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(54) **Combined packaging strapping-winding apparatus**

(57) A wrapping apparatus for pallet-mounted loads is disclosed of the type comprising a rotating platform (2) adjacent to a column (20) for the support and translation of a bobbin of plastic film, further comprising a support castle frame (1) across said platform (2) whereon at least

a strapping device is mounted, with the relative runways (10) and guides (11,12,11i,11s,12s) of the strap and the relative strapping head (T) capable of being arranged outside the specific volume occupied by a load when placed on said platform (2).

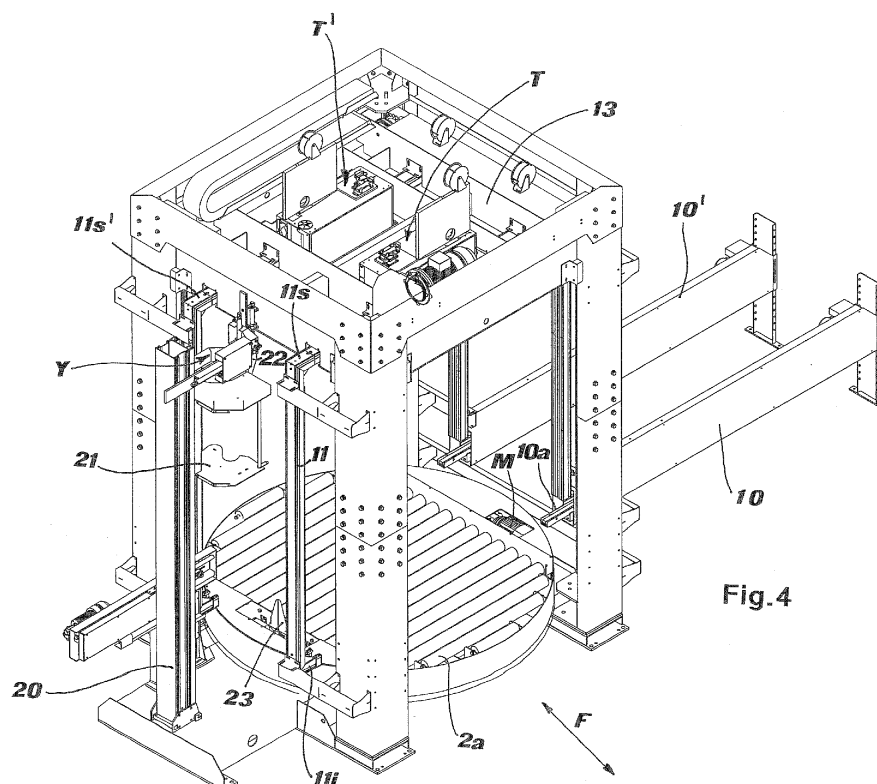


Fig.4

Description

[0001] The present invention concerns a wrapping apparatus for pallet-mounted loads, in particular a combined machine which performs two complementary packaging functions.

[0002] As known, in the field of industrial packaging - where the need to consolidate pallet loads exists - two different technologies are generally resorted to, one employing plastic film and the other employing a strap of high-strength (plastic or metal) material. The two technologies are employed on different types of loads and normally meet different requirements.

[0003] Strapping of a load typically involves greater sturdiness, economy and speed, but does not protect the load from environmental agents, nor is it capable of consolidating a composite load (for example a stack of small boxes).

[0004] Plastic-film packaging - which is effected by winding the load with a stretchable or heat-shrinkable film - consolidates and protects the load better, but does not allow good attachment of the load to the pallet, is time-consuming and more expensive (in terms of plant, material and operation).

[0005] Since the two technologies are employed in different applications, it happens that users purchase one or the other apparatus depending on the specific goods they intend to package. As a result, also the manufacturers of these apparatuses have developed and offer on the market specific apparatuses which perform only one of the two functions.

[0006] However, there are manufacturing situations wherein a primary need arises which is met by one of the two technologies (for example by strapping), but an occasional need simultaneously exists to employ also the other technology (for example plastic-film packaging): in these cases the user uses improperly the apparatus which meets the primary need also in those situations in which a different apparatus would be better suited.

[0007] Alternatively, the user is forced to purchase both apparatuses. This choice, as can be clearly understood, is not particularly appreciated for two essential reasons:

[0008] the additional costs, which are not strictly justified, and

[0009] the bulk of two plants which, if the security area around each apparatus for injury-prevention needs is also considered, becomes positively important and little acceptable in small-sized manufacturing situations.

[0010] The object of the present invention is hence that of providing an apparatus which allows to meet diversified packaging needs, albeit with a reduced cost and bulk, which are also attractive for users who do not have a high packaging productivity.

[0011] Such object is achieved by an apparatus as described in its essential features in the accompanying main claim.

[0012] Other inventive aspects of the apparatus are

described in the dependent claims.

[0013] Further features and advantages of the apparatus according to the invention will in any case be more evident from the following detailed description, given by way of example and illustrated in the attached drawings, wherein:

[0014] fig. 1 is an elevation front view of the apparatus according to the invention;

[0015] fig. 2 is an elevation view taken from the right hand side of fig. 1;

[0016] fig. 3 is an elevation view taken from the left hand side of fig. 1;

[0017] fig. 4 is a perspective top view from the left front side of the apparatus of fig. 1; and

[0018] fig. 5 is a perspective top view from the right front side of the apparatus of fig. 1.

[0019] The packaging apparatus is mounted on a castle frame 1, which may be arranged across a conveyor line whereon the pallets are moved which carry the loads to be packaged.

[0020] In the lower part of castle 1 a rotating platform 2 is provided, equipped with a roller unit 2a, consisting of a plurality of rollers, capable of allowing the translation of the load in the direction of advancement of the conveyor line (as shown by arrow F).

[0021] For such purpose, the rollers of roller unit 2a are mounted parallel on platform 2 and said platform can be set in a preset position, referred to as home position, wherein the rotation axes of rollers 2a are perfectly perpendicular to the direction of advancement F.

[0022] Roller unit 2a is preferably motor-driven, for example by means of motor M illustrated in fig. 4, for automating the movement of the pallet along the direction of movement.

[0023] Platform 2 is in turn motor-driven so as to be able to rotate on its plane with respect to castle 1, according to the operation mode which will be detailed further on.

[0024] On the castle there is further mounted at least a strapping line - advantageously two strapping lines as shown in the drawings - intended to deliver and tighten a strap loop on a plane perpendicular to the direction of movement F of the load.

[0025] In particular, each strapping line comprises

[0026] a runway 10, with relative strap guide 10a, which extends on the right hand side of castle 1 (according to the illustration of fig. 1),

[0027] a first vertical guide 11, with relative horizontal top conveyor 11s and bottom conveyor 11i, arranged on the left hand side of the castle,

[0028] an upper strapping head T,

[0029] a second vertical guide 12, opposite the first one (hence on the right hand side of the castle), with a relative top horizontal conveyor 12s.

[0030] Guides 11 and 12 and runway 10 of course lie on a same vertical plane (the plane whereon the strapping loop forms) and are located strictly outside the plan perimeter of platform 2 and of the roller unit 2a thereof,

in order to prevent interference with the load thereof during operation of the apparatus (in particular during the load wrapping and handling steps, which will be described further on). In other words, it is necessary for the guides and the runway, as well as for strapping head T, to be able to be arranged - at least provisionally - outside the specific area occupied by the load when it is placed on platform 2.

[0031] Preferably, vertical guides 11 and 12, with the relative horizontal conveyors, are fixedly mounted at the two right and left sides (with reference to fig. 1) of castle 1, i.e. on the two opposite sides parallel to the direction of movement F of the load.

[0032] Strapping head T, of a type known per se, is mounted on a translatable carriage 13, only outlined in the drawings, which may rise or descend vertically along the height of castle 1, through respective sliding guides (not specifically illustrated). The vertical translation of carriage 13, which is suitably controlled by a relative actuation motor, brings strapping head T from the raised position, illustrated in the drawings, to a lower position - depending on the height of the load to be strapped - at which it can complete the strapping operation.

[0033] Next to the strapping line just described, a second identical strapping line (visible in the drawings) is preferably arranged, which has identical components (marked by identical reference numbers but having a tip) which will hence not be further described. The two lines are arranged parallel and staggered along the direction of movement F, in order to be able to have simultaneously two strap rings on the same load or to strap simultaneously two distinct loads arranged closely together.

[0034] Operationally, the strapping operation occurs when the load is stationary on platform 2, launching a strap from a runway 10, which ends up sliding below the load arranged on the pallet, enters bottom conveyor 11i, runs along vertical guide 11, is diverted by top conveyor 11s and by opposite conveyor 12s and then closes the last side of the ring along the second vertical guide 12.

[0035] The specific operations connected with closing the strap ring by strapping head T will not be described in further detail here, because they are known per se and are not the subject of the present invention.

[0036] Thanks to the presence of rotary platform 2, the load can be rotated by 90° after having carried out a first strapping, to be able to perform a second one perpendicular to the first one. Thereby two pairs of mutually perpendicular strapping processes can be carried out in the same position.

[0037] According to the invention, the wrapping apparatus further comprises a column or pedestal 20 supporting a bobbin-holding shelf 21, arranged on the side of castle 1 opposite to the one of runways 10.

[0038] The bobbin-holding shelf 21 is slidably mounted vertically on pedestal 20 by means of suitable motoring means. This shelf 21 is intended to house a bobbin of plastic film and possibly a relative pre-stretch unit (not shown).

[0039] The plastic film reel is used in the apparatus for performing a wrapping of the load, in cooperation with the rotary operation of rotary platform 2. For such purpose, there are further provided first gripping means 22, movably mounted according to what is outlined in the following, and second gripping means 23, integral with platform 2. Gripping means 22 and 23 are intended to cooperate for retaining the film edges at the beginning and at the end of the load wrapping operation.

[0040] For a perfect integration with the combined apparatus of the invention, the second gripping means 23 are mounted on the platform in a position opposite to runways 10 - i.e. in front of pedestal 20 - when the platform is in its home position illustrated in the drawings.

[0041] Grippers 23 of the platform are intended to retain a film edge coming from the bobbin mounted on shelf 21 during the winding of a load. As a matter of fact, during the rotation of platform 2, gripper 23 draws with itself the free edge of plastic film which thereby, being delivered from a sliding position vertically sliding on pedestal 20, winds like a spiral on the load.

[0042] On the other hand, when it is necessary to have platform 2 rotate without drawing also the plastic film - for example to rotate the load by 90° and to apply mutually orthogonal strapping loops - it is necessary to provisionally free the edge of gripper 23. For such purpose, first grippers 22 are mounted on control device Y so as to be movable both vertically and horizontally. The vertical movement allows grippers 22 to descend to the level of the grippers 23 of the platform. The horizontal movement allows grippers 22 to be brought alternately in a backward position, i.e. behind grippers 23 (i.e. between grippers 23 and pedestal 20), or in a forward position, i.e. in front of grippers 23 (i.e. between grippers 23 and roller unit 2a). Thereby, grippers 22 may be caused to descend arranged in a backward position, until they intercept the film which stretches between the bobbin and second grippers 23 of the platform. In this position, movable grippers 22 can retain the film and hence free second grippers 23 from such a gripping function. In this condition the film edge is in any case retained in a controlled manner, but the platform can rotate freely without performing any winding of the load.

[0043] Where there is again interest in delivering the film edge to the platform grippers 23, movable first grippers 22 are lifted and moved in a forward position by device Y and then lowered again until they are brought in front of second grippers 23. In this condition the plastic film, which runs from the bobbin mounted on shelf 21, can be gripped again by the second grippers 23 of the platform; after that, movable grippers 22 are brought back into a home position which does not interfere with the regular operation of the apparatus.

[0044] This opportunity for exchange of the film between the two grippers 22 and 23 allows to make the process fully automatic, even in the presence of the peculiar requirements of the combined apparatus.

[0045] As visible in the drawings, pedestal 20 is ad-

vantageously arranged on the side of castle 1 opposite runways 10, so as to integrate in an optimal manner with the strapping lines and, at the same time, in order not to interfere at all with the load both in the strapping step and in the conveying step.

[0046] The winding of the load with the plastic film occurs with platform 2 in rotation.

[0047] For example, the load arrives on platform 2 sliding along the conveyor line. After having consolidated it with the pallet by means of two strap loops (or four cross-overs), platform 2 is caused to rotate with a film edge retained on the second lower gripper 23 of the platform. After having arranged one or two turns of film (so as to securely fasten the film to the load), the bobbin-holding shelf is caused to rise and then descend on pedestal 20, so as to distribute a series of turns of film across the entire height of the load. At the end of the operation, platform 2 is stopped again in the home position (i.e. with the rolls of roll unit 2a orthogonal to the direction of movement F), the film is cut and gripped by first grippers acting in a coordinated manner with second gripper means and finally the load can resume its movement along the conveyor line.

[0048] It is evident that there are no preclusions in performing also a reverse process, i.e. in performing first a winding of the load with the plastic film and then in arranging one or more strap loops around the load.

[0049] As can be detected from the supplied description, the combined apparatus according to the invention reaches perfectly the objects set forth in the preliminary remarks. As a matter of fact, through a synergistic and effective combination of one or two strapping lines with a film winding system, it provides a flexible and cheap instrument for wrapping in a variety of applications, also in situations where plant cost and space occupation are very relevant factors.

[0050] However, it is intended that protection of the invention described above is not limited to the particular embodiment illustrated, but extends to any other construction variant which achieves the same result within the scope of the appended claims.

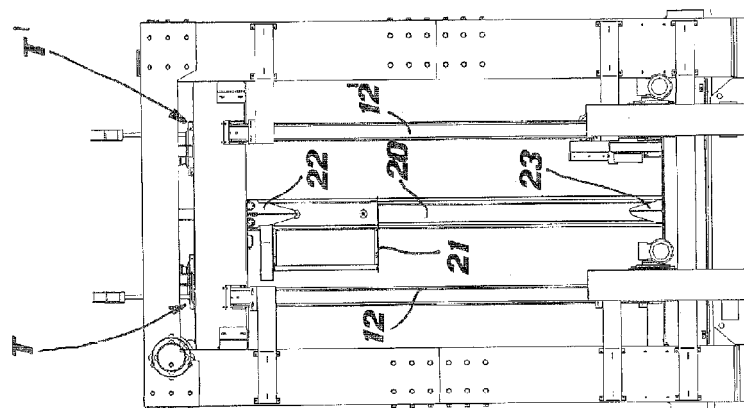
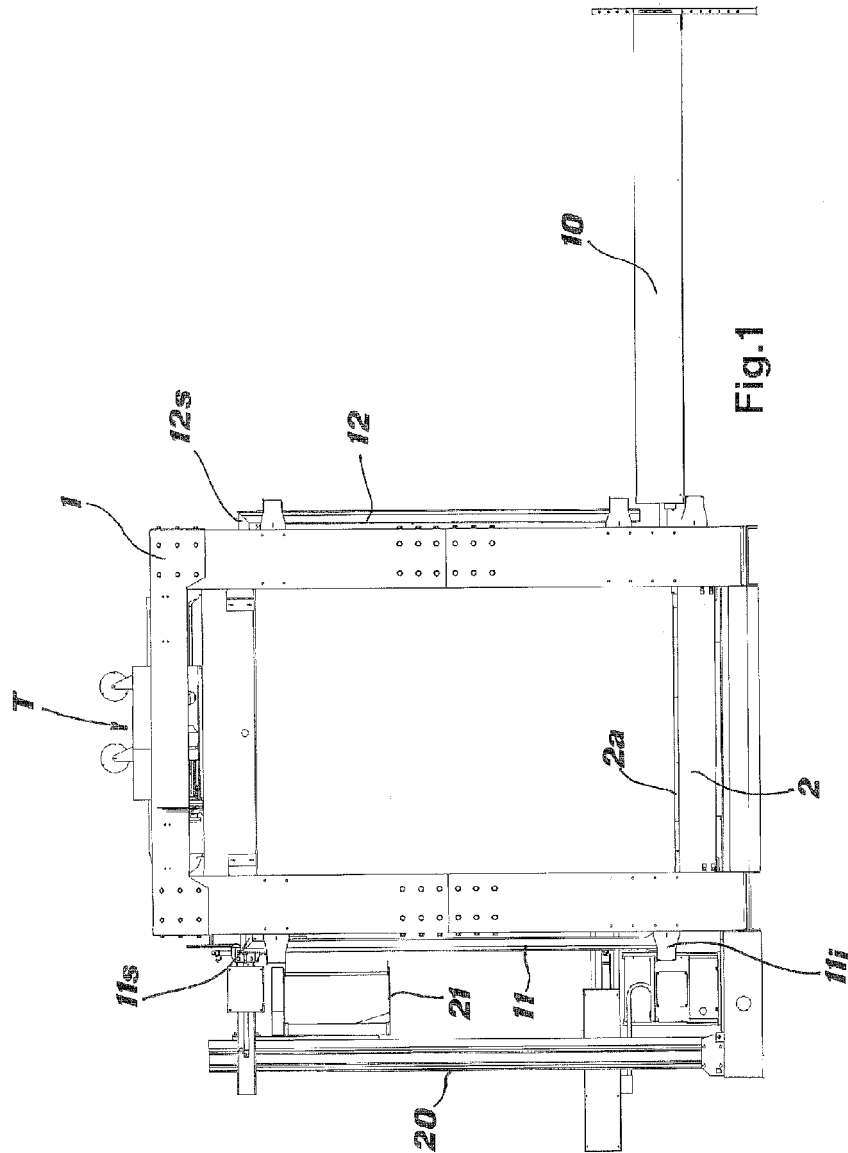
[0051] For example, although the runways and guides of the strap are preferably mounted in a fixed manner on the carriage, it is not ruled out that they - in order to meet other specific requirements - may be movably mounted, so as to provisionally interest the bulk area of the load on the platform, but then leaving it free when it is necessary to perform winding or translation of the load.

with relative runways (10) and guides (11, 12, 11i, 11s, 12s) of the strap and relative strapping head (T) capable of being arranged outside the specific volume occupied by a load when placed on said platform (2).

2. Apparatus as in claim 1), wherein said support column (20) is arranged on one side of the castle (1), such side being perpendicular to a plane along which whereon the strapping is performed.
3. Apparatus as claimed in claim 1) or 2), wherein said platform (2) comprises a series of parallel rollers which make up a roller unit (2a) for the sliding of the load.
4. Apparatus as claimed in claim 3), wherein said rollers have a rotation axis perpendicular to a direction of advancement (F) of the load when said platform (2) is in a home position.
5. Apparatus as claimed in any one of claims 2) to 4), wherein said runways (10) are arranged on the side of said castle (1) opposite said support column (20).
6. Apparatus as claimed in any one of the preceding claims, wherein said at least one strapping head (T) is mounted vertically translatable on said castle (1).
7. Apparatus as claimed in any one of the preceding claims, wherein two groups (22, 23) of grippers co-operating for the management of the plastic film are provided, a first group of grippers (22) being mounted on a drive device for vertical and horizontal movement, and a second group of grippers (23) being integral in rotation with said platform (2), the first group (22) being able to be arranged in front of or behind said second group (23) with respect to said bobbin of plastic film.

Claims

1. Wrapping apparatus for pallet-mounted loads of the type comprising a rotating platform (2) adjacent to a column (20) for the support and translation of a bobbin of plastic film, **characterised in that** it further comprises a support castle (1) across said platform (2) whereon at least a strapping device is mounted,



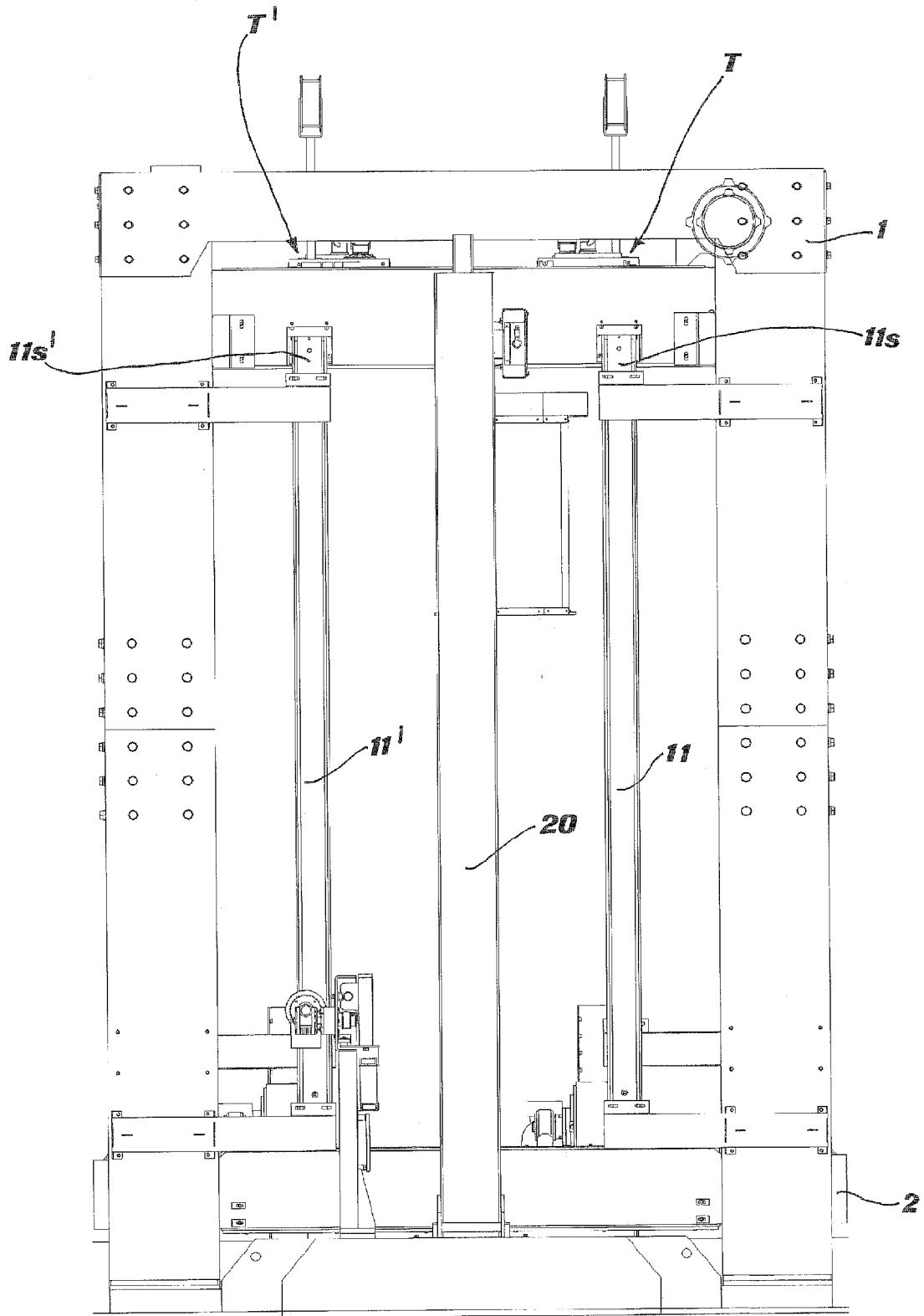


Fig.3

