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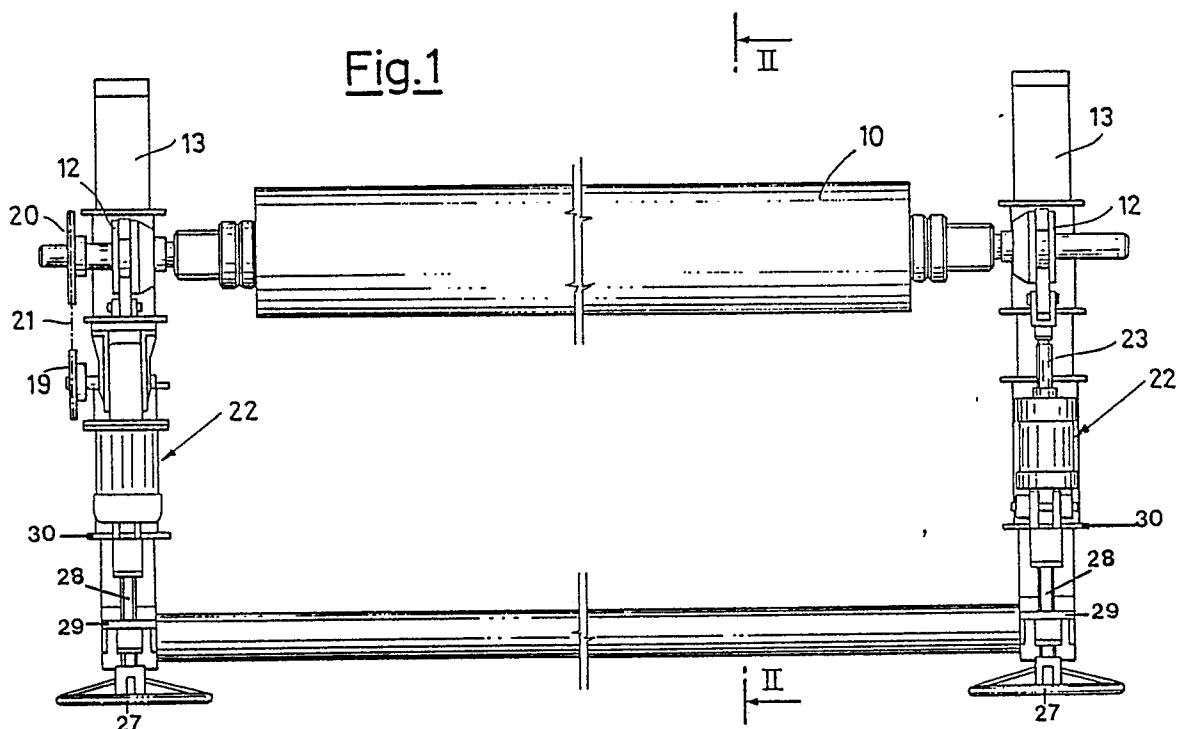
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54 **Device for cleaning drier clothes or felts in paper producing plants.**

57 The backward stroke of the drying cloth or felt is carried across with a pressure contact against a brush, preferably rotating in a opposite direction to that of the felt, to remove, in a continuous way or a prefixed intervals, the residual incrustations transferred from the paper being dried to the drier felt.

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Device for cleaning drier clothes or felts in paper producing plants

The present invention relates to drier clothes or felts in paper producing plants and more specifically to a device for cleaning their surface in a continuous or discontinuous way.

It is known that in paper producing plants, the paper must be dried by passing through drier banks, comprising a plurality of heated metal cylinders. The efficacy of the drying process depends on the adherence between the paper being dried and the heated surface of the cylinder.

For this reasons drier clothes or felts are used (hereinafter indicated only as drier felts) formed by textile bands, preferably manufactured from synthetic fibers, which follow the same path as the paper being dried pressing the paper against the metal surface of the drier cylinders for making the most of their thermal efficiency.

Since the water contained in the paper during the evaporation is only permitted to pass through the drier felt, it is clear that the filter fabric must be perspirable and permeable enough; the latter characteristic is expressed as the ability of dispose of a set quantity of air through a unit surface in the unit time.

Another characteristic of the fabric of the drier felt is that of being smooth and with a small loops weft, because if large loops were used they would be either less efficient to ensure a faultless adherence of the paper to the drier cylinders or could "mark" the final paper.

Finally, from surface of the paper being dried that comes into contact with the fabric of the drier filter, substances are transferred to the fabric which might clog the fabric surface, such as pitch residuals, tars and adhesives and possibly cellulosic fibers.

This transfer is particularly evident when waste pulp paper is used, as the raw material, to produce the paper.

Consequently, the efficiency of the drier filters is affected in a short time, because:

1. The specific evaporation from the paper is reduced
2. The paper drying takes place in an irregular way, especially in the cross direction.
3. The paper sheet may come out marked on the surface.
4. The physical and mechanical characteristics of the produced paper are poor.
5. The total productivity is lower.

Till now, therefore, it has been necessary to restore the drier felt with a periodic treatment. The traditional methods for restoring the drier felts, regularly used in paper mills, are substantially two,

namely;

- chemical treatments with solvents and diluents;
- washings by saturated steam streams or by water at high pressure.

Both these methods require, for their carrying out: a two to three hours plant stop and this stop can be seldom made coincident with the scheduled stops for the routine maintenance.

If account is taken of the fact that the daily output of a medium potentiality plant is of the order of hundreds of tons, the relevant economic cost of these stops for the felt restoring is self-evident.

Major object of the present invention is to solve these problems and disadvantages, as mentioned before, by both ensuring the cleaning of the drier felts according to the requested specifications and eliminating or at least substantially reducing the stopping time of the plant.

This object is achieved by an only mechanical device for cleaning the surface of the drier felts, characterized by comprising a brushing element with stiff bristles kept into contact for a set time with the active surface (i.e. the surface that is in direct contact with the paper being dried) of the drier felt during its backward stroke, that is in the length between the outgoing of the felt from the engagement with the paper being dried and the re-entry of the same in a position such as to press the paper being dried against the drier cylinders.

In the preferred embodiment of the cleaning device according to the invention, said brushing element is formed by a around cross section shape brush having radially extending bristles around the whole periphery of its round section, and means to rotate said brush oppositely to the displacement direction of the felt.

However the direction of the brush rotation could also be the same as the felt displacement direction.

As it will be appreciated from the following detailed description of a preferred embodiment, the device according to the present invention, besides fulfilling the requirement of surface cleaning and drier felt restoring shows equally important advantages of requiring a very short time (about 15 minutes) to carry out and complete the cleaning process, and of being applicable without any need of stopping the overall paper production line, on purpose.

Description of the drawings:

- figure 1 is a side view of the device of the present invention:

- figure 2 is a cross section view along the line II-II of fig. 1.

Referring to the drawings, the device according to the invention comprises a brush 10, having a hub 11 and bristles radially extending from its periphery to forming the brush 10.

The ends of hub are supported by terminal flanges 12, slidably mounted to vertical structural frame elements 13 fixed at their top ends, by plates 4 bolted to the basement of the continuous machine for the paper manufacturing, below the backward stroke of the drier felt 16.

As said before, the invention relates to the cleaning of drier felts which are mounted in an endless configuration both above and below the path of the paper being dried through a bank of drying metal cylinders. Each of these drier felts comprises a working stroke, where it presses the paper against the cylinders, and a backward stroke, so that the device of the present invention, in relation to the felts below the paper path will be arranged as shown in the figures, whereas in relation to the felts above the paper path it will be turned upside down.

In both cases the structural elements 13 will be fixed to the machine basement by the bolted plates 14.

Idle rollers for the drier felt 16 are shown in figure 2 by reference 17. Motor or a gearmotor means 18 to rotate the rotating brush 10, are provided, and the motor or gearmotor 18, through a pair of sprockets 19, 20 and a chain 21, rotates the brush 10 around its longitudinal axis (axis of the hub 11).

For the vertical displacement of the rotating brush 10 between the rest position (when the brush is disengaged from the felt 15), and the working position (as in figure 2) pneumatic cylinder and piston assemblies generally shown by the reference 22 are provided, the stem 23 of this assembly being fixed to said terminal flanges 12.

Since the cylinder and piston assemblies 22 have a restricted and fixed stroke a mechanism is provided to adjust the contact pressure between the brush and the felt and also to compensate the bristle wear of the rotating brush. This mechanism, for each structural element comprises a small manual driving wheel 27 for the rotation of a threaded rod 28, engaged with a bracket 29, having a threaded hole. The base of the cylinder and piston assembly 22 is integral with the end of the threaded rod 28, said base, in turn, being movable along the structural element 13 owing to the engagement between a bracket 30 and a sliding guide 31 formed in the structural element 13.

Referring to the operation of the device according to the invention it is easily understood from figure 2, where it can be seen that the brush 10 is rotated in the direction of the arrow 24, while the drier felt moves in the direction of the arrow 25,

whereby the felt surface that will come into contact, during the working stroke, with the paper being dried, will be completely cleaned and unclogged.

Operating tests have shown that the cleaning process is satisfactorily completed within about fifteen minutes.

As described before, the cleaning operation could be carried out without stopping the paper machine, even if the discontinuous execution thereof does not affect the productivity.

Particularly, the cleaning process can be carried out when the paper being manufactured breaks: this occurs quite often during the standard paper production cycles.

Referring to the embodiment shown in the figures, the removed incrustation fall down over the floor, while in the case of the cleaning of the drier felt above the paper path, they are gathered in trays possibly provided in the paper machine at the end of the felt backward stroke.

Tests have shown that, by the device according to the invention, not only the restoring phase of the felt is greatly reduced, consequently increasing the plant productivity, but also the drier felt life is longer and the felt restoring is better. This latter feature obviously influences the characteristics of the produced paper, such as the cross profile of moisture and the physical-mechanical and qualitative properties (in fact the latter are more constant in the long run).

The invention has been described in relation to a preferred embodiment but it is understood that changes and variations, which are in concept and mechanically equivalent, are possible and foreseeable without falling out of the scope of the invention.

This holds true not only for the monitoring advancement and moving mechanisms of the rotating brush, but also for the brush itself because instead of using a rotating brush it is possible to use a brushing element having a fixed position.

Claims

1. Mechanical device for cleaning the surface of a drier felt of paper machines, characterized by comprising a brushing element formed by bristles which are kept into contact for a set time with the felt surface that is going to come into direct contact with the paper being dried, and means for the displacement of said brushing element between a rest or disengaged position from said felt and a position wherein the bristles are engaged with said felt with a set contact pressure.

2. Mechanical device according to claim 1, characterized in that said brushing element consists of a rotating brush having an axial hub supported at its ends of frame elements by vertically

slidable flanges, motor means to rotate said brush around its axis and cylinder and piston means to displace said brush between said two positions.

3. Mechanical device according to claim 2, characterized in that said motor means is arranged to rotate said brush oppositely to the displacement direction of said drier felt.

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4. Mechanical device according to claim 2, characterized in that said operating cylinder and piston means of said brushing element are mounted by flange means movable along the corresponding frame element manually actuatable by screw means.

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5. Mechanical device according to claim 4, characterized in that said screw means consists of threaded rod engaged with a threaded hole of a flange fixed to the corresponding structural elements, said threaded rod being integral with a small operating driving wheel.

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6. Mechanical device according to claim 1, characterized in that said brushing element is engaged with the backward stroke of said drier felt.

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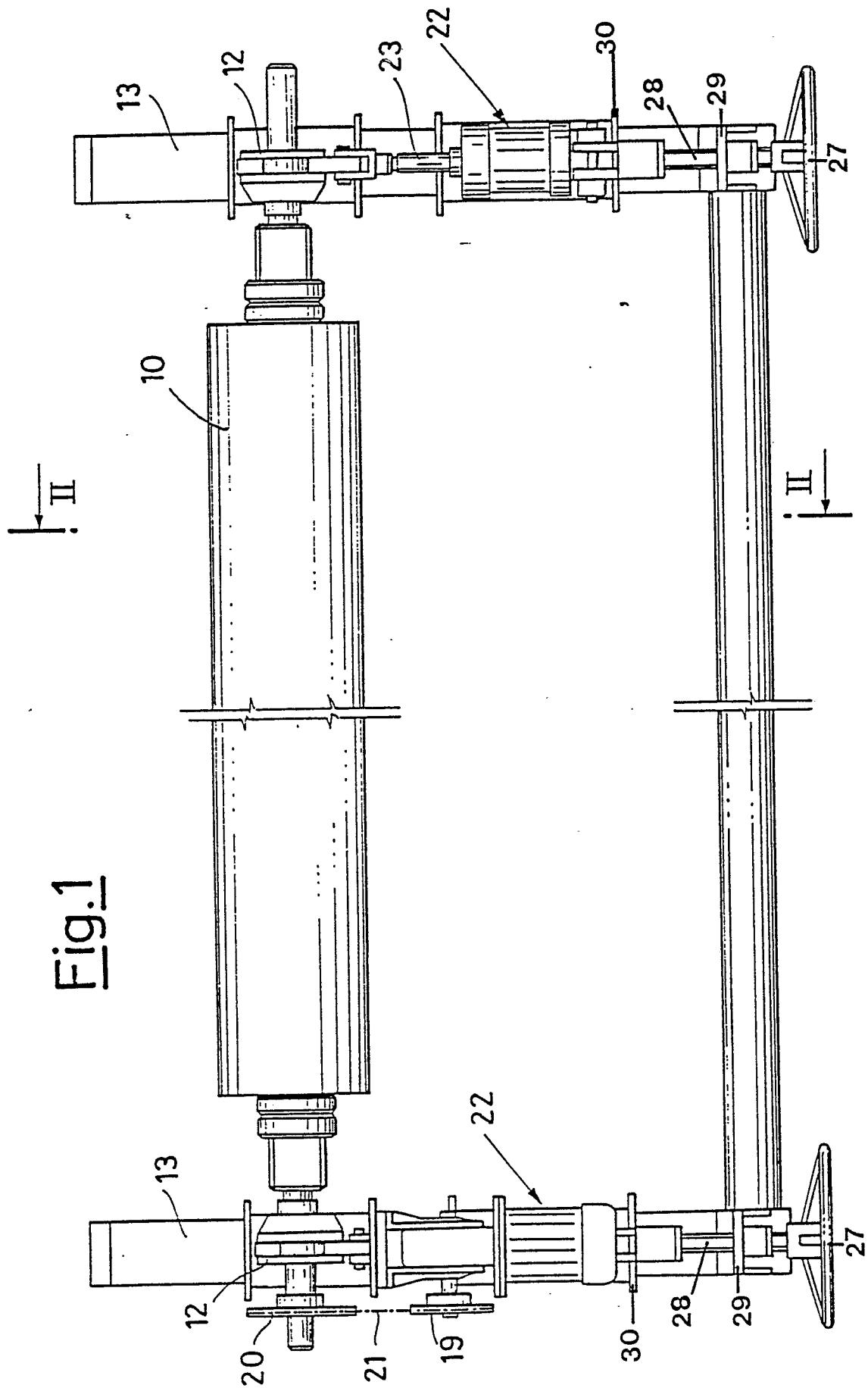
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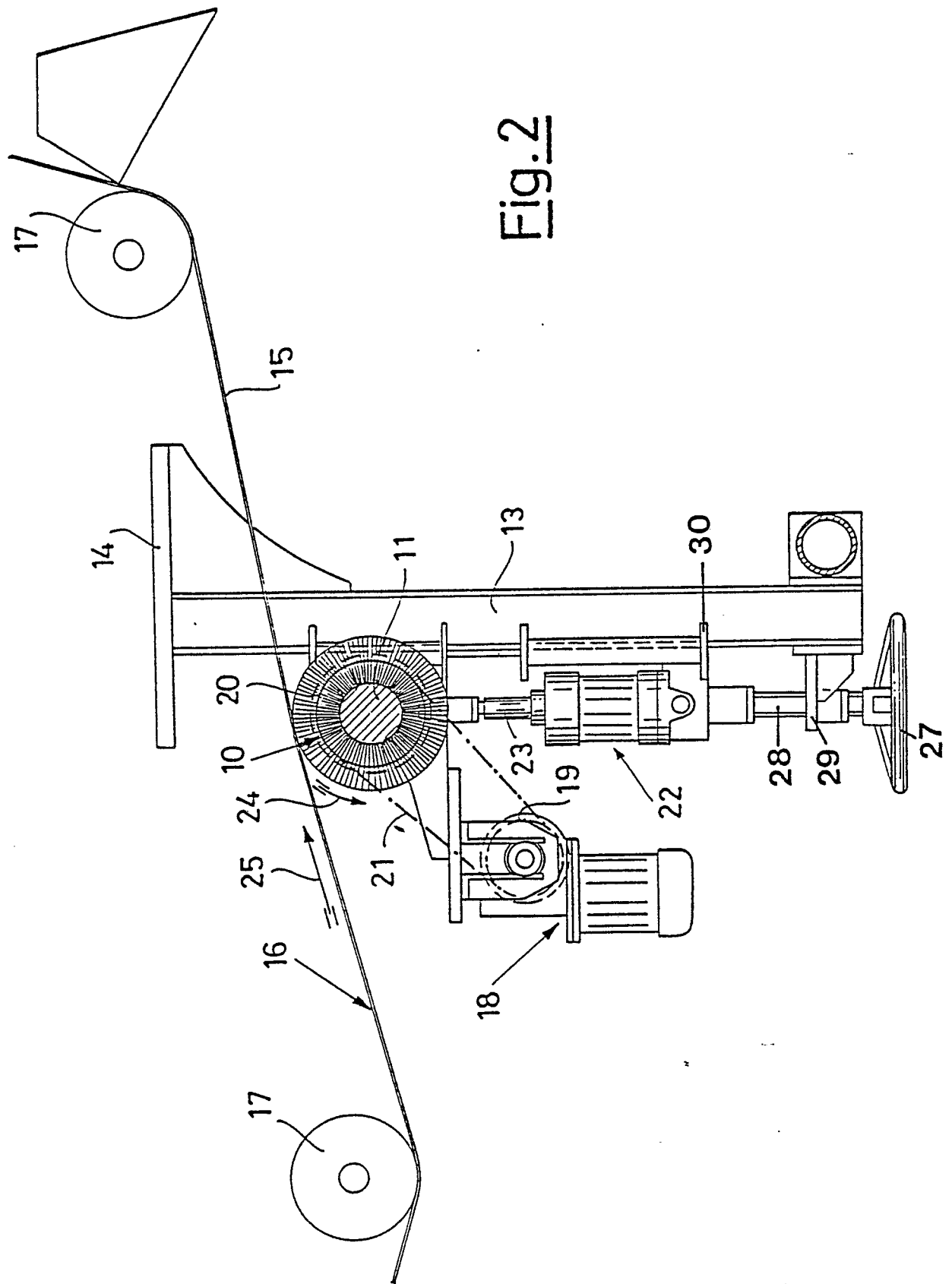


Fig. 2