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(54) **Machine for the treatment of several ropes of textile fabric**

(57) A machine (1) for the simultaneous treatment of several ropes (2) of fabric, in particular for the fulling and/or washing of fabrics, including a treatment chamber (4) and drive means (5) for maintaining each rope (2) of fabric in motion along a respective loop path within the treatment chamber (4): the drive means (5) including, for each rope (2) of fabric, a pair of drive cylinders 6 for the rope itself, a plurality of the said pairs of drive cylinders (6) being driven by a single motor (3); the ma-

chine (1) further includes displacement means (10) operable independently on each pair of drive cylinders (6) to bring the drive cylinders (6) of each pair selectively to assume a first operating position in which the drive cylinders (6) are close to one another to be able to drive the respective rope (2) of fabric, and a second operating position in which the drive cylinders (6) are spaced from one another and no longer able to drive the rope (2) of fabric.

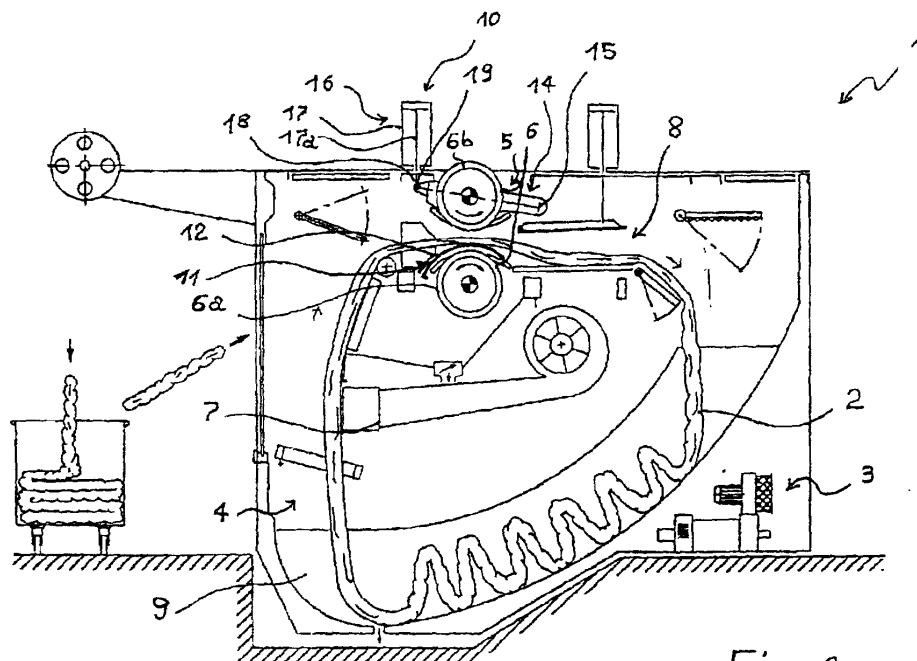


Fig. 2

Description

[0001] The present invention relates to a multiple machine for the treatment of ropes of textile fabric.

[0002] It is known that the various industrial treatments to which numerous types of textile fabrics (for example wool) are subjected, include process of washing and fulling: in particular, it is known to effect such treatments in machines for the treatment of ropes of textile fabric in which the fabric, in the form of a rope, is maintained in a loop driven by drive cylinders: along the path of the fabric there are normally provided devices for delivering suitable treatment fluids, for example mixtures of washing water with various additives, which collect in treatment vessels positioned beneath the machine itself and into which the fabric is cyclicly immersed; these machines also make it possible to subject the fabric to fulling/beating thanks to the presence of the so-called "fulling box" the principle of operation of which is well known in the field.

[0003] Machines of this type also make it possible, at the end of the fulling process, once the delivery of treatment fluid has been stopped and the associated collection vessels emptied, to dry the treated fabric.

[0004] For the purpose of optimising the productive process the use of "single" machines comprising in substance a single vessel for the treatment of a single rope of fabric, has moved on to "multiple" machines which present the possibility of simultaneously washing two or more ropes of fabric. Currently available multiple machines for the treatment of ropes of fabric are constituted by two or more drive units for respective ropes, driven by a single rigid drive shaft. With this type of multiple machine, which allows the simultaneous washing of several ropes of fabric, the problem arises that, when the fabric of one rope reaches the predetermined working percentage in length and/or width before the others due to differences in characteristics of the threads or length of the rope, such fabric must be removed from the machine and moved onto the subsequent working phases, which would involve the interruption of the working of the other fabrics as well, which instead need further treatment time in the machine. In conclusion, with this type of machine it is difficult to obtain uniformity of results in the various simultaneously treated fabrics.

[0005] One solution to this problem is described in European Patent EP 414 650 in which, in the same multiple machine for the treatment of ropes of fabric, each drive unit for each treated rope is driven by an independent motor: in this way it is possible to interrupt the working of each rope of fabric by stopping the corresponding motor, whilst the other ropes of fabric continue the normal working process.

[0006] This type of multiple machine for the treatment of ropes of fabric can be very complex and very expensive for its operation and maintenance.

[0007] The object of the present invention is that of providing a multiple machine for the treatment of ropes

of fabric driven by a single motor capable of treating several ropes of fabric which require different working times.

[0008] Acropeing to the invention there is therefore provided a machine for the simultaneous treatment of several ropes of fabric, in particular for fulling and/or washing of fabrics, comprising a treatment chamber and drive means for maintaining the said ropes of fabric in movement along respective loop paths within the said treatment chamber, the said drive means in turn comprising a pair of drive cylinders for each of the said ropes of fabric, a plurality of the said pairs of drive cylinders being driven by a single motor; characterised in that it further includes displacement means operable to work independently on each said pair of drive cylinders and operable to carry the drive cylinders of each pair selectively to a first operating position, in which the said drive cylinders are close to one another to be able to drive the respective rope of fabric, and to a second operative position in which the said drive cylinders are spaced from one another and no longer able to drive the said rope of fabric.

[0009] The machine further includes support means operable to support each of the said ropes of fabric when the respective drive cylinder are in their second operating position, in such a way that the said ropes are not in contact with the said drive cylinders.

[0010] The support means work in the space which is created between the drive cylinders when these assume their second operating position.

[0011] In this way a machine is obtained for treatment of ropes of fabric, in particular for fulling and/or washing of the said fabric, capable of treating several ropes of fabric simultaneously, working each rope for the time necessary without requiring interruption of working of the other ropes, whilst being driven by a single motor: it is clear that the use of a single motor simplifies the construction of the machine and its maintenance and therefore reduces the costs of production and use.

[0012] Further characteristics and advantages of the present invention will become clearly apparent from the following description of a non-limitative embodiment thereof, given with reference to the attached drawings, in which:

Figure 1 is a side view, in longitudinal section, of a machine for the treatment of ropes of fabric acropeing to the present invention, which shows a pair of drive cylinders in their first operating position;

Figure 2 is the same view as Figure 1 but shows the drive cylinders in their second operating position; and

Figure 3 is a transverse section of the machine acropeing to the invention in which two pairs of drive cylinders are in the first operating position and another two pairs of cylinders are in the second operating position.

[0013] With reference to the drawings, the reference numeral 1 generally indicates a machine for simultaneously treating several ropes 2 of fabric, in particular for fulling and/or washing the fabrics, driven by a single motor 3 and comprising: a treatment chamber 4, drive means 5 for maintaining the ropes 2 in motion along respective loop paths within the treatment chamber 4 and including in turn a pair of drive cylinders 6 for each rope 2 of fabric, for example having parallel axes and being superimposed vertically, conveyor means 7 for conveying a treatment fluid to the said rope 2 of fabric, disposed upstream of the pair of drive cylinders 6 with respect to the direction of circulation of the rope 2, a beating/fulling system 8 positioned downstream of the pair of drive cylinders 6 again with respect to the direction of circulation of the fabric ropes 2, a treatment vessel 9 which may or may not be subdivided into sections or passages (for example for each rope 2 of fabric) depending on the requirements of the fabrics to be treated.

[0014] Acropeing to the invention the machine 1 further includes displacement means 10 acting independently on each pair of drive cylinders 6 in order selectively to bring the respective drive cylinders 6 to a first operating position (illustrated in Figure 1) in which the drive cylinders 6 are brought together and drive the respective rope 2 of fabric, and to a second operating position (illustrated in Figure 2) in which the drive cylinder 6 are on the other hand spaced from one another and no longer able to drive the rope 2 of fabric. To prevent the rope 2 of fabric from falling under gravity onto a lower cylinder 6a of the pair when the associated drive cylinder 6 assume their second, spaced, operating position, and therefore being driven by it, the machine 1 further includes support means 11 operable to support each rope 2 of fabric in such a way that this is not in contact with the lower cylinder 6a.

[0015] In the preferred embodiment illustrated in the drawings, the displacement means 10 act on an upper drive cylinder 6b of the pair of drive cylinders 6, whilst the lower cylinder 6a is mounted directly on a drive shaft 13 of the single motor 3 provided for all pairs of drive cylinders 6. The upper, driven cylinder 6b is freely rotatably carried by a respective rocker arm 14 having a first end 15 pivoted to a support structure of the machine 1; the displacement means 10 further include actuator means 16 for turning the rocker arm 14 about its pivoted end 15.

[0016] The actuator means 16 in turn comprise an actuator cylinder 17, for example a hydraulic or pneumatic actuator disposed outside the treatment chamber 4: a rod 17a of the actuator cylinder 17 passes through one wall of the treatment chamber 4 and has an end 18 within this latter: the end 18 of the rod is pivotally attached to a second end 19 of the rocker arm 14, opposite the first, pivoted end 15 thereof.

[0017] The machine 1 further includes, for each pair of drive cylinders 6, transmission means 20 between the driven lower cylinder 6a (for example, as illustrated in

Figure 3, mounted directly on the drive shaft 13) and the corresponding upper driven cylinder 6b: preferably, as schematically illustrated in Figure 3, the transmission means 20 are belt transmission means and comprise, for each pair of drive cylinders 6, at least one pulley 21 fitted on the drive shaft 13 and connected by means of a respective belt 22 to a return pulley 23 disposed in correspondence with the centre of rotation of the rocker arm 14: the return pulley 23, in turn, transmits the drive, for example via another belt not illustrated, to the upper drive cylinder 6b: in this way the distances between the centres of rotation of the rotating members (drive cylinders 6 and pulleys 21 and 23) are maintained constant even when the relative positions of the drive cylinders 6 are changed by the effect of the displacement means 10.

[0018] It is clear that the same result can be obtained in any other known way, for example by means of a tensioning system (known and not illustrated for simplicity) fitted between a pulley carried directly on the drive shaft and a pulley mounted for rotation with the upper drive cylinder 6b.

[0019] In the specific example illustrated in Figure 3, moreover, two pairs of transmission pulleys are utilised and therefore two belts for each pair of drive cylinders 6.

[0020] As schematically illustrated in Figures 2 and 3, the support means 11 operate in the space which is created between the drive cylinders 6 of each pair when these assume, by the action of the displacement means 10, their second, spaced, operating position: in particular, the support means 11 comprise, for each pair of drive cylinders 6, a movable screen 12 which can be inserted between the lower drive cylinder 6a and the associated rope 2 of fabric in order to maintain this latter separated from this lower drive cylinder 6a. The movable screen 12 has a curvilinear profile in the shape of an arc of a circle and is disposed substantially coaxially and concentric with the lower drive cylinder 6a at a predetermined distance from it: the movable screen 12 is rotatable about a centre of rotation coincident with the centre of the arc which its shape defines: in the specific example, therefore, the movable screen 12 is rotatable about an axis of rotation which is the same axis of rotation as the lower drive cylinder 6a (and therefore of the drive shaft 13).

[0021] The movement of the movable screen 12 in the manner described can be effected in any known manner and is therefore not described in detail for simplicity.

[0022] The operation of the machine 1 the subject of the invention is as follows.

[0023] Supposing that the machine 1 the subject of the present invention is washing several ropes 2 of fabric and one of these reaches the predetermined working percentage in length and/or width before the others due to differences in characteristics of the yarn or length of the rope itself; at this point the displacement means 10 are actuated in relation to the drive cylinders 6 of the rope of fabric which has finished working and must be

removed from the machine 1.

[0024] Actuation of the displacement means 10 causes raising of the rod 17a of the actuator cylinder 17, which causes the rocker arm 14 to turn about its first, pivoted, end 15: consequently, the upper, drive cylinder 6b, carried by the rocker arm 14, rises separating from the lower drive cylinder 6a.

[0025] Once the upper, driven cylinder 6b has been raised, the movable screen 12 turns (driven by its own independent actuator means or connected mechanically to the actuator means 16 which moves the actuator cylinder 17) bringing it between the two drive cylinders 6 and is interposed between the rope 2 of fabric and the lower cylinder 6a: the rope 2 of fabric therefore remains completely released from both the drive cylinders 6 which, therefore, no longer transmit drive. At this point it is possible to cut the rope 2 of fabric by now stationary, whilst the other ropes which need more time continue with their working process.

[0026] Finally, it is clear that the machine for simultaneous treatment of several ropes of fabric described here can have modifications and variations introduced thereto which do not depart from the ambit of the claims.

[0027] For example, it is possible that the displacement means may act not on the driven cylinder but on the cylinder connected to the motor, whilst it is possible that the support means may not be present or that they come into contact with the rope of fabric not between the two cylinders but alongside them.

[0028] A possible variant of the machine described above could be represented by a machine which has two motors, each of which drives a plurality of drive cylinders.

Claims

1. A machine (1) for simultaneously treating several ropes (2) of fabric, in particular for fulling and/or washing the fabrics, comprising a treatment chamber (4) and drive means (5) for maintaining the said ropes (2) of fabric in motion along respective loop paths within the said treatment chamber (4), the said drive means (5) in turn comprising a pair of drive cylinders (6) for each of the said ropes (2) of fabric, a plurality of the said pairs of drive cylinders (6) being driven by a single motor (3); characterised in that it further includes displacement means (10) operable to work independently on each said pair of drive cylinders (6) so as to bring the drive cylinders (6) of each pair selectively to a first operating position in which the said drive cylinders (6) are close together to be able to drive the respective rope (2) of fabric, and to a second operating position in which the drive cylinders (6) are spaced from one another and no longer able to drive the said rope (2) of fabric.

2. A machine acropeing to Claim 1, characterised in that it further includes support means (11) operable to support each of the said ropes (2) of fabric when the respective drive cylinders (6) of the said rope (2) are located in their said second operating position in such a way that the said rope (2) does not come into contact with the said drive cylinders (6).

3. A machine acropeing to Claim 2, characterised in that the said support means (11) operates in the space which is created between the drive cylinders (6) when these assume their said second operating position.

4. A machine acropeing to Claim 3, characterised in that the said support means (11) comprise, for each pair of said drive cylinders (6), a movable screen (12) which can be inserted between first of the said drive cylinders (6a) and the associated rope (2) in order to maintain this latter separated from the said first drive cylinder (6a).

5. A machine acropeing to Claim 4, characterised in that the said movable screen (12) has a curvilinear profile in the shape of an arc of a circle and is disposed substantially coaxially and concentrically with respect to the said first drive cylinder (6a), at a predetermined distance from it.

6. A machine acropeing to any preceding Claim, characterised in that the said displacement means (10) act on an upper driven cylinder (6b) of each of the said pairs of drive cylinders (6).

7. A machine acropeing to Claim 6, characterised in that the said upper driven cylinder (6b) of each pair of drive cylinders (6) is freely rotatably carried by a respective rocker arm (14) having a first end (15) pivoted to a support structure of the machine (1); the said displacement means (10) further including actuator means (16) for turning the said rocker arm (14) with respect to the said pivoted end (15) thereof.

8. A machine acropeing to Claim 7, characterised in that the said actuator means (16) comprise an actuator cylinder (17): a rod (17a) of the said actuator cylinder (17) being pivoted at its end (18) to a second end (19) of the said rocker arm (14) opposite the said first pivoted end (15) thereof.

9. A machine acropeing to any preceding Claim, characterised in that it further includes conveyor means (7) for conveying a treatment fluid to the said rope (2) of fabric, disposed upstream of the said pairs of drive cylinders (6) with respect to the direction of movement of the said rope (2) of fabric.

10. A machine acropeing to any preceding Claim, char-

acterised in that it further includes a beating/fulling system (8) positioned downstream of the pair of drive cylinders (6) with respect to the direction of movement of the said rope (2) of fabric.

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11. A machine acropeing to any preceding Claim, characterised in that it includes a treatment vessel (9) positioned beneath the said treatment chamber (4).

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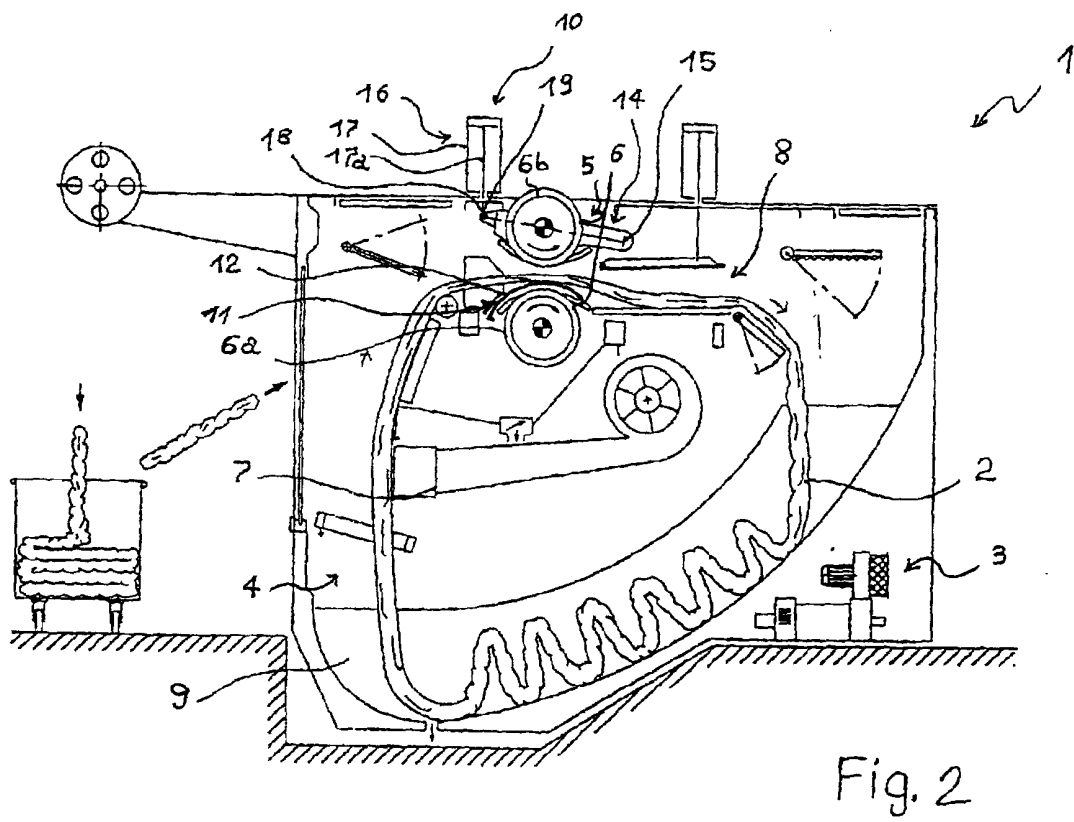
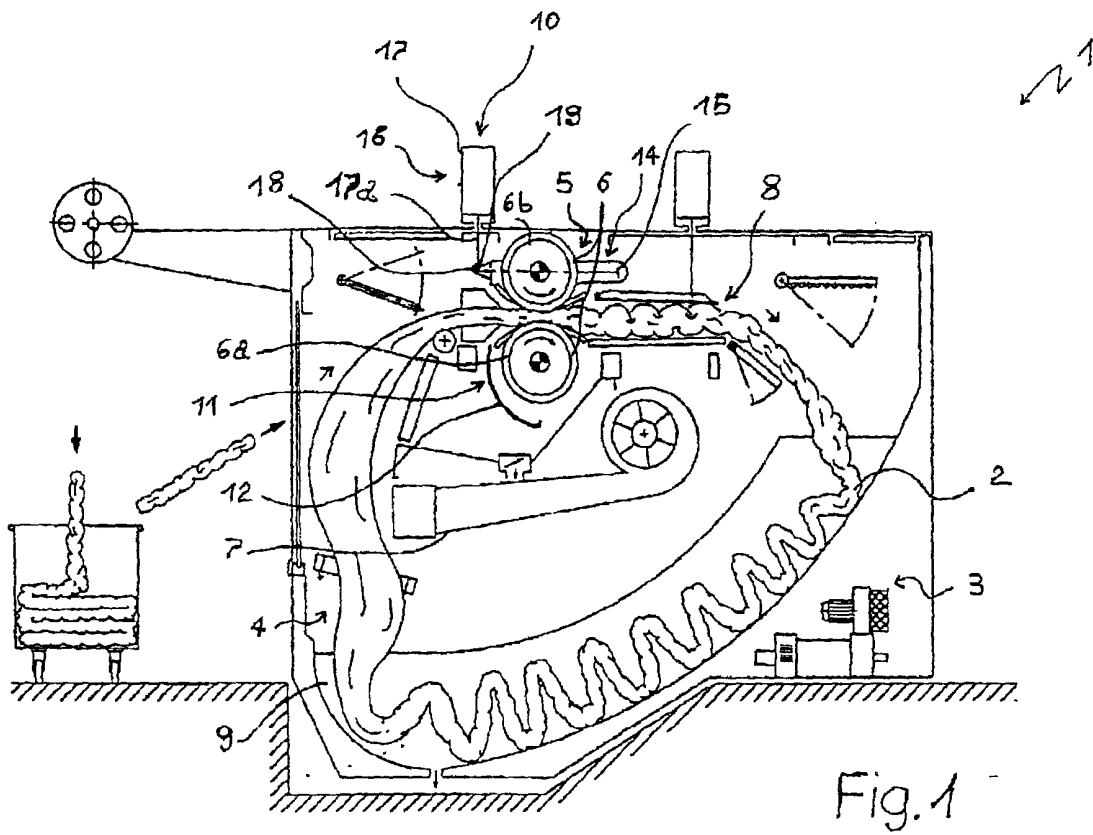
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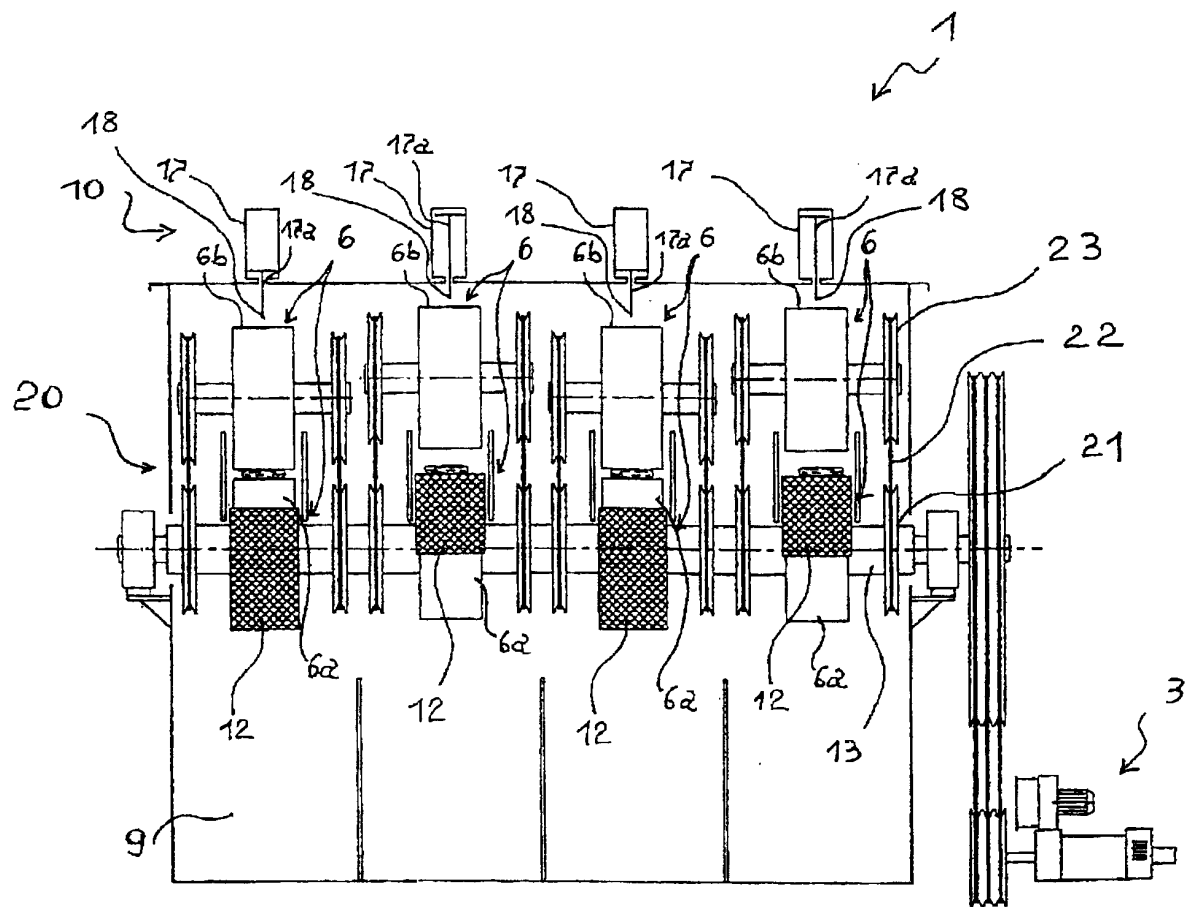


Fig. 3