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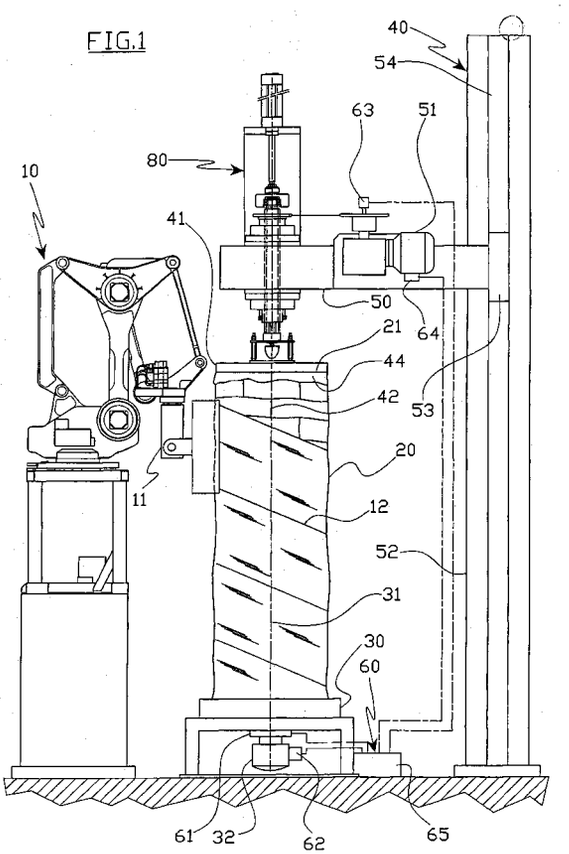
(54) Wrapping apparatus for wrapping a palletised load with thin coating band

(57) The wrapping apparatus is used to wrap a palletised load (20) with a thin coating band (12) and comprises at least one wrapping terminal (11) for carrying out the wrapping through the coating band (12) wound with tension on the side walls of the load, and a rotating support base (30), motorised by a motor (32), on which said palletised load (20) is rested acting in combination with the action of the wrapping terminal (11). The apparatus is characterised in that it comprises a presser device (40) having: a rotating member (41) suitable for being made integral with the upper end (21) of the palletised load (20); means for making the rotating member (41) integral with the upper end (21) of the load (20); moving means suitable for making the rotating member (41) rotate about a rotation axis (42) substantially coinciding with the rotation axis (31) of the rotating support base (30), in synchrony with it.

FIG.1



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Description

[0001] The present finding concerns, in general, a wrapping device for packaging, and in particular for wrapping a palletised load with a thin coating band.

[0002] An important function of packaging is to link together the objects that make up the load, in particular in the case in which these objects are particularly light.

[0003] It is known to use wrapping apparatuses having a wrapping terminal for coating, through a thin band wrapped with tension, the side walls of a palletised load, which, during the wrapping step, is positioned on a rotating support base moved by a suitable motor and acting in combination with the action of the wrapping terminal.

[0004] The packaging process foresees the arrangement of the palletised load on a rotating support base; then the motor puts said base and consequently the palletised load into rotation. The wrapping terminal can be actuated by a Cartesian or anthropomorphic robot, or an equivalent means, which makes it translate in combination with the rotation of the rotating support base in order to carry out a helical wrapping of the thin coating band around the side walls of the palletised load. At the end of the packaging process one ends up with a palletised load wrapped with a thin coating band (also known as coating film) with constant tension, which adapts to the faces and corners of the palletised load.

[0005] In the case of relatively light loads, it is necessary to use, on the upper base of the load, an idle rotating plate that is pressed on the load, towards the bottom.

[0006] The purpose of the present finding is that of improving the packaging process above all in the case in which the palletised loads consist of relatively light objects, in a simple and rational solution.

[0007] Indeed, it has been noted that in known wrapping devices the tension that the thin coating band is subjected to causes torsion on the loads that can cause a more or less marked warping in the shape of the loads themselves with a consequent increase in volume that they occupy when stacked up one next to the other, inside a warehouse or inside load spaces of transportation means. This aspect has a particularly negative effect, above all in the transportation of relatively light loads, since it prevents the load volume of the transportation means from being used to the maximum degree.

[0008] The finding, as characterised by the claims, solves the problem of warping caused by the tension of the thin coating band during the packaging of light palletised loads rested on a rotating base, with the advantage of reducing the bulk of said palletised loads and therefore of being able to introduce a greater number of said loads inside a load space or inside a warehouse.

[0009] The characteristics and constructive advantages of the finding shall become clear from the following detailed description, given with reference to the figures of the attached tables of drawings that illustrate a particular and preferred embodiment thereof, purely as an example and not for limiting purposes.

Fig. 1 is a schematic side view of the wrapping apparatus in object.

Fig. 2 is an enlarged detail of fig. 1.

Fig. 3 is a perspective view of the presser device during the operating packaging step.

[0010] The wrapping apparatus in object carries, at the right end, a wrapping terminal 11 carried by a robot 10 to wrap, with a thin coating band 12, a palletised load 20, rested on a rotating support base 30, moved by an electric motor 32, which imposes a rotation according to a vertical rotation axis 31. Said palletised load 20 has an upper end 21, on which a presser device 40 acts. The presser device 40 comprises a rotating member 41 consisting of a rigid support 43, rotating around a rotation axis 42, and an elastomeric layer 44 arranged below said rotating support 43 and integral with it, shaped in such a way as to adhere well to the upper end 21 of the palletised load 20 to be made integral with it.

[0011] The presser device 40 also comprises an arm 50 that carries an electric motor 51 for the rotation of the rotating member 41, said mobile arm 50, thanks to a guide 53, being slidably engaged in a seat 54 obtained in a support column 52, so as to be able to vary its distance from the rotating base 30 according to the height of the load 20. Moreover, the presser device 40 comprises a support group 80 for the rotating member 41, carried by the free end of the mobile arm 50 having a bearer structure 81, fixed to the arm 50, centred on the rotation axis 42 of the rotating member 41, which supports, through bearings 89 and 90, a hollow pipe 84, rotating about a rotation axis 83, substantially coinciding with the axis of the rotating base 30. The pipe 84 has an idle transmission wheel 82 fixed to it that is connected, through a transmission chain 96, to a motorised wheel 95, moved by the electric motor 51 of the rotating member 41. Inside the recess of the pipe 84 an axially grooved thrusting shaft 86 is inserted, which is engaged in rotation with the pipe 84 itself, whereas it can slide axially with respect to it. The shaft 86 is pressed downwards by a pneumatic jack 70 comprising a stem 72 at the lower end of which a plate 72 is integrally fixed capable of thrusting, through the interposition of bearings 94, upon the upper end of the shaft 86; this carries, integrally attached to its lower end, the rotating member 41, which is thus pressed against the upper end 21 of the palletised load 20. A suitable control system 60 is also foreseen that comprises at least one inverter 64, and at least one encoder 63 associated with the electric motor 51 of the rotating member 41, and at least one inverter 62, and at least one encoder 61 associated with the electric motor 32 of the rotating support base 30, and a control card 65, connected to said encoders 61, 63 and inverters 62, 64, suitable for keeping the synchrony between the angular speed of the rotating member 41 and the angular speed of the rotating support

base 30.

[0012] In the wrapping of the load, the latter rotates together with the rotating support base 30 whereas the wrapping terminal 11, actuated by the support robot 10 or by an equivalent means, is made to translate in combination with the rotation of the base 30 in order to carry out a helical wrapping of the thin coating band around the side walls of the palletised load. The rotating support base 30 rotates, thanks to the control system 60, with the same angular speed as the rotating support 43 for the rotating member 41, which is made integral with the palletised load 20, thanks to the jack 70. The jack 60 is able to press on the load 20 with a thrust of adjustable value (for example through a pressure adjustment valve), in order to adjust its action according to the mechanical characteristics (consistency, compressibility,) of the load itself.

[0013] The rotation of the rotating member 41 takes place around the rotation axis 31 of the rotating support base 30 substantially aligned with the rotation axis of the rotating member 41, which in turn is substantially aligned with the rotation axis of the pipe 84. The wrapping apparatus, acting in combination with the rotation of the rotating support base 30 and of the rotating member 41, translates vertically so that the thin coating band 12 helically wraps the side walls of the palletised load 20. The control system 60 is used to keep the angular speed of the rotating support 43 equal to that of the rotating member 41; in particular, it acts with an electronic control capable of detecting the angular speed of the rotating member 41 through the encoder 63, carrying out a comparison with the angular speed, taken from the encoder 63, of the rotating support base 30, and finally, after suitable software processing, sending a suitable effective voltage value to the inverter 64 of the electric motor 51, so as to correct and make the angular speed of the rotating member uniform with that of the rotating support base 30.

[0014] Thanks to the fact that the rotating member 41 is made integral (through the action of the jack 70) with the upper end of the palletised load and also rotates with the same speed as the rotating base 30, the load itself is very compact and offers more resistance to the warping produced by the tension of the coating band.

[0015] The control system can also adjust the vertical movement of the mobile arm 50 connected to the support group 80.

[0016] Of course, numerous practical-application modifications can be brought to the invention in object, without for this reason departing from the inventive idea as claimed below.

Claims

1. Wrapping apparatus for wrapping a palletised load (20) with a thin coating band (12) comprising at least one wrapping terminal (11) for carrying out the wrapping through the coating band (12) wound with tension on the side walls of the load, and a rotating support base (30), motorised by a motor (32), on which said palletised load (20) is rested acting in combination with the action of the wrapping terminal (11), **characterised in that** it comprises a presser device (40) comprising:

   - a rotating member (41) suitable for being made integral with the upper end (21) of the palletised load (20);
   - means for making the rotating member (41) integral with the upper end (21) of the load (20);
   - moving means suitable for making the rotating member (41) rotate about a rotation axis (42) substantially coinciding with the rotation axis (31) of the rotating support base (30), in synchrony with it.

2. Wrapping apparatus according to claim 1, **characterised in that** said moving means comprise an electric motor (51) suitable for making the rotating member (51) rotate, and a suitable control system (60) of the electric motor (51), which allows synchrony to be maintained between the rotation of the rotating member (41) and the rotation of the rotating support base (30).

3. Wrapping apparatus according to claim 2, **characterised in that** the control system (60) comprises at least one inverter (64) and at least one encoder (63) associated with the electric motor (51) of the rotating member (41), and at least one inverter (62), and at least one encoder (61) associated with the electric motor (32) of the rotating support base (30), and a control card (65), connected to said encoders (61, 63) and inverters (62, 64), suitable for keeping the synchrony between the angular speed of the rotating member (41) and the angular speed of the rotating support base (30).

4. Wrapping apparatus according to claim 1, **characterised in that** to make the rotating member (41) integral with the upper end (21) of the load (20) it comprises means (70) suitable for pressing the rotating member (41) with direct action downwards, against the upper end (21) of the palletised load (20).

5. Wrapping apparatus according to claim 4, **characterised in that** said means (70) suitable for pressing comprise a jack (60) suitable for pressing upon the load (20) with a thrust of adjustable value suitable for adjusting its action according to the mechanical characteristics of the load itself.

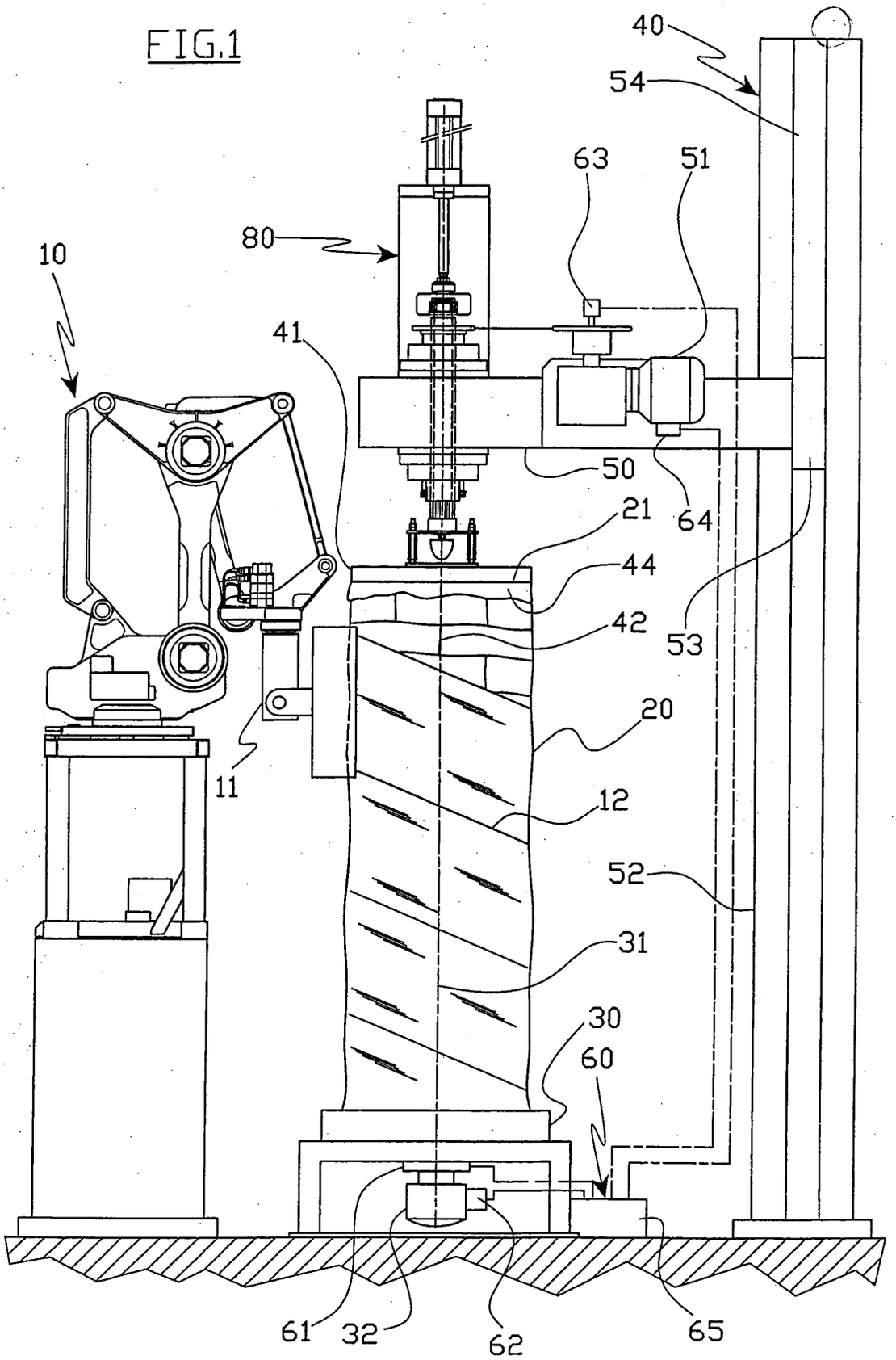
6. Wrapping apparatus according to claim 5, **characterised in that** the rotating member (41) comprises

a rigid rotating support (43) and an elastomeric layer (44) arranged below the rotating support (43) and integral with it, shaped in such a way as to adhere well to the upper end (21) of the palletised load (20).

7. Wrapping apparatus according to claim 2, **characterised in that** the presser device (40) comprises at least one mobile arm (50) that carries the electric motor (51) of the rotating member (41), the mobile arm of which (50) is slidably engaged at a support column (52), and a support group (80) for the rotating member (41) carried by the free end of the mobile arm (50); the mobile arm (50) being able to translate vertically to move the rotating member (41) closer to and/or further away from the upper end (21) of the palletised load (20).

8. Wrapping apparatus according to claim 5, **characterised in that** said support group (80) comprises a hollow pipe (84) rotating about the rotation axis (42) of the rotating member (41), to which an idle transmission wheel (82) is fixed, connected to the electric motor (51) of the rotating member (41), inside the recess (85) of which a thrusting shaft (86) is slidably inserted, pressed by the pneumatic jack (70) and forced to rotate with the same angular speed as the rotating pipe (84); the thrusting shaft (86) being integrally attached with its lower end to the rotating member (41).

FIG.1



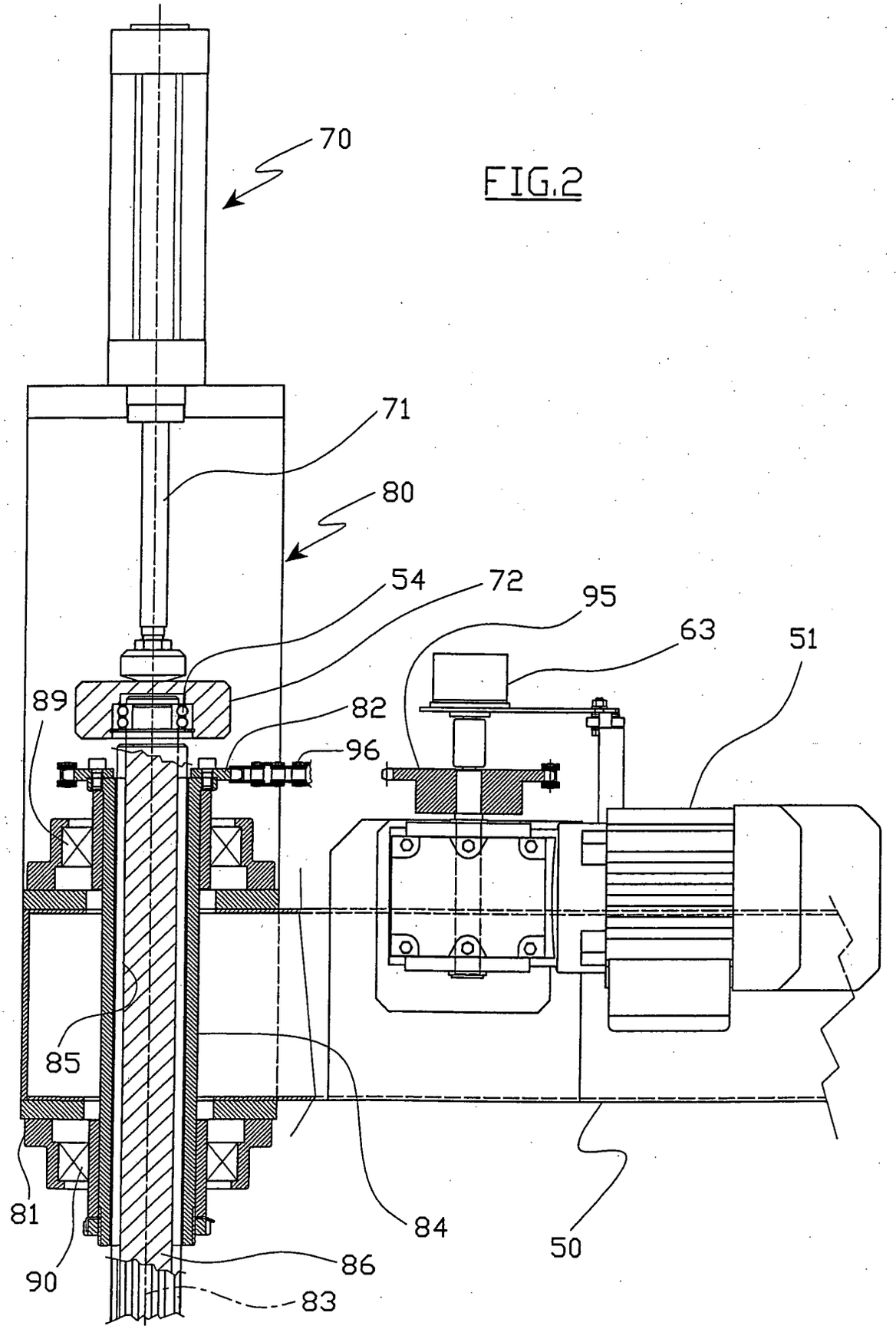


FIG.2

FIG.3