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(71) Applicant: **Marzoli S.p.A.**
25036 Palazzolo Sull'Oglio, Brescia (IT)

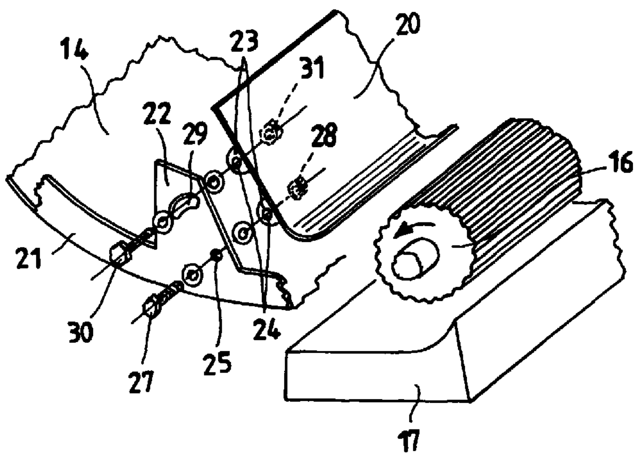
(72) Inventors:
- **Patelli, Silvano**
  25036 Palazzolo sull'oglio (Brescia) (IT)
- **Pasini, Giovanni Battista**
  25036 Palazzolo sull'oglio (Brescia) (IT)

(74) Representative:
Fusina, Gerolamo et al
Ing. Barzanò & Zanardo Milano S.p.A,
Via Borgonuovo, 10
20121 Milano (IT)

(54) **Improved guide means for fibres in the form of a mat supplied to a carder**

(57) Guide means for the flock fibres supplied to a carder, comprising a guide slide for the fibres in the form of a mat, in the passage between the supply roller and the plate, in which the end part of the slide is superimposed by an element to restrain the lap of the mat, which delimits the height available for passage of the mat.

Fig.2A



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Description

[0001] The present invention relates to supply to carders, in which fibrous material in a thin layer is worked by a series of surfaces which are provided with a multiplicity of tips with a variety of shapes, inclinations and rigidities, and are driven by motion relative to one another, by which the fibrous material is opened up into the form of individual fibres, the particles of dirt are eliminated, the fibres are mingled with one another, and a strip of non-twisted fibres is formed, to be conveyed to the subsequent processing stages.

[0002] In its most general outlines, the operation of supply to carders of the cotton-industry type is carried out according to the significant aspects in the diagram illustrated in figure 1. The light-coloured arrows indicate the flow of flock fibres, whereas the dark arrows indicate the flow of conveying and control air.

[0003] The untreated material 1 is obtained in general from an opener, not shown in the figure, and consists of flock fibres. It is conveyed by pneumatic transport in an air current, and is accumulated in the end part 2 of the descending duct 3 for intake of the fibres. The transport air is discharged from the apertures 4; as the fibrous material is deposited in the end part 2, it covers these apertures, and increases the pressure in the duct 3. Monitoring of the pressure value in the upper duct makes it possible to detect the level of filling of the end chamber or part 2. On the basis of this level of filling, there is regulation of the processing, and conveyance of flock fibres from the preceding set of openers. If the carding unit consists of a plurality of carders in parallel, the flow of fibres, conveyed by the opener unit upstream to the carder downstream, is preferably distributed to the carders which have their ducts 3 least filled, and which thus provide a lower load loss for the flow of fibres.

[0004] Downstream from the end part 2, there is disposed the supply cylinder 5, which supplies the flock fibres to the breaker cylinder 6, which breaks up the material. The two cylinders operate with coherent rotation, in order to transfer the material into the duct 7 beneath.

[0005] The air current in order to maintain the pressure in the lower chanter 8 at the end of the duct 7 is supplied by a blower 10, which provides an air flow which is tangential relative to the breaker cylinder 6, and is then discharged from the apertures 11. In the duct 7, there is installed a pressure switch which controls the speed of rotation of the roller 5, such as to regulate the density of the fibres which are contained in the chamber 8, and form the mat supplied to the carder.

[0006] The base of the second descending duct 7 is equivalent to conventional storage of fibres in a silo, in which the density of the fibres is controlled and regulated by pneumatic effect.

[0007] The set of discharge cylinders or lobed rollers 13, which rotate at a controlled speed, in order to regulate the flow of fibres, discharges the fibres onto a slide 14, which supplies the fibres in the form of a mat 15 to the carder. The machine is provided with a supply roller 16, which presses and controls the mat against the supply plate 17, and supplies a strip of mat to the actual carder. The first carding stage is carried out by means of the opener cylinder 18, which is commonly known as the "briseur".

[0008] The transverse dimension of the mat supplied is compatible with that of the processing cylinders of the carder; for carders of the cotton-industry type, this transverse dimension is in general between 0.7 and 1.5 m, depending on the models, and it is essential that this mat is well distributed in terms of thickness and density along its entire width, such that the strip produced by the carder is worked homogeneously in the transverse direction.

[0009] The supply system described hitherto has some problems. Significant amongst these is considerable difficulty in starting up, when a new batch of fibres is started, or after a stoppage for maintenance of the upper accumulation system, or when the continuity of the supply of fibres is interrupted. In these cases, the slide 14 is empty of fibres, and the continuity of the mat 15 must be reconstituted with the new fibres which begin to be released by the lobed rollers 13, which have been re-started, after the ducts and storage units above have been supplied with the fibres of the new batch.

[0010] The new fibres are released into a mat 15 by the two rollers 13, initially at a low linear speed, in general of 0.1 to 0.5m per minute, and flow downwards along the slide 14, with a lap which has an inflated shape which expands upwards. This speed is then gradually increased to the steady-state value, which in general is between 2 and 4m per minute.

[0011] The phenomenon of inflation of the material at the front of the lap is caused by a resilient effect of the fibres, which, after the compression sustained in the gap between the lobed rollers 13, tend to resume their natural preceding state, and to decrease their apparent density, expanding and becoming softer. As a result of the low speed, the lap has time to expand freely until it assumes excessive thicknesses, which does not allow the roller 16 to capture and control the lap correctly: the lap can in fact tend to surmount this roller, at least in its upper part. The phenomenon is further influenced by the fact that when the system is restarted, the pneumatic conditions of the accumulation silos and ducts above are in general adverse, and not at the steady state, with fluctuations of the density of the body of fibres which is released by the rollers 13.

[0012] With the carder in steady-state conditions, when the mat 15 reaches the supply roller 16 without interruption, the fibres downstream restrain and draw the fibres upstream, and the inflation of the mat is more restrained. However, this phenomenon makes it necessary to use supply rollers 16 which are substantially oversized, in order to prevent the rollers from being surmounted by the fibres, owing to the tendency to inflation of the latter, even when the carder is in steady-state conditions. Furthermore, in order to prevent these oversized supply rollers 16 from being surmounted, the latter provide the fibrous material with an extensive surface for gripping the fibres, which does not allow the latter to slide relative to one another under the drawing action of the briseur.

[0013] During the stage of starting the carder, the operation of inserting the front of the lap of new fibres beneath the roller 16 of each carder, in order to re-form the new, continuous, controlled mats 15, requires manual intervention by several operators. Two or more operators must compress and insert the front of the lap of new fibres in the supply gap of the carder intake unit, i.e. between the rotating roller 16 and the plate 17, whereas another operator must control functioning of the supply line, in order to ensure that the correct quantity of fibres reaches each line. This situation gives rise to considerable disadvantages, both owing to potential accidents to the hands of the operators who insert the lap of new fibres into the gripping gap between the roller and the plate, and owing to the high level of workforce allocated. If it is considered that a carding line in general consists of several tens of carders, and that the operation of starting each carder requires a time of approximately 4-8 minutes, these disadvantages are significant.

[0014] The present invention relates more particularly to a system for starting the supply to the opening cylinders or briseur of a carder, which requires reduced use of workforce, prevents accidents, and reduces the dead times for starting up.

[0015] The starting system according to the invention is divided up into a device, the substantial characteristics of which are defined in claim 1, and the preferred embodiments of which are defined in the dependent claims.

[0016] In order to illustrate more clearly the characteristics and advantages of the present invention, it is described with reference to a typical embodiment shown in figures 1 to 4, by way of non-limiting example, in which the following are illustrated schematically:

- figure 1 shows the technical problem of starting the supply of the carder in general;
- figures 2 and 2a show a schematic embodiment of the present invention; and
- figures 3, 3a, 3b and 4, 4a show alternative schematic embodiments of the invention.

[0017] In the embodiment illustrated in figure 2, the end part of the slide 14 for starting conveyance of the fibres in the form of a mat, is superimposed by an element to restrain the lap of the mat, for example a restraint wall 20 which delimits the height available for passage of the mat. By way of example, this wall consists of a flat plate 20, the width of which is equivalent to that of the slide 14, and is shaped in the form of a J in its lower end towards the roller 16. As shown schematically in the detail in perspective 2a, this plate is supported by the structure of the slide 14, and in particular by its vertical flanks 21 which restrain the mat, and end in two trapezoidal uprights 22. On both sides of the wall 20, there are secured several pairs of securing plates or lugs 23, which are provided with through apertures 24. In the uprights 22, there are provided pairs of through apertures, at distances compatible with those of the pairs of apertures 24. In particular, the lower aperture 25 has a circular cross-section for passage of its screw 27 to be screwed onto the nut 28, and secures the position of the end of the J, without interfering with the supply roller 16; on the other hand, the upper apertures 29 are produced in the shape of a curved slot for passage of the screw 30 and securing of the latter to the nut 31. Modification of the securing in the slots 29 permits regulation of the corresponding gradient of the wall 20, relative to the slide 14, for constriction of the mat 15 towards the roller 16, thus preventing the mat from surmounting the said roller.

[0018] In the embodiment illustrated in figure 3, the restraint element which superimposes the end part of the slide 14 consists of a roller 40 with a horizontal axis. By way of example, this roller is produced with a length which is equivalent to the width of the slide 14, is mounted on a shaft 41, and is rendered idle relative to the latter by means of bearings 42. The height of this roller can be adjusted independently from the supply roller, in order to adapt to any thickness of the mat 15.

[0019] As shown schematically in the detail in perspective in figure 3a, the roller is supported similarly to the wall 20, by the structure of the slide 14, and in particular by its vertical walls 21, for restraint of the mat, which end in two trapezoidal uprights 22. In these uprights there are provided two apertures in the form of an elongate slot 43, for regulation of the corresponding distance of the shaft 41 of the roller 40, relative to the slide 14, and constriction of the mat 15, without creating interference with the roller 16. The shaft 41 is secured and locked in the regulation position by known means, for example by threading 44 of its ends, and locking by means of plates, nuts and spacers in the slots 43.

[0020] As an alternative, the roller 40 can also be controlled in rotation. For example, as shown in figure 3b, the roller 40 can be controlled by the supply roller 16, by means of a toothed-belt kinematic mechanism 46. By this means, the fibrous material is provided with action of conveying towards the gripping point.

[0021] According to a further embodiment of the present invention illustrated schematically in figure 4, the restraint element which superimposes the end part of the slide 14 is produced by means of a plurality of rollers 50 with a horizontal axis, which are similar to the roller 40, and are disposed in series, in order to obtain progressive reduction of the height available for passage of the mat. The series of the rollers 50 can thus be regulated both in terms of distance of the individual rollers, and the gradient of their assembly for restraint, relative to the slide 14. As shown schematically in the detail in perspective in figure 4a, in the uprights 22, there are provided two apertures with a vertical slot 51, for regulation of the corresponding distance of the shaft 52 of the rollers 50, relative to the slide 14. The securing system for the shafts can be altogether similar to that shown in figure 3a.

[0022] Similarly to the embodiment previously described, the rollers 50 can also be rotated in order to convey the fibres towards the gripping point.

[0023] The device according to the present invention makes it possible to eliminate the disadvantages described, both during the starting stage, and in normal use. In the stage of starting the carder, the lap of the new mat which descends the slide 14 is progressively constrained by the restraint element, both by means of the wall and rollers, in order to restrict inflation of the mat, and to channel it between the roller 16 and the plate 17. The operators therefore do not need to intervene manually in order to compress the front of the lap of the new fibres beneath the roller 16, with all the associated disadvantages, particularly if many carders must be started up at once.

[0024] As far as the supply roller also is concerned, there is the advantage that it is possible to use supply rollers 16 with a smaller diameter, which are more efficient, less costly, and take up less space, since once the steady-state speed has been reached, it is no longer necessary to provide the mat of fibres with a supply roller of a height such that it cannot be surmounted.

Claims

1. Guide means for the flock fibres supplied to the opener roller (18) of a carder, comprising a slide (14) to guide the fibres in the form of a mat (15), in the passage between the supply roller (16) and the plate (17), characterised in that the end part of the slide (14) to start conveying the fibres in the form of a mat (15) is superimposed by an element to restrict the lap of the mat, which delimits the height available for passage of the mat.

2. Guide means for the flock fibres supplied to the opener roller of a carder according to claim 1, characterised in that the restraint element consists of a wall (20) which is produced by means of a flat plate, the width of which is equivalent to that of a slide (14).

3. Guide means for the flock fibres supplied to the opener roller of a carder according to claim 2, characterised in that the wall (20) is in the shape of a J, in its lower end towards the roller (15).

4. Guide means for the flock fibres supplied to the opener roller of a carder according to claim 1, characterised in that the restraint element consists of an idle roller (40) with a horizontal axis.

5. Guide means for the flock fibres supplied to the opener roller of a carder according to claim 1, characterised in that the restraint element consists of a roller (40) which is rotated and has a horizontal axis.

6. Guide means for the flock fibres supplied to the opener roller of a carder according to claim 1, characterised in that the restraint element consists of a series of idle rollers (50) with a horizontal axis, which are disposed in series, in order to obtain progressive reduction of the height available for passage of the mat.

7. Guide means for the flock fibres supplied to the opener roller of a carder according to claim 1, characterised in that the restraint element consists of a series of rollers (50) which are rotated, have a horizontal axis, and are disposed in series, in order to obtain progressive reduction of the height available for passage of the mat.

8. Guide means for the flock fibres supplied to the opener roller of a carder according to claim 1, characterised in that the restraint element can be adjusted in terms of gradient and/or distance relative to the slide (14), in order to restrain the mat (15) towards the roller (16).

Fig.1

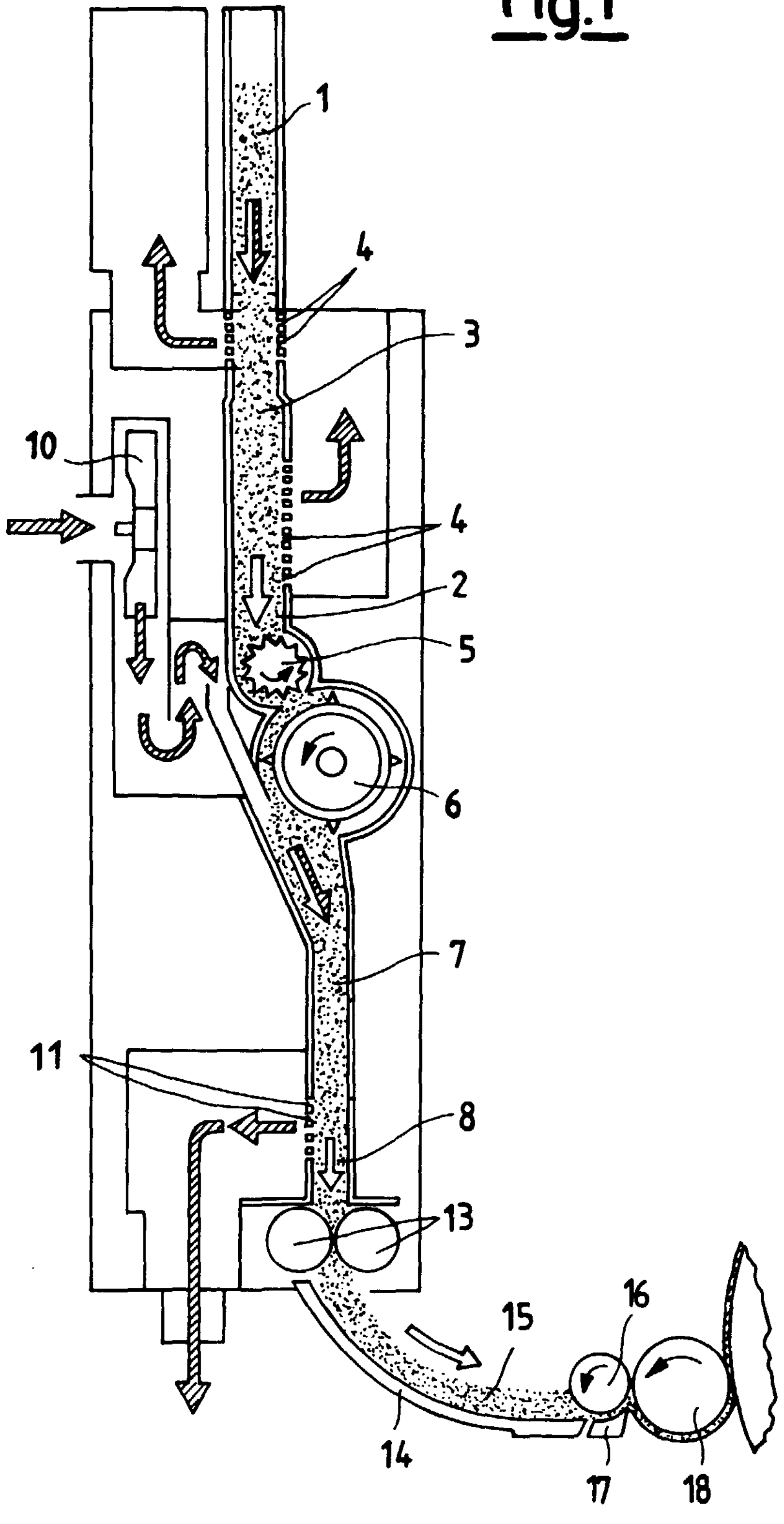

Fig.2

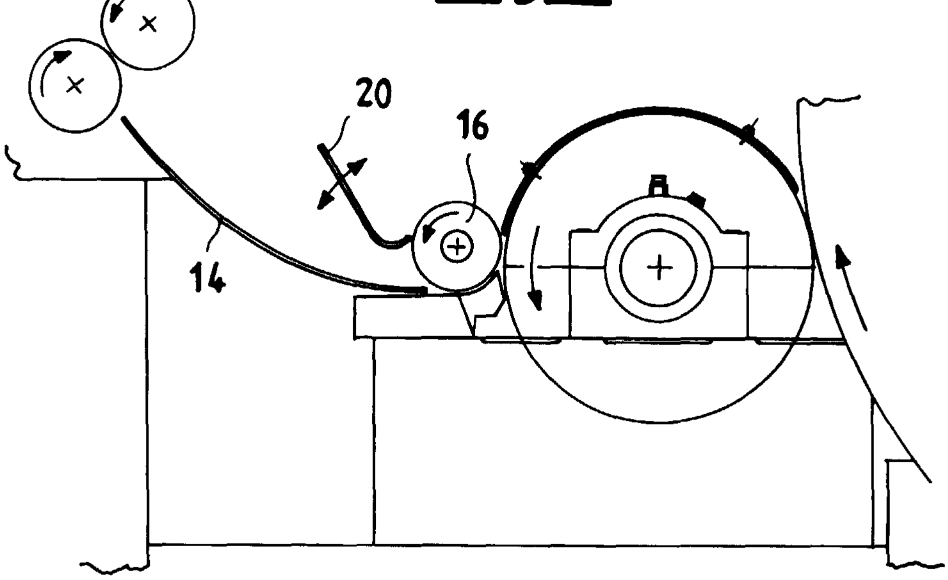

Fig.2A

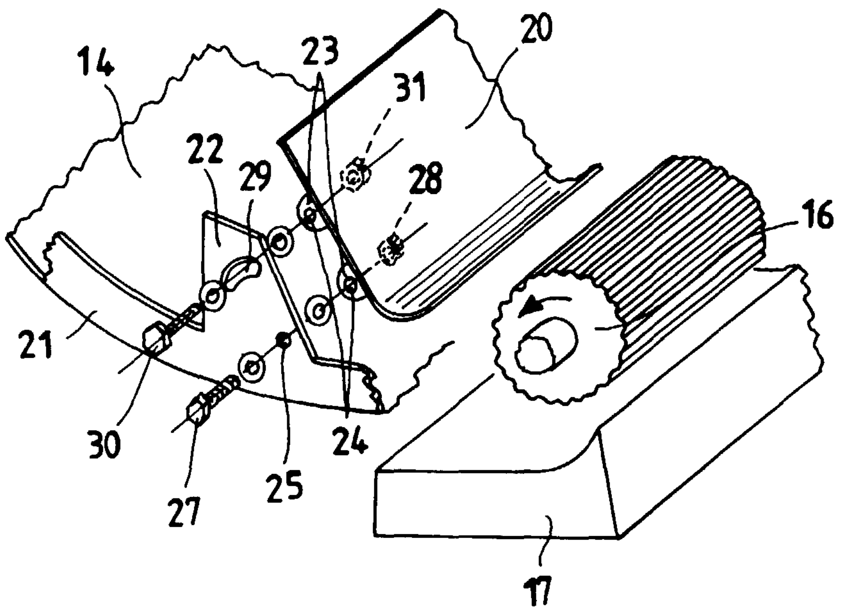

Fig.3

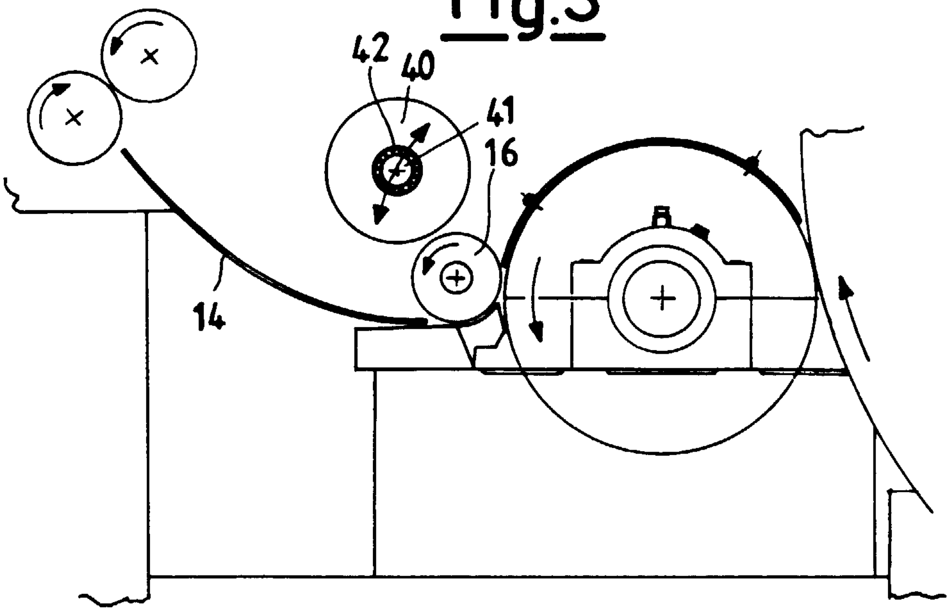

Fig.3A

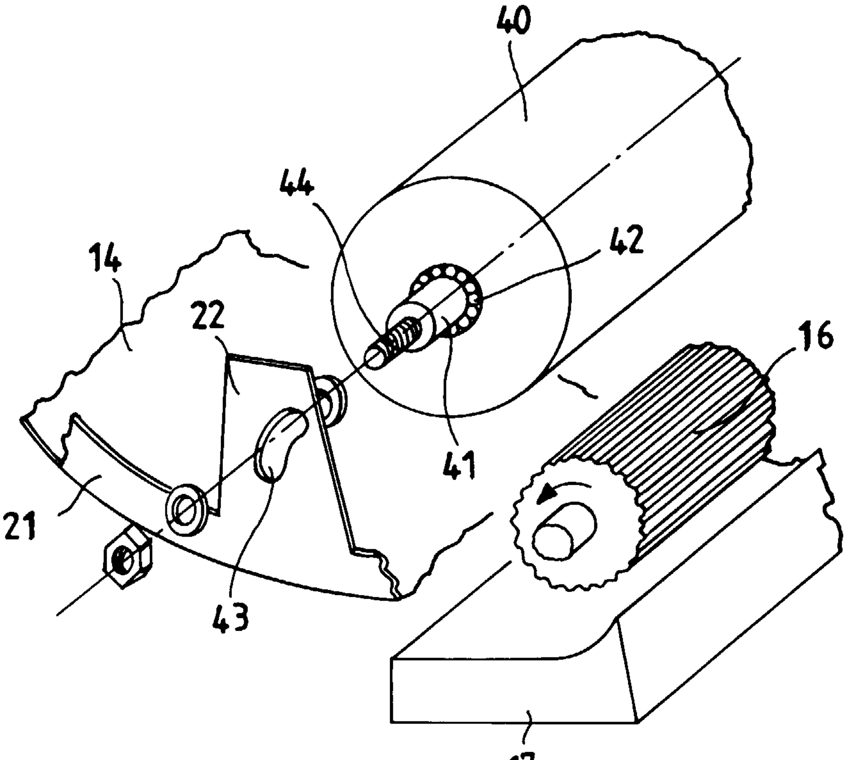

Fig. 3B

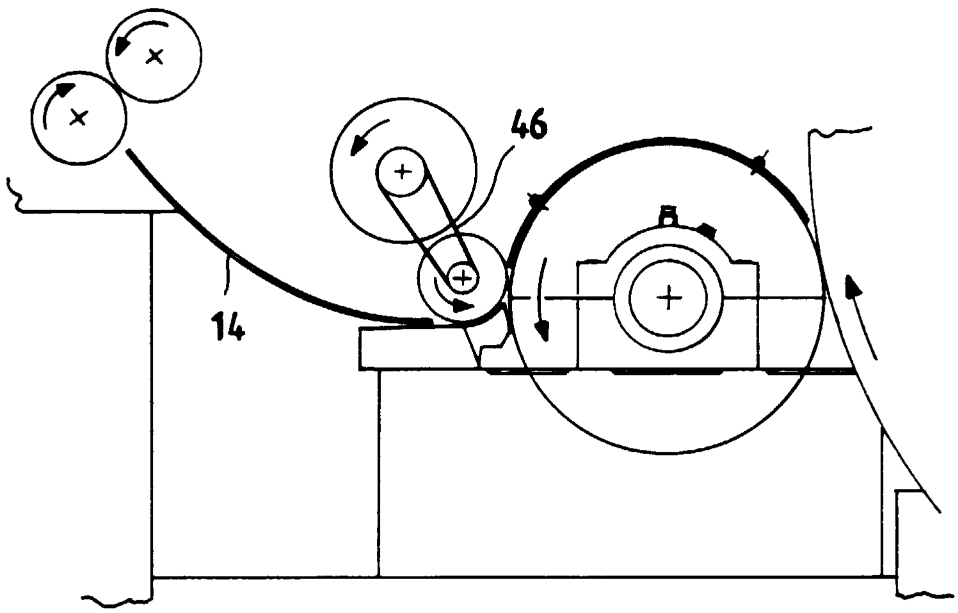

Fig.4

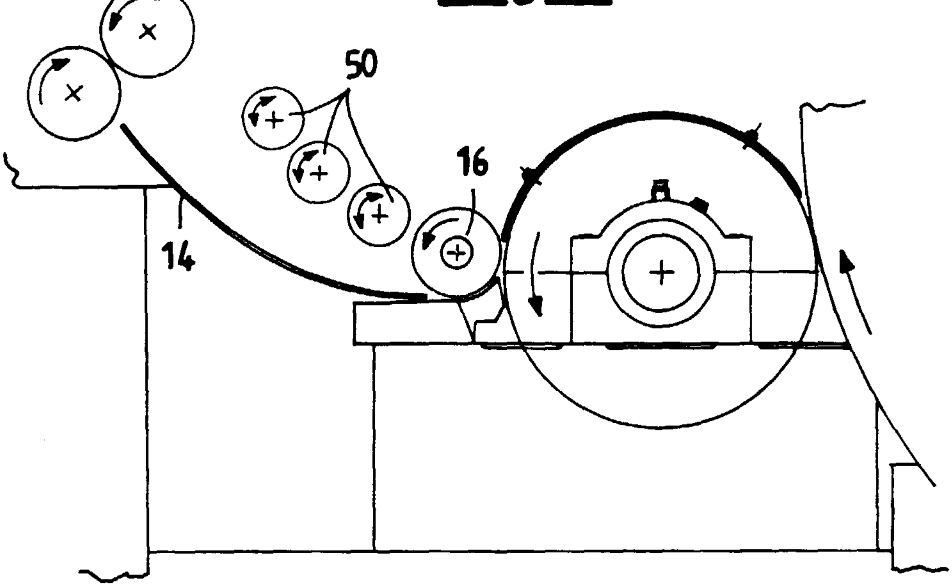

Fig.4A