(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 431 279 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.03.2012 Bulletin 2012/12

(51) Int Cl.:
B65B 9/13 *(2006.01)* ***B65B 9/14*** *(2006.01)*

(21) Application number: **11178288.4**

(22) Date of filing: **22.08.2011**

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

(30) Priority: **21.09.2010 IT MI20101714**

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(54) Machine for applying a packaging hood on an object

(57) A hooding machine (10) for an object (14) comprises a vertical supply unit (11) able to supply from the bottom upwards a hood of heat-shrinkable film in the form of a tube segment with an open top end; a vertical fitting unit (13) arranged alongside the vertical supply unit and able to fit from the top downwards a hood of heat-shrinkable film with its open end directed downwards over an object positioned in a hooding zone of the machine; and an upper overturning device (16) which is arranged above and between the supply unit and the fitting unit and which grips the open top end of the hood inside the vertical supply unit and turns it over through 180° on top of the fitting unit, so as to transfer the hood to the fitting unit with its open top end directed downwards.

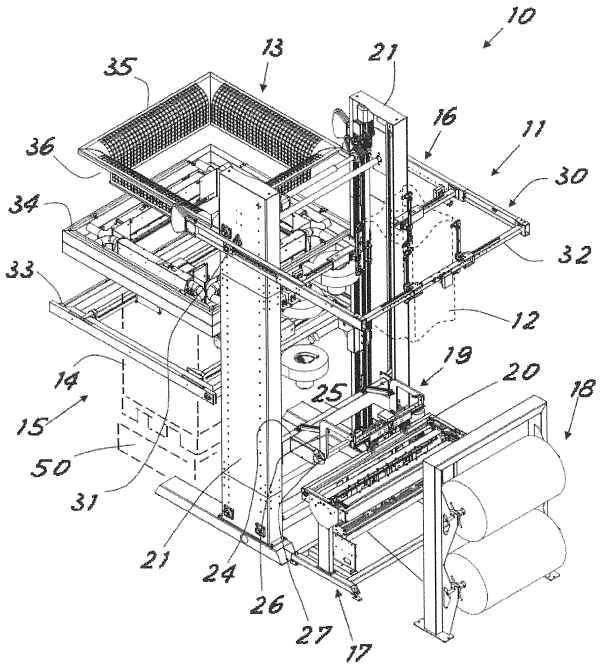

Fig.1

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Description

[0001] The present invention relates to a machine for wrapping objects, such as packages, with a tube of heat-shrinkable film. In particular, the packages may consist of objects which are stacked on a pallet.

[0002] In the prior art machines, called hooding machines, are known, these machines being designed to fit a hood formed by a tube of heat-shrinkable film onto the package to be covered. The film is then heated in order to perform heat-shrinking thereof around the package. Since the tube of film is fitted from the top onto the package, these machines usually form or unroll the tube of film directly above the package receiving zone from a reel which is arranged close to this zone or alongside the machine. Guides and rollers are therefore provided between the reel and the package receiving zone, these conveying the unwound film over the top of the package. In the case of vertical formation of the hood above the package receiving zone the vertical dimensions of the machine are, however, relatively large.

[0003] Moreover, the known machines are fairly slow owing to the need to form and position the hood of film above the package, fit the hood, if necessary heat-shrink the film, remove the package and, only then, repeat from the beginning the operation with the next package. Among other things, the time required to perform satisfactory heat-shrinkage cannot be reduced by more than a certain amount, if the operation is to be properly performed.

[0004] Moreover, the aesthetic quality of the heat-shrunk hood is often unsatisfactory, especially in the case of product packages which cause rapid cooling of the film when it comes into contact with them. In this case, in fact, the heat-shrunk hood has puckers, bumps and irregularities. This is particularly the case, for example, with packages containing glass bottles. Among other things, precisely the packaging of bottles is one of the sectors where rapid execution of the hooding operation is required owing to the high processing speed of the plants which produce the bottles.

[0005] In order to attempt to alleviate this problem, machines with a relatively high thermal power for heating the film have been proposed, but this adversely affects the cost-effectiveness of operation of the machine and in any case is unable to achieve a really satisfactory result both in terms of the speed and in terms of the final quality.

[0006] The general object of the present invention is to provide a hooding machine which is able to achieve both high speeds and a more satisfactory end result, preferably with a lower power consumption.

[0007] In view of this object the idea which has occurred according to the present invention is to provide a hooding machine for an object, comprising: a vertical supply unit able to supply from the bottom upwards a hood of heat-shrinkable film in the form of a tube segment with an open top end; a vertical fitting unit arranged alongside the vertical supply unit and able to fit from the top downwards a hood of heat-shrinkable film with its open end directed downwards over an object positioned in a hooding zone of the machine; and an upper overturning device which is arranged above and between the supply unit and the fitting unit and which grips the open top end of the hood inside the vertical supply unit and turns it over through 180° on top of the fitting unit, so as to transfer the hood to the fitting unit with its open top end directed downwards.

[0008] In order to illustrate more clearly the innovative principles of the present invention and its advantages compared to the prior art, an example of embodiment applying these principles will be described below, with the aid of the accompanying drawings. In the drawings:

- Figure 1 shows a perspective schematic view of a hooding machine designed in accordance with the invention;
- Figure 2 shows a partial, perspective, schematic view of a first zone for picking up and forming the hood of film in the machine according to Figure 1;
- Figure 3 shows a partial, perspective, schematic view of a device for receiving and overturning the hood of film in the machine according to Figure 1;
- Figure 4 shows a partial, perspective, schematic view of part of a hooding unit of the machine according to Figure 1;
- Figure 5 shows a partial, perspective, schematic view of a heat-shrinking frame of the machine according to Figure 1;
- Figures 6 and 9 are schematic side elevation views of successive sequences of operating steps of the machine according to Figure 1.

[0009] With reference to the figures, Figure 1 shows, generically denoted by 10, a hooding machine designed in accordance with the principles of the present invention.

[0010] The machine 10 comprises a vertical supply unit 11 which is able to supply from the bottom upwards a hood 12 of heat-shrinkable film in the form of a tube segment with an open top end. The machine 10 also comprises a vertical fitting unit 13 arranged alongside the vertical supply unit 11 and able to fit a hood of heat-shrinkable film over an object 14 (for example formed by a package comprising objects, such as bottles, boxes, bricks, etc., which are arranged on a pallet) positioned in a hooding zone 15 of the machine (advantageously on top of a suitable known raised base 50, which may be equipped with a means for moving the package inside and outside of the machine). The fitting unit is able to fit the hood from the top downwards and with its open end directed downwards. An upper overturning device 16 is present above and in between the supply unit 11 and the fitting unit 13 and is designed to grip the open top end of the hood in the vertical supply unit and turn it over through 180° above the fitting unit so as to transfer the hood to the fitting unit 13 with its open top end directed downwards.

[0011] The supply unit 11 comprises a feeder device 17 which unwinds a flattened tube of film wound onto a reel 18 and a gripper pick-up device 19 which is vertically slidable so as to grip with its vertical grippers 20 the opposite edges of an open top end of the tube of film leaving the feeder device and convey it upwards as far as the upper overturning device 16. The reels 18 may be more than one in number so as to provide different sizes or types of film which can be chosen by suitably setting the feeder device.

[0012] The feeder device 17 also comprises known means 23 (for example of the hot electric blade type) for performing transverse welding of the tube of unwound film so as to form, upon operation, a closed end of the hood opposite to the open top end gripped by the grippers of the pick-up device.

[0013] The tube of film, as will be clarified below, is flattened by means of folding in the form of a strip with a rectangular section having two opposite straight sides close together and the other two opposite sides folded inwards in the form of a V, as can be clearly seen in Figure 2.

[0014] As can also be clearly seen in Figure 2, the grippers 20 advantageously grip the free top end of the film along its two straight sides which are slightly spaced from each other by a certain amount by means of guide blades 22 which are arranged on the exit side of the feeder device 17. The pick-up device 19 has advantageously four vertical motor-driven grippers 20 which are coupled together in pairs on opposite edges of the open top end of the tube of film which leaves the feeder device in a flattened condition. The movement for extraction of the segment of film from the feeder device is schematically shown on the right-hand side of Figure 6.

[0015] In order to raise the film and form the hood, the pick-up device 19 is advantageously motor-driven so as to be movable vertically along vertical guiding uprights 21 by means of suitable carriages 24 which are connected by a beam 25 which carries arms 26 supporting the grippers 20. The vertical grippers 20 of the pick-up device are supported in the pick-up device 19 so as to be movable, upon operation, between a vertical operating position for gripping and conveying the film upwards and a retracted non-operating position. This is advantageously achieved by mounting the grippers on arms 26 which are pivotably hinged with the beam by means of a horizontal pin 27. Actuators 28 produce the movement of the grippers of the pick-up device between the operating position and the non-operating position, as will be clarified below.

[0016] The upwards travel of the pick-up device 19 is such that the latter passes through and beyond the upper overturning device, positioning on it the hood to be turned over (as is clearly shown schematically on the right-hand side of Figure 7).

[0017] Advantageously, the upper overturning device comprises four gripper units 29, each provided with at least one horizontal motor-driven gripper (advantageously two horizontal grippers coupled together in pairs at a distance and on top of each other). The gripper units are intended to grip the tube of film by respective side edges so as to open it with a substantially rectangular section after the pick-up device 19 has reached the end of its upper travel path, as schematically shown on the right-hand side of Figure 8 where the pick-up device is overturned towards its non-operating position after transferring the film to the overturning device 16.

[0018] The gripper units 29 are advantageously mounted on a frame 30 which is motor-driven so as to rotate about a horizontal axis 31 for overturning the hood between the supply unit and the fitting unit (as schematically shown in Figure 9, where it can also be seen how at the same time the pick-up device 19 is able to return downwards in order to pick up a new hood).

[0019] As can be clearly seen in particular in the detail of Figure 3, in order to open the hood, the overturning device comprises advantageously a drive for moving two of said gripper units (arranged on one side of the tube of film with respect to the other two gripper units arranged on the other side of the tube), so as to allow the controlled movement of two gripper units away from the other two after receiving the hood from the supply unit. For this purpose, the frame 30 advantageously comprises a cross-member 32 for supporting two of the gripper units, which is slidable by motor means (via telescopic sliding of arms of the frame hingeably mounted on the axis 31) so as to move from a first position close to the other two gripper units into a position sufficiently removed in order to open completely the top mouth of the hood before overturning it towards the fitting unit 13. The vertical fitting unit 13 in turn comprises a conveying frame 33 and, optionally, a heat-shrinking frame 34 arranged on top (advantageously in the form of a closed rectangle lying in a horizontal plane), which frames are motor-driven so as to slide vertically in sequence around the object which is positioned in the hooding zone (as schematically shown on the left-hand side of Figures 6-9). Advantageously, sliding is performed by means of suitable support carriages 51, 52 sliding along guides in the said uprights 21 which thus separate the zone of upward travel of the hood from the feeder device and the zone of downward travel of the overturned hood in the fitting unit where it is inserted over the object to be covered. The drive systems may be for example of the chain-drive type.

[0020] Advantageously above the hooding zone there is also a protective frame 35 which defines the inlet in this zone for the hood which is overturned by the overturning means and which is transferred from the latter to the conveying frame 33 (Figure 9). This protective frame, which is for example made of metal mesh or the like, defines externally a zone 36 which receives the heat-shrinking frame when not operative (in its raised position) so as to prevent contact between the hood and heating means present on the heat-shrinking frame and protect the hood during insertion onto the object by the conveying frame 33.

[0021] As can be clearly seen in Figure 4, the convey-

ing frame 33 supports vertical grippers 37 which are motor-driven so as to grip the edge of the hood of heat-shrinkable film with its open end directed downwards. Advantageously, the grippers 37 have (like the grippers 20 and the gripper units 29) means for adjusting the position depending on the transverse dimensions of the hood.

[0022] The conveying frame advantageously comprises means for blowing air inside the hood retained by the grippers 37 thereon. These blowing means may comprise a fan 38 which blows air for example through pipes which emerge on the top end of said grippers 37. By keeping the hood inflated, insertion and subsequent heat-shrinking is facilitated.

[0023] For the heat-shrinking operation the heat-shrinking frame 34 is provided with heating means 39 on its four sides, as can be clearly seen in Figure 5. These heating means (advantageously known gas heaters for emitting hot air at a suitable temperature) are directed towards the outer surface of the hood fitted by the conveying frame onto an object positioned in the hooding zone.

[0024] After the overturning device 16 has transferred the hood to the conveying frame 33, the conveying frame travels downwards while the heat-shrinking frame remains advantageously in the zone protected by the protective frame 35 (as schematically shown on the left-hand side in Figure 6). The blown air keeps the hood inflated and facilitates introduction over the object to be wrapped.

[0025] Once insertion has been completed, the frame 33 stops (Figure 7) and the heat-shrinking frame 34 with the activated heating means commences its downwards movement (left-hand side of Figure 8), while advantageously blowing of air into the hood continues. The descent continues down as far as the base of the package. During the subsequent return upward movement of the heat-shrinking frame, heating may be maintained for more complete and uniform heat-shrinkage of the film.

[0026] Once the frames have returned into the high position the package may be removed and a new object to be wrapped may be arranged in the hooding zone (left-hand side of Figure 9).

[0027] At this point it is clear how the predefined objects have been achieved. With the machine described, the wrapping operations are performed faster, it being possible for example to perform, in parallel, preparation of a hood and insertion and heat-shrinkage of a preceding hood, as can be seen from the sequence shown in Figures 6 to 9. Moreover, the movement of the heat-shrinkage means may be performed more quickly owing to the fact that the hood touches the package only after it has been heat-shrunk. Moreover, a low power consumption may be maintained. The machine is compact and has small dimensions. Finally, the quality of the finished product is improved owing to the innovative features which characterize insertion and heat-shrinking of the hood on the object.

[0028] Obviously, the above description of an embodiment applying the innovative principles of the present invention is provided by way of example of these innovative principles and must therefore not be regarded as limiting the scope of the rights claimed herein. For example, the proportions of the various parts of the machine may vary depending on the specific requirements and the dimensions of the products to be wrapped.

[0029] Moreover, heat-shrinkage of the film may also be performed in a separate station, with a heating frame or with a special heated chamber or oven. In this case it is possible to dispense with the heat-shrinking frame 34, and also, if required, the protective frame 35, if considered unnecessary for guiding the hood.

Claims

1. Hooding machine (14) for an object (14), comprising:

   - a vertical supply unit (11) which is able to supply from the bottom upwards a hood of heat-shrinkable film (12) in the form of a tube segment with an open top end;
   - a vertical fitting unit (13) arranged alongside the vertical supply unit and able to fit from the top downwards a hood of heat-shrinkable film with its open end directed downwards over an object positioned in a hooding zone (15) of the machine;
   - an upper overturning device (16) which is arranged above and in between the supply unit and the fitting unit and which grips the open top end of the hood in the vertical supply unit and turns it over through 180° on top of the fitting unit so as to transfer the hood to the fitting unit with its open top end directed downwards.

2. Machine according to Claim 1, **characterized in that** the supply unit comprises a feeder device (17) which unwinds a tube of film wound onto a reel (18) and a vertically sliding gripper pick-up device (19) for gripping with its vertical grippers (20) opposite edges of an open top end of the tube of film leaving the feeder device and for conveying it upwards as far as the upper pick-up device (16).

3. Machine according to Claim 2, **characterized in that** the feeder device (17) comprises means for performing transverse welding of the tube of unwound film so as to form, upon operation, a closed end of the hood opposite to the open top end gripped by the grippers of the pick-up device.

4. Machine according to Claim 2, **characterized in that** the pick-up device (19) has advantageously four vertical grippers (20) which are coupled together in pairs on opposite edges of the open top end of the tube of film which leaves the feeder device in a flat-

tened condition.

5. Machine according to Claim 2, **characterized in that** the pick-up device (19) is motor-driven so as to be movable vertically along vertical guiding uprights (21).

6. Machine according to Claim 2, **characterized in that** the vertical grippers of the pick-up device (19) are supported in the pick-up device (19) so as to be movable, upon operation, between a vertical operating position for gripping and conveying the film upwards and a retracted non-operating position.

7. Machine according to Claim 1, **characterized in that** the upper overturning device comprises four gripper units, each provided with at least one horizontal gripper and intended to grip the tube of film by respective lateral edges so as to open it with a substantially rectangular section, the gripper units being supported by a motor-driven frame so as to rotate about a horizontal axis for overturning the hood between the supply unit and the fitting unit.

8. Machine according to Claim 7, **characterized in that** each gripper unit comprises two spaced horizontal grippers arranged on top of each other.

9. Machine according to Claim 7, **characterized in that** the upper overturning device comprises a drive for moving two of said gripper units which are arranged on one side of the tube with respect to the other two gripper units arranged on the other side of the tube, so as to allow the controlled movement of two gripper units away from the other two units after receiving the hood from the supply unit, so as to open the hood mouth from a flattened tube-segment supply condition.

10. Machine according to Claim 1, **characterized in that** the vertical fitting unit comprises a conveying frame which is motor-driven so as to slide vertically around the object which is positioned in the hooding zone, the conveying frame supporting vertical grippers for gripping the edge of the hood of heat-shrinkable film with its open end directed downwards.

11. Machine according to Claim 10, **characterized in that** the vertical fitting unit comprises a heat-shrinking frame which is motor-driven so as to slide vertically around the object positioned in the hooding zone, the heat-shrinking frame supporting heating means directed towards the outer surface of the hood fitted by the conveying frame over an object positioned in the hooding zone.

12. Machine according to Claim 10, **characterized in that** the conveying frame comprises means for blowing air inside the hood retained by the grippers thereon.

13. Machine according to Claim 11, **characterized in that** above the hooding zone there is a protective frame which defines the inlet in this zone for the hood which is overturned by the overturning means and which is transferred from the latter to the grippers on the conveying frame, the protective frame defining externally a zone for receiving the heat-shrinking frame when not operative, so as to prevent contact between the hood and the heating means of the heat-shrinking frame.

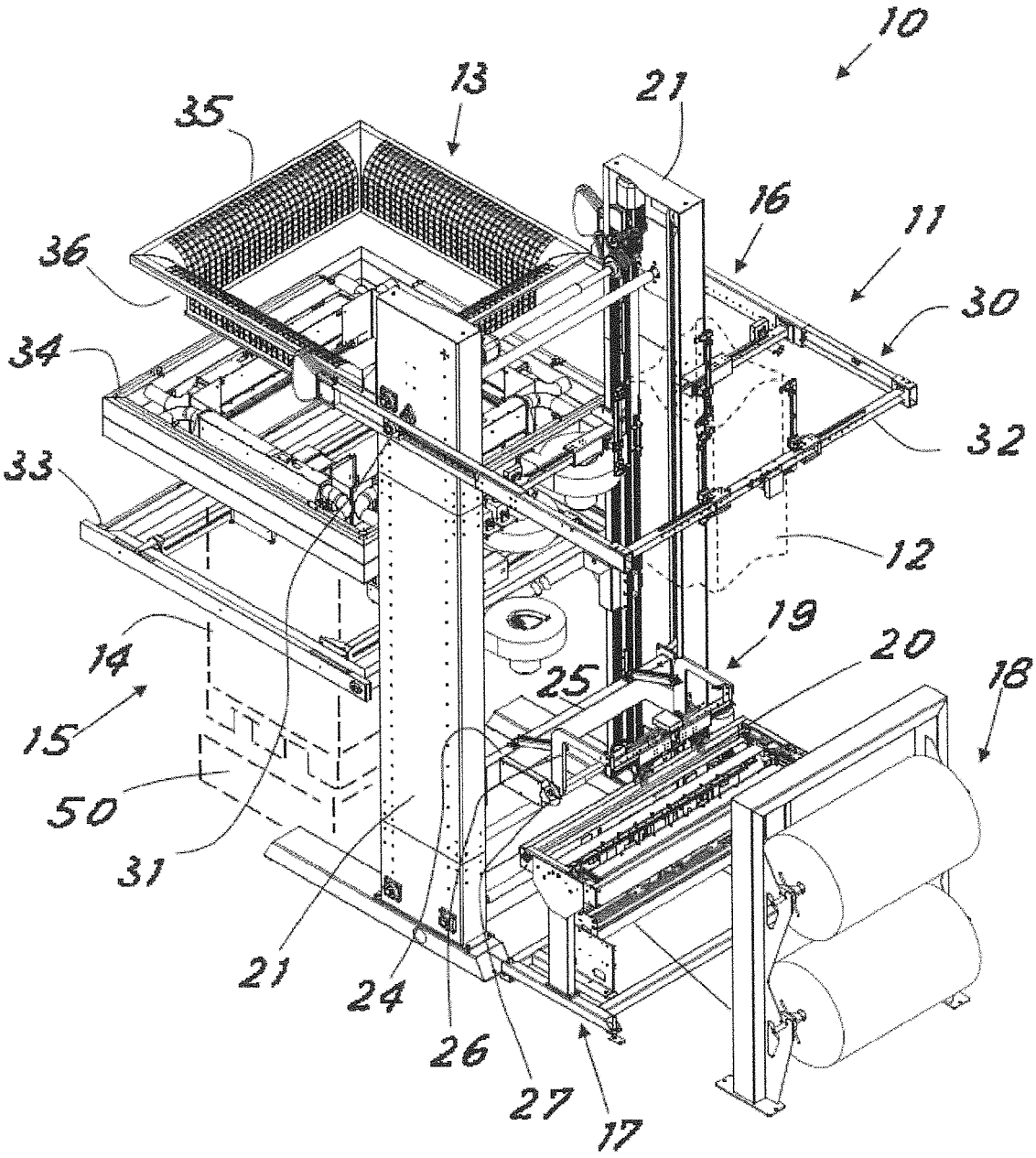
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Fig.1

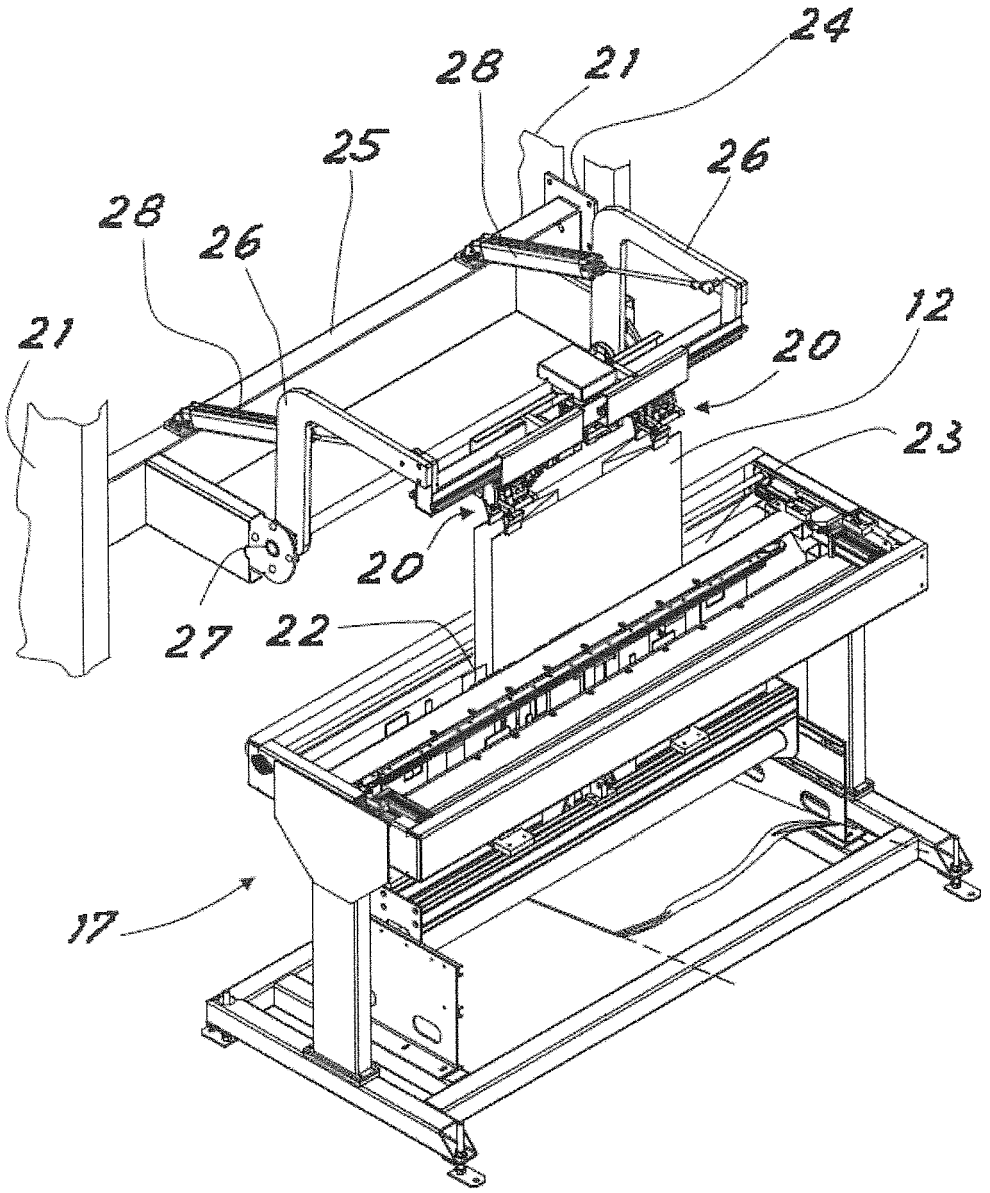

Fig.2

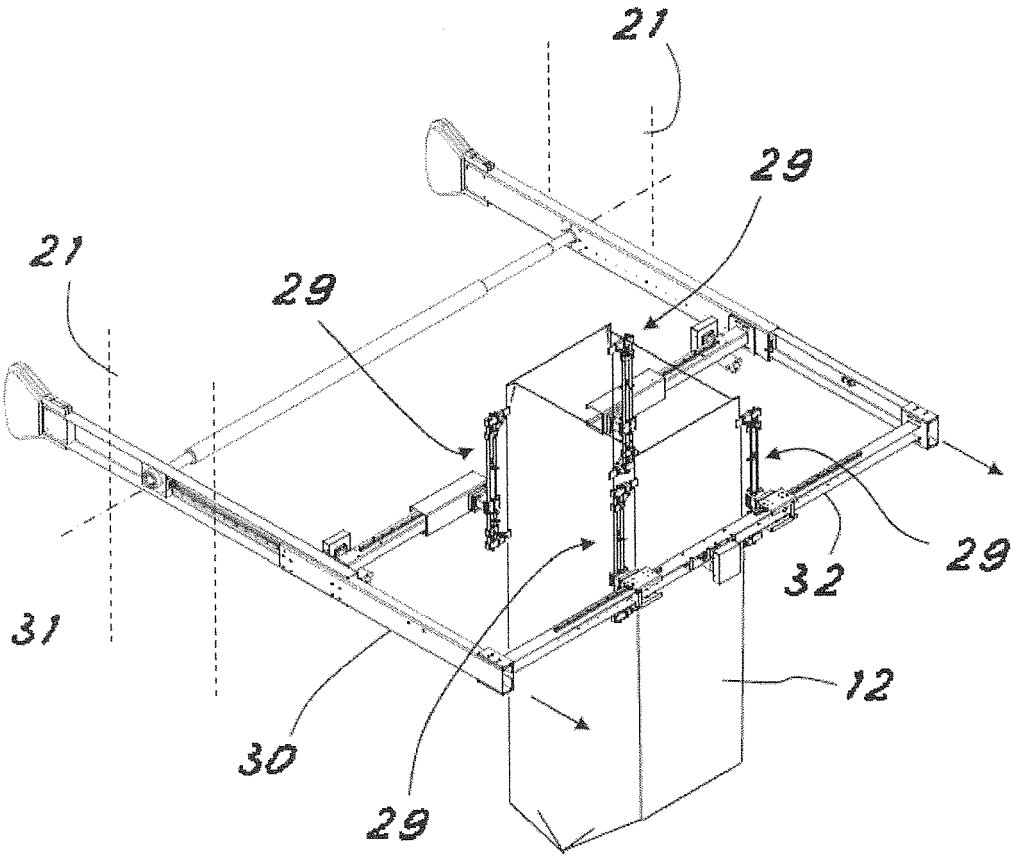

Fig.3

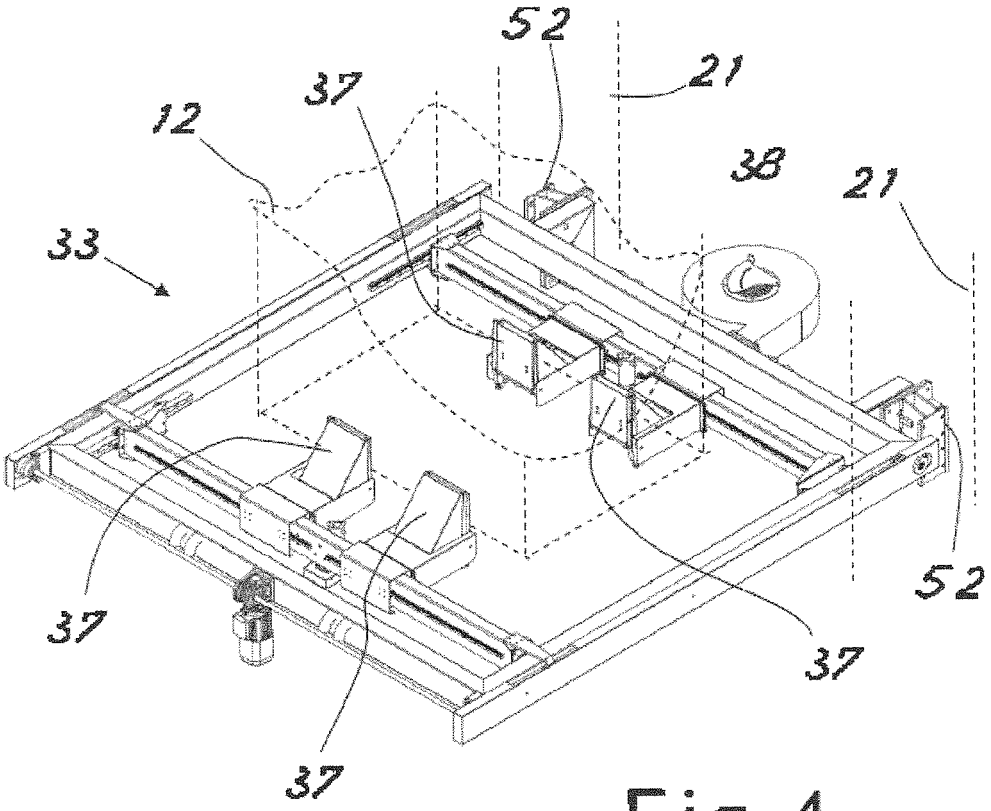

Fig.4

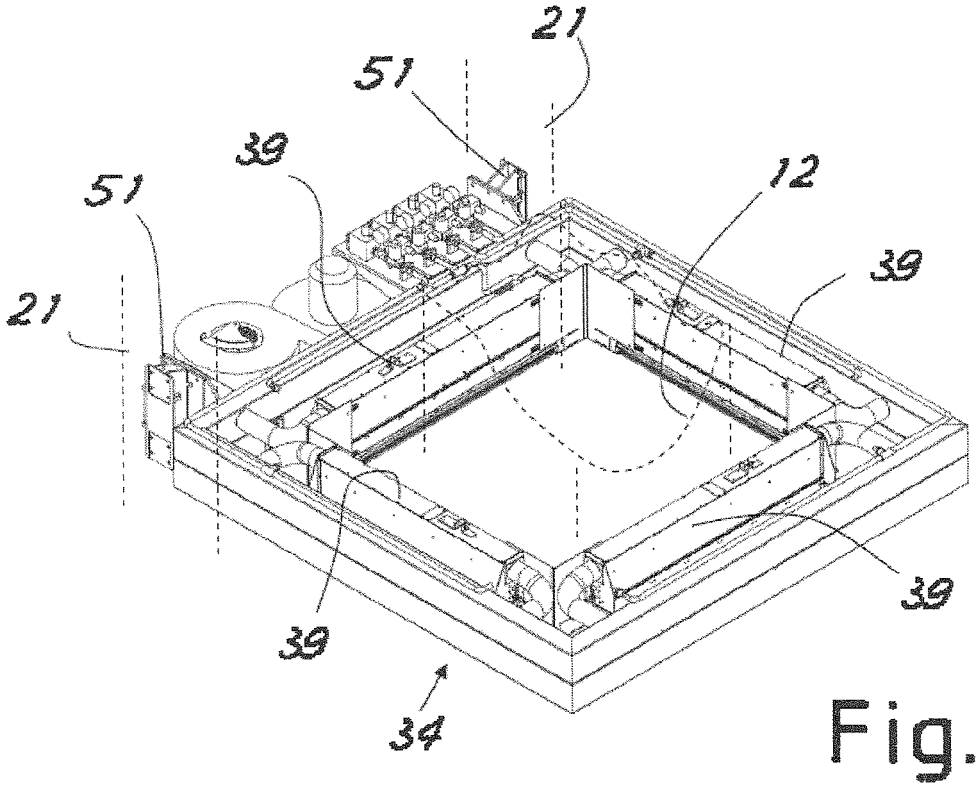

Fig.5

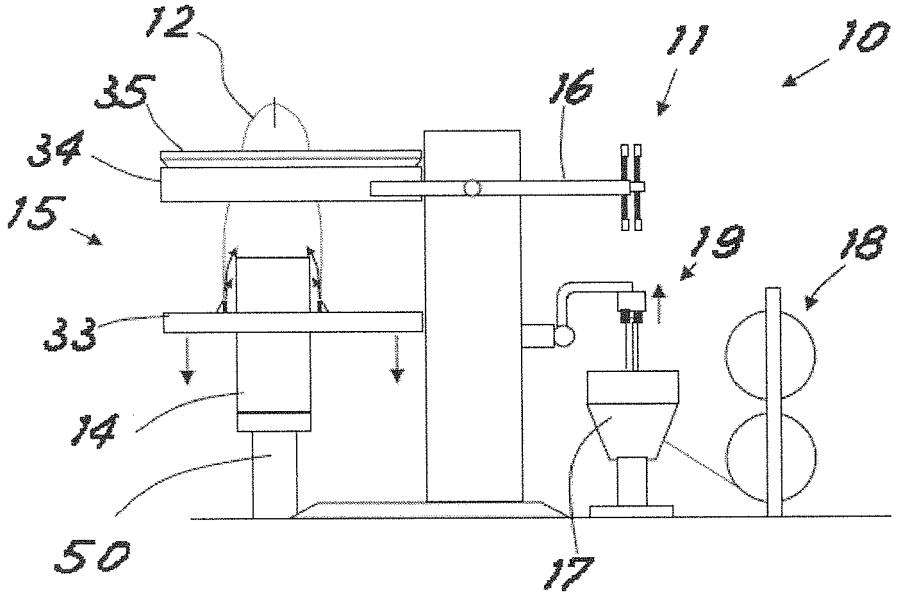
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Fig.6

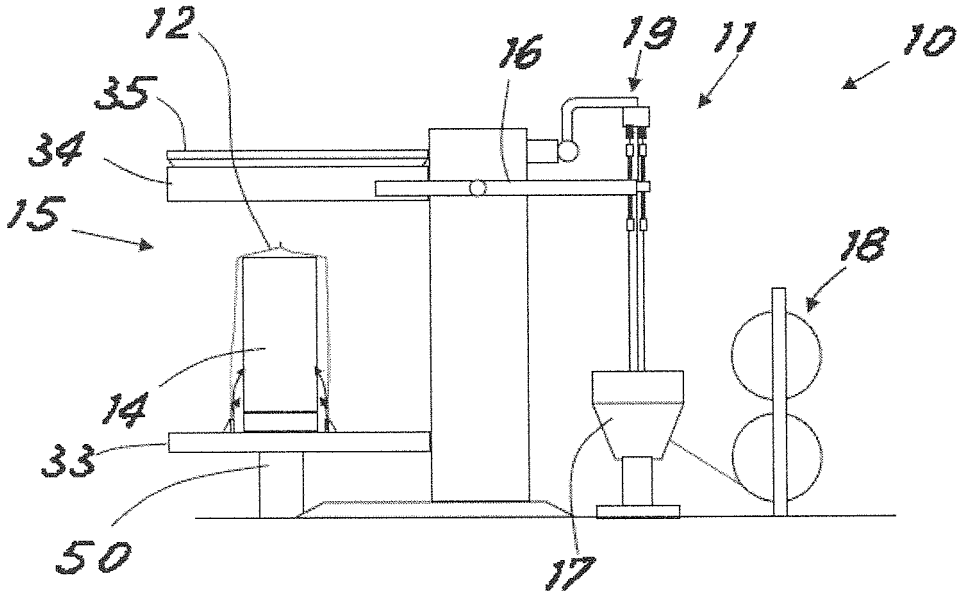
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Fig.7

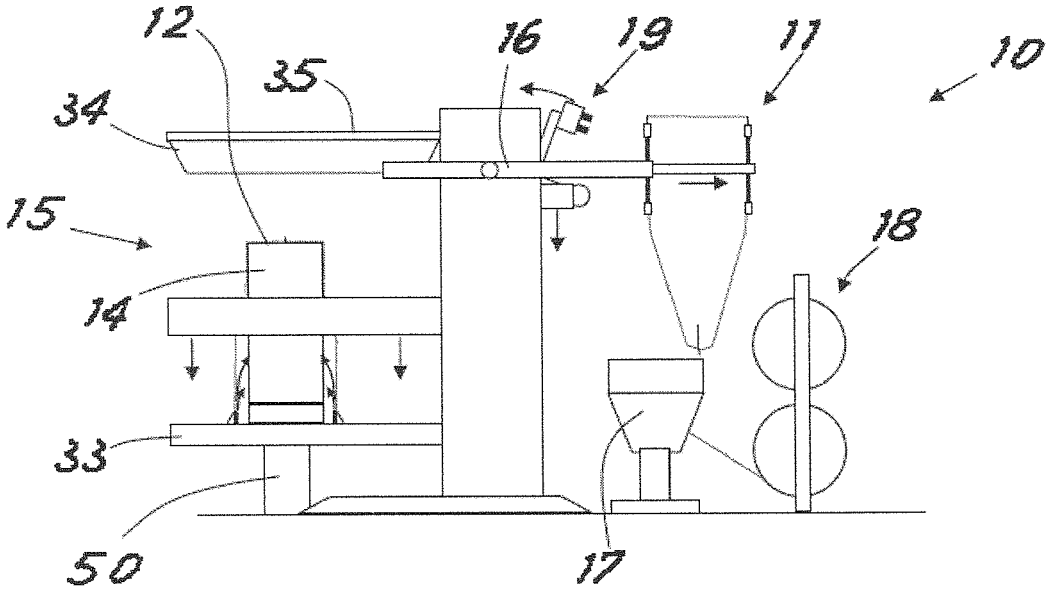
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Fig.8

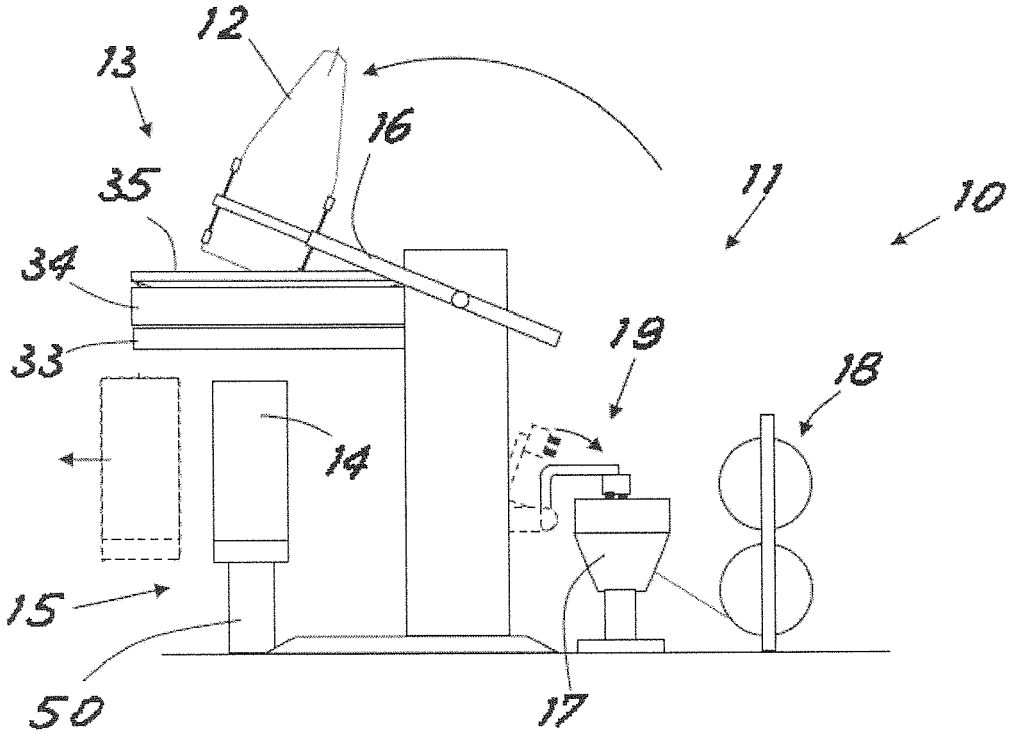
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Fig.9

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EUROPEAN SEARCH REPORT

Application Number
EP 11 17 8288

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 28 06 343 A1 (MSK VERPACKUNG SYST GMBH) 23 August 1979 (1979-08-23) * the whole document *	1-13	INV. B65B9/13 B65B9/14
A	EP 1 574 433 A1 (THIMON [FR]) 14 September 2005 (2005-09-14) * the whole document *	1	
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TECHNICAL FIELDS SEARCHED (IPC)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 November 2011	Johne, Olaf

CATEGORY OF CITED DOCUMENTS

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