is connected with the upper arm 52 which it moves up and down. Furthermore, a deflecting device 60 is provided which converts movement of the upper arm 52 into opposite movement of the lower arm 51.

The deflecting device 60 may be provided by any known configuration. The exemplary embodiment shown provides for a deflection roller 61 over which a flexible element 62, such as a rope, is guided. The rope 62 is connected with the upper arm 52 and the lower arm 51 so that movement of the upper arm 52 is converted into a correspondingly reversed movement of the lower arm 51. Configurations with pivoting linkages or other adjustment devices known in the prior art can be expediently used. Configurations including two drives respectively actuators are likewise conceivable.

Figure 2 schematically illustrates that the two arms 51, 52 of the opening device 50 were pivoted apart by the displacement device 56, wherein one arm 51 is configured stationary and the other arm 52, displaceable. The stationary arm 51 is disposed inclined downwardly, preferably providing for an adjustable angle of half the desired opening angle. Since each of the suction devices 55 aspires one layer of the plastic bag 2 closed on one side, it is opened and a nearly rectangular cross section forms.

For transferring the plastic bag 2 to the gathering brackets 4, the opening station traverses in the direction of the gathering brackets 4 so that the opened plastic bag 2 can be placed over the gathering brackets 4.

In other configurations the opening station 50 may also be provided stationary, wherein then the gathering brackets 4 can traverse in the direction of the opening station to collect the opened plastic

bag 2. Both of the assemblies may be provided to be traversable.

Depending on the configuration, in particular in high-performance systems, two or more complete bag lengths may be accommodated in the opening station 50.

The enlarged illustration shows that the plastic bag 2 opened by the suction devices 55 is pulled respectively placed over the gathering brackets 4, which gathering brackets 4 may be configured in any desired way known in the prior art. In the presently shown exemplary embodiment the gathering brackets each comprise one driven roller 19, wherein the direction of rotation can be adapted in the shown exemplary embodiment so that the rollers 19 act as supports both for gathering and pulling off.

The bag position relative to the gathering brackets 4 is again shown schematically from above in the small view.

Figure 3 schematically shows that the bag kept open by the opening station 50 has been completely gathered onto the gathering brackets 4. This can also be seen in particular in the enlarged view and in the small view from above.

The enlargement furthermore clearly shows the plastic sheet 27 gathered on the gathering brackets 4, wherein the weld seam 28 of the plastic bag 2 inserted by the welding and cutting station 57 is approximately centrally opposite the bag opening in the exemplary embodiment shown.

Figure 4 shows in the top view, compared against the view according to Figure 3, that the gathering brackets are slightly spread apart so as to slightly stretch the gathered plastic bag 2.

Figure 4 furthermore shows that in the exemplary embodiment shown the plastic bag 2 pulled onto the gathering brackets traverses downwardly along with the gathering brackets 4 to the packaging position 7. To the left of the conveyor device 8 one can see that an object 100 intended for packaging is transported toward the

gathering brackets 4 in the conveying direction 16.

The horizontal stretch system 1 according to the application provides, unlike the otherwise known systems, one single conveyor device 8 both for feeding the object 100 intended for packaging toward the gathering brackets 4 and discharging it after packaging.

To allow the gathering brackets 4 to bring the plastic bag 2 to a suitable packaging position 7 in the conveying plane 10 of the conveyor device 8 and thus also to dispose the lower components respectively the lower assembly of the closing station 5 beneath the conveying plane 10, according to the application the conveying member 9 is deflected by means of two deflecting devices 11, 11a in the region of the gathering brackets 4 and the closing station 5, such that the conveying member 9 is deflected downwardly beneath the conveying plane 10 and thus a free space 12 respectively a gap 21 forms in the conveying plane 10.

To provide sufficient support to the plastic bag 2 in this free space 12 also while the object 100 is being conveyed through the plastic bag 2, the exemplary embodiment shown provides the free space 12 with a supporting device 15 configured as a supporting roller 20 over which the plastic sheet is pulled. Such a supporting roller 20 may be designed with a drive as needed.

Figure 5 illustrates schematically that the conveying member 9 may be displaced between the gathering brackets 4 respectively inwardly of the plastic bag 2 when the gathering brackets 4 have been displaced to the packaging position 7.

This creates a nearly closed gap in the conveying plane so that an object 100 intended for packaging, in particular if not rigid, can be safely conveyed into the bag 2 and through the packaging position 7.

This is achieved in that the deflecting device 11 in the exemplary embodiment shown comprises an upper deflection roller 14a and a lower deflection roller 14b which in this case are configured

jointly pivotable. Displacing respectively pivoting the deflection rollers 14a, 14b of the deflecting device 11 allows to vary the gap 21 in the conveying plane 10. In the shown exemplary embodiment, the conveying member 9 thus traverses as described above between the gathering brackets 4, as soon as the gathering brackets with the bag 2 have been lowered downwardly to the packaging position 7.

Generally, the deflecting devices 11, 11a are provided to comprise upper and lower deflection rollers 14a, 14b, wherein at least each of the upper deflection rollers 14a shows the smallest diameter possible or this deflection is configured as a knife edge. This is to achieve a particularly narrow gap 21 since the diverting radii are particularly small.

Figure 6 shows that the object 100 is conveyed by means of the conveyor device 8 respectively on the conveying member 9 through the plastic bag 2 kept open by the gathering brackets 4. Conveying the object 100 through the gathered plastic bag 2 causes the bag 2 to be pulled off the gathering brackets 4 due to the conveying performance and to wrap itself around the object 100. In the exemplary embodiment shown, the driven rollers 19 on the gathering brackets 4 control the pulling off respectively pulling down of the plastic bag 2 from the gathering brackets 4 in a defined manner, so as to introduce into the plastic sheet a preferably defined tensile stress also in the conveying direction.

Figure 7 shows that the clamping and welding device 22 of the closing station 5 have closely approached one another so that the open end of the plastic bag 2 is so to speak captured and clamped together. The welding device of the packaging station 5 closes the plastic bag 2 at its open end so as to obtain a completely wrapped respectively welded-in object 100. In order to ensure defined welding in particular when using gusseted sheets, gusset insets (not shown in detail) may be provided in accordance with the configuration, to fold back the gussets prior to clamping and welding.

Figure 8 schematically shows a process step which may be provided alternatively or additionally to the process step according to Figure 7.

This configuration shows that the plastic bag 2 is not closed in a start-stop operation. In this case the bag 2 is welded and closed by the closing station 5 which it traverses together with the conveying member 9 during discharge on the conveying member 9.

This is done in that the conveying member 9 displaces respectively elongates the free space 12 respectively the gap 21 in the conveying plane 10 due to the upper deflection rollers 14a traversing together with the lower deflection roller 14b of the deflecting device 11a so that the closing station 5 which is configured traversable may traverse respectively be conveyed off together with the bag 2. After welding the bag 2 the closing station 5 may be displaced back in the direction of the gathering brackets 4. Traversing of the upper and lower deflection rollers 14a, 14b together allows to vary the gap 21 without changing the length of the conveying member 9.

The Figures 9 to 11 schematically illustrate another exemplary embodiment of a horizontal stretch system 1 according to the application. In the exemplary embodiment shown the horizontal stretch system 1 also comprises one single, continuous conveyor device 8 with a conveying member 9.

In this exemplary embodiment the conveying plane 10 again shows a free space 12 respectively a gap 21 formed by means of a deflecting device 11. The free space is provided by deflection rollers 14 which deflect the conveying member 9 downwardly away from the conveying plane 10.

The general functioning of the horizontal stretch system 1 shown corresponds to the functioning of the horizontal stretch system 1 described above. Unlike the system described above, this horizontal stretch system 1 provides for a free space 12 only in the region of the closing station 5.

This allows to displace the lower part respectively the lower assembly of the closing station 5 downwardly beneath the conveying plane 10 so that an object 100 intended for packaging can be transported while being conveyed into the plastic bag 2 over the lower part of the closing station 5 respectively through the closing station 5.

In order to enable the plastic bag 2 to traverse to a suitable packaging position 7 by means of the gathering brackets 4, the shown exemplary embodiment provides for a horizontal distance 23 between the gathering brackets 4 to be larger than the width 24 of the conveying member 9. Thus the gathering brackets 4 may traverse a little on the conveying member 9 respectively until beneath the conveying plane 10 so that the plastic bag 2 retained by the gathering brackets 4 can even be slightly tensioned over the conveying member 9. This is schematically shown in a top view in particular in the image on the left.

It is thus achieved that the gap 21 in the conveying plane must only be provided for taking up the lower assembly of the closing station 5 so as to enable a particularly narrow gap 21 respectively a particularly short free space 12.

Additionally the present exemplary embodiment provides for a sliding discharge 13 in the region of the gathering brackets 4 on the conveyor device 8. This sliding discharge 13, in particular if it is supported sprung beneath the conveying member, causes the object 100 to be securely conveyed into the plastic bag 2.

Alternately the conveyor device 8 respectively the conveying member 9 may show a slight yield in the region of the gathering brackets 4 respectively the plastic bag 2 resting thereon so that then an object 100 can be optimally conveyed by means of the conveying member 9 into the bag kept open by the gathering brackets 4.

List of reference numerals:

1 horizontal stretch system
2 plastic bag
3 tubular sheet supply
4 gathering bracket
5 closing station
6 bag takeup position
7 packaging position
8 conveyor device
9 conveying member
10 conveying plane
11 deflecting device
11a deflecting device
12 free space
13 sliding discharge
14 deflection roller
14a upper deflection roller
14b lower deflection roller
15 supporting device
16 conveying direction
17 tubular sheet
18 roller
19 roller
20 supporting roller
21 gap
22 clamping and welding station
23 distance gathering brackets
24 width of the conveying member
25 sheet inlet
26 conveyor drive
27 gathered plastic sheet
28 welding seam
50 opening station
51 arm
52 arm
53 conveying device

54 conveying device
55 suction device
56 displacement device
57 welding and cutting station
58 rollers
59 holding device
60 deflecting device
61 deflection roller
62 flexible member
63 supporting device
100 object

P A T E N T K R A V

1. Horisontalstretchanlæg (1) til emballering af mindst et objekt (100) i en foliesæk (2), omfattende mindst et rørfolielager (3), mindst en åbningsstation (50), mindst to rebningsbøjler (4) til oprebning og udbredning af foliesækken (2) og mindst en lukningsstation (5) til lukning af den fyldte foliesæk (2), hvor rebningsbøjlerne (4) kan flyttes mellem en sækoptagningsposition (6) og en emballeringsposition (7),

kendetegnet ved,

at der er tilvejebragt en gennemgående transportindretning (8) med mindst et transportelement (9), hvorpå et objekt (100), som skal emballeres, transporteres igennem ind i foliesækken (2), som holdes åben af rebningsbøjlerne (4) i emballeringspositionen (7), hvor transportindretningen (8) omfatter et transportplan (10), og hvor der er tilvejebragt mindst en omstyreindretning (11, 11a), som omstyrer transportelementet (9) mindst afsnitsvis nedad ud af transportplanet (10), således at der er dannet et frirum (12) i transportplanet (10), hvori mindst lukningsstationen (5) kan anbringes mindst afsnitsvis.

2. Indretning ifølge krav 1, hvor rebningsbøjlernes (4) horisontale afstand (23) er større end transportelementets (9) bredde (24).

3. Indretning ifølge et af de foregående krav, hvor transportindretningen (8) i området af rebningsbøjlerne (4) omfatter en glidende udledning (13).

4. Indretning ifølge et af de foregående krav, hvor transportelementet (9) i området af rebningsbøjlerne og/eller den glidende udledning (13) er lejret i det væsentlige eftergivende og/eller fjedrende.

5. Indretning ifølge et af de foregående krav, hvor den mindst ene rebningsbøjle (4) i emballeringspositionen (7) mindst afsnitsvis nedsænker den rebede foliesæk i det af omstyre-indretningen (11, 11a) dannede frirum (12).

6. Indretning ifølge et af de foregående krav, hvor omstyre-indretningen (11, 11a) omfatter mindst en omstyrerulle (14), hvor fortrinsvis den mindst ene omstyrerulle (14) kan flyttes og/eller drejes.

7. Indretning ifølge et af de foregående krav, hvor der er anbragt mindst en støtteindretning (15) i frirummet (12), hvor fortrinsvis støtteindretningen (15) er udformet højdejusterbart.

8. Indretning ifølge et af de foregående krav, hvor luknings-stationen (5) er udformet flytbart, hvor fortrinsvis frirummet (12) kan forskydes og/eller forøges svarende til flytningen af luknings-stationen (5).

9. Indretning ifølge et af de foregående krav, hvor åbningsstationen (50) omfatter mindst to arme (51, 52) med mindst en transportindretning (53, 54), hvor rørfolien kan transporteres fra rørfolielageret (3) igennem mellem de to arme (51, 52), hvor der fortrinsvis på mindst en arm (51, 52) er tilvejebragt mindst en sugeindretning (55).

10. Indretning ifølge det foregående krav, hvor der på mindst en arm (51, 52) er tilvejebragt mindst en forskydningsindretning (56) til udkøring af armene (51, 52), og/eller hvor åbningsstationen (50) er udformet flytbart.

11. Fremgangsmåde til emballering af objekter i foliesække ved hjælp af et horisontalstrechanlæg (1) ifølge et af de foregående krav,
kendetegnet ved de følgende trin i egnet rækkefølge:

- oprebning af en foliesæk (2) på rebningsbøjlerne (4)
- udbredning af foliesækken (2) ved hjælp af rebningsbøjlerne (4)
- flytning af rebningsbøjlerne (4) til emballeringspositionen (7)
- transport af et objekt (100) ind i posen ved hjælp af den gennemgående transportindretning
- sammensvejsning af den åbne ende af den fyldte foliesæk (2) ved hjælp af lukningsstationen (5).

12. Fremgangsmåde ifølge det foregående krav, omfattende mindst et af de følgende yderligere trin på et egnet sted:

- afkortning af et forudbestemt rørfolieafsnit
- sammensvejsning af den ene ende af rørfolien og/eller
- overtagelse af foliesækken (2) ved hjælp af åbningsstationen op på rebningsbøjlerne (4) i sækoptagelsespositionen (6).

13. Fremgangsmåde ifølge et af de to foregående krav, **kendetegnet ved, at** trinene gennemføres parallelt og/eller mindst afsnitsvis overlejret.

14. Fremgangsmåde ifølge et af de foregående krav 12 eller 13, **kendetegnet ved, at** transportelementet (10) flyttes mellem rebningsbøjlerne (4), efter at rebningsbøjlerne (4) er blevet forskudt til emballeringspositionen (7).

15. Fremgangsmåde ifølge et af de foregående krav 12 til 14, hvor lukningsstationen (5) medforskydes i transportretning (16), og foliesækken (2) lukkes under transporten.

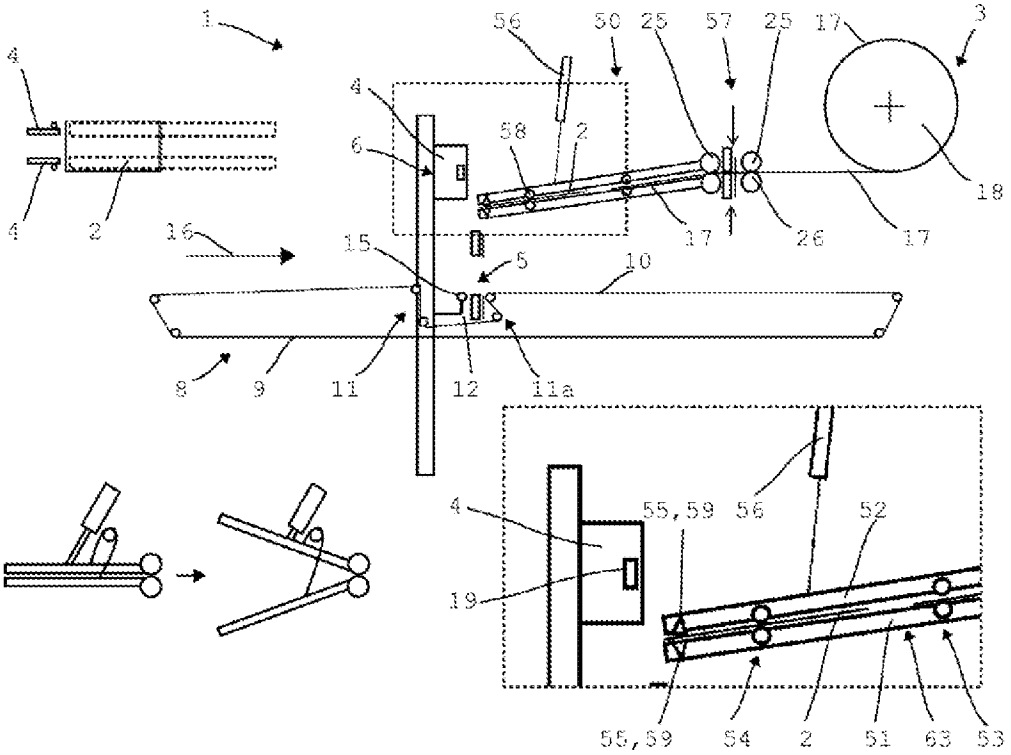
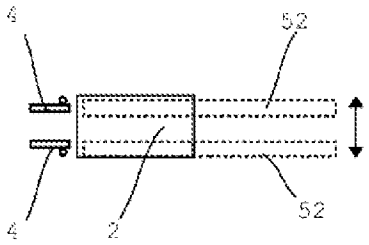

1
56
50
25
57
25
17
3
4
4
6
58
2
18
4
2
16
15
5
10
17
26
17
8
9
11
12
11a
4
55,59
56
52
19
55,59
54
2
51
63
53

Fig. 1


4
52
4
2
52

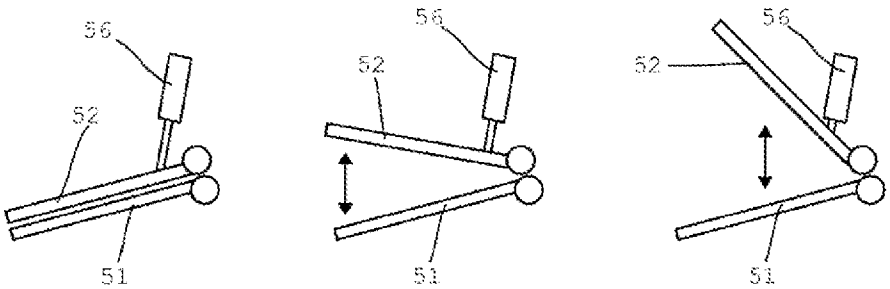

56
52
51
56
52
51
56
52
51

Fig. 1a

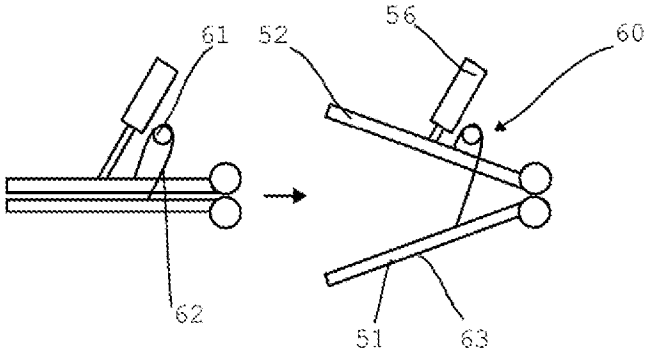

61
52
56
60
62
51
63

Fig. 1b

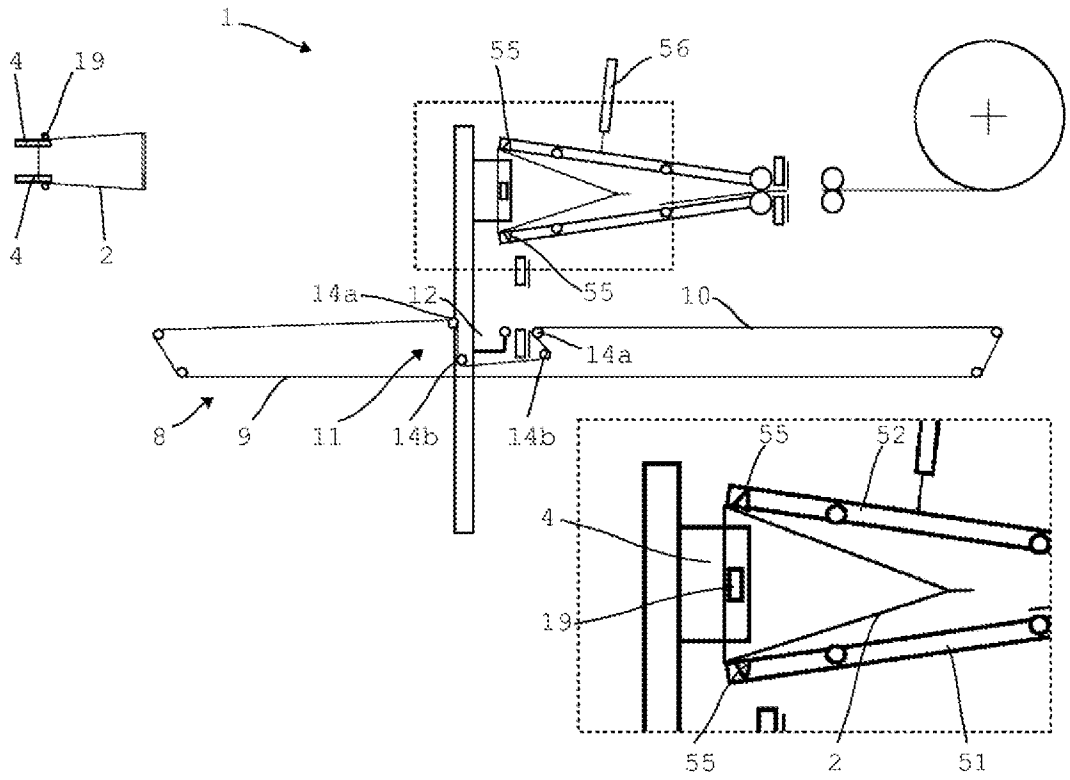
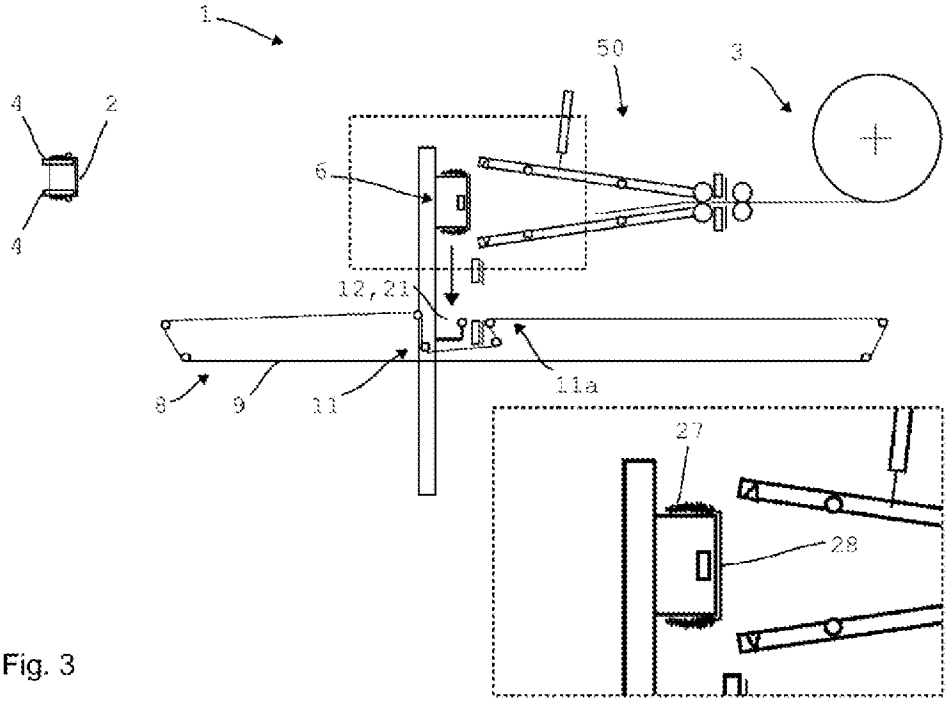

1
4
19
4
2
55
56
55
14a
12
10
14a
8
9
11
14b
14b
55
52
4
19
55
2
51

Fig. 2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50
3
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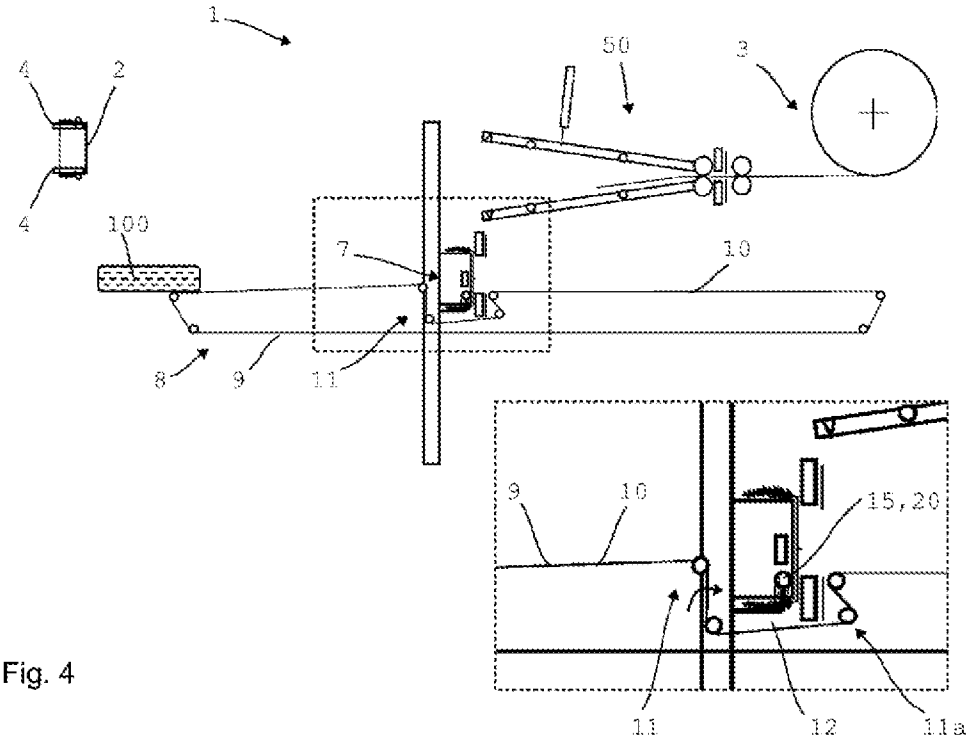
2
4
6
12,21
8
9
11
11a
27
28

Fig. 3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100
7
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9
11
9
10
15,20
11
12
11a

Fig. 4

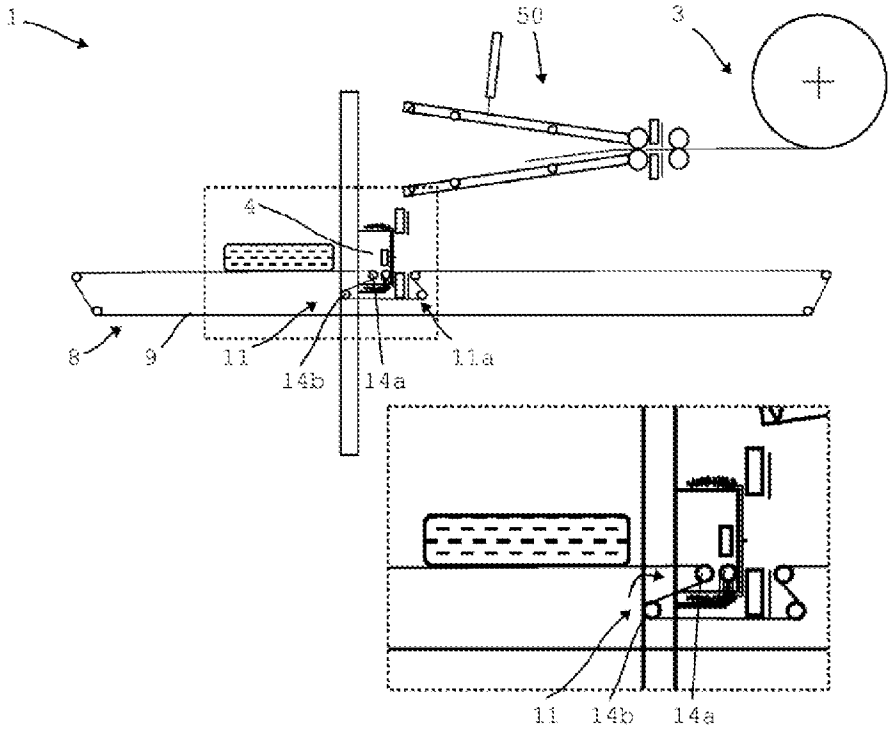


Fig. 5

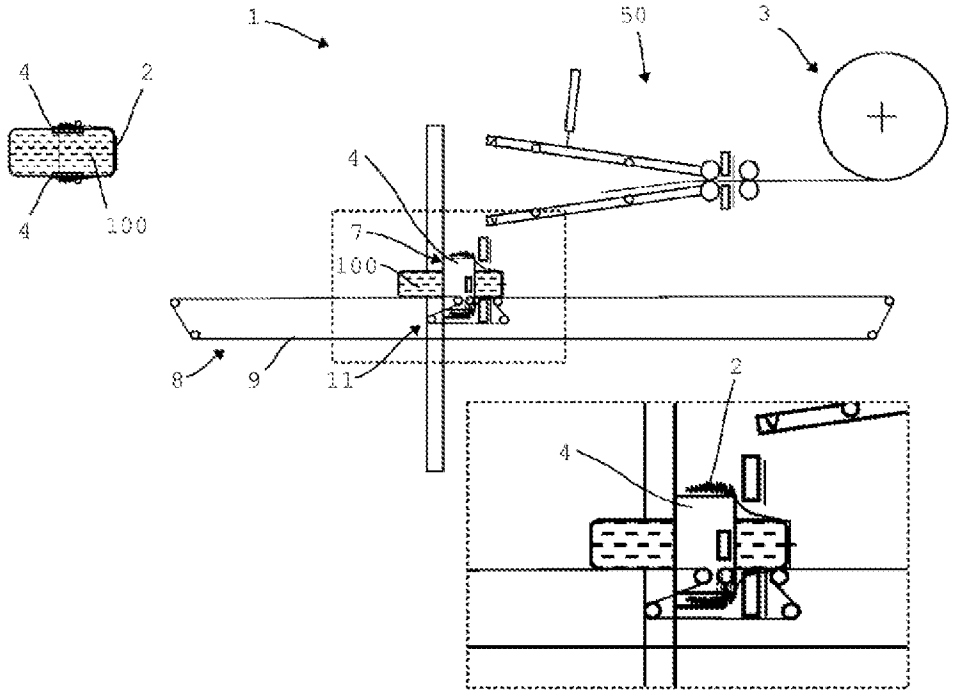
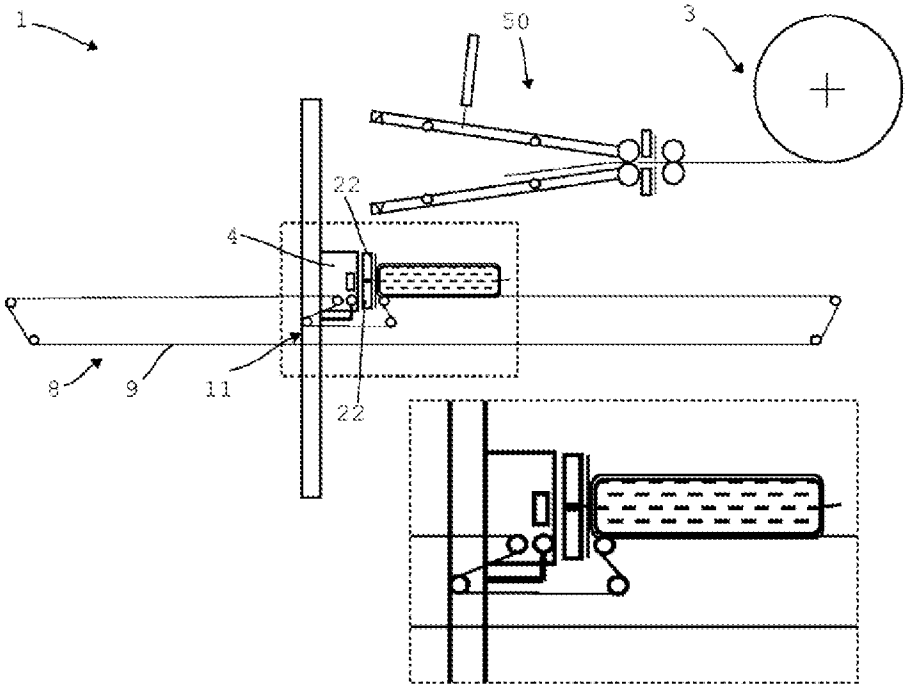


Fig. 6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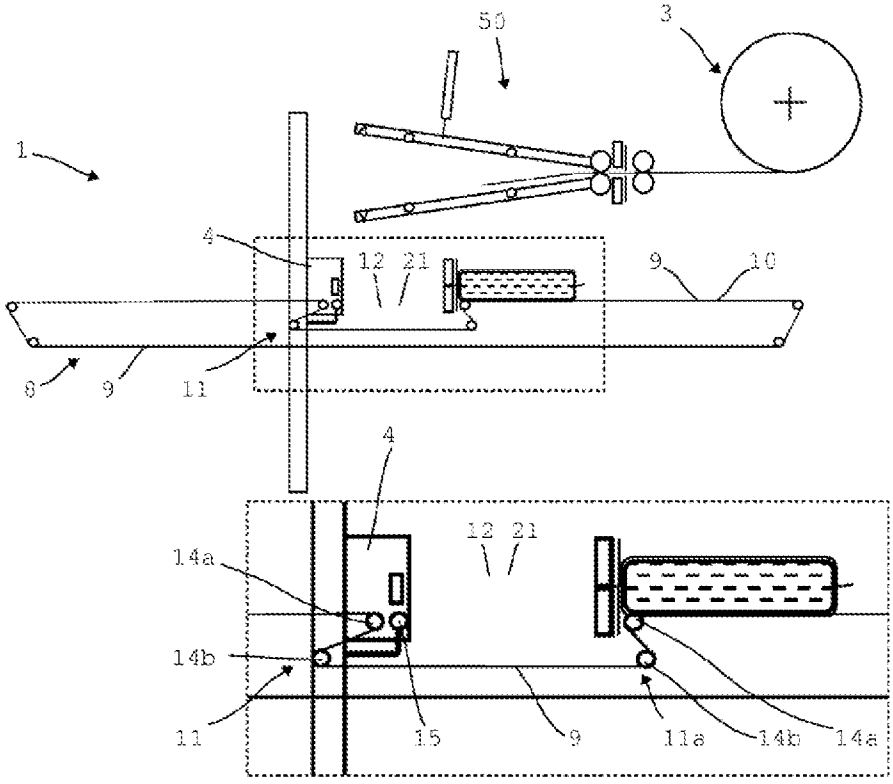
3
22
4
8
9
11
22

Fig. 7


50
3
1
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12
21
9
10
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9
11
4
14a
12
21
14b
11
15
9
11a
14b
14a

Fig. 8

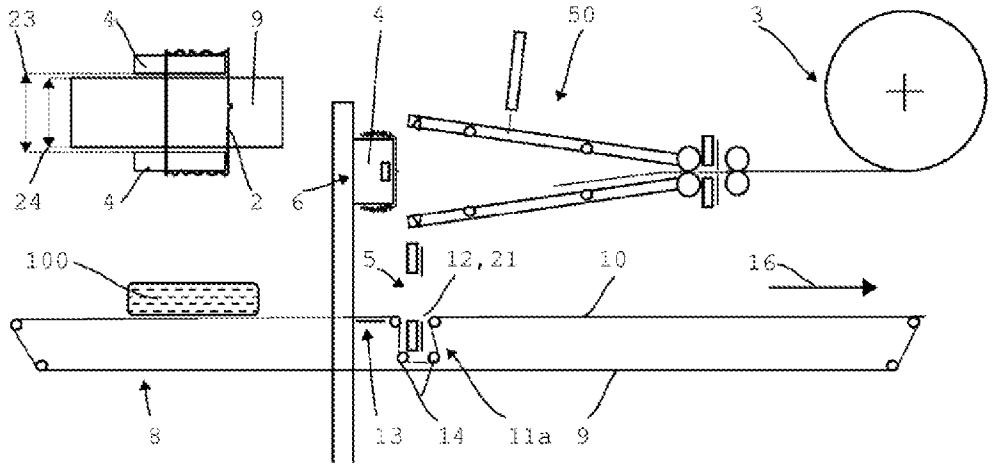

Fig. 9

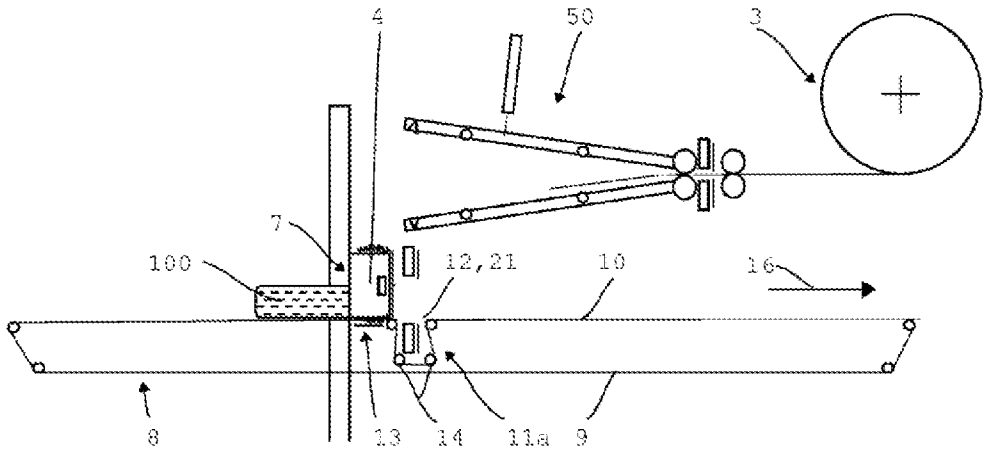

Fig. 10

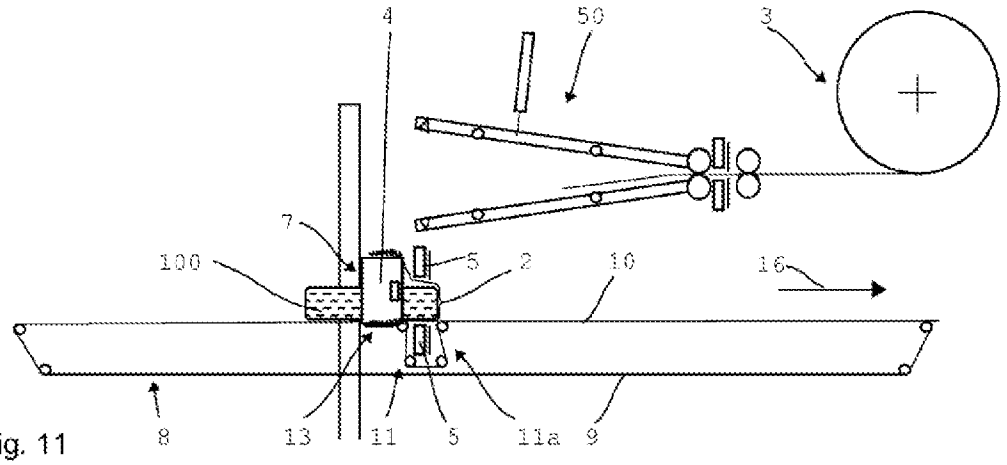

Fig. 11