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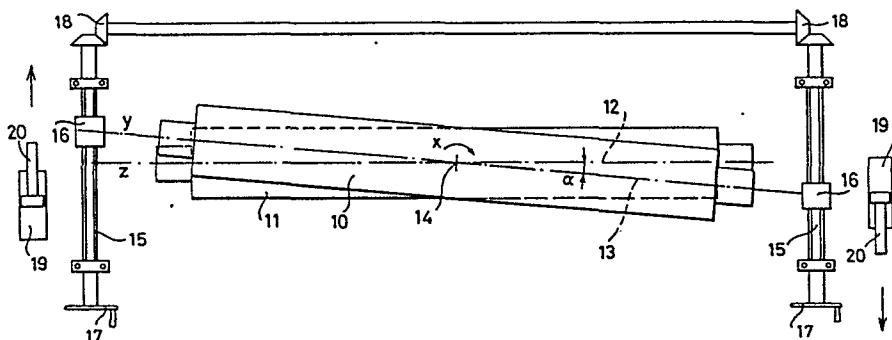
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Improvements in squeeze rolls for sheet materials.

Squeeze rolls (10, 11) for sheet materials fed continuously between said rolls, in which: considering a traditional position in which the rolls (10, 11) are tangential along a straight line lying in the plane defined by the axes (y, z) of the two rolls, one of the two rolls is rotated about an axis (x) lying in said plane, in a position corresponding with the central section of

the roll in order that the rolls (10, 11) become tangential at only one point (14), situated on said axis (x) of rotation, whereas the theoretical straight lines (12, 13) which in the traditional position define the line of tangency where they mate, now define a plane (p) orthogonal to said axis (x) of rotation.



DESCRIPTION

The invention relates to improvements in squeeze rolls for sheet materials.

During the most varied transformation and finishing processes in the textile, paper and plastics industries, the processed materials are squeezed by means of rolls.

This technique has arisen as a result of the various continuous treatments which are carried out on webs and sheets of moving material, to replace the old presses which are well known to be restricted by the loading and unloading of the processed products.

The principle on which this technique is based is to mount two tangential rolls, of which one is rotated by the other. The sheet material is passed between these rolls, which squeeze it during its advance because of the pressure exerted by the two rolls, which are maintained in contact with each other.

One of the greatest difficulties in executing this system is to obtain a uniform pressure over the entire length of the two rolls, i.e. along their entire line of tangency. This condition is in fact necessary in order for the advancing sheet of material to be squeezed uniformly over its entire length, so as to obtain linear treatment over the entire sheet.

In this respect, it is found that the squeeze rolls are subjected to high pressures acting laterally to the rolls at their rotation supports. These forces cause deflection and warping of the rolls, so that their squeezing pressure is greater towards the outside and less towards the centre.

Various methods have been studied and applied for overcoming

this drawback, which is extremely serious because it compromises the perfect and uniform processing of the sheets and thus of the finished product.

Among these methods can be cited for example the placing of bearings in one or both the rolls, they being mounted on the shaft of the roll itself and designed to centrally stiffen the rolls in order to keep them always in contact with each other at all points. Again, rolls have been constructed with crowning which increases from the periphery to the centre in order to compensate the pressure reduction by means of a greater diameter.

However, these and other methods, no matter how elaborate, complicated and costly, have not solved the problem other than to a minimum extent, in that the equipment available commercially at the present time always has a squeezing pressure between the rolls which, to a greater or lesser degree, is not uniform.

The invention proposes a mounting arrangement for the rolls which is able to completely and definitively solve this problem.

Fundamentally, this arrangement consists of making one roll assume a skew position relative to the other, i.e. one of the two rolls is rotated about an axis passing through the plane in which the axes of the rolls and their line of tangency originally lie, so that the rolls are no longer tangential along a straight line but at a point situated halfway along the length of the rolls, whereas the theoretical straight lines which previously mated to define the line of tangency now define a plane orthogonal to the axis about which one roll has been rotated.

The angle of skew in reality is minimal, and in fact almost

imperceptible to the eye, but is however such as to vary the degree of pressure from the centre to the periphery of the two rolls, with the consequent ability to obtain compensation of the squeezing pressure.

This solution solves the problem by means of considerable constructional simplicity, together with the fact that it is not necessary to provide rolls having large or different diameters and thicknesses.

The arrangement can be put into practice either with the machine at rest, by means of manual adjustment by releasing and moving the roll supports, or with the machine in motion, by means of a continuous movement using hydraulic units, operating screws with manual control, or an electric motor.

These and further objects and advantages are thus attained according to the invention by squeeze rolls for sheet materials fed continuously between said rolls, wherein the rolls are kept tangential by forces applied to their ends, and wherein at least one of two adjacent rolls is rotated relative to the other about an axis orthogonal to the plane in which the two tangential rolls originally lie, and passing through the central section of the rolls; the original lines of tangency of the rolls now defining a plane orthogonal to said axis of rotation.

Further objects and advantages will be more apparent from the description given by way of example hereinafter of the subject matter of the invention with reference to the accompanying drawings, in which:

Figure 1 is a plan view of the two rolls according to the invention, with the devices for their mutual positioning being

shown diagrammatically;

Figures 2 and 3 are respectively front and side views of the rolls of Figure 1;

Figures 4 and 5 are perspective views of the rolls, one of them being partly sectioned in Figure 4.

The most classical application of these rolls will be considered, namely the squeezing of fabrics, where so-called "foulard" machines are used in their finishing and dyeing.

The fabric unwinds from a reel and, suitably guided and deviated by rollers, is immersed in a tank containing the size or other solution with which it has to be impregnated, and takes it up. The fabric then passes through two rolls which, by squeezing the excess, cause this substance to penetrate further into the fabric. At the outlet, this latter is either collected on a beam, or passes directly to a drier or to a vaporisation chamber.

The two aforesaid rolls are disposed according to the invention.

As can be clearly seen from the figures, the two rolls 10 and 11 are mutually skew such that their two straight lines 12 and 13, which in conventional equipment coincide to define the line of tangency, in this case are incident to each other and intersect at the point 14, which also constitutes the point of tangency of the two rolls 10 and 11.

Again according to the invention, the rolls are rotated relative to each other about an axis x passing through said centre 14 and through the axes y and z of the two rolls, such that the two incident straight lines 12 and 13 lie in a plane p orthogonal to the axis x (Fig. 3).

Figure 1 shows diagrammatically two devices for effecting said skew arrangement of the rolls. One of them consists of two screws 15 disposed at the opposite ends of one of the two rolls 10, and two nut screws 16 which are made to move along said screws by rotating these latter with handles 17. A mechanical transmission, for example with bevel gears 18, enables the nut screws 16 to be moved simultaneously in the two opposite directions by rotating a single handle 17. One end of the roll 10 to be rotated is hinged to each nut screw 16, so as to obtain a manual degree of skew which is adjustable at will.

A further method is to use two hydraulic cylinders 18 positioned in opposite directions, and having the ends of the roll to be rotated hinged to their rods 20. A suitable central hydraulic unit causes the cylinders to extend through the required stroke, thus controlling the required degree of skew of the rolls.

These are two of the many devices which can be used for effecting the skew arrangement of the rolls. Further devices are not described, as they do not form the subject matter of the invention, but represent only technical means for attaining the required object, and thus in any case fall within the scope of the invention.

It should be also noted that the rolls 10 and 11 are always kept urged one against the other by forces F (Figure 2), and that the degree of skew is of very slight extent, the angle α which is created between the two straight lines 12 and 13 in fact being very small. The angle α shown on the drawings is much greater than in reality, but has been exaggerated specifically for reasons of clarity, and in fact the actual angle α , being variable within only a limited range, would be hardly perceptible on the drawing. It is in fact

sufficient to compensate the existing roll defect, i.e. the fact that the squeezing pressure of the two rolls is a maximum at the periphery and a minimum at the centre. In this respect, if it is assumed that the rolls are covered with a rubber layer 21 (Figure 5), contact between the two rolls 10 and 11 is also obtained at their ends, so that the effect of the reduction in the externally applied pressure-generating force F between the periphery and the centre of the rolls (traditional case) is compensated by the reduction in pressure between the rubber-covered surfaces 21 of the two skew-disposed cylinders between the centre and the periphery.

A uniform distribution of this pressure is thus obtained over the entire length of the rolls.

Uniform pressure conditions between the rolls can always be obtained by adjusting the skew angle α at any given time, either manually or by other means, so producing an optimum degree of squeezing of the material advancing between them.

The case of two rolls has been considered as this is the most traditional, but in three-roll "foulard" machines, it is sufficient to rotate the intermediate roll or the two outer rolls to obtain the same result, which falls within the scope of the invention, and is protected by the following claims.

PATENT CLAIMS

1. Squeeze rolls for sheet material fed continuously between said rolls, in which the rolls are kept tangential by forces applied to their ends, characterised in that two adjacent rolls (10, 11) are disposed mutually skew such that the projection of their axes (y, z) on to the plane (p) of tangency of the rolls (10, 11) defines two incident straight lines (12, 13), of which the point of intersection (14) lies substantially along the central section of the rolls (10, 11), and constitutes the actual point of tangency of the two rolls (10, 11).

2. Squeeze rolls for sheet material as claimed in claim 1, characterised in that the angle (α) of skew is very small at the point, such that by virtue of the forces applied to the ends of the two rolls (10, 11) these latter are in contact not only at the actual point of tangency (14) but also at the ends, so that the reduction in the pressure between the rolls from the centre to the ends compensates the reduction in the extent of the applied forces F from the ends to the centre, so that a uniform pressure between the rolls from one end to the other is attained.

3. Squeeze rolls for sheet material as claimed in claim 1, characterised in that the rolls are three in number and the intermediate roll is arranged skew.

4. Squeeze rolls for sheet material as claimed in claim 1, characterised in that the rolls are three in number and the two outer rolls are arranged skew relative to the intermediate roll.

5. A method for effecting the skew arrangement of the two rolls as claimed in claims 1 and 2, characterised in that starting from a traditional position in which the two rolls are tangential along a straight line lying in the plane of the axes of the two rolls, one of the two rolls is rotated about an axis (x) passing through the central section of said rolls and lying in said plane, until the required angle (α) of skew is attained as defined by those straight lines (12, 13) of the two rolls (10, 11) which in the traditional position coincide to define the line of tangency; said two straight lines (12, 13) now lying in a plane (p) orthogonal to said axis (x) of rotation of the rolls (10, 11).

6. A method as claimed in claim 5, characterised by being effected by hinging one or both the ends of the roll (10) to be rotated, to a nut screw (16) slidable along a screw (15) rotatable by manual means (17).

7. A method as claimed in claim 5, characterised by being effected by hinging one or both the ends of the roll (10) to be rotated, to the rod (20) of a hydraulic cylinder (19), the extension of which is adjustable manually.

8. The skew arrangement of two adjacent rolls as claimed in claims 1 to 5, effected by a method as claimed in claims 5 to 7.

Fig.1

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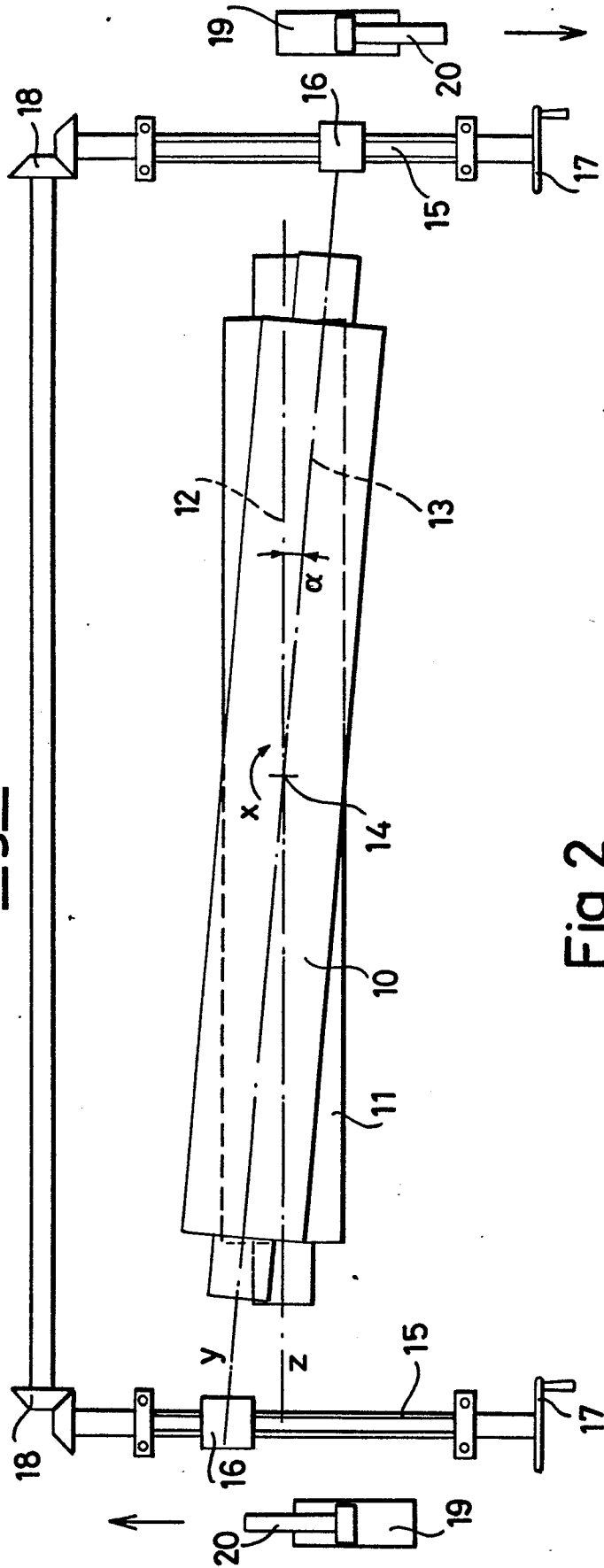


Fig. 2

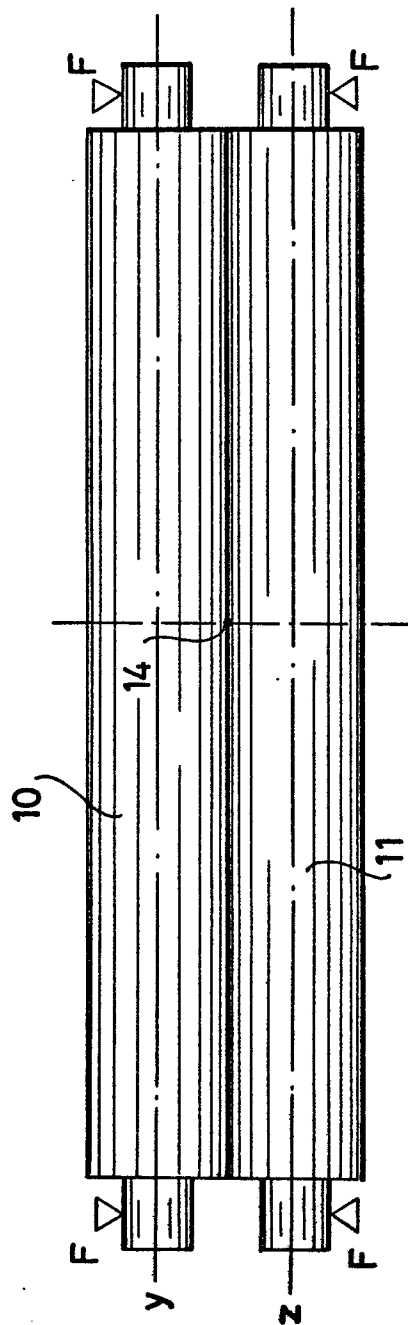
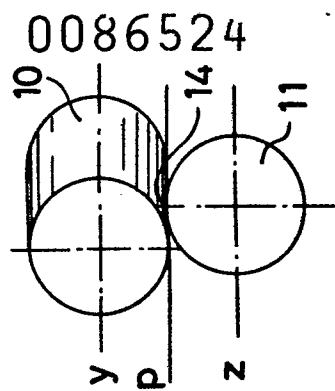


Fig. 3



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Fig. 4

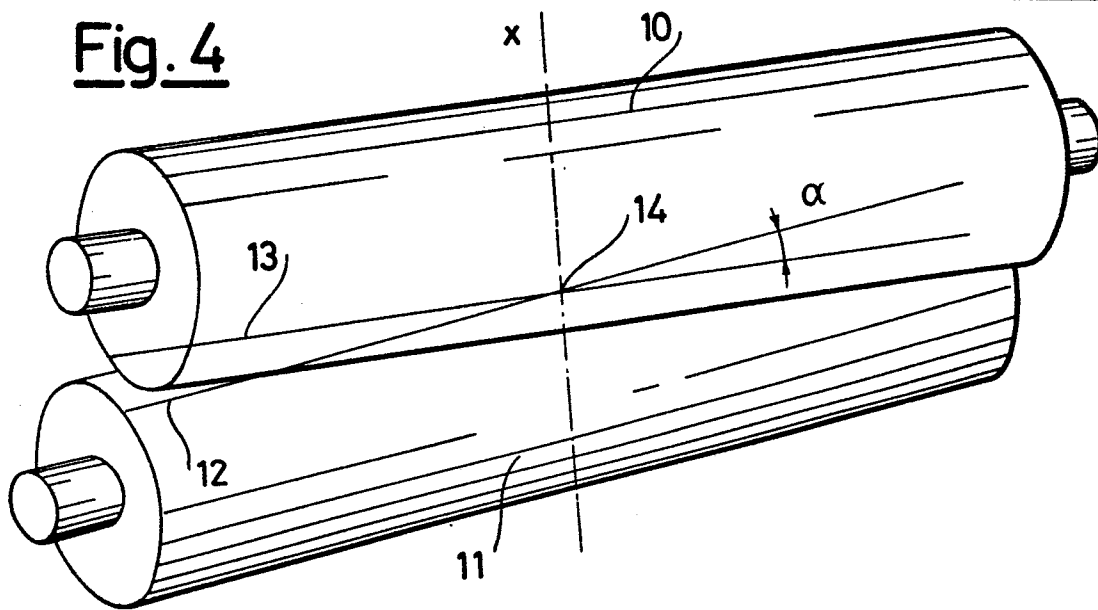


Fig. 5

