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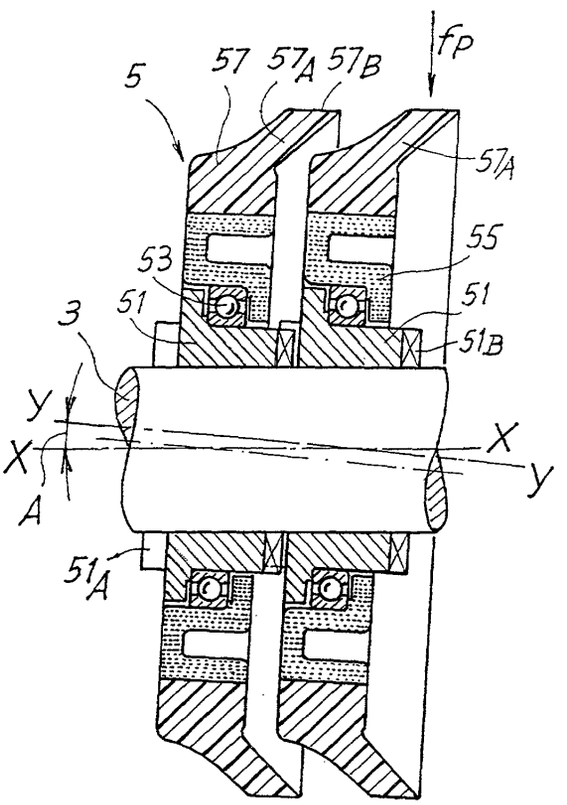
(54) Spreading roller for fabrics or the like

(57) The widening bar or roller (1) for transverse spreading-out of web-like materials, such as films, fabrics or the like, partially entrained around the roller (1), envisages the roller (1) made up of disk-like elements (5), each of which rotates about its own axis, the axes of rotation of said disk-like elements (5) being slightly inclined with respect to the axis of the roller (1).

Fig.2



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Description

[0001] The subject of the present invention is a so-called widening bar, i.e., a roller for transverse spreading-out of web-like materials, such as films, fabrics and the like, which are partially entrained around the roller, the said roller comprising projections designed to act transversely in opposite directions on the material that is passing.

[0002] Currently, rollers are used that have two opposed helical projections which extend from the centre towards the two ends of the roller. During rotation in contact with the web-like material that is passing, the projections tend to widen out transversely, and hence stretch, the material that is passing in opposite directions towards the edges, with an effect that is not always satisfactory and without much possibility of adaptation to the varying needs of the materials to be treated, as well as to other requirements. Other types of rollers have elastically deformable projections, so that an effect is obtained that is approximately equivalent to that of the rollers described previously, but with not particularly appreciable results.

[0003] The subject of the present invention is a roller for spreading out, or a widening bar, which solves the problem in a satisfactory way and with effects that can also be adjusted and adapted to the materials being treated.

[0004] The above and further innovative purposes and advantages will appear evident from the ensuing text.

[0005] Basically, according to the invention, the roller is made up of disk-like elements, each of which rotates about its own axis, the axes of rotation of said disk-like elements being slightly inclined with respect to the axis of the roller; said disk-like elements are thus inclined. In addition, they present a perimetral surface designed to exert an action of contact friction on the material.

[0006] The said disk-like elements are in practice mounted on the roller by means of bearings, either sliding bearings or rolling bearings, supported by mutually engaged cores.

[0007] The axes of rotation of said disk-like elements advantageously lie substantially in one and the same geometrical plane which passes through the axis of the roller. In addition, the said axes of rotation of said disk-like elements may be parallel to one another or be variably inclined also in groups and/or with smooth, i.e., neutral areas.

[0008] The aforesaid disk-like elements may have their perimetral edges made of resilient material, or else rough metallic material, or alternatively may have their perimetral edges formed by filiform components, such as bristles, pins, or equivalent structures. In addition, the perimetral edge of the roller may present a conical development and be designed to undergo flexural deformation.

[0009] Normally provided adjacent to the roller are means for guiding the web-like material as it approaches or recedes from said roller. According to the invention, at least one of said guiding means is position-adjustable for modifying the amplitude and/or the position of the arc of contact of the web-like material with the perimetral surfaces of the disk-like elements that make up the roller, with respect to the inclination of the disk-like elements.

[0010] A better understanding of the present invention will be provided by the ensuing description and by the attached drawing, which illustrates a practical, non-limiting example of the invention. In the drawing:

Fig. 1 is a schematic representation of a substantially overall external view of a widening roller, or so-called widening bar, for transverse spreading-out of a web-like material, such as a fabric or the like;
Fig. 2 an enlarged cross-sectional view illustrating a detail of a pair of disk-like elements forming part of the roller according to the invention;
Fig. 3 illustrates a detail of a possible specific function of the disk-like elements;
Fig. 4 is an external view of one of the disk-like elements with indications regarding the operation of the roller;
Figs. 5 and 6 are very schematic representations of two possible solutions different from the one illustrated in Fig. 2;
Figs. 7, 8, and 9 show three possible arrangements of guiding means for feeding the material and for output of the latter after it has been deviated on the roller that constitutes the widening bar; and
Figs. 10, 11 and 12 are schematic representations of a number of variant embodiments.

[0011] As illustrated in the annexed drawing, a roller for transverse spreading-out of web-like material, such as a film, a fabric or the like, is designated, as a whole, by the reference number 1, and consists of an axial shaft 3 on which a multiplicity of disk-like elements are arranged, each of which is designated by 5 and will be described in greater detail in what follows. The shaft 3 may be a fixed supporting shaft on which cores 51 for supporting the rotating part of each of the disk-like elements 5 are arranged. Mounted on a bearing 53 carried by each core 51 is an annular component 55, on which the perimetral portion 57 of the disk-like element is mounted. In Figs. 2 to 4, this perimetral portion constitutes the perimetral surface of contact with the material, and is formed with a lip 57A having a development basically shaped like a truncated cone and made of an elastically flexible material, such as rubber or the like, to form the perimetral contact surface 57B. The conformation of the said perimetral portion 57 is such that, when a centripetal radial load is applied, as indicated by the arrow fp of Fig. 2, the lip 57A basically shaped like a truncated cone tends to undergo deformation locally until it assumes the configuration indicated by the

dashed-and-dotted line in Fig. 3, thereby determining displacement, by an amount Z, as illustrated in Fig. 3, in the axial direction, of the perimetral surface 57B up to the position $57B_1$.

[0012] Characteristically, according to the invention, the disk-like elements 5, as described above, are divided into two areas that make up two symmetrical parts with respect to the median transverse plane M of Fig. 1. In each of the halves of the roller 1, the disk-like elements 5 are equally inclined with respect to one another, but the disk-like elements 5 of one half of the roller are inclined in a direction opposite to the direction of the disk-like elements 5 of the other half. The cores 51 arranged on the shaft 3 provide the seat for the respective bearings 53, which is inclined according to an axis Y-Y inclined by the angle A with respect to the axis X-X of the supporting shaft 3. Consequently, also the component 55 and the perimetral portion 57 of the disk-like element 5 develops according to the axis Y-Y.

[0013] The cores 51, and hence the disk-like elements 5 as a whole, are mounted in such a way that their axes Y-Y, which are inclined with respect to the axis X-X by the angle A, all lie on one and the same diametral geometrical plane of shaft 3. To ensure this, the cores 51 have opposed front teeth 51A and 51 B which enable mutual angular engagement of said cores 51 arranged on the shaft 3, so that there are no reciprocal angular displacements of the cores 51.

[0014] In a possible embodiment, the geometrical plane that contains the axis X-X and the axes Y-Y of the individual cores 51 may be appropriately oriented about the axis X-X, either by manoeuvring of the shaft 3 to which the cores 51 may be angularly connected or by angular manoeuvring of the row of cores 51 that are connected together and angularly mobile about the shaft 3, with respect to which they do not have stable connection. The set-up described above allows for possible limited variations.

[0015] The perimetral surface 57B of the various disk-like elements constitutes the perimetral surface of friction contact with the material to be processed. In the diagrams of Figs. 7 to 9, which are still to be described, the said material to be processed is designated by T, and may be, for example, a fabric or a film, or the like, that is to be spread out transversely with respect to its web-like development. The material T is fed to the roller 1 and is recalled and moved away from the roller 1 in such a way as to undergo an angular deviation which, as is clearly illustrated in the diagrams of Figs. 7 to 9, may also be variable, as indicated by the angles B, C and D of Figs. 7, 8 and 9, for the purposes that will be explained hereinafter. As a result of the deviation imposed in the aforementioned way on the web-like material T, the latter exerts a centripetal pressure according to the arrow fp locally on the lips 57A in a position corresponding to the arc of deviation, such as the one designated by B, C and D, respectively in Figs, 7, 8 and 9. It follows from this that, on account of the displacement of the perimetral surface 57B as far as the position 57B', there is an effect of spreading-out of the material in opposite directions, as indicated by the arrows fd pointing in opposite directions in Fig. 1, as a result of the opposite orientation of the frustoconical lips 57A in one direction and in the opposite direction in the two symmetrical portions of the roller 1, as has already been described, and on account of the deformations that the lips undergo under the pressures exerted according to the arrows fp. Moreover, in addition to the possibility of the effect due to the deformation of the lips 57A, the disk-like elements 5 have a spreading-out effect on account of their inclination due to their being mounted according to the axes Y-Y which are inclined with respect to the axis X-X of the roller along the arc that goes from the point In of start of contact of the material T with the roller 1 as far as the point U of exit of the material T from contact with the roller 1. By varying the starting point In, which is generic with respect to the point U of exit from contact, a variation is obtained in the amount of spreading-out that is achieved by means of the effect of drawing along in the direction of the arrows fd by the perimetral surface 57B along the arc of contact, also in the absence or independently of the effect that may be obtained by the deformation of the lip 57A from the normal configuration to the deformed configuration, in which the surface 57B passes to the position $57B_1$. Designated by 12 in Figs. 7 to 9 is a guiding means for input of the material T up to contact with the roller 1. The said guiding means 12 may be a roller that can be displaced from the position 12A up to the position 12B through intermediate positions, such as the position 12C, as illustrated in Figs. 7, 9 and 8, respectively. From the displacement of the said guide means 12 between the various positions there is obtained an arc of contact that is different between the material T and the peripheral surface of the roller: the arc I1-U of Fig. 7 is smaller than the arc I2-U of Fig. 8 and smaller still than the arc I3-U of Fig.9.

[0016] By thus varying the arc of contact, there is obtained a different amount of translation in the direction indicated by the arrow fd of spreading-out by an amount that is illustrated in Fig. 4 respectively by D1, D2 and D3 as a result of the contact respectively along the arc I1-U, along the arc I2-U, and along the arc I3-U of the material T with the perimetral surface of the disk-like elements, a surface which in Figs. 1 to 4 is designated by 57B. The same function may be achieved by modifying the output point U with respect to the start-of-contact point of the material with the peripheral surface of the roller 1. The amplitude of said arc of contact may also be modified by simultaneously varying the positions of the two points In and U with respect to the position of the axes Y-Y which are inclined with respect to the axis X-X.

[0017] In any case, from the variation of the arc of contact of the material on the roller there is obtained a variation in the amount of spreading in the direction indicated by the arrows fd of Fig. 1 of the material to be spread out, such as a fabric, a web-like film, and the like.

Added to this is the spreading effect due to the deformation of the elastic lip 57A of the periphery of each of the disk-like elements 5 that form the roller 1, whenever also this measure is adopted.

[0018] According to the variant schematically illustrated in Fig. 5, the perimetral surface of the disk-like elements which exerts a contact friction with the material, instead of consisting of the surface 57B shown in Figs. 1 to 4, may consist of a series of pins or bristles 157 which have a basically radial orientation and start from the periphery of each of the disk-like elements 105. The said bristles or pins 157 penetrate, purely by way of example, into a fabric and perform the spreading-out function in the same way as the surface 57B of the periphery of each of the disk-like elements 5. Smooth materials having a high coefficient of friction and/or materials machined in order to increase roughness can be used.

[0019] Furthermore, Fig. 6 shows another variant embodiment, according to which bristles or pins 257 are provided on the periphery of each of the disks 205 (which are equivalent to the disk-like elements 5 or 105), with the difference, with respect to the solution illustrated in Fig. 5, that these bristles or pins are relatively long and relatively flexible; consequently, with the pressure exerted by the material deviated by the roller in the direction indicated by the arrow fp, these bristles or pins undergo elastic deformation, bending from the configuration designated by 257 to the elastically more deformed configuration designated by 257A, thereby performing a function similar to that of the deformation of the lips 57A when these are deformed for displacing the perimetral surface from the position 57B to the position $57B_1$ of Fig. 3.

[0020] Fig. 10 shows a variant in which the disk-like elements do not present projecting peripheral portions.

[0021] Figs. 11, 12 and 13 show other embodiments, in which the roller has a number of sections with different shapes, among which at least one smooth section and/or sections with disk-like elements having different inclinations.

[0022] The invention makes it possible to achieve the advantages mentioned at the beginning of the present description, with the further possibility of adjustment even during operation of a machine, in order to vary the amount of transverse spreading-out of the material that reaches the roller 1 and is more or less deviated by the said roller.

[0023] It is understood that the drawing only illustrates a simplification that is provided merely as a practical demonstration of the invention, which may vary in its embodiments and arrangements without thereby departing from the scope of the underlying idea.

Claims

1. A roller for transverse spreading or a widening bar for web-like materials, such as films, fabrics or the like, partially entrained around the roller, which comprises surfaces or projections designed to act transversely in opposite directions on the material that is passing, **characterized in that** the roller comprises disk-like elements, each of which rotates about its own axis, the axes of rotation of said disk-like elements being slightly inclined with respect to the axis of the roller, and said disk-like elements being thus inclined and each having a perimetral surface that is designed to exert contact friction with the material.

2. The spreading roller according to Claim 1, **characterized in that** the axes of rotation of said disk-like elements lie in one and the same geometrical plane that passes through the axis of the roller.

3. The spreading roller according Claim 1 or 2, **characterized in that** the axes of rotation of said disk-like elements are parallel to one another.

4. The spreading roller according to Claim 1, or 2, or 3, **characterized in that** said disk-like elements are mounted on the roller by means of rolling bearings or sliding bearings, which are supported by mutually engaged cores.

5. The spreading roller according to at least one of Claims 1 to 4, **characterized in that** said disk-like elements have their perimetral edges made of resilient material.

6. The spreading roller according to at least one of Claims 1 to 4, **characterized in that** said disk-like elements have their perimetral edges made of a material with a high coefficient of friction.

7. The spreading roller according to at least one of Claims 1 to 4, **characterized in that** said disk-like elements have their perimetral edges made up of filiform components, such as bristles, pins, or equivalent elements.

8. The spreading roller according to at least Claim 5, or 6, or 7, **characterized in that** the perimetral edge has a conical development.

9. The spreading roller according to Claim 1, comprising guiding means for guiding the web-like material coming up to or away from said roller, **characterized in that** at least one of said guiding means is position-adjustable to modify the amplitude and/or the position of the arc of contact of the web-like material upon the perimetral surface of the disk-like elements making up the roller, with respect to the inclination of the disk-like elements.

10. The spreading roller according to at least one of the

foregoing claims, **characterized in that** the roller comprises sections formed by disks, and at least one smooth section.

11. A widening bar for smoothing out web-like material, such as fabrics or the like, in the form of a composite roller; the foregoing as described above and represented by way of example in the annexed plate of drawings.

Fig.1

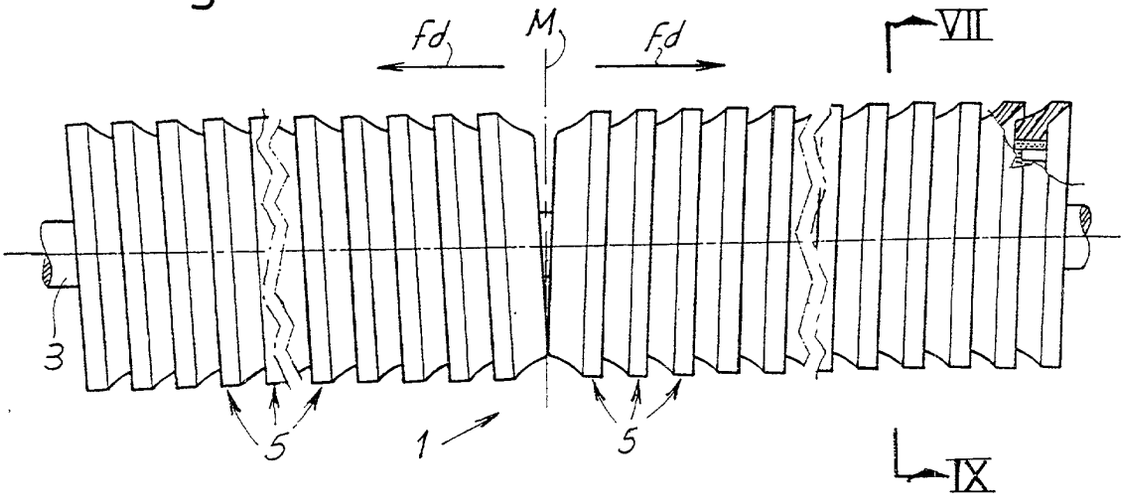


Fig.2

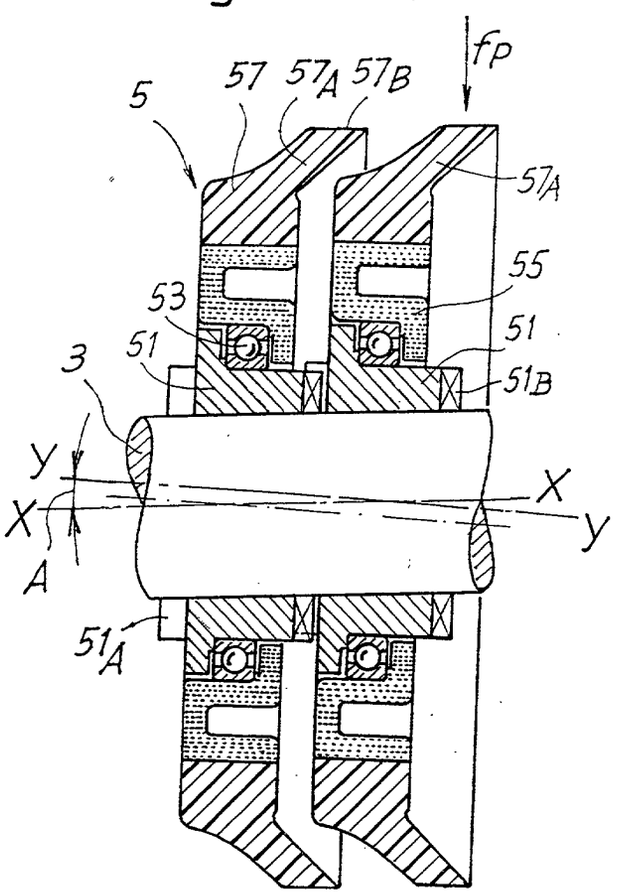


Fig.3

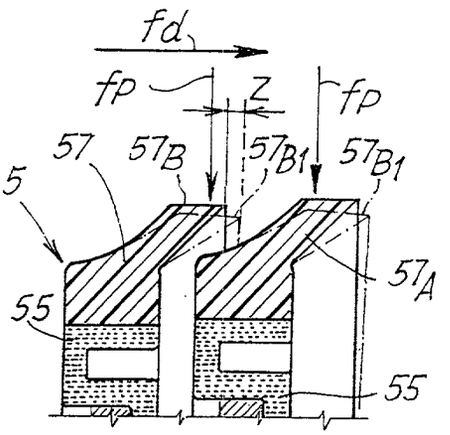


Fig.4

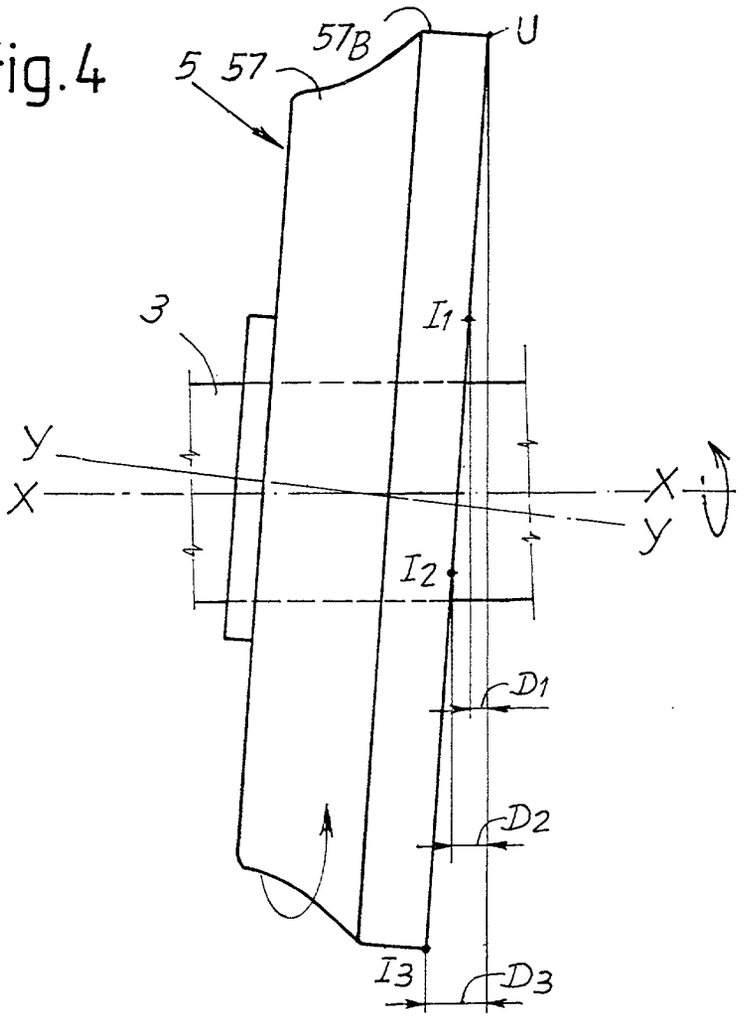


Fig.5

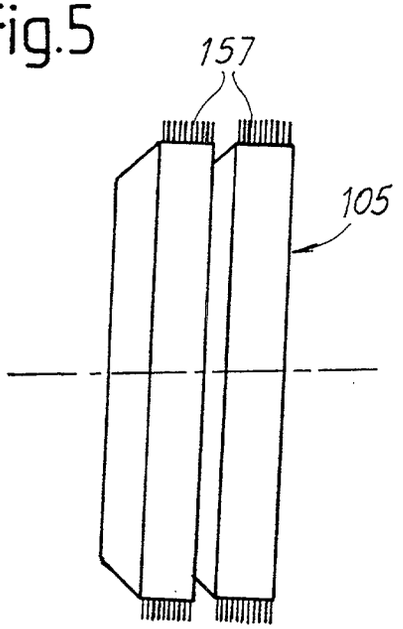


Fig.6

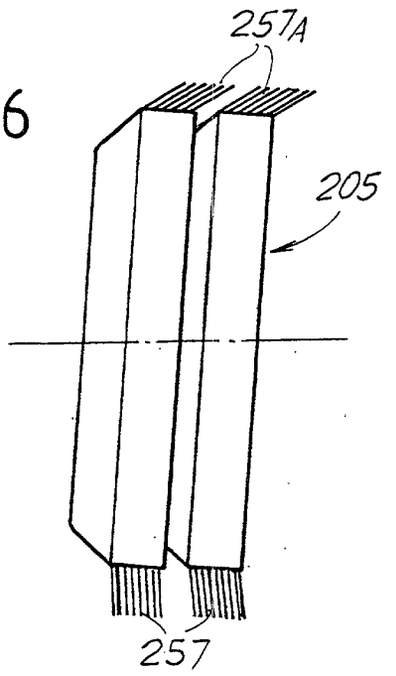


Fig.7

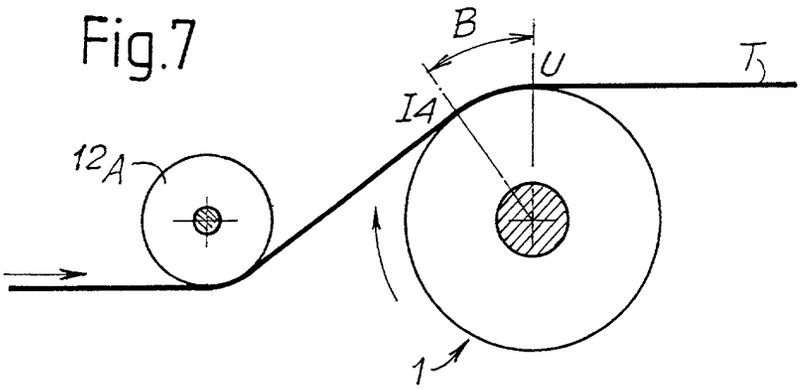


Fig.8

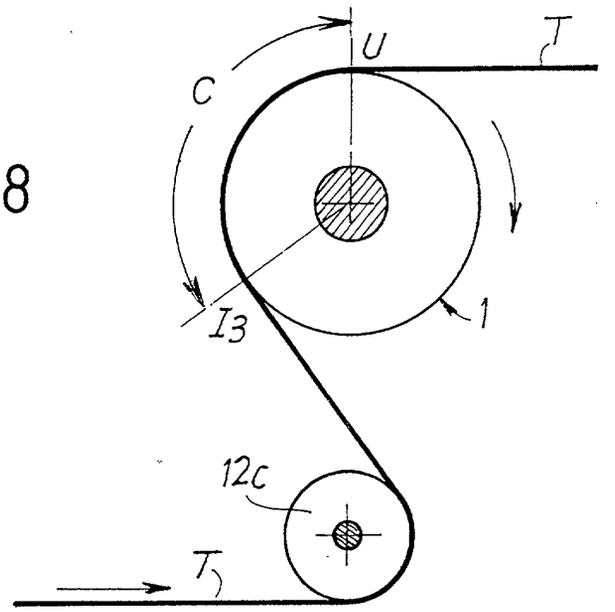


Fig.9

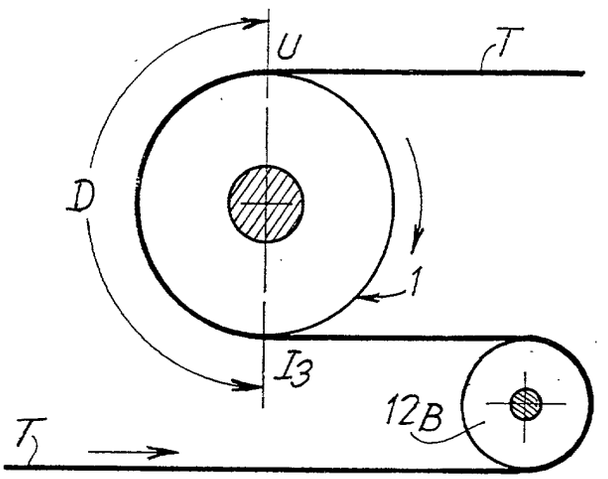
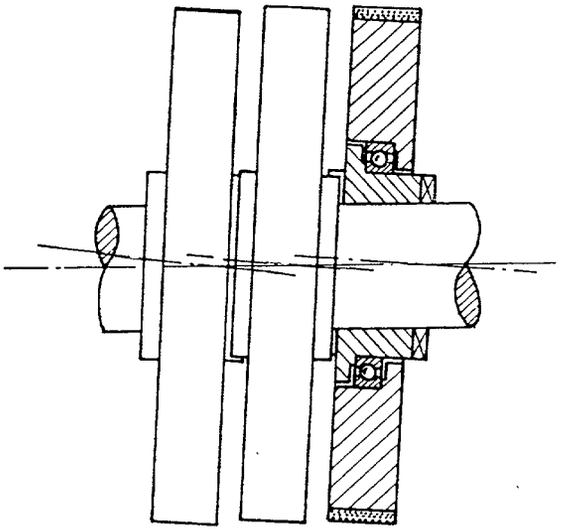


Fig.10



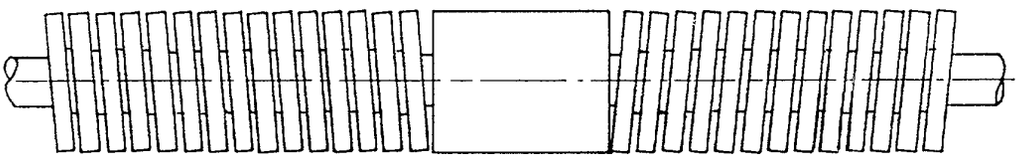


Fig.11

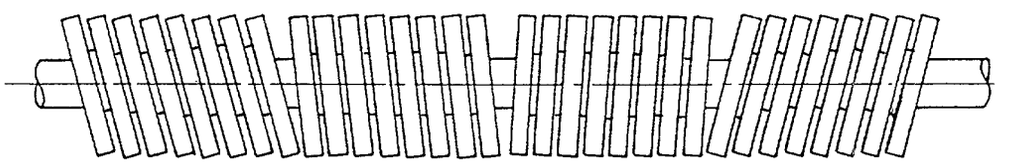


Fig.12

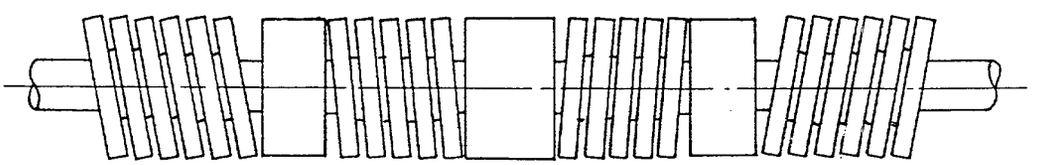


Fig.13