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(54) **Apparatus for surface treatment of fabrics**

(57) The apparatus comprises at least one rotor (9) which is grazed by the fabric (T) and diverts the sliding trajectory of the product; the active surface of the rotor (9) includes active regions for abrading the fabric by

grinding, said regions consisting of surfacing cylinders (22) alternated with active regions for abrading the fabric by brushing which consist of brush cylinders (24) or brushes, that is, brush-like plates; the feed speed of the fabric being lower than the peripheral speed of the rotor.

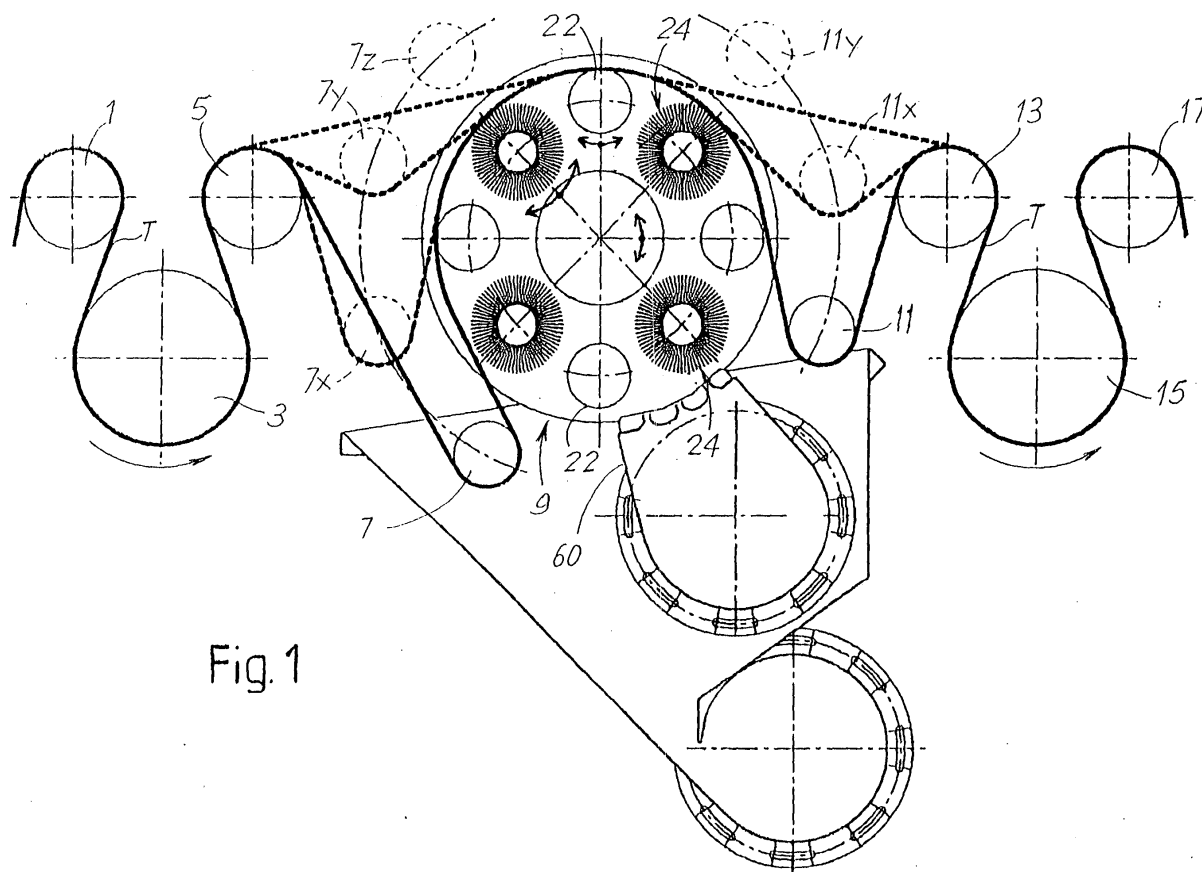


Fig. 1

Description

[0001] In the textile industry - especially for the manufacturing of wool textiles or the like - the pieces or rolls of fabric are treated through an abrasive-type brushing operation (that is, by means of flexible fringes holding abrasive granules which surface progressively) and/or through a grinding or proper abrasive operation; these two steps are carried out - when both required - one after the other and, in some cases, repetitively. The product, therefore, must be treated successively by different machines, with waste of time and space, and also with cost of equipment and manpower.

[0002] The object of the invention is to provide an apparatus which overcomes the above mentioned drawbacks and obtains further objects and advantages that will result evident from the following text.

[0003] The present apparatus for surface treatment of piece goods, comprises at least one rotor with active surface which is grazed by the product and diverts the sliding trajectory of the same product; the said active surface is characterized by comprising active abrasive regions alternated with active brushing regions; the feed speed of the product being lower than the peripheral speed of the rotor.

[0004] In a practical embodiment, the active regions for abrading the fabric belong to cylinders mounted on the rotor and with their periphery surfacing between contiguous active brushing regions carried by the same rotor; said cylinders being driven into rotation by a kinematic chain.

[0005] The active regions for the brushing may belong to cylinders mounted on the rotor and with their periphery surfacing contiguous active abrasive regions carried by the same rotor; said cylinders being driven into rotation by a kinematic chain. Alternatively, the active brushing regions may consist of non-rotating brushes or so-called plates.

[0006] The said cylinders for the abrasion, and/or the cylinders for the brushing, can be driven into rotation in a controllable manner and/or in opposite directions.

[0007] The peripheral speed of one of the groups of cylinders can be adjusted to correspond to the slide speed of the fabric relative to the rotor, thereby excluding one action on the fabric by the active regions of said cylinders ("zero-effect" condition).

[0008] Means may be provided for supporting said active regions (which are made up of cylinders and/or brushes or so-called plates), these means being movable from the active position surfacing the periphery of the rotor inwardly thereof, to positions gradually retracted, until they result withdrawn from the transiting fabric and, thus, in an inoperative position. Such support means can be slidably adjusted on radial guides or guides having at least a radial component, and blocked thereon in the desired positions.

[0009] A particular embodiment of the apparatus comprises a rotating carrier provided with a plurality of

said rotors positioned on the periphery of the same carrier; the product to be treated being then diverted by said rotors around an arc of the periphery of said carrier.

[0010] The apparatus with a single rotor comprises a kinematic chain for one group or for each group of cylinders; such kinematic chain being possibly made up of a transmission between a motorization and a driving-out member coaxial to the rotor, and of a flexible transmission between said driving-out member and at least one of the cylinders of the group, as well as of transmission means between the various cylinders of the same group.

[0011] The apparatus with movable carrier which carries more rotors, is provided with a kinematic chain including a transmission between a first motorization and a first driving-out member coaxial to said carrier, and at least one transmission between said first driving-out member and the axis of at least one of the rotors. Provided for the group of grinding cylinders of the various rotors is at least one transmission between a second motorization and a second driving-out member coaxial to said carrier, at least one transmission between said second driving-out member coaxial to said carrier and a third driving-out member coaxial to the axis of at least one of said rotors; and a transmission between said third driving-out member and the abrasive cylinders of said rotor.

[0012] The invention will be best understood by following the description and the attached drawing, which shows a practical, not limiting example of the same invention. In the drawing:

- Fig. 1 shows a schematic assembly of a first embodiment of the present apparatus with a single rotor;
- Fig. 2 is an ensemble side view comprising the transmissions for driving the operating cylinders;
- Fig. 3 is an axial view of a transmission for the movement between the operating cylinders of a same group of cylinders;
- Figs. 4 and 5 show device for adjusting the radial position of operating abrasive cylinders and, respectively, of cylinders with brushes or so-called plates;
- Fig. 6 shows in axial view the said devices for radial adjustment of the cylinders;
- Fig. 7 is a schematic assembly of a modified embodiment of the apparatus shown in Fig. 1, wherein the brushing cylinders are replaced by non-rotating brushes or plates;
- Fig. 8 shows a device for adjusting the non-rotating brushes or plates of Fig. 7;
- Fig. 9 is an axial view of the systems for adjusting the abrasive cylinders and the non-rotating brushes or plates;
- Fig. 10 is a schematic assembly drawing of an apparatus with a plurality of rotors mounted on the periphery of a rotating carrier; and

- Fig. 11 shows an assembly of transmissions for driving into motion the members of the carrier of Fig. 10.

[0013] According to the drawing, reference being made to Figs. 1 to 6, numerals 1, 3 and 5 indicate rollers for diverting the fabric T to be fed to the apparatus in question, the roller 3 being a conveyer roller. Numeral 7 indicates a feeding roller, that is, a roller of approach to a rotor generally indicated with 9 and carrying the active members; numeral 11 indicates a roller for the output of the fabric; the fabric T being moved away by rollers 13, 15 and 17 similar to those indicated by 1, 3 and 5.

[0014] The rotor 9 comprises an axial structure 20 supported by a fixed casing 21. The axial structure 20 is developed with two discoidal components 20A spaced apart by an extension greater than the operating front of the apparatus, that is, at the "height" of the bolt of fabric to be treated by grinding (that is, by abrasion) and brushing. Mounted between these two discoidal components 20A are the operating cylinders 22 provided with abrasive surface and so located as to graze the peripheral surface of the rotor 9 to define active abrasion regions, said abrasive cylinders being in number of four in the example illustrated in Fig. 1 but also being possibly provided in a higher or lower number. Further brushing cylinders 24 are also distributed peripherally to make them surfacing from the periphery of the rotor 9 and be supported as well by the two discoidal components 20A of rotor 9. These brushing cylinders 24 make up, therefore, the active brushing regions which alternate the active grinding regions which are created by the grinding or abrasive cylinders 22.

[0015] Numeral 26 indicates a motorization for the axial structure 20 of the rotor 9. Indicated by 28 is a motorization for the grinding cylinders which operate said abrasion; this motorization 28 provides a kinematic chain which comprises a transmission 30 between the motorization 28 and an axial driving-out member 32 mounted on the axial structure 20, and a transmission 34 between this driving-out member 32 and the shaft of one of the abrasive or grinding cylinders 22. Numeral 36 indicates a further motorization intended for driving the brushing cylinders 24 via a kinematic chain which comprises a transmission 38 between the motorization 36 and a driving-out member 40 coaxial to the axial structure 20 of the rotor 9, and a second transmission 42 between said driving-out member 40 and the axis of one of the brushing cylinders 24. The two motorizations 28 and 36 can be disposed on opposite sides, that is, in correspondence of the two opposite ends of the rotor 9, according to overall dimensions requirements. Between the cylinder 22 driven into rotation by the transmission 28, 30, and the other grinding cylinders 22 provided along the periphery of the rotor 9, is a belt transmission such as the one shown in Fig. 3; a similar belt transmission is provided between the brushing cylinder 24 driven into rotation by the motorization 36, 38, 40, 42, and the other brushing cylinders 24 alternately distributed with

the abrasive cylinders 22 along the periphery of the rotor 9. In Fig. 3, the transmission between the cylinders of the same type, comprises an axial driving-out belt 46 over the axial structure 20 of rotor 9, and wheels for belts engaging the four cylinders to be actuated. A driving-out wheel 48 can be adjusted - for example radially - in position to ensure the tensioning of the belt 46 by means, to be described later on, for the radial adjustments of the axes of the operating cylinders, such as those indicated by 22 or 24 driven by the same transmission belt.

[0016] The operating cylinders, such as those indicated by 22 or 24, may be adjusted in radial position independently from each other, while maintaining the transmission in operating condition between the cylinders of the same group, inasmuch as the cylinders, such as those indicated by 22, are mounted in such a way as to allow the positioning thereof by adjustment devices, like the one shown in Fig. 4 for the abrasive cylinder 22 illustrated therein. This cylinder, like all the others of the same group, is mounted on two support prism-shaped means 50 sliding along radial guides possibly consisting of slits 52; these prisms can be adjusted by screw means 54 and locked by lock nuts 56 and - for safety's sake - with pressure screws 58 as well, acting along slits 52 making up the slide guides and which, however, may also be provided by the threaded stems 54. These arrangements are repeated for each of the two groups of operating cylinders 22 and 24, independently from each other and according to the operating function required from the type of abrasive, respectively, brushing cylinders.

[0017] With this adjustment of the radial position of the individual groups of cylinders, such as those indicated with 22 and 24, it is possible to preset as desired the treatment of the fabric in transit by means of the operating cylinders of each group. The work can be regulated, besides adjusting the radial positions of the cylinders, also by the rotational speed of the rotor 9 and of the individual cylinders, such as those indicated with 22 and 24, as well as by the ratio between the peripheral speed of rotor 9 and the transit speed of the fabric along the paths determined by the rollers 1, 3, 5 and 13, 15, 17, as shown in Fig. 1. A further possibility for adjustment is that of displacing the feeding roller 7, respectively the output roller 11, in order to change the arc of deviation of the fabric around the rotor 9; the adjustments are clearly visible from the position depicted with chain-dotted line for the roller 7 and for the roller 11, and indicated with 7X, 7Y, 7Z and with 11X, 11Y in Fig. 1; it is thus possible to carry out a wide range of adjustments.

[0018] Indicated by 60 in Fig. 1 is a suction unit for the periodic and systematic cleaning treatment of the rotating brushing cylinders and abrasive cylinders, such as those indicated by 22 and 24.

[0019] Shown in Figs. 7 to 9 is a modified embodiment, with respect to the preceding example, which consists in the replacement of the brushing cylinders 24 by fixed brushes or so-called plates 124, which alternate

grinding cylinders 22. Also the brushes or plates 124 can be regulated in radial position with respect to the periphery of the rotor indicated by 109 in this embodiment, so as to surface by a more or less extent at the periphery of the same rotor. The fixed brushes or plates 124 do not require a transmission for their rotation, which is instead required in the previous example for the brushing cylinders 24. As for the rest, the disposition is equivalent to that already described. In Fig. 8, the system for the radial adjustment is provided with support means 150, equivalent to those indicated by 50, and on which the brush 124 is mounted without rolling bearings but again through radial adjustment means indicated by 154, 156 and 158 equivalent, respectively to 54, 56 and 58.

In both the solutions, the members 50 and 150 can be adjusted in position by using graduated control scales such as those indicated by 50A and 150A, respectively.

[0020] Shown in Figs. 10 and 11 is a further modified embodiment in which - instead of exhibiting a single motor such as that indicated by 9 or 109 of the preceding examples - there is provided a rotary carrier with an axial structure 202 and discoidal components 204, between which there are mounted two series of rotors 206 each of which being possibly formed like the rotor 109 of Fig. 7, that is, with fixed brushes (plates) equivalent to those indicated by 124, and with grinding or abrasive cylinders 222 equivalent to those indicated by 22 and interposed between the fixed brushes (plates) 224. Each of these cylinders 222 is interposed between brushes (plates) 224 with the same disposition as shown in Fig. 7 and relating to the rotor 9. Each of the rotors 206 must be driven into rotation around its own axial structure 220, while the rotors 206 must be made to rotate.

[0021] To drive into rotation the rotor 200, the individual rotors 206 and individual cylinders 22 mounted on the rotors 206, there are provided respective motorizations as shown in Fig. 11.

In particular, numeral 230 indicates a motorization which actuates directly the axial structure 202 of the carrier 200 which includes the discoidal components 204. Two separate motorizations 232 are dedicated to the rotation of rotors 206 positioned perimetrically on the rotating carrier 200. Each of the two motorizations 232 comprises a kinematic chain consisting of a first transmission 234 between the motorization 232 and a first coaxial driving-out member 236, as well as a second transmission 238 between said first driving-out member 236 and the axial structure 220 of one of the two rotors 206. Two further motorizations 240 are predisposed for the rotation of the abrasive cylinders 222 of rotors 206; each of these motorizations 240 makes part of a kinematic chain which includes a transmission 242 between the motorization 240 and a second driving-out member 244 coaxial to the structure 202 of carrier 200, 204; a second transmission 238 between the second driving-out member 244 and a driving-out member 248 coaxial to the axial structure of one of the rotors 206; moreover, a transmission 250 is provided between the second driv-

ing-out member 248 and one of the abrasive cylinders 222 of one or more of rotors 206. Further transmissions are provided between the cylinders 222 adjoining the various rotors 206.

[0022] In all the embodiments it is possible to adjust the speeds relating to the various members which cooperate with the various transmissions and even to stop some of the rotations. In conclusion, it is possible to achieve an extremely variable number of treatments of the fabrics by a simple operation and a high productivity, inasmuch as the fabric undergoes a plurality of desired treatments by passing one time only through the apparatus.

Claims

1. An apparatus for surface treatment of fabric piece goods, comprising at least one rotor with active surface which is grazed by the good and diverts the sliding trajectory of the same good, **characterized in that** the said active surface comprises active regions for abrading the fabric by grinding, alternated with active regions for abrading the product by brushing, and **in that** the feed speed of the fabric is lower than the peripheral speed of the rotor.
2. Apparatus according to claim 1, **characterized in that** the active regions for the abrasion of the fabric belong to cylinders mounted on the rotor and with their periphery surfacing between adjoining active regions for the brushing which are carried by the same rotor, said cylinders being able to be driven into rotation via a relevant kinematic chain.
3. Apparatus according to at least the claim 1, **characterized in that** the said active regions for the brushing belong to cylinders mounted on the rotor and with their periphery surfacing between adjoining active regions for the abrasion which are carried by the same rotor, said cylinders being able to be driven into rotation via a relevant kinematic chain.
4. Apparatus according to claim 2 or 3, **characterized in that** said cylinders for abrading and/or said cylinders for brushing are driven into rotation in a controllable manner and/or in opposite direction.
5. Apparatus according to at least one of the preceding claims, **characterized in that** the peripheral speed of the cylinders of one of the group of cylinders is adjustable to correspond to the slide speed of the fabric with respect to the rotor, so as to exclude any action on the fabric by the active regions of said cylinders.
6. Apparatus according to at least claim 1 and/or 2, **characterized in that** the said active regions for the

brushing consist of brushes (plates) with an active surface fixed with respect to the periphery of the rotor or so-called plates.

7. Apparatus according to at least one of the preceding claims, **characterized in that** it comprises means for supporting the said active regions - made up of cylinders and/or brushes (plates) - said support means being movable from the active position, in which they surface the periphery of the rotor, to a position inwardly of the same periphery by progressively retracting as far as to result withdrawn from the fabric in transit and thus, up to an inoperative position. 5
10
8. Apparatus according to claim 7, **characterized in that** the said support means are adjustable for sliding on radial guides, or guides having at least a radial component, and blocked thereon in the desired positions. 15
20
9. Apparatus according to at least one of the preceding claims, **characterized in that** it comprises a rotating carrier provided with a plurality of said rotors positioned on the periphery of the same carrier, and **in that** the good is diverted by said rotors around an arc of the periphery of said carrier. 25
10. Apparatus according to at least one of the preceding claims, wherein associated to said rotor, respectively said rotating carrier, is a piece good-diverting system with a feeding roller to feed the same good to the rotor, respectively to the carrier, and an output roller to move the good away from the rotor, respectively the carrier, **characterized in that** at least one of said rollers is adjustable in position in order to change the good's deviation arc around the periphery of the rotor, respectively the carrier. 30
35
11. Apparatus according to one of claims 2 to 8, **characterized in that** the said kinematic chain comprises, for one group of cylinders or for each group of cylinders, a transmission between a motorization and a driving-out member coaxial to the rotor, and a flexible transmission between said driving-out member and the cylinders of the group. 40
45
12. Apparatus according to at least one of claims 2 to 9, **characterized in that** the said kinematic chain comprises: a transmission between a first motorization and a first driving-out member coaxial to said carrier and at least a transmission between said first driving-out member and the axis of at least one of the rotors; and for the group of grinding cylinders of the various rotors at least a transmission between a respective second motorization and a second driving-out member coaxial to said carrier, at least one transmission between said second driving-out 50
55

member coaxial to said carrier and a third driving-out member coaxial to the axis of at least one of said rotors; and a transmission between said third driving-out member and the abrasive cylinders of said rotor.

13. Apparatus according to claim 12, in which the brushing members (plates) do not rotate.

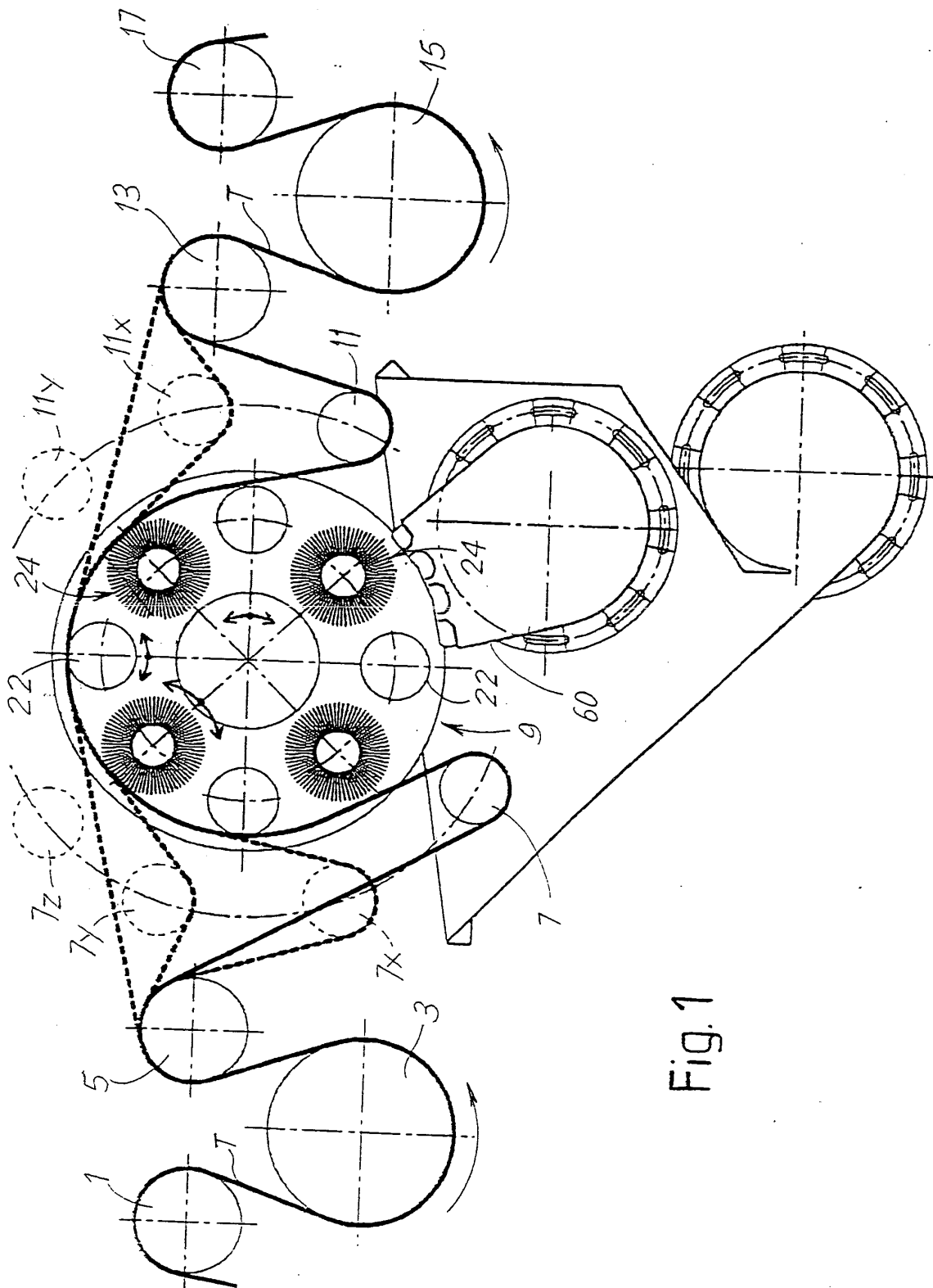


Fig. 1

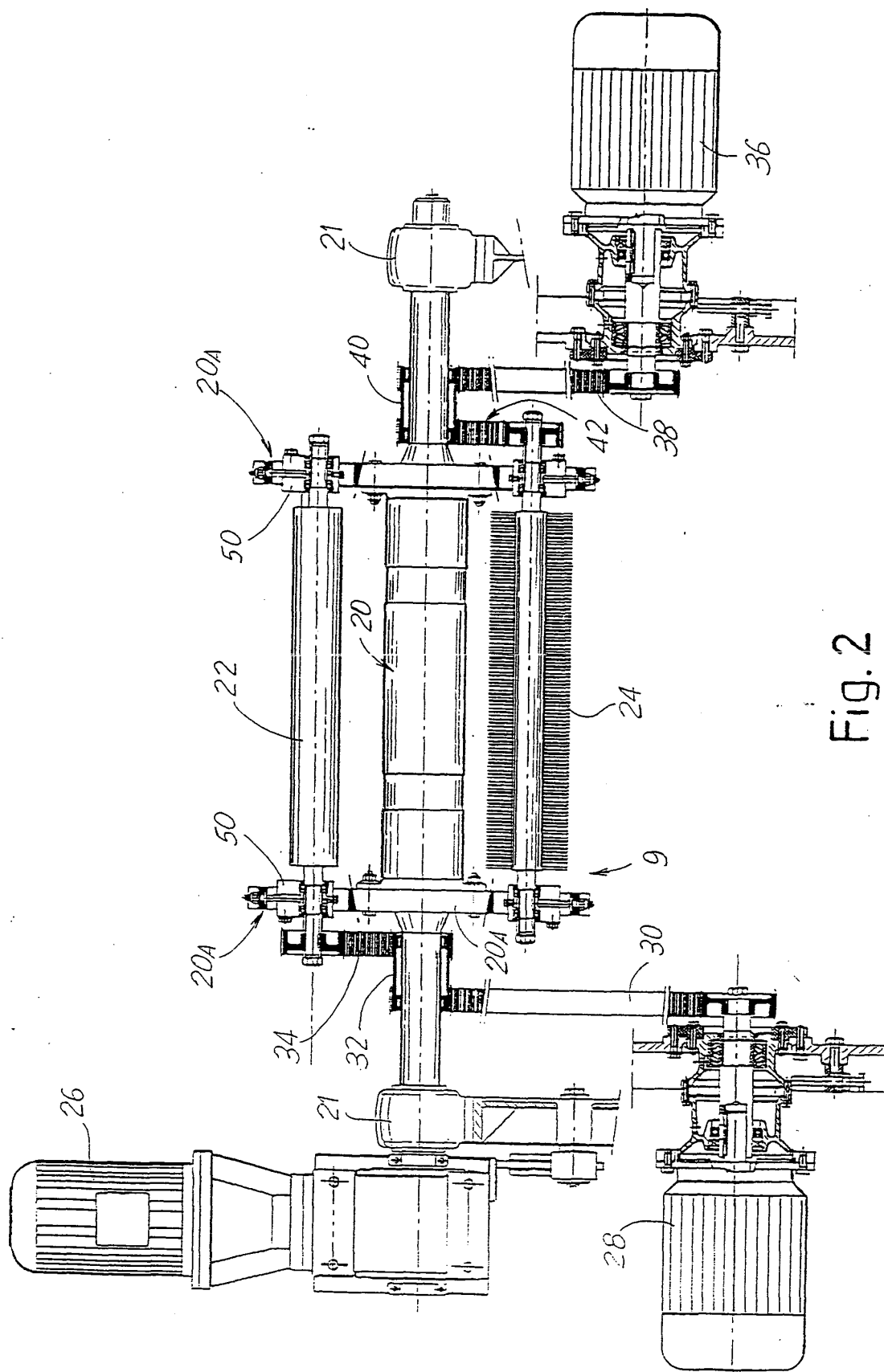


Fig. 2

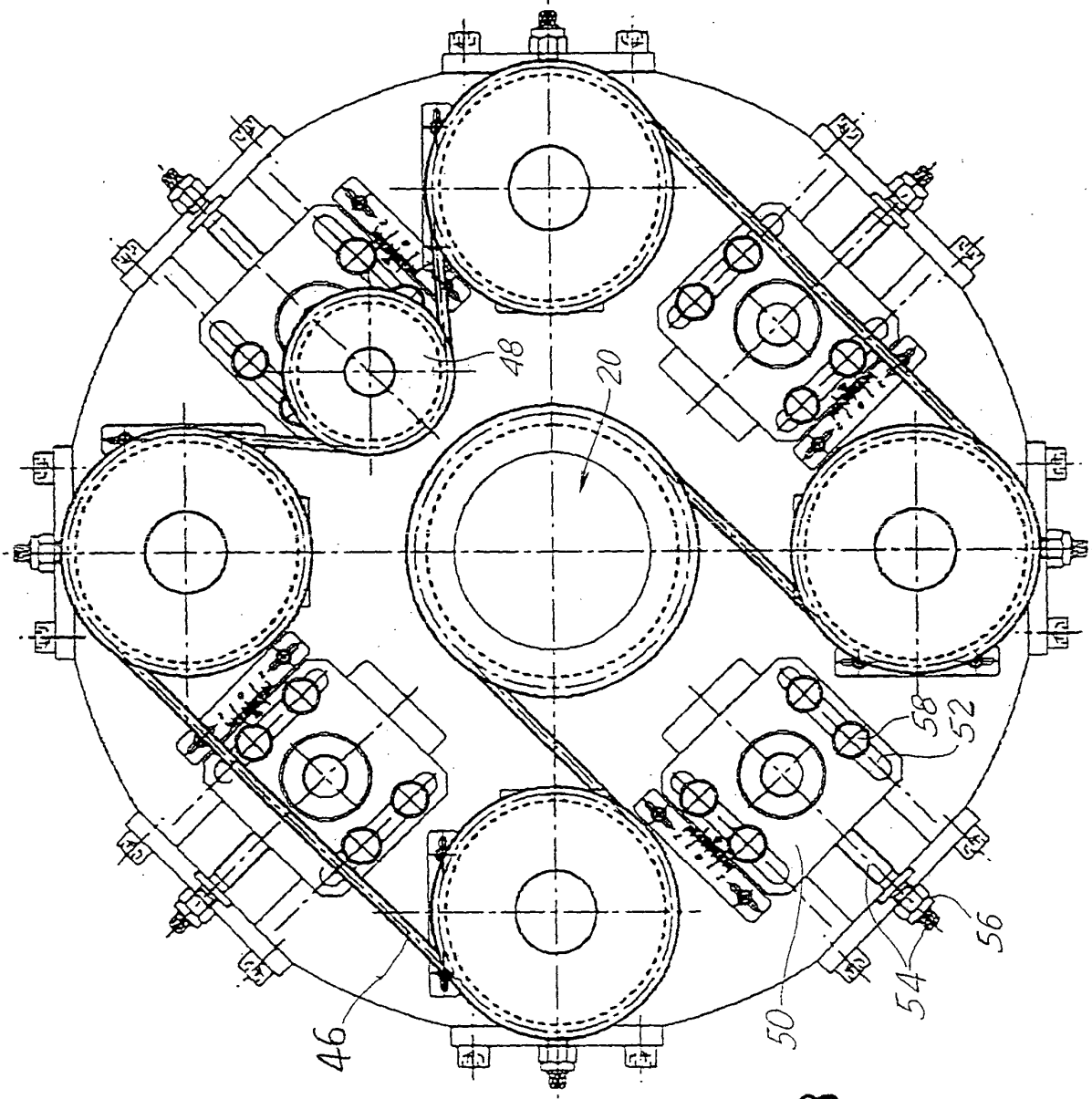
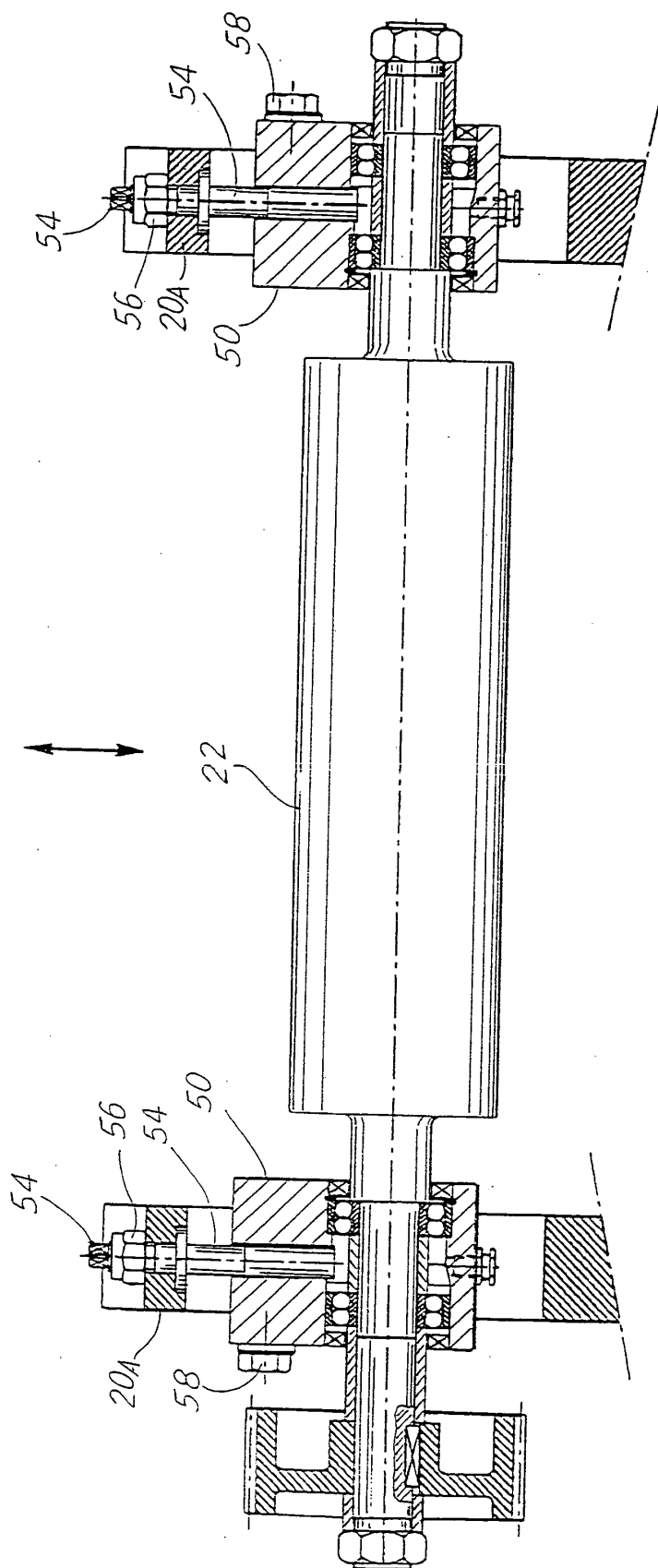


Fig.3



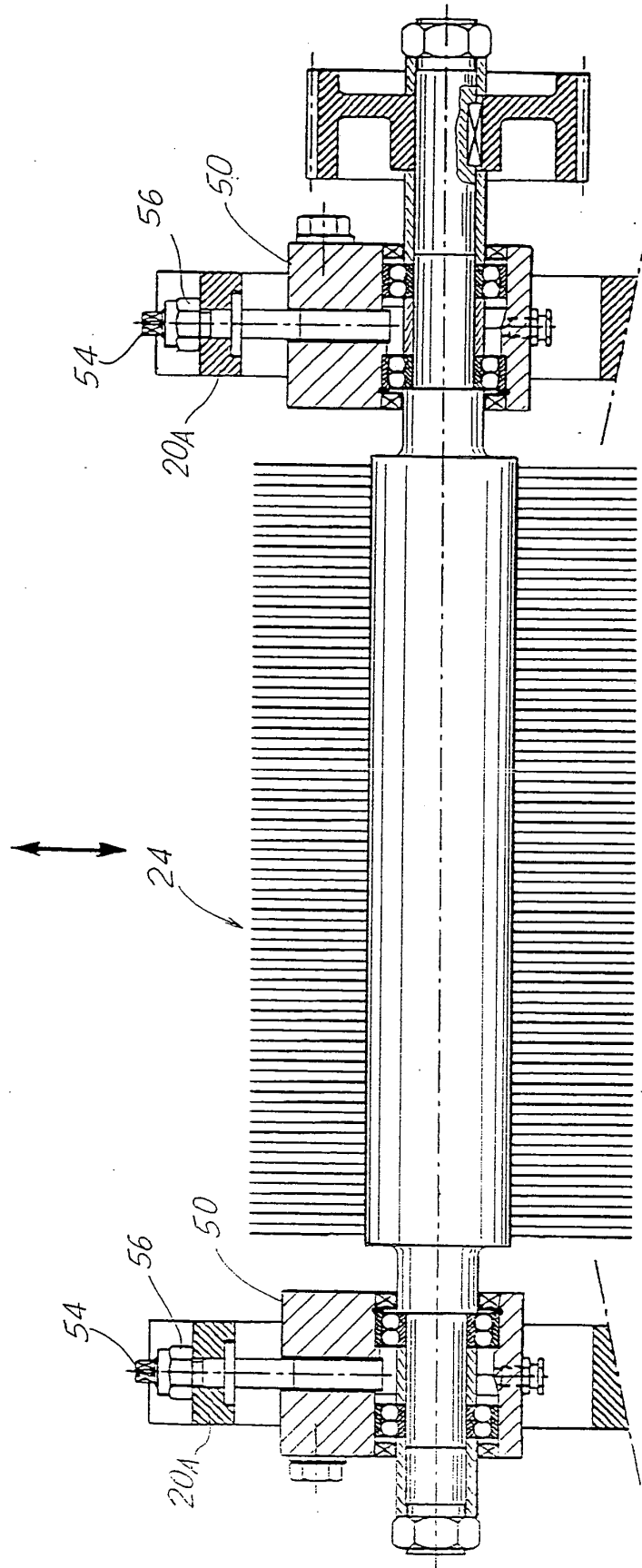
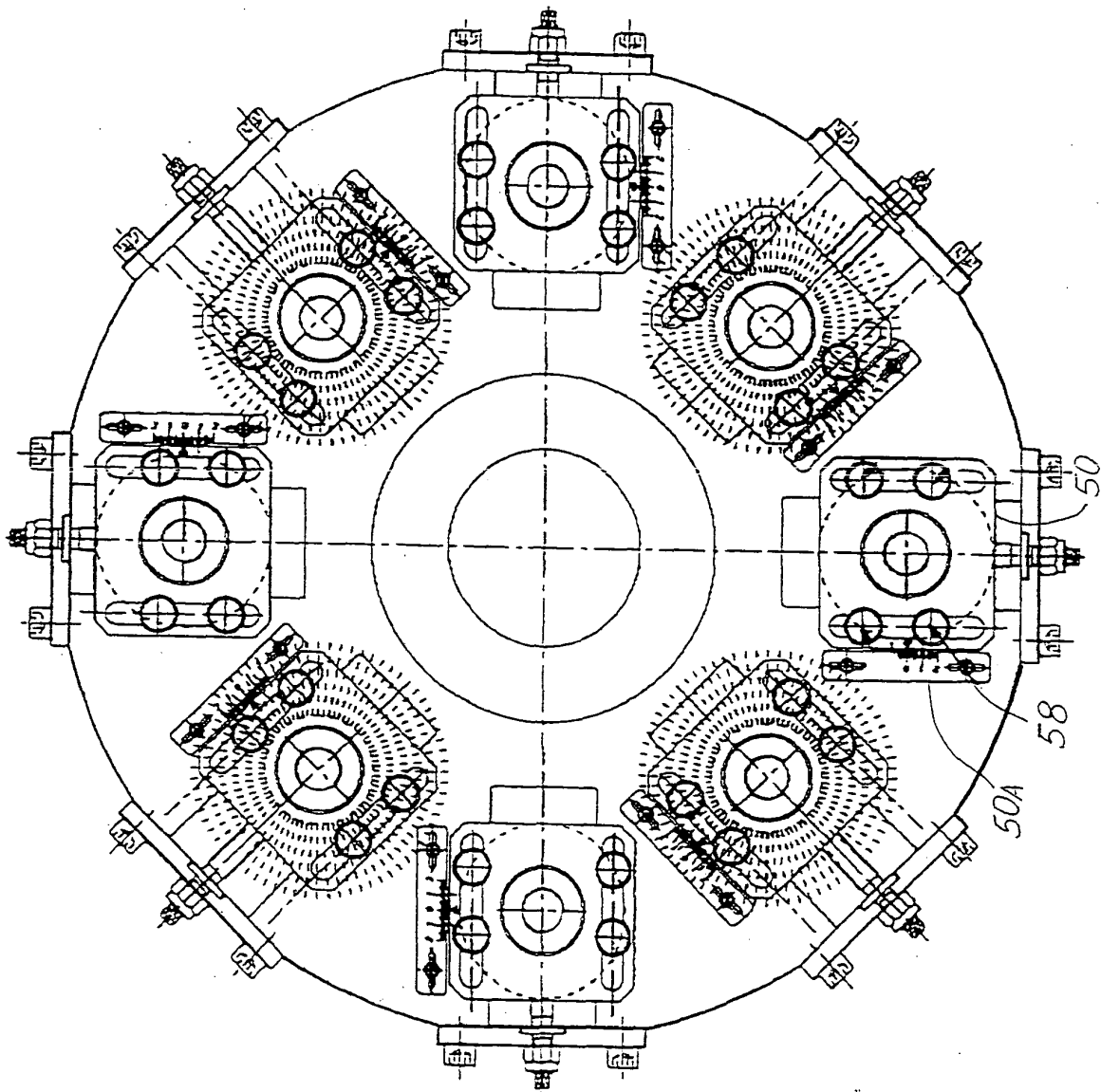


Fig.5

Fig. 6



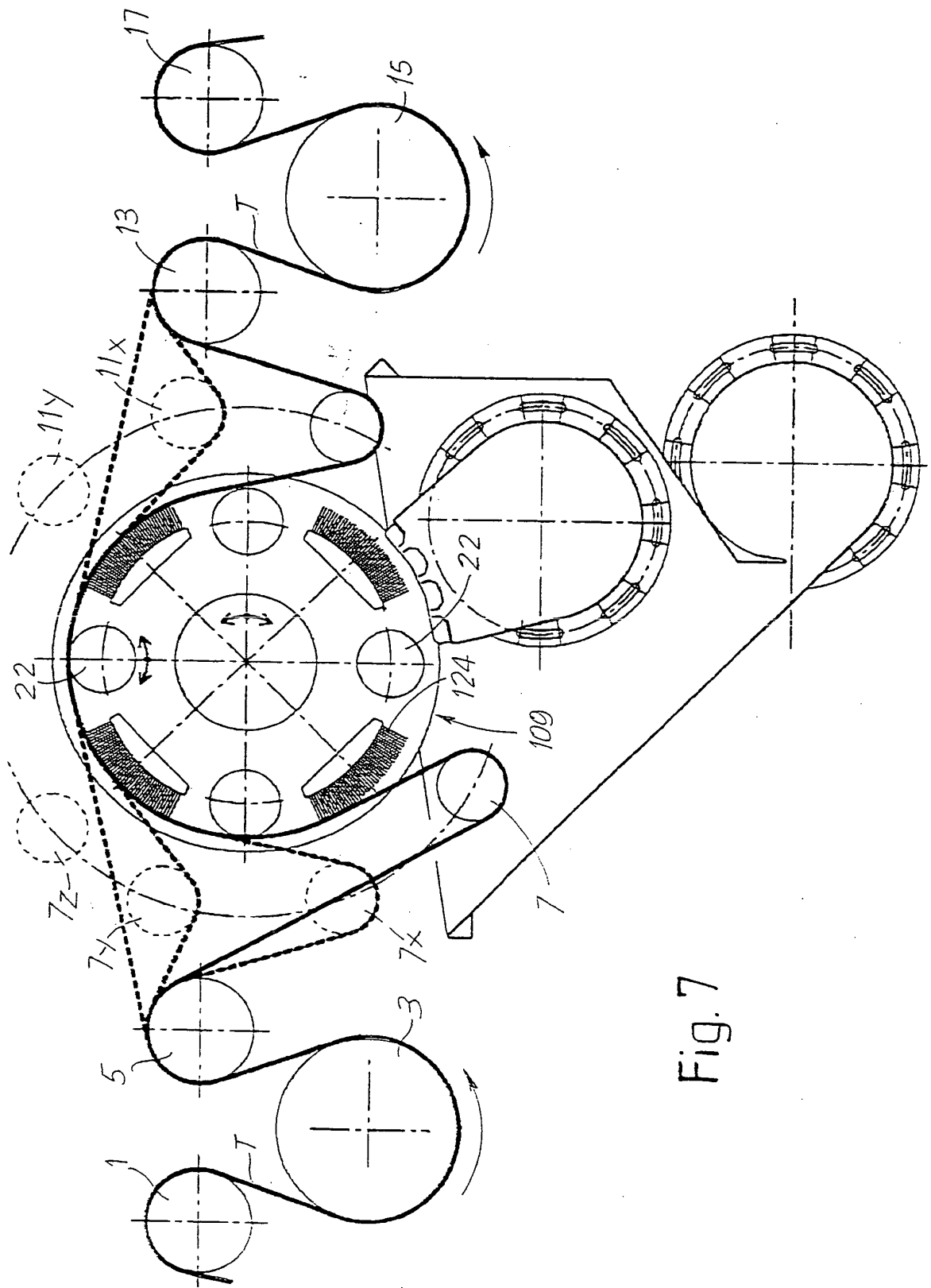


Fig. 7

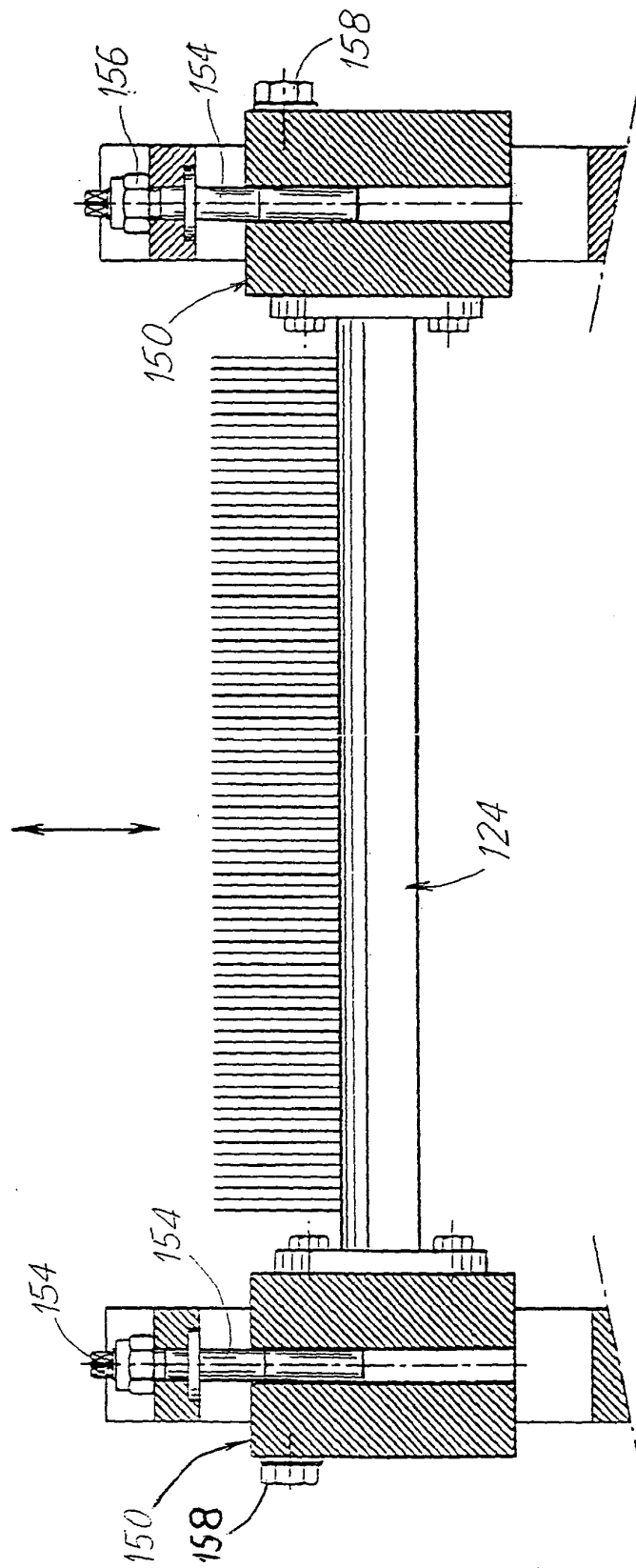


Fig. 8

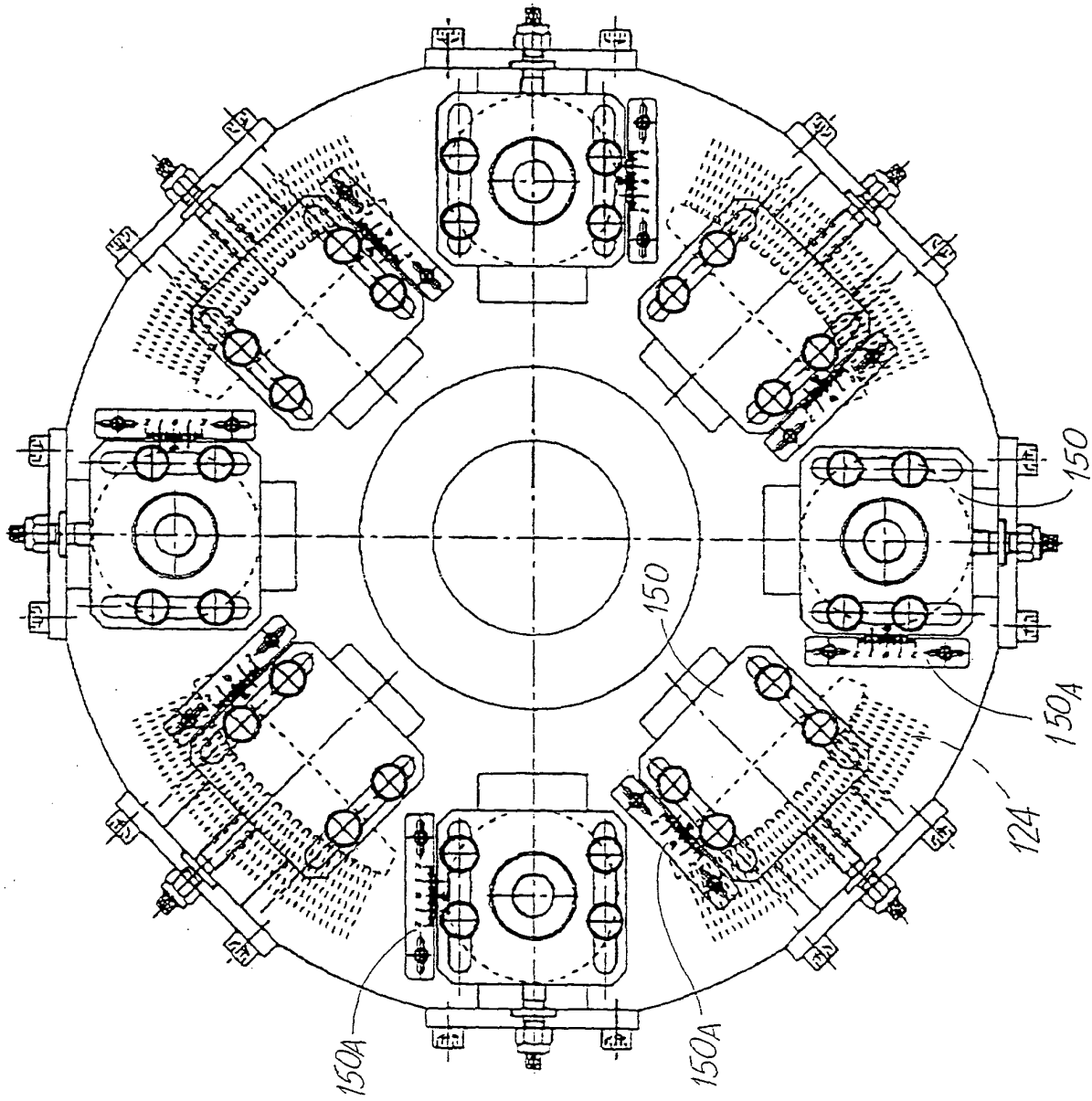


Fig. 9

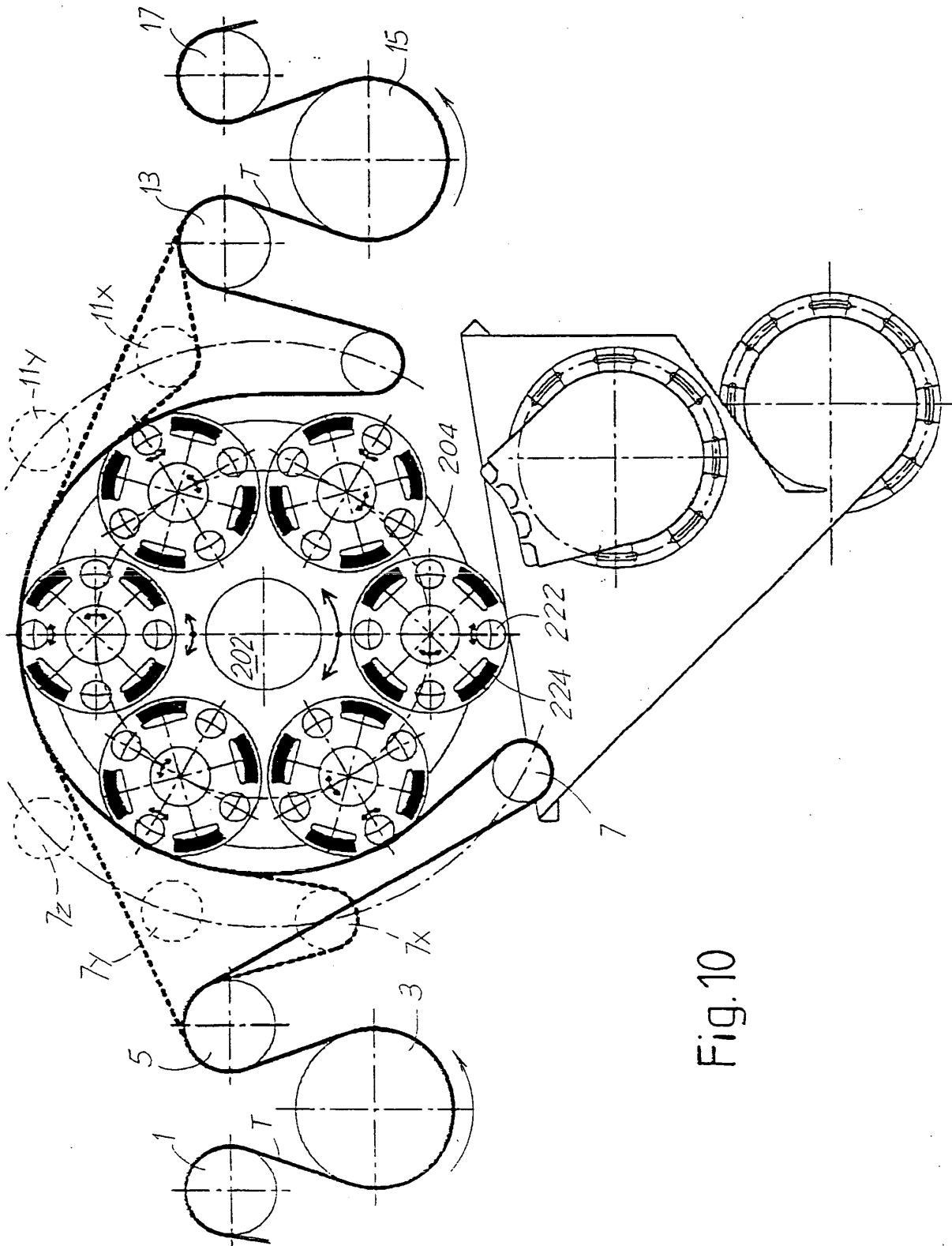


Fig. 10

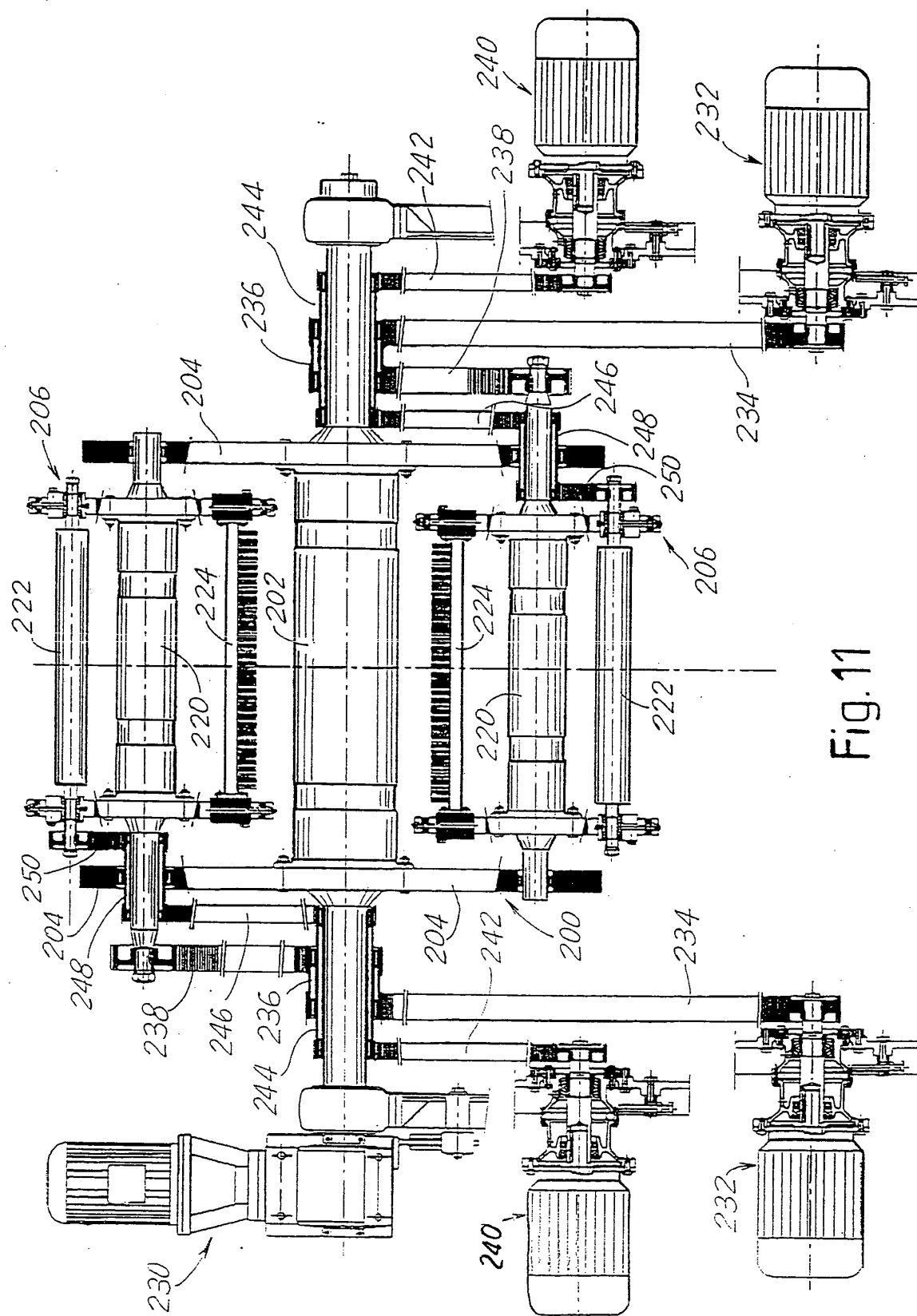


Fig. 11