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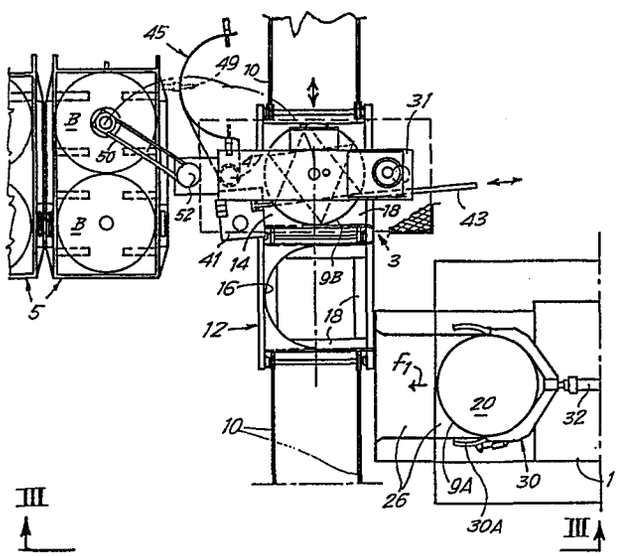
(54) Automatic apparatus for handling and binding packs (bumps) of textile fibre tapes.

(57) The apparatus comprises: containers defined by cylindrical walls (9), with raisable bottom (20); means for sliding the containers on smooth slide surfaces up to a transfer truck (12); means for bringing said truck under a press (3) which acts onto said bottom (20) to perform the pressing of the material and its subsequent lifting from the cylindrical walls (9); means (41) for binding the material while it is kept pressed, and means for transferring the bound material up to a container (5) having a plurality of seats which is arranged for further handlings.



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GUALCHIERANI & C. S.p.A.

"AUTOMATIC APPARATUS FOR HANDLING AND BINDING PACKS (BUMPS) OF TEXTILE FIBRE TAPES".

The invention relates to an automatic apparatus for forming, pressing and handling packs (bumps) of coiled combed fibre tape. Substantially it comprises: containers defined by cylindrical walls, with raisable bottom plane; means for the container sliding on smooth slide surfaces up to a transfer truck; means for bringing said truck under a press which acts onto said bottom to perform the pressing of the material and its subsequent lifting from the cylindrical portion; means for binding the material being kept in the pressed arrangement; and means for transferring the bound material up to a container having a plurality of seats which is arranged for further handlings.

The cylindrical walls may have a diameter of about 80 cm.

At the position where the accumulation of the material is formed in the cylindrical wall, a gripper may be provided able to make the filled wall slide as far as to transfer it on a truck and able also to withdraw from said truck an empty cylindrical wall; the walls sliding on said slide surfaces. The truck

is movable under the press, and its bottom, on which the cylindrical wall has slid, is open to allow for the passage of the active member of the press, for the lifting and compression of the material against an upper plate and along the cylindrical wall.

The bottom as well as the upper plate are raisable above the cylindrical wall in the pressing position, rotatable around the assembly axis, and able to co-operate with a binder.

The binder is able to cooperate with a C-shaped guide and is operated many times after subsequent angular shifts of the bottom and of the upper and lower plates of the press brought close to each other, in order to bind many times the compressed material. Practically, the means for transferring the pressed material include a first trasverse withdrawing means with radial needles, able to laterally shift the pressed material by withdrawing it out of the press plates being slightly loosened after the binding.

The binding means may further include a second transfer means with an expansible gripper which is made to penetrate the central hole of the mass of the material being coiled and pressed, in order to support the pressed material and lay it down on several piles in a truck intended to a further pressing system.

The invention will be better understood by a the reading of the following description and the accompanying drawing which shows a practical non limitative exemplification of the invention itself. In the drawing:

Fig. 1 shows a diagram of the automatic apparatus in a plan view;

Fig. 2 shows a view of an enlarged detail of Fig. 1; and

Fig. 3 shows a view and a scrap cross section from line III-III of Fig. 2.

According to what is illustrated in the accompanying drawing, numeral 1 indicates a plurality of groups for the production of tops, that is, of fibre tapes, which are to be heaped up in cylindrical containers. The various groups 1 (so-called "intersecting"), according to the diagram of Fig. 1, are served by a single press 3 for their loading in trucks 5, which are intended for the delivery to other handlings like to a further pressing of the material which has been bound and loaded on said trucks 5.

According to the invention, it is first provided to prepare the containers with cylindrical walls 9 which, during the loading, that is, during the filling up, are located in a position 9A opposite to the respect

ive production group. The diameter of the walls 9 which make up the containers is of about 80 cm; moreover, the walls 9 are lacking in bottom and are intended for sliding on flat surfaces during the transfers in order to safely contain the heaped material. On each wall 9 a bottom 20, resting on an inner edge 11 of the wall, is free to slide.

For the container transfer a track 10 is provided which, according to the drawing, develops along the front part of the aligned groups 1 and permits the slide of trucks 12, in number of two in the drawing, to serve the groups 1 which are on opposite sides relative to press 3 located in an intermediate position along said track 10. Each truck 12 has two seats 14 and 16 to receive an empty wall 9 to be transferred to a position 9A and/or to receive a filled container having wall 9; said seats 14 and 16 are defined in the lower part by brackets 18 for supporting the walls 9 with relative plane 20. As already stated, at the bottom of wall 9 a discoid plate 20 is provided which, in the position 9A, is raisable by a mobile member 22 of a cylinder-piston system 24 set up beneath the position 9A of the cylindrical walls 9, in front of each group 1. At the same level of the surface which bears the wall 9 in the position 9A, slide surfaces 26 are provided

which develop up to be flushed with brackets 18 of the truck seats 14 and 16, said seats being laterally open at the side of groups 1.

In correspondence of each group 1 a gripper 30 is provided which can be controlled by a cylinder-piston system 32 in order to shift a container wall 9 at right angle with the tracks 10 between the loading position 9A and the positions defined by the seats 14 and 16 of the truck 12. Thus, the gripper 30, which has a fork-like portion extending with two short mobile jaws 30A, is able to move a wall 9 according to the direction of arrow f1 for transferring it from the position 9A into the seat 16, and is able to transfer - in the opposite direction of arrow f1 - an empty wall 9 from the seat 14 into the position 9A. The transfer to and from the truck may occur according to a suitable trucks-shifting program in order to bring first an empty seat into allignment with the fork 30 for receiving a loaded container and then to bring the seat of the truck holding an empty wall 9 into allignment with the fork (temporaneously and partially retracted), said empty wall 9 being picked up by the fork 30 to be transferred into position 9A. In each case the transfers take place along smooth slide surfaces.

The truck or the two or several trucks 12 are

moved along the track 10 by a program, or manually as well, or by hand-control, to ensure in time the replacement of a full container wall 9 with an empty one in each position 9A in front of groups 1, and to place in time a wall 9 in position 9B under the press 3 for the preliminary pressing and the binding.

The press, generically indicated by 3 has a frame-like housing 31 and a lower cylinder-piston system 33 on the mobile equipment of which a motor reducer 35 is located able to rotate the member 36 which contacts the plate 20 for the lifting within and along the wall of container 9 in the position 9B. In the upper part of the portal-like frame 31 a second cylinder-piston system 37 with a motor reducer 38 is provided for the upper plate 39 of the press. By this arrangement it is possible to press the material contained inside the wall 9 in the position 9B; this is obtained by determining the lowering of plate 39 down to the upper edge of wall 9 and by determining, through the system 33, the lifting of plate 36 to compress the material inside the wall 9. Once the material has been pressed, the two cylinder-piston systems 33 and 37 are driven for the lifting of components 36 and 39 up to the position indicated by 36B, 39B above the wall 9, and with the pressed material which is to be bound up.

On one of the posts of the frame 31 a binder 41 is placed of a type per se known, able to carry out a binding of the material which is comprised between the two plates which have been raised as indicated, to the positions 36B and 39B. For the binding, a series of channels is provided in the plate 20 and in the disk 39 an U-shaped guide 43 is also provided for the filiform element utilized by the binder 41, which element is relatively solid being possibly made up, for example, of a thread of synthetic resin. As it can be seen in particular in Fig. 2, the binder 41 and its relative mobile guide 43 are disposed to effect bindings which are not diametrical; in particular, the bindings are each carried out according to a secant; several subsequent bindings are carried out and, between one binding and the other, the two motor reducers 35 and 38 are driven in order to orientate, each time in a different way, the mass of material pressed and to be bound; the bindings may be carried out so as to have, in the bottom surfaces, a six points star arrangement as indicated in Fig. 2. In any case, the two bindings are carried out by exploiting suitable channels in the plates 20 and 39 and the guide 43, and with timely and simultaneous rotations performed by the motor reducers 35 and 38.

After a charge of textile fibre material has been compressed, raised and bound, the two compression and lifting plates are slightly moved apart to allow for the lateral withdrawing of the pressed and bound material. To this aim, a withdrawing means 45 is provided being developed as an arched wall carried by an equipment articulated in 47 to the frame 31 according to a vertical axis; along the arched wall of the withdrawing means 45 needles 49 are provided, controlled by cylinder-piston systems in order to be protruded and retracted and having a substantially radial trend. When the pressed and bound material must be picked up, the withdrawing means 45 is rotated to partially embrace the pressed and bound material, the needles 49 being retracted; the needles 49 are then radially pushed in centripetal direction to penetrate the material mass and thus to support it for the transfer up to a position remote from the press, in which position the withdrawing means 45 is shown in Fig. 2. From this position the pressed material may be picked up to be delivered to the trucks 5. At this point, the plate 39 is kept raised while the system 33 lowers the element 36 and then the plate 20 once again to the level of truck 12 which can thus dispose of an empty wall 9 to be transferred up to the position 9A

as indicated above.

In order to transfer a mass of pressed and bound material from the transferring means 45 moved away from the press up to the trucks 5, an arm 50 may be provided which is articulated in 52 to a bracket of the press frame 31, said arm being advantageously extensible. The arm 50 bears a cylinder-piston system 54 to vertically handle an expansion gripper 56. This gripper is able to engage the mass of the bound material, which mass typically has in the centre a substantially vertical-hole like recess into which the gripper 56 may be made to penetrate from up downwards when the transfer means 45 is located in the position remote from the press. The arm 50 is rotated in order to align the gripper 56 with the hole, then the gripper is lowered and expanded to engage the mass of the bound material. After that, the needles 49 are made to retract, that is, to defilade, the gripper 56 is slightly raised and the arm 50 is then moved towards the trucks 5, where the system 54 can lower the gripper 56 until it lays down the masses of bound material, to form, on the trucks 5, piles of these masses of bound textile material so-called "bumps"; these bumps are loaded on the trucks 5 and arranged in piles as indicated in B. It can be seen in the drawing that the arm 50 - owing to its

rotation around the articulation 52 and its extension - is capable of loading bumps, for example, on two trucks in two piles for each truck 5. The trucks 5 may be then delivered to other systems for the handling of the textile material and also, in particular, to a press for a further simultaneous pressing of one, two or more piles of bumps.

The apparatus permits a high rate of production, that is, of material handling, both for the automation and mechanization obtained in the described way, and because it is possible - by virtue of this automation and this mechanization - to utilize containers, that is, walls 9 of considerable capacity and in particular of considerable diameter and considerable weight of the unit charge which may be contained in each container made up of wall 9.

It should be unterstood that the drawing shows an exemplification given only as a practical demonstration of the invention, as same invention may vary in the forms and dispositions without, nevertheless, coming out from the ambit of the idea on which the invention is based.

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CLAIMS

1. An automatic apparatus for forming, pressing and handling packs (bumps) of tapes of coil-like arranged combed or top fibres, characterized by the fact that it comprises: containers defined by cylindrical walls, with raisable bottom plane; means for sliding the containers on smooth slide surfaces up to a transfer truck; means for bringing said truck under a press which acts onto said bottom to perform the pressing of the material and its subsequent lifting from the cylindrical portion; means for binding the material being kept in pressed arrangement, and means for transferring the bound material up to a container having a plurality of seats, which is arranged for further handlings.

2. An apparatus according to claim 1, characterized by the fact that the cylindrical walls have a diameter of about 80 cm.

3. An apparatus according to claims 1 and 2, characterized by the fact that it comprises, in the position where the accumulation of the material occurs in the cylindrical wall, a gripper able to make the sliding of the filled wall on a truck and the withdrawing of an empty cylindrical wall from the truck; the walls sliding on said slide surfaces.

4. An apparatus according to the preceding claims, characterized by the fact that the truck is movable under the press, and its bottom, on which the cylindrical wall has slid, is open to allow for the passage of the active member of the press, for the lifting and compression of the material against an upper plate and along the cylindrical wall.

5. An apparatus according to the preceding claims, characterized by the fact that the bottom and the upper plate of the press are raisable above the cylindrical wall in the pressing position, rotatable around the assembly axis, and able to cooperate with a binder.

6. An apparatus according to the preceding claims, characterized by the fact that the binder is able to cooperate with a C-shaped guide, and is operated many times after subsequent angular shifts of the bottom and of the upper and lower plates of the press brought close to each other in order to bind many times the compressed material.

7. An apparatus according to the preceding claims, characterized by the fact that the means for transferring the pressed material include a first trasverse withdrawing means with radial needles which is able to laterally move the pressed material by withdrawing it out from the press plates being slightly loosened

after the binding.

8. An apparatus according to the preceding claims, characterized by the fact that the binding means comprise a second transfer means with expansible gripper which is made to penetrate the central hole of the mass of the coiled and pressed material in order to support the pressed material and lay it down on a plurality of piles in a truck intended for a further pressing system.

9. An automatic apparatus for handling and binding packs (bumps) of textile fibre tapes; all as above described and illustrated for exemplification in the accompanying drawing.

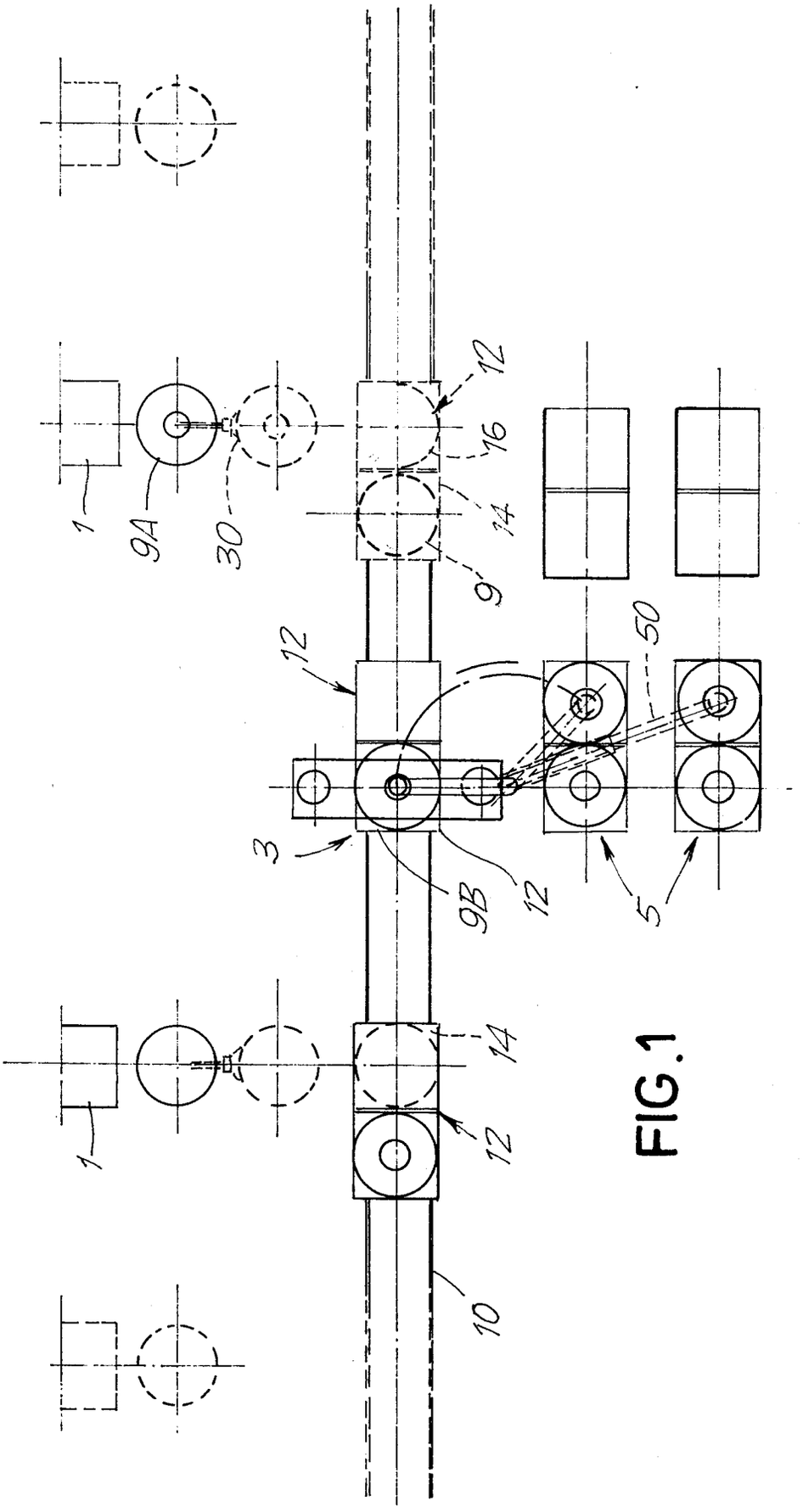

FIG.1

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FIG. 2

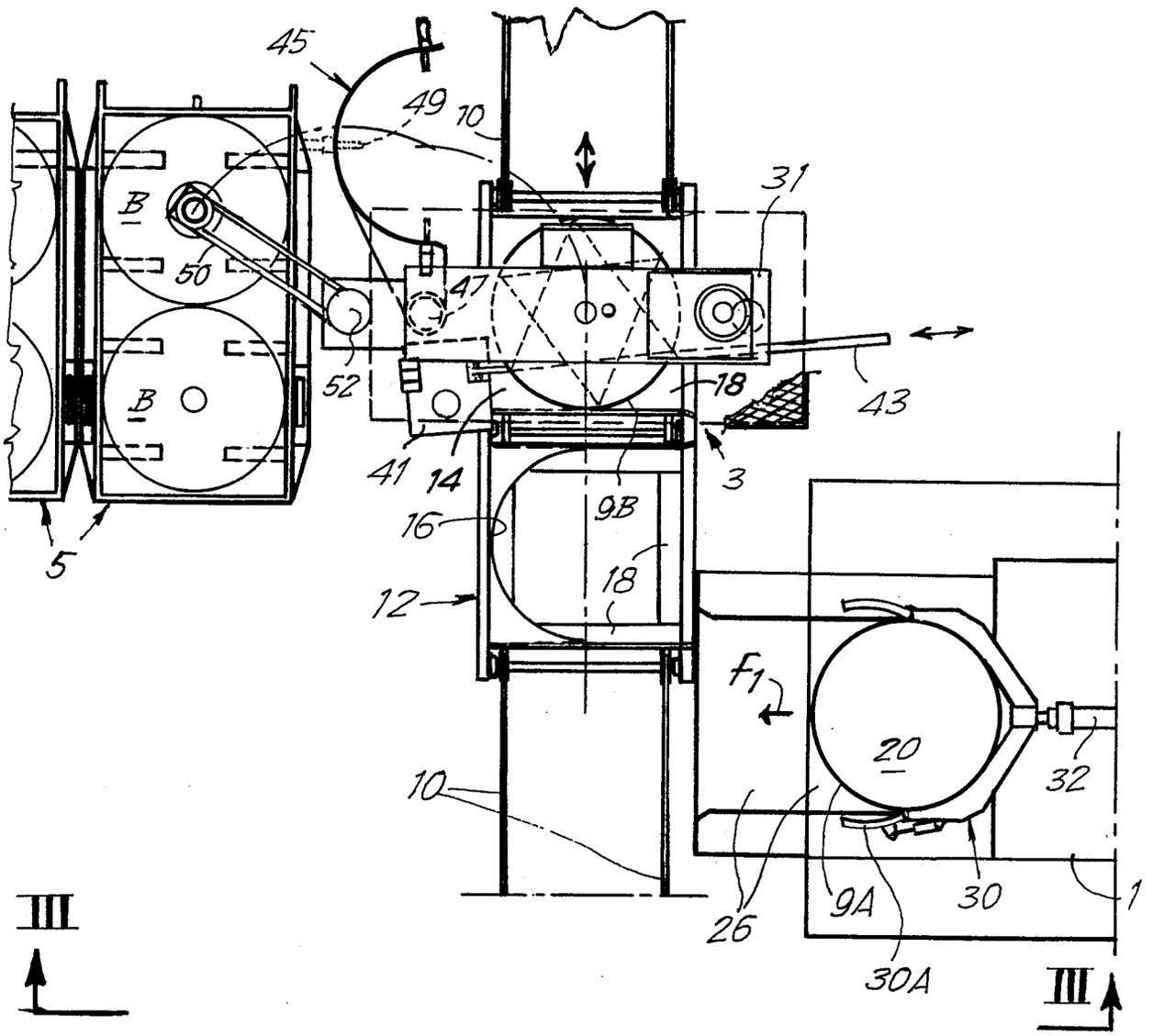

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FIG.3