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(54) **Improved hooding machine, with automatic reel change**

(57) A hooding machine for the wrapping of loads is disclosed, comprising a support frame (1) on which a sleeve-forming system is arranged, the sleeve being made of a plastic material, starting from a tubular sheet (F) folded on a plane and wound on a feeding reel (3), said forming system comprising, in the proximity of the machine base, dragging means apt to grab a terminal edge of said tubular sheet and to drag it along a sleeve-forming path, in which at least one moving carriage (2) on which at least one feeding reel (3) of said tubular sheet

(F) is mounted is furthermore provided, said carriage having gripping or retraining means (8a) arranged to present a terminal edge of said plastic sheet (F) in a preset position with respect to said carriage (2), and in which at least guiding and control means (12) are furthermore provided for guiding said carriage (2) so as to locate said gripping or retaining means (8a) laterally in correspondence of a grabbing position of said dragging means, said guiding and control means (12) or said carriage (2) managing a plurality of reels (3a-3g).

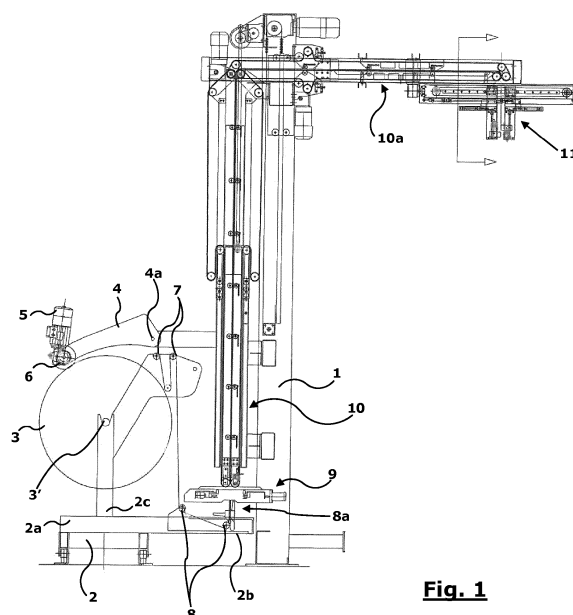


Fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a wrapping machine with extensible or heat-shrinking film, in particular an hooding machine. This type of machine provides to the wrapping of generally pallet-mounted loads with a tubular sheet of plastic material.

BACKGROUND OF THE INVENTION

[0002] The general principle of hooding machines is the following. A pallet-arranged load is brought in correspondence of a wrapping position, in the middle of a wrapping machine frame where it is covered by a sleeve of plastic material which is tightened around the load, either by elastic shrinking of the extensible material, or by heating of the heat-shrinking material. The sleeve is formed starting from a tubular sheet which is folded flat, concertina-like, in a feeding reel which is normally supported with a horizontal axis next to the hooding machine. The tubular sheet, during the feeding step from the corresponding reel, is firstly cut to measure, sealed and welded at one end, leaving the other end open to form the "sleeve"; then it is grabbed by this open end and brought - after having possibly spread it apart - over the entire load.

[0003] The techniques of feeding, opening and force-fitting an extensible sleeve are well-known and will not be further described here. As an example, reference can be made to EP1086893 in the name of the same Applicant.

[0004] When use is made of a heat-shrinking film, the initial force-fitting step does not cause problems because the tubular section of the film is rather wide and is applied effortlessly onto the load; the final step of the wrapping then consists in the tightened closing of the sleeve on the load, which is carried out subjecting the wrapping film to shrinking as an effect of heat supply.

[0005] When instead one makes use of an shrinkable film, the sleeve force-fitting step is preceded by a stretching step in a crosswise direction and of temporary spreading apart the sleeve which, in the final wrapping step, due to the elastic effect, returns into its initial condition and hence automatically tightens around the load.

[0006] Both in the first and in the second case the cutting-to-measure operation and the welding of the final edge of the tubular sheet is performed in a specific position along the running path of the plastic sheet. Normally, the welding and cutting station is arranged in the upper part of the frame, above the load wrapping area, but sometimes it is instead located in the proximity of the base (as in cited EP'893). The hooding machine furthermore provides a dragging device (apt to transfer the edge of the tubular portion along the running path of the sleeve) which is mounted moving on the machine frame.

[0007] The reel of tubular material is comfortably

housed in the lower part, beside the machine. This is also in order to allow simple access by the operator who must intervene when a replacement of the supply reel is necessary due to the running out thereof or due to size change of the load to be wrapped.

[0008] The reel replacement operation is in any case awkward, both due to the relative complexity of the replacement operation - which implies opening the gripping, cutting and welding device to remove the initial edge of an empty, in any case not usable reel, and reintroducing the initial edge of a new reel - and due to the position where said operation is carried out, which is often in the upper part of the machine, therefore forcing the operator to work in dangerous positions.

[0009] An arrangement which certainly makes the reel replacement operation easier is the one described in EP 1,086,893, where the gripping position of the film edge is in the lower part of the machine. As a matter of fact, in this document it is provided to engage the free edge of the tubular sheet into a drawer-shaped support device (suited to maintain together multiple tubular sheets all available at the same time) housed in the bottom area of the machine. The drawing of the tubular film occurs through gripper bars which raise it along the machine frame, until drawing it by the desired measure to be welded and cut, and then dragging it towards the delivery and force-fitting means.

[0010] This arrangement has a series of advantages, which make the machine more flexible with respect to the conventional ones with a single reel inserted in the upper part of the machine.

[0011] However, accessibility problems still persist when the reels need to be replaced, because the operator must nevertheless introduce the tubular film into the machine frame, between the various dragging means provided. Moreover, having to interact with the machine in a working area, where moving members are, for the duration of the operator's entire action the machine must be halted and is unproductive.

[0012] A similar teaching is disclosed from DE8519247U1. This document is relating to a hooding machine where the drawer-shaped support device for the reels is in the form of a carriage, running beneath the machine frame. This arrangement still provide, one above the other, a carriage frame, a couple of reels, a delivering gripper unit and the dragging unit of the machine: this arrangement, though facilitating change of film format, still prevent an operator from easily performing regular maintenance operations when the carriage is engaged with the machine, even because the delivering gripper unit is at a certain height on the floor.

SUMMARY OF THE INVENTION

[0013] The problem at the base of the invention is hence to provide an hooding machine structure of the above-cited type which overcomes the described drawbacks. It is hence desired to provide a machine which

admits a very quick, operator-friendly reel replacement which does not cause prolonged idle times.

[0014] This object is achieved through the features mentioned in claim 1. The dependent claims describe preferred features of the invention.

[0015] In particular, according to a first aspect of the invention, it is provided a hooding machine for the wrapping of loads, comprising a support frame whereon a plastic sleeve-forming system is arranged, said sleeve being formed starting from a plastic tubular sheet folded on a plane and wound on a feeding reel, said forming system comprising, in the proximity of the machine base, dragging means apt to grab a terminal edge of said tubular sheet and to drag it along a sleeve-forming path, wherein

at least a movable carriage on which at least a feeding reel of said tubular sheet is mounted is furthermore provided, said carriage having gripping or retaining means arranged as to present a terminal edge of said plastic sheet at a preset position with respect to said carriage, and

said gripping or retaining means are located in a lower cantilevered part of said carriage, and

at least guiding and control means for guiding said carriage are furthermore provided, apt to locate said gripping or retaining means at a side of the hooding machine in correspondence of a grabbing position of said dragging means, and

said guiding and control means, or said carriage, manage a plurality of reels.

[0016] According to a further aspect, said carriage comprises a support platform, having a first main part housing supporting means for one or more reels and a second cantilevered part on which said gripping or retaining means are installed, one for each reel.

[0017] According to a further aspect said guiding and control means define a displacement path of the at least one carriage which extends at least partly according to an axis parallel to the longitudinal transport axis of the machine. Preferably, guiding and control means also comprise driving means provided with motorisation.

[0018] According to another aspect, a single device driving the rotation of the one reel of the plurality of reels being fed, is furthermore provided. Preferably, said single driving device consists of an arm, mounted with an end thereof pivoting around a pin and projecting from said support frame towards a respective reel, said arm in turn carrying, at the free end thereof, a motorization for a rubber roller which drives said reel into rotation by friction.

[0019] According to a preferred aspect, each carriage carries a plurality of reels with parallel rotation axes.

[0020] According to another aspect, multiple carriages are provided, movable independently through the same guiding and control means.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Further features and advantages of the inven-

tion are in any case more evident from the following detailed description of a preferred embodiment, given purely as a non-limiting example and illustrated in the attached drawings, wherein:

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fig. 1 is a schematic, partly cross-section elevation view of an hooding machine according to the invention;

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fig. 2 is a schematic top plan view of the same machine of fig. 1, provided for the use of three supply reels mounted on a single carriage; and

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fig. 3 shows, in a top plan view similar to that of fig. 2, a second embodiment of a machine according to the invention, which employs two groups of reels mounted on two independent carriages.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

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[0022] As shown in the drawings, an hooding machine comprises, in a way known per se, a main post 1 of a support frame (not better shown overall, being of a type widely known per se), at the top of which delivery and force-fitting means of a plastic sleeve on a load to be

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wrapped are provided.

[0023] Beside post 1, a feeding reel 3 of a sheet F of flattened, tubular plastic material is arranged.

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[0024] On post 1 control means of the rotation of reel 3 are furthermore arranged, consisting of an arm 4, mounted with one end thereof pivoting around a pin 4a and carrying at the other free end thereof a motorisation 5 for a roller 6, which roller rests on the periphery of reel 3 and controls the rotation thereof by friction.

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[0025] The sheet F fed by reel 3 firstly runs through a tensioning device 7 and subsequently on a transfer device 8 guiding toward a gripping frame 9 of the tubular sleeve. On said frame 9, or in the proximity thereof, a gripping system (not shown) of dragging means meant to collect the free edge of sheet F and to bring it along the sleeve-forming path is provided.

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[0026] As a matter of fact, through the dragging means (not belonging to the present invention) a segment intended to form the sleeve of tubular sheet is dragged upwards, along post 1, then horizontally along a cross-member 10a, finally deviated downwards by a spreading-apart device 11, for the opening and the forming of an open sleeve. All that occurs, equally in a known manner, both for the wrapping sheets made of extensible plastic material, and for those made of heat-shrinking plastic material.

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[0027] On gripping frame 9 a cutting and welding device may also be mounted, should the sleeve be formed below, on the lateral side of the machine. Alternatively, the cutting and welding device is arranged in some other location along the sleeve-forming path, for example in the top part of the machine. This device, too, is not described and shown in detail, since it does not belong to the present invention; it must also be pointed out that it

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comprises welding means for welding the two overlapping edges of film sheet F, one on top of the other, as well as cutting means, for severing an initial edge of sheet F from a final end of the remaining part of the sheet, that is, a sheet segment which, thus closed below, forms, during the feeding thereof, a bag or sleeve for the subsequent hooding operation of the load.

[0028] Each one of devices 7 and 8 is diagrammatically shown by a series of cylinders which are not described in further detail since they are known per se.

[0029] According to the invention, reel 3 and the transfer devices 7 and 8 thereof are mounted on a moving carriage 2, which will be described in further detail further on.

[0030] Moreover, according to a peculiar aspect of the invention, downstream of transfer means 8, gripping or retaining means 8a (not shown in detail) are provided, the function of which is to hold the initial edge of sheet F and to present it to the gripping system of the dragging means which, in the suitable work step, intervene and grip the sheet F it to drag it to and beyond the cutting and welding device.

[0031] As is evident from fig. 1, when carriage 2 is in correspondence of a reel work position, gripping or retaining means 8a are positioned in the lower part of the hooding machine, below frame 9. According to an essential aspect of the present invention, retaining or gripping means 8a are mounted integral in movement with carriage 2, on which one or more reels are supported. Further, retaining or gripping means 8a are located on the lower part of the carriage, at least below the level of reel axis. In fig. 1, in particular, it can be appreciated that means 8a are supported on a cantilevered portion 2b of carriage 2, in turn mounted moving on a preferably preset and fixed path, on the side of the hooding machine, as will be described further on. In this context, by the term "cantilevered" it is meant "with respect to the reel": that is, the cantilevered part 2b of the carriage is a portion thereof which projects from the area occupied in plan (footprint) by the reel (as visible in fig. 1). According to a preferred embodiment of the invention, movable carriage 2 comprises an elongated support platform, consisting of a main support part 2a - under which, for example, moving wheels are installed - and of a cantilevered auxiliary part 2b. Main part 2a carries a fork 2c supporting a shaft 3' of a reel 3 of plastic film F. Cantilevered part 2b extends laterally to support the cited transfer device 8 of sheet F and gripping or retaining means 8a.

[0032] As better shown in the top plan view of fig. 2, a first embodiment provides that carriage 2 accommodates a plurality of support stations of the feeding reels and, more precisely, three reel stations 3a, 3b and 3c with parallel rotation axes. The elongated platform 2a, 2b of the same carriage 2 extends to each one of these reels 3a, 3b and 3c; gripping and retaining means 8a are provided for each reel, one opposite each one thereof; on the other hand, alternatively, each one of the three reels can be caused to rotate by the only drive mechanism

4,5,6 associated with frame 1.

[0033] The three reels 3a-3c may be identical and fully replaceable, or they may be of different sizes or types, i. e. carrying tubular sheets with features suited for the wrapping of different loads. What is important, for the purposes of good accessibility by operators, is that the distance between the reel support stations is sufficient to enable an operator to stay in front of the ones not engaged in the feeding activity. As a matter of fact, of the reels supported on carriage 2, only one is meant to deliver plastic film to the hooding machine, that is, the one arranged in correspondence of frame 9 and of the dragging means thereof. This reel, which is the only one working at a certain moment, is driven into rotation by the only driving device associated with arm 4. The adjacent reels remain temporarily unused. That allows to work on the unused stations of the same carriage 2 to replace the corresponding reels without interfering with the regular operation of the machine.

[0034] Carriage 2 is mounted sliding on a rail 12 running close to the hooding machine. The rail 12 is preferably arranged according to an axis Y-Y running parallel to the longitudinal transport axis X-X of the wrapping machine. The movement of carriage 2 along rail 12 is driven by a drive unit 13 which uses for example an end-less dragging chain 13a.

[0035] Controlling the movement of carriage 2, it is hence possible to shift each time either one of the stations of reels 3a, 3b and 3c opposite frame 9 and the corresponding dragging means, so as to allow the feeding of the best suited tubular sheet depending on the load to be wrapped. Since the free edge of each reel is kept inserted in the respective gripping or retaining means 8a, it is possible to bring the film edge precisely into close proximity of the dragging means of the hooding machine, with no action by the operators. As a matter of fact, retaining means 8a slide, together with carriage 2, below frame 9 and are halted in the correct position through a suitable control of the movement of carriage 2, in correspondence of the dragging means. This allows a smooth transfer of the tubular sheet F from retaining means 8a to the dragging means housed on frame 9.

[0036] Since the three reels 3 are mounted on carriage 2 at a mutual distance - in the direction of axis Y-Y - it is possible to replace an exhausted reel, for example reel 3a or 3c, while it is in a position away from frame 9 (as shown in fig. 2), when another reel, in this case reel 3b, is instead opposite said frame 9, for the feeding in progress of respective sheet F.

[0037] This arrangement hence accomplishes the fundamental advantage of the present invention, connected precisely to the fact that the replacement of an exhausted reel with a new one - that is, the replacement of a reel of one type with another one of a different type - occurs in a position in which the exhausted reel is found away from frame 1 and from the dragging means thereof and it is hence easily accessible without interfering with the regular delivery of the work reel.

[0038] The advantage lies in the fact that, in this position, the operator can work freely from above to cause sheet F of the replaced reel to run through assemblies 7 and 8 and to fasten the initial end thereof on the gripping means 8a associated with respective assembly 8, with no interference with the work under way with another reel.

[0039] In other words, the operator no longer - as in the prior art - has to go under frame 9 to fasten the initial end of sheet F on dragging means.

[0040] During operation it is hence provided that the operator can load a reel on one of the stations of carriage 2 which is not engaged working opposite the hooding machine. Since the cantilevered part 2b of the carriage, with the relative gripping and retaining means 8a, is freely accessible from above, the operator can easily introduce the free edge of film F into the various transfer cylinders 7 and 8 and arrange it in a preset position of the carriage defined by gripping and retaining means 8a. During this action it is not necessary to halt the operation of the hooding machine.

[0041] Retaining or gripping means 8a are laid out so that film F comes from below along cylinders 8 and is presented with the free edge thereof vertically facing upwards. Thereby, the edge or end of film F can be easily grabbed by further gripping means which come from above, that is, from the gripping system of the dragging means hosted on the hooding machine.

[0042] When the reel needs to be replace - for example because a load arrives which requires a variation of the tubular size - in the idle time in which a first wrapped load moves away from the machine and the new load arrives, carriage 2 is also moved through moving control 13 and 13a. The desired reel is brought opposite the hooding machine, bringing gripping and retaining means 8a below and flush to the frame 9 of the hooding machine. Through suitable reference system, known per se, it is hence possible to perfectly arrange the free edge of film F in correspondence of the location where the dragging means are apt to grip it from above and to bring it along the sleeve-forming path of the machine.

[0043] Once the desired reel has been brought into the work position, also arm 4 is caused to drop until bringing rubber roller 6 to rest against the reel periphery, so as to control the unwinding/winding thereof. The action of motor 5 is synchronised with that of the dragging means: depending on the torque delivered to the motor, it alternatively cooperates to deliver the plastic sheet F (unwinding) or it maintains the correct film tension between gripping or retaining means 8a and transfer means 7 (winding), so as not to create excessive slack which could lead to jamming.

[0044] Fig. 3 shows an alternative embodiment. Here it is provided, in order to further facilitate the replacement work of reels 3, to have two separate carriages 15 and 16, independently slidable along rail 12. In the case shown, each one of the two carriages carries a pair of reels 3d, 3e and 3f, 3g, respectively.

[0045] Thereby it is possible to arrange a first carriage

in working station: in the case shown, carriage 15, with reel 3e in a feeding step of sheet F and with reel 3d ready and waiting for replacement. At the same time a second carriage, in the case shown carriage 16, remains stationary in a position away from the working station, where it can easily be provided to reel replacement or to other maintenance operations.

[0046] For this purpose, for example, carriages 15 and 16 may be engaged and disengaged according to the requirements, to the end-less moving chain 13a of drive system 13.

[0047] However, it is understood that the invention must not be considered limited to the particular arrangements illustrated above, which represent only exemplary embodiments thereof, but that various other variants are possible, all within the reach of a person skilled in the field, without departing from the scope of protection of the invention, as defined by the following claims.

[0048] For example, it is not ruled out that reel support carriages may be moved also in other ways, possibly also manually. Moreover, the carriages may be movably mounted on the respective guiding means in various ways, not necessarily through wheels and rails. For example, if space allows, the carriages may be fixedly mounted on a revolving structure, which in turn is rotatably driven on a vertical axis.

[0049] Each reel may furthermore be mounted on an own, independent carriage, or a single carriage with a number of reels even exceeding three may be provided.

[0050] Finally, retaining or gripping means 8a may be configured to have the terminal edge of film F with a different attitude from the one shown in the drawings, depending on how the gripping system of the dragging means is meant to work. For example, the edge may be presented on an oblique, rather than a vertical, or nearly horizontal, plane. Retaining or gripping means 8a are provided opposite each reel to manage the individual terminal edges of film F independently, but that does not imply from a that construction point of view there are as many separate devices as are the reels, because retaining or gripping means 8a may also be part of a single complex unit.

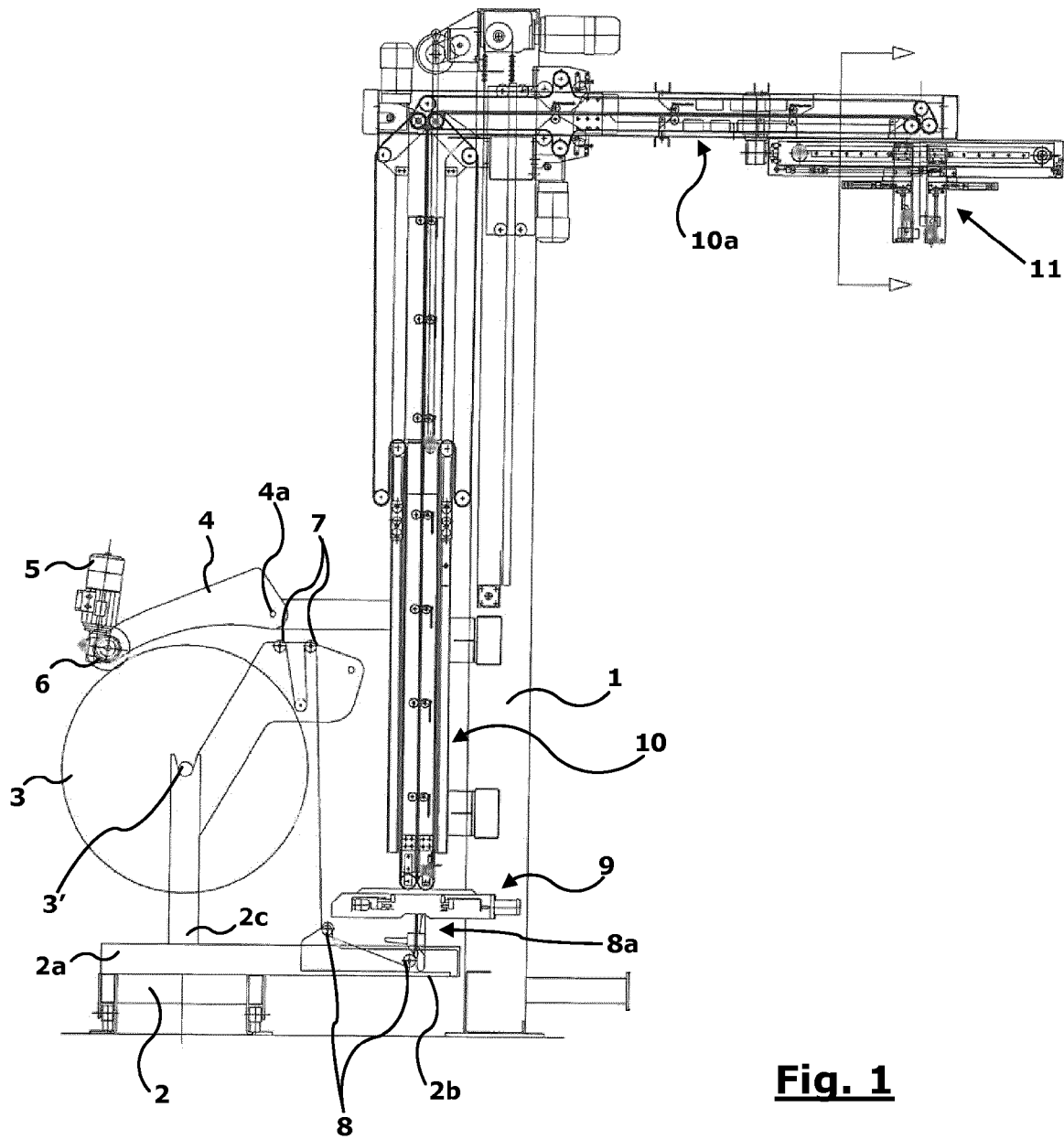
Claims

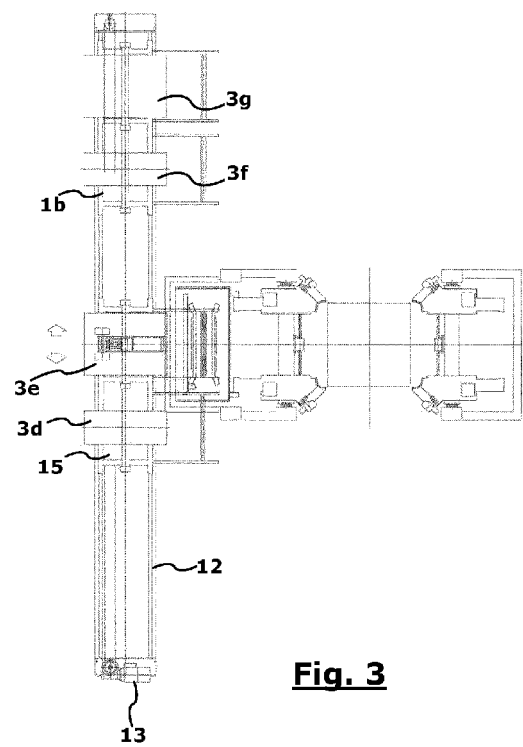
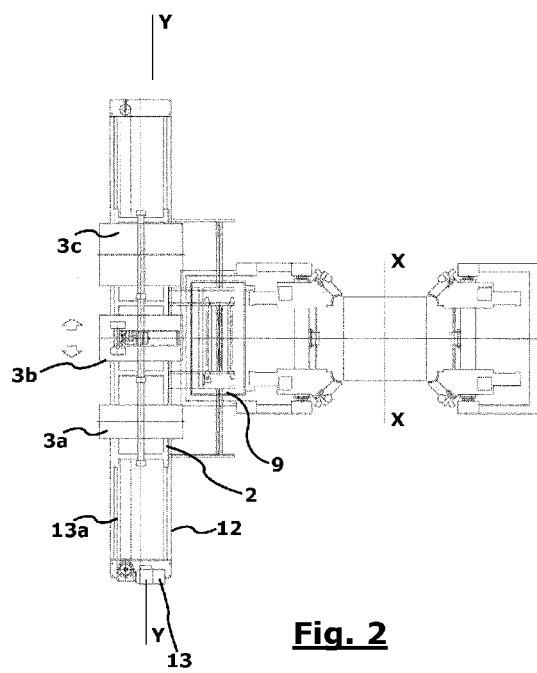
1. Hooding machine for the wrapping of loads, comprising a support frame (1) whereon a plastic sleeve-forming system is arranged, said sleeve being formed starting from a plastic tubular sheet (F) folded on a plane and wound on a feeding reel (3), said forming system comprising, in the proximity of the machine base, dragging means apt to grab a terminal edge of said tubular sheet and to drag it along a sleeve-forming path, **characterised in that** at least a movable carriage (2) on which at least a feeding reel (3) of said tubular sheet (F) is mounted is furthermore provided, said carriage having grip-

ping or retaining means (8a) arranged as to present a terminal edge of said plastic sheet (F) at a preset position with respect to said carriage (2), and **in that** said gripping or retaining means (8a) are located in a lower cantilevered part of said carriage (2), and **in that**

at least guiding and control means (12) for guiding said carriage (2) are furthermore provided, apt to locate said gripping or retaining means (8a) at a side of the hooding machine in correspondence of a grabbing position of said dragging means, and **in that** said guiding and control means (12), or said carriage (2), manage a plurality of reels (3a-3g).

2. Hooding machine as claimed in claim 1, **characterised in that** said carriage (2) comprises a support platform (2a, 2b), having a first main part (2a) housing supporting means (2c) for one or more reels (3a-3g) and a second cantilevered part (2b) on which said gripping or retaining means are installed (8a), one for each reel (3a-3g).
3. Hooding machine as claimed in claim 1 or 2, wherein said guiding and control means (12) define a displacement path of the at least one carriage (2) which extends at least partly according to an axis (Y-Y) parallel to the longitudinal transport axis (X-X) of the machine.
4. Hooding machine as claimed in claim 3, wherein said guiding and control means (12) also comprise displacement means provided with motorization (13).
5. Hooding machine as claimed in any one of the preceding claims, wherein a single device (4) driving the rotation of the one reel (3) of the plurality of reels (3a-3g) being fed, is furthermore provided.
6. Hooding machine as claimed in claim 5, wherein said single driving device consists of an arm (4), mounted with an end thereof pivoting around a pin (4a) and projecting from said support frame (1) towards a respective reel (3), said arm (4) in turn carrying, at the free end thereof, a motorization (5) for a rubber roller (6) which drives said reel (3) into rotation by friction.
7. Hooding machine as claimed in any one of the preceding claims, wherein each carriage (2) carries a plurality of reels (3a, 3b, 3c; 3e, 3d; 3f, 3g) with parallel rotation axes.
8. Hooding machine as claimed in any one of the preceding claims, wherein multiple carriages (2, 15, 16) are provided, movable independently through the same guiding and control means (12).





REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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