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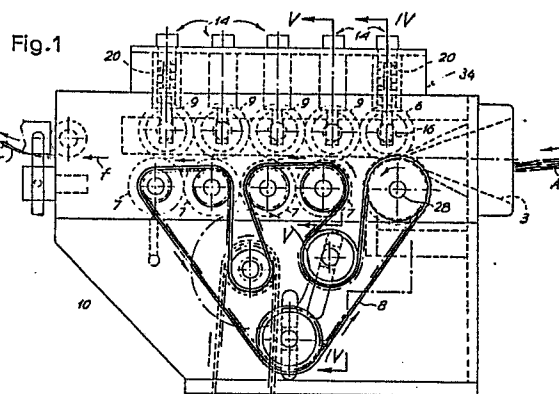
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(54) Draw group for drawing fibres, coming from a card or the like, in parallel arrangement, with pairs of positively-operated draw cylinders having metal surfaces.

(57) The draw group - combined with the card - comprises several pairs of rotating cylinders (7,9), both the cylinders of each pair being driven into rotation to drag the web (B) passing therebetween; the cylinders (7,9) of a subsequent pair are provided with a peripheral speed greater than that of the cylinders (7,9) of the preceding pair, in order to cause a partial draw; the cylinders of adjacent pairs graze one another thus obtaining a self-cleaning effect; the two cylinders (7,9) of each pair are provided with metal surfaces and one of them is elastically urged towards the other.



Description

"DRAW GROUP FOR DRAWING FIBRES, COMING FROM A CARD OR THE LIKE, IN PARALLEL ARRANGEMENT, WITH PAIRS OF POSITIVELY-OPERATED DRAW CYLINDERS HAVING METAL SURFACES"

In the presently known draw groups, two or more groups of draw cylinders with upper and lower cylinders are located at various spacings. The lower ones of said cylinders are driven, while the upper ones are not driven and are made of material exhibiting a very high friction coefficient in order to be dragged into rotation by the material being processed that is worked and by the lower cylinders.

The material used in the construction of said upper cylinders is generally rubber or the like; in any case, this material is usually subject to rapid wear, so that the upper cylinders demand frequent grinding operations. These grinding operations alter the diameter of the upper and lower cylinders and thus, substantially, the spacings between the various groups of cylinders, thereby frequently causing bunches of fibres with consequent web interruptions and impairment of all the subsequent spinning operations.

The invention overcomes these drawbacks by using upper and lower cylinders that are all mechanically driven and made of highly wear-resistant material. In this way the cylinders diameter remains constant in the course of time thus avoiding the above mentioned drawbacks.

The diameter steadiness allows also the cylinders to be so disposed that they graze one another while exerting also a practically constant self-cleaning action between them. The web comes out from the draw group perfectly close and with fibres in parallel arrangement irrespectively of the fibre nature (natural, artificial or synthetic).

Substantially, according to the invention, a group for drawing textile fibres of a veil that is a web coming from a card and condensed in order to form a web to be stacked up into containers, comprises several pairs of cylinders driven into rotation by a positive drive, the web passing between two cylinders of each pair; the cylinders of each subsequent pair are provided with peripheral speed greater than that of the cylinders of the preceding pair, in order to cause a partial draw; the active surfaces of the cylinders are rigid and wear-resistant, especially metallic, so that no significant wear occurs in the course of time and thus it is possible to drive them into rotation by a mechanical drive. The fibres have the possibility to slide in the transit zone between the cylinders of each pair, thus emphasizing the effect of parallel arrangement of the fibres and preventing long fibres breaking. The cylinders of each pair are elastically urged one towards the other up to an adjustable minimum limit. The corresponding cylinders of adjacent pairs are so disposed that they graze one another, thus obtaining a self-cleaning effect which remains practically constant in the course of time because of the mutual axes position and the practical lack of wear.

The draw group advantageously comprises also at least a condenser means for condensing the fibres in transit at the inlet, especially of the type with one

cylinder having an annular groove and another cylinder with an annular projection going into the groove.

In practice, a cylinder of each pair is driven by a toothed pulley with a driving belt in common with all the pulleys which have various diameter; the two cylinders of each pair are connected between them through a pair of equal gears.

The draw group in question is housed into a box; more boxes, with cylinders in different number and/or diameters are replaceable according to the work requirements.

The invention will be better understood by following the description and the attached drawing, which shows a practical, non limitative exemplification of the same invention. In the drawing:

Figs. 1, 2 and 3 show respectively a scheme of a box with draw group in side view, longitudinal section and schematic plan view; Figs. 4 and 5 show respectively a section on line IV-IV and a section on line V-V of Figs. 1 and 2.

According to what is illustrated in the drawing, letter A indicates the card veil or web which may be concentrated so as to form a ribbon B to be suitably condensed and drawn in order to obtain the arrangement of fibres in parallel and reduce the material section. To this end, the material B is fed through a shape 3 to a first pair of condenser cylinders 5 and 6, respectively having an annular channel or groove and an annular projection cooperating with one another. Next to said condenser, pairs of cylinders 7 and 9 are located, which form operating pairs for the fibres draw and compression. All these members are operated by a belt 8, which may also have a double toothing. The cylinder 5 may also be positioned so as to graze the first one of cylinders 7. The projection in the channel of cylinder 7 acts as a doffer, but the channel may also be doffed by a fixed member. The two cylinders 7 and 9 of successive pairs of cylinders 7 and 9, being in a suitable and variable number, are positively engaged into rotation through a pair of gears, and the various successive pairs are provided with different peripheral speeds that gradually increase in the direction of the material transit according to arrow f. The various lower cylinders 7 have fixed axis and are individually driven into rotation at the preset speed, through the toothed belt 8 (which also drives the lower cylinder 5 of the pair of condenser cylinders 5, 6), in order to achieve the desired drawing of the material between subsequent pairs of cylinders; the cylinders 9 between them and the cylinders 7 between them are disposed in such a way that each of them grazes and is grazed by the adjacent cylinder in order to achieve a cylinders self-cleaning effect. The complex of condensing and draw groups is housed in a self-contained box 10.

The upper cylinders 9 have mobile axis and are elastically urged towards the lower cylinders 7 and against the material being processed. Similarly, the

upper cylinder 6 of the pair of condenser cylinders 5, 6 is elastically urged towards the lower cylinder 5 and against the material being processed. As shown in particular in Fig. 4, spring devices 14 push downwards a shaft 16 supporting the cylinder 6. The lower position of shaft 16 is adjustable by dowels 18. In addition, the force with which the upper cylinder 6 is urged against the material being processed can be adjusted by varying the preloading of a spring 20 by means of a screw 22. This adjustment is carried out according to the smoothness and resistance of the fibres being processed and to the length thereof. The upper cylinder 6 is loosely mounted on the shaft 16 and solid with a gear 24 meshing with a like gear 26. Said second gear 26 is solid with a rotating shaft 28 carrying the lower cylinder 5. Said shaft 28 receives motion from the toothed belt 8 and transmits said motion directly to the lower cylinder 5, and indirectly to the upper cylinder 6 through a pair of gears 24, 26. As illustrated in Fig. 5, a similar arrangement with devices 14 and dowels 18 permits the downwardly elastic pressing of each cylinder 9, idly mounted on a shaft 30, against the cylinder 7 mounted on and solid with a shaft 32; the pairs of gears 24, 26 permit the motion transmission from shaft 32 to shaft 30 of each pair, even with limited variations of the spacing between the axes of the two shafts.

The mobility of the axis of cylinders 9 and cylinder 6 allows some adaptation to the thickness of the web being worked thus limiting the compression thereof, thereby favouring the draw and the parallel arrangement of the fibres as these can slide more easily, and the breaking of same fibres, especially of the longest ones, is therefore prevented.

Advantageously, the spring devices 14 are housed in a mobile part 34 acting, in particular, as a cover. This allows an easy access to the draw group.

The active surfaces of the cylinders are metallic or anyway made of materials of low friction coefficient and practically not subject to wear. The material engaged between the two cylinders 7 and 9 of the subsequent pairs is drawn - owing to the differences in peripheral speeds - along the short length between the contact points of the cylinders of subsequent pairs, even with relative slidings, thus obtaining an efficacious draw and parallel arrangement action of the fibres and an efficacious stretching of the ribbon-like that is web material. In presence of relatively long fibres, a sliding of the fibres may also occur in the zones comprised between two cooperating cylinders, with no fibres ruptures taking place.

The number of pairs of cylinders may vary according to the characteristics of the material and of the desired stretching degree. The diameter may be modified according to the fibres length and, however, for the purpose of varying the interspace between the contact points of the cylinders of subsequent pairs, without prejudice to the geometrical contact conditions.

At the end of the set of pairs of cylinders 7, 9, a further concentration system may also be provided, which concentrates the stretched material S and feeds it to the stocking containers or anyway to the subsequent operations.

A box according to the invention is complete and interchangeable, according to the fibres length, with a group of rotating cylinders possibly numbering from two and ten or more pairs having also diameter variable according to the fibres length.

The positioning of the cylinders provided with relatively mobile axis, and the metal - or the like - surface thereof, although ensuring the drag motion of fibres, prevents an excessive compression of same fibres thereby facilitating the draw and the parallel arrangement of same fibres as well as allowing the sliding thereof and preventing the breaking of the long fibres that may have been simultaneously engaged by subsequent pairs of cylinders 7, 9. Any trend to the fibres winding around the cylinders (having metal surface) which perform a mutual self-cleaning is also avoided; this function lasts in the course of time since no superficial wear of cylinders 7 and 9 takes place.

Each box, which makes up a separate group, can be applied to all the cards and allows a fibres drawing up to 100% and above, since the draw between the rotating groups takes place very gradually and the fibres are drawn in parallel arrangement above normal, thus improving the so called "uster" that is the uniformity of the ribbon closeness and making up for those small deficiencies that may occur because of the increase in thickness of the outgoing web.

After all, a larger production of fibres with improved parallel arrangement thereof as well as no breaking of wound fibres is obtained. In fact, as already stated, since the cylinders of pairs of cylinders are able to graze one another, they have the capacity of mutually self-cleaning and therefore, all group is self-cleaning and does not allow the fibres to wind up around any of the draw members.

In addition to the draw high degree, to the elimination of long fibres rupture and of interruptions caused by winding events, the card is also caused to produce a heavier ribbon, increasing the production in kgs and lowering the "doffer" speed. In the central collecting groups, the work is carried on without interruptions even in case of glossy fibres. The lower speed of the "doffer" allows as well less dust to be generated at the outlet of the card web.

Several condenser groups may be applied to the box in order to compact the ribbon to a more or less degree, according to the requirements to be met by the fibres that are being processed, and to achieve, besides a better parallel arrangement of the fibres, also an increase of the contents - measured in linear meters - of the ribbon held in the storage container. A draw passage may even be eliminated in the subsequent work operations.

The draw performed by rotating groups occurs very gradually and the fibres result more parallel to each other than with the present draw systems, thus greatly compensating for those small deficiencies that the card may generate when a heavier web comes out therefrom.

The cylinders 7 and 9 may be made of hardened steel; since they are not subject to any wear, they remain perfectly alike in their diameter: this allows the draw group to be constructed with all the

cylinders being driven between them, thus eliminating any fibres slippage yet allowing mutual slides thereof. An immediate gripping action and a perfect draw are thus obtained which cause the ribbon to go out forwards with no interruption, as it occurs, instead, with the present systems.

The invention offers the possibility of perfectly drawing the fibres through a draw greater than the normal draw for both the cotton and the wool, the acrylic, synthetic and artificial fibres, whether they are short or long, with no need to carry out a change over in the draw group.

It is understood that the drawing shows an exemplification given only as a practical demonstration of the invention, as this may vary in forms and dispositions without nevertheless departing from the scope of the idea on which the same invention is based.

Claims

1. Draw group for drawing textile fibres of a veil that is a web (A) coming from a card and being condensed to form a ribbon (B) to be stacked inside a container, combined with the card and comprising a plurality of rotating cylinders, the ribbon or web passing between the two cylinders of each pair, and the cylinders of a subsequent pair being provided with peripheral speed greater than that of the cylinders of the preceding pair in order to cause a partial draw, characterized in that both cylinders (5,6,7,9) of each pair are driven into rotation by a mechanical drive (8,24,26) - gear-type or equivalent -, that the axis of one cylinder (5,7) of each pair is fixed whereas the other axis is movable and elastically urged towards the first axis, and that the active surfaces of the cylinders are rigid and wear-resistant, especially of metal construction, so that no significant wear takes place in the course of time, and the fibres have the possibility of sliding in the passage zone between the cylinders (7,9) of each pair thus improving the parallel arrangement effect of the fibres and avoiding ruptures of the long ones.

2. Draw group according to the preceding claim, characterized in that means (14,18) are provided for the adjustment of the position of maximum approach of the cylinders (6,9) having mobile axis (16,30) to the respective cylinders (5,7) having fixed axis (28,32).

3. Draw group according to the preceding claims, characterized in that the mobile cylinders (6,9) are elastically urged by spring means (14) - or other members like cylinder-piston systems or the like - the preloading of which can be suitably varied to adjust the force with which the mobile cylinders (6,9) are pushed against the material being processed.

4. Draw group according to the preceding claims, characterized in that the spring means (14) which act on the mobile cylinders (6,9) are

housed inside a cover (34) of a box (10) accommodating the draw group.

5. Draw group according to the preceding claims, characterized in that the corresponding cylinders (7,9) of adjacent pairs are so disposed that they graze one another thus obtaining a self-cleaning effect which remains practically constant in the course of time owing to the mutual position of the axes and the condition of lack of wear.

6. Draw group according to the preceding claims, characterized in that it also comprises at least a means (5,6) for condensing the incoming fibres at the inlet and possibly another one at the outlet, said means being self-cleaning and driven between them.

7. Draw group for drawing fibres coming from a card or the like in parallel arrangement, with pairs of positive-operated draw cylinders having metal surfaces; all as above described and represented for exemplification in the attached drawing.

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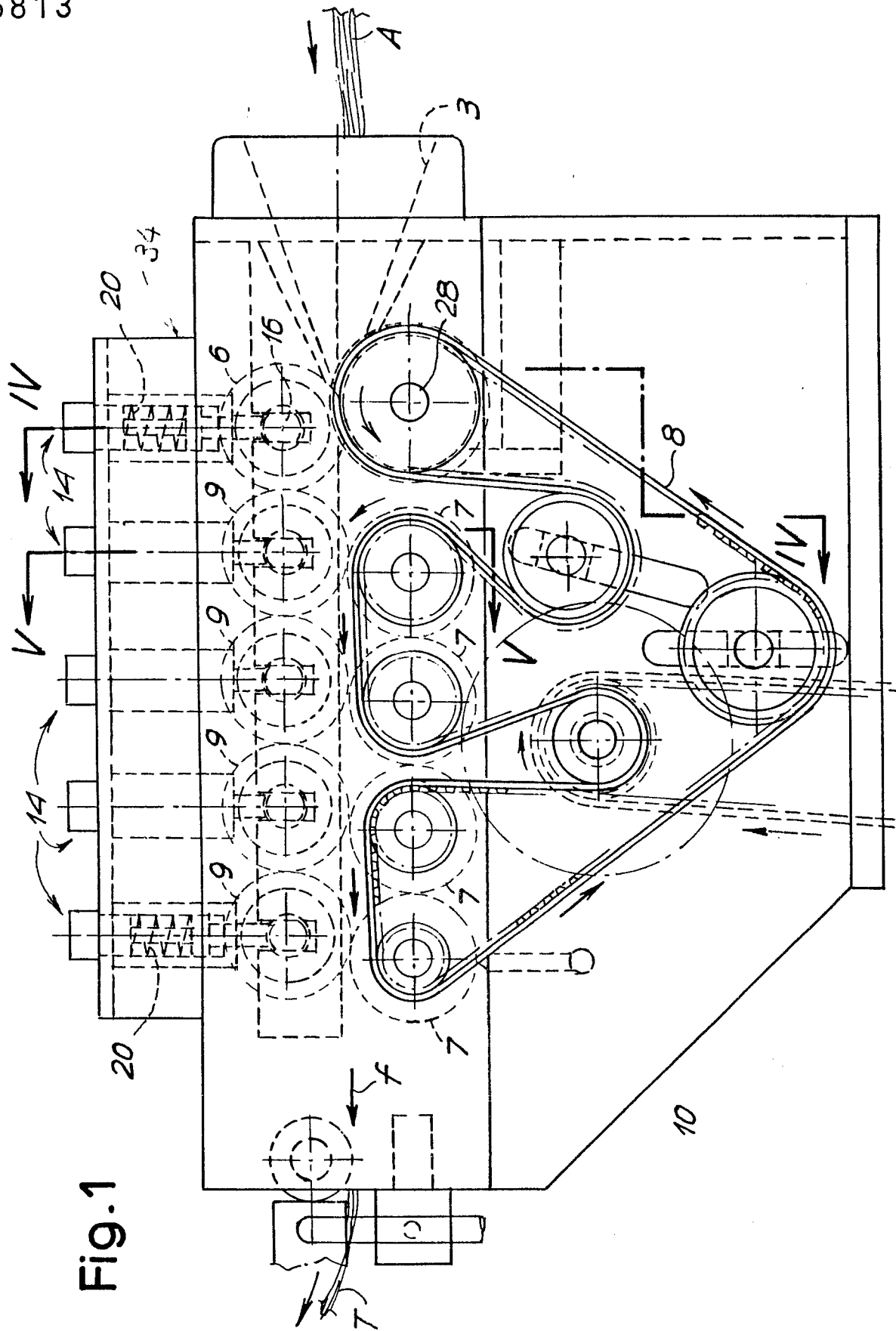
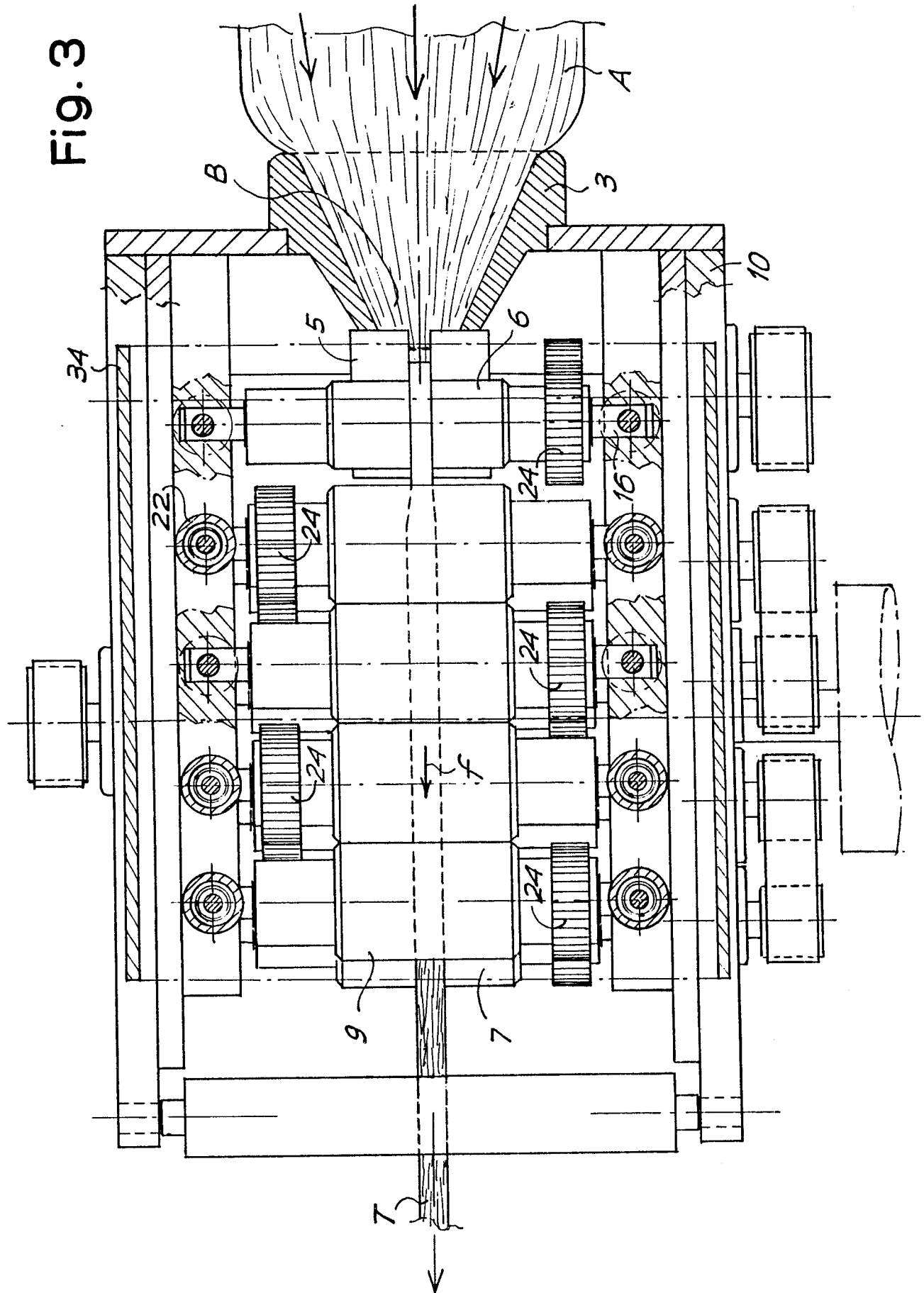


Fig. 3



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Fig. 5

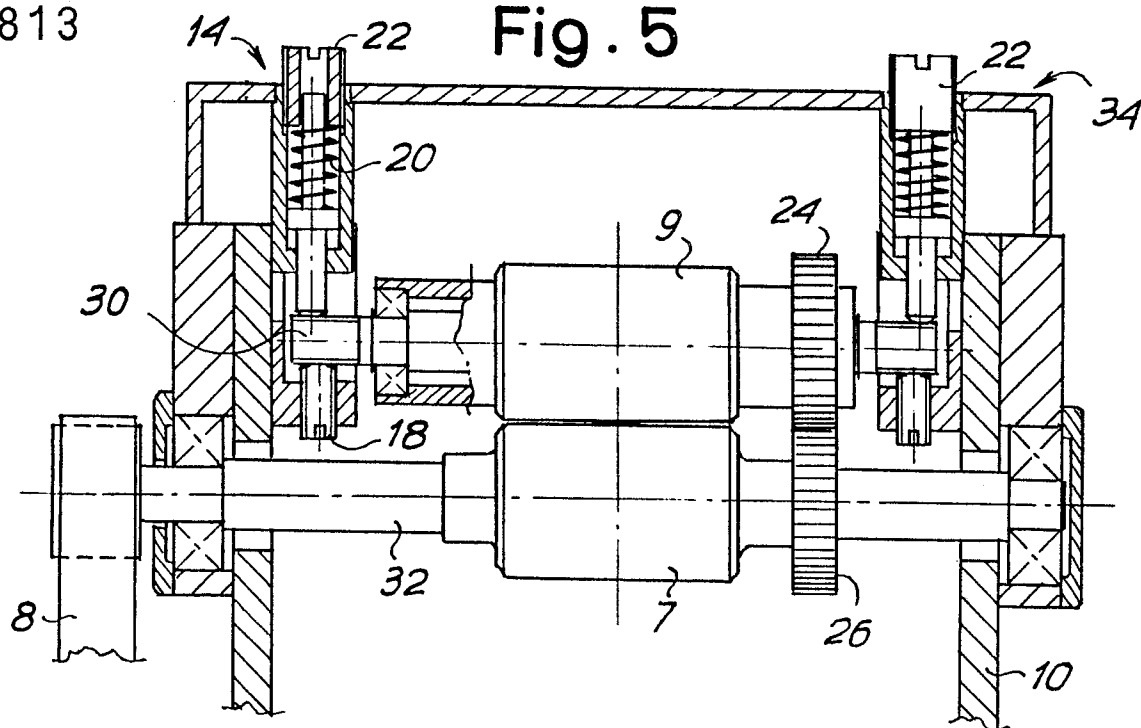


Fig. 4

