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(54) **Head with combs.**

(57) The invention concerns a head with combs, which is advantageously, but not essentially, a head with combs with a double needle field (11-12), for the processes of drawing and combing slivers of textile fibres, whereby the possible upper needle field (11) can be opened as wished and there are envisaged devices for cleaning the needles (15), suction groups (16) and drawing and feeding groups (13-14) and whereby the needles (24) are caused to move forward by a thrust action, said head being characterized by the fact that each needle field (11-12) comprises a double opposed plurality, closed ringwise (20), of blocks (18) side by side and perhaps connected together, said blocks (18) being thrust by sprocket means (25) positioned upstream from said needle field (11-12), whereby said opposed blocks (18) are in pairs and there is envisaged in the inner opposed faces of said blocks (18) a vertically oriented hollow (22) within which a needle-bearing (24) bar (23) is lodged in a movable manner, and whereby at least part of the course of said blocks (18) co-operates with stationary cam means (42-43-142) and the vertical positioning of said needle-bearing (24) bars (23) is conditioned by a trajectory determined by stationary cam means (29-30).

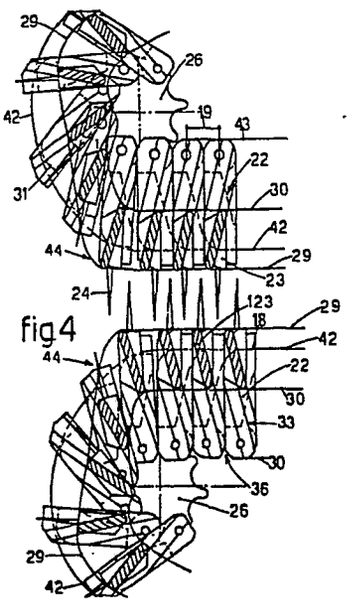

fig 4

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Description of the invention entitled:
"HEAD WITH COMBS"
in the name of OFFICINE SAVIO S.p.A.
submitted on under No.

This invention concerns a head with combs; to be more exact, the invention concerns a head with combs with a double needle field, suitable for processing textile fibres.

The so-called screw-type and chain-type heads with combs are known; the disk heads and rotating comb heads are also known.

The disk heads, designated commercially as rotary heads, are suitable for processing fibres cut to a wool staple length in a preliminary combing operation or for half-combed fibres.

These disk heads can be used advantageously for the first and second preparatory passes, and the regularity of the sliver coming out from these disk heads is in itself poor.

Moreover, the disk heads involve setting difficulties at the start of the batch and, although they can work theoretically at up to a maximum of 300-350 metres a minute, in actual fact their operating speed is not higher than a speed at least 15-20% below that level.

The rotating comb heads, for which the present author

has submitted relative applications for patents, are instead suitable for processing fibres of a wool and/or cotton staple length.

This type of head comprises a working field greater than that which can be obtained with the rotary disk heads, but said field is still not big.

The limitations to the application of these heads, which offer a high processing speed, spring from the short working field of the needles in processing the sliver being worked.

To obviate the technical shortcomings inherent in the rotary heads and disk heads, chain-type gill boxes have been designed. Chain-type gill boxes involve the substantial drawback of not ensuring the ability to regulate the material leaving them. This lack of ability to regulate the sliver arises from the fact that the chain drive permits an elongation of the chain and needs continuous adjustment.

Chain-type gill boxes also involve the shortcoming, as compared, for example, to the rotary head gill box of the present author, of offering a limited field of use and of providing a considerably worse technological performance.

Gill boxes have also been proposed which have combing mats of serrated rubber, or smooth combing mats, or drawing mats of which the upper one is of serrated rubber while the lower has steel combs. But in practice these gill boxes can only be used in the third pass and with fibres with a large yarn count and half-combed fibres. As these gill boxes have the fibres gripped elastically, they cannot be used in other passes and, in any event, offer a limited field of use.

To obviate the problem of the elongation of the chain and the other problems of known gill boxes, a gill box has also been proposed with substantially cylindrical bars thrust continuously into the working area, whereby one bar is linked to another with a connecting element and the orien-

tation of the needles is obtained by making the bars rotate on their own axis by means of a lever.

This system too involves shortcomings owing to elongation, to wear and to combined bending and compression force or stress exercised on the plurality of bars, which therefore have to be checked constantly as regards both their state of maintenance and their temporary position.

Furthermore, in this known solution each bar itself has to perform all the functions of guiding, positioning and orienting and becomes stressed in a dynamic manner too to a very high degree.

Next, this known solution involves considerable maintenance and replacement problems.

Lastly, this known solution is not able to bring about an entry of the needles into the sliver being processed and a departure of the same therefrom such as will not interfere with the mass of the fibres in an irregular manner.

The present invention tends to improve the known systems, and said improvements are aimed at the accomplishment of a plurality of advantages.

A first advantage is the attainment of better and higher working speeds.

A second advantage is the obtaining of a better quality in the sliver processed.

Yet another advantage is the accomplishment of an improved and even penetration of the bars into the material.

A further advantage is an improved departure of the bars from the material being processed.

Another advantage again is to obtain a simple device, easy to control and maintain, reliable in the long term and very strong.

According to the invention the problems connected with the elongation of the chain are wholly eliminated, as also

are those linked to the specific stresses acting on the bars in the known types. Other problems are also eliminated, as will be seen hereinafter in the description.

According to one formulation of the invention, two opposed series of blocks, suitably shaped and predisposed side by side to form the series, are thrust by coordinated sprockets.

This plurality of blocks side by side can perhaps, but not necessarily, be mutually connected to each other by a ring which only serves to carry out a function of auxiliary connection between neighbouring blocks.

According to the invention the blocks are moved by thrust; said thrust can be exercised without difficulty and without consequences since the bearing surface of the blocks can be dimensioned as desired. The blocks are envisaged as being in facing pairs so as to form two coordinated and opposed series closed ringwise.

According to the invention the blocks include in their facing sides some appropriate grooves within which are inserted some needle bars which can move on one of their lengthwise vertical surfaces.

Said needle bars cooperate with an appropriate guide-cam groove lying on a plane at right angles to the lengthwise axis of the bars themselves and lying near the periphery of transit of the individual pluralities of blocks.

This guide-cam groove cooperates with the bars and conditions their temporary positioning in respect of the carrying blocks and of the sliver of fibres to be processed.

The blocks too are conditioned advantageously, in at least one tract of their course, by at least one system of guide-cams able to ensure the desired positioning of the blocks themselves.

The course of the blocks lies substantially near the

tangents to two or more activation and guide sprockets, while the course of the needle-bearing bars can be varied as wished to suit the conformation of the cams as predisposed and as constituting said groove cooperating with them.

The invention permits a considerable movement of the bars, that is, a considerable vertical displacement thereof and, therefore, a considerable penetration by the needles. It also permits a relative speed, adjustable as wished, of penetration of the needles into the sliver of fibres.

It permits, besides, an appreciable relative speed of departure of the needles during the phase of release of the sliver of fibres, and the departure of the needles can take place substantially in a direction at right angles to the axis of feed of the sliver.

The departure of the needles in a direction at right angles to the axis of feed of the sliver is facilitated by the conformation of the blocks. It can be further facilitated by one or more possible and advantageous lateral conformations in the blocks, these conformations cooperating with one or more holding and positioning cams.

According to the invention the needle-bearing bars can be readily replaced, being substantially independent of the blocks; for there is only a lengthwise bond of thrust between blocks and bars, and the bars are free to move vertically within the grooves present in said blocks.

According to the invention the blocks do not involve substantial wear problems because they provide the possibility of suitable and widely different dimensioning and also because of the way in which they are made to work.

Moreover, according to the invention the upper needle field can be opened with a fulcrum as wished so as to enable the gill box to be examined, regulated and set without any difficulty.

The conformation allowed by the invention next makes it possible that during the phase of closure of the two needle fields no special attention is needed for setting them in cooperation and phase since this takes place automatically owing to the system embodied for the transmission of motion.

Furthermore, the chamber defined by the plurality of needle-bearing bars can be readily put under pressure, and in this way a noteworthy cleanliness and a facilitated detachment of the fibres from the needles are obtained.

It is also possible to carry out special or specific treatments of the sliver by means of fluid under pressure containing additives or not.

Moreover, the area where the needles arrive most, or else the only area where the needles arrive, when subjected to said action of pressurizing the chamber, can be readily limited and defined and can be localized at one or more points, which can also be subjected to differing pressures.

Besides, according to the invention only one head with combs can be used without the cooperation of the other head.

The invention is embodied, therefore, in a head with combs, which is advantageously a head with combs with a double needle field, for the processes of drawing and combing slivers of textile fibres, whereby the upper needle field can be opened as wished and provision is made for devices for cleaning the needles, suction groups and drawing and feeding groups, and whereby the needles are caused to move forward by an action of thrust, said head being characterized by the fact that every needle field comprises a double opposed plurality, closed ringwise, of blocks placed side by side and perhaps connected together, which are thrust by sprocket means positioned at least upstream from said needle field, whereby said opposed blocks are in pairs and there

is envisaged in the inner opposed faces of said blocks a vertically oriented hollow within which a needle-bearing bar is lodged in a movable manner, and whereby the course of said blocks cooperates in at least part of their course with fixed cam means and the vertical positioning of said needle-bearing bars is conditioned by a trajectory determined by fixed cam means.

With the help of the attached tables let us now see a preferential formulation of the invention given as a non-restrictive example.

In the table we have as follows: -

Fig. I shows diagrammatically a lengthwise middle section of a gill box according to the invention;

Fig. 2 shows a crosswise section of part of the control head of one of the two needle fields;

Fig. 3 gives a three-quarter view of two blocks with one bar;

Figs. 4 and 5 show the blocks and bars at the outgoing zone;

Fig. 6 shows possible means for putting the chambers under pressure;

Fig. 7 shows a detail of the bars.

Referring to the figures, we have the following; the gill box I0 consists of upper II and lower I2 needle fields.

The gill box next comprises a known feed system with two or more rollers I3 and a known drawing system at the outlet with two or more rollers I4.

The gill box also includes known cleaning means I5 co-operating, or not, with known suction means I6, the means for cleaning the teeth of the combs being of any desired type, shape and conformation.

According to the invention the gill box I0 can be opened in the direction II7 with its fulcrum at I7, and in this

way there is no difficulty in having access to the needle field II or needle field I2 as necessary. The invention envisages the employment of the blocks I8, which work by thrust, the thickness of said blocks I8 constituting substantially the step I9 of the hypothetical chain 20 closed ringwise, in our example, around the sprockets 25 and 26.

The blocks I8 can be merely positioned side by side and therefore free from each other or be positioned side by side and connected together by chain elements 2I, or belt elements not shown here.

In this case too the step I9 is decided by the thickness of the blocks I8.

Fig. 3 shows diagrammatically two blocks I8 connected together with chain elements 2I, the step of the chain elements 2I being, as said earlier, substantially the same as the thickness of the blocks I8.

The blocks I8 comprise on one of their sides some slots or hollows 22 oriented substantially vertically, within which are inserted the end parts I23 of the bars or combs 23 bearing the needles 24.

The end parts I23 can slide along the hollows 22 but cannot be displaced sideways.

For each needle field II and I2 two rows of blocks I8 are envisaged, being wound in a catenary around the sprockets 25 and 26, which rotate in the direction 28.

As said earlier, the blocks I8 include in their facing sides the slots 22, so that the combs 23 are guided at their ends I23 by said slots 22, the slots 22 and end parts I23 of the combs 23 being suitably at an angle to the needles 24 and to the working plane of the needles 24.

The sprockets 25 and 26 cooperate with appropriate pin or ridge means 27 in the blocks I8, so that said pin or ridge means 27 constitute substantially the links of a chain

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with a step I9 substantially the same as the thickness of the blocks I8.

The sprocket 25 is the drive sprocket, and its direction of rotation 28 has the effect that, as said before, the bars are thrust, one by the next, into the working field of the needles.

The bars 23 slide on a path delimited on its outside by the course 29 and on its inside by the course 30. Said path delimited by the courses 29 and 30 conditions the specific position of the bars 23, which is also affected by the conformation of the bars 23 themselves and of the end part I23 of the bars themselves.

The blocks I8 can include advantageously some arms II8 which slide, for at least a tract of their course, on an appropriate surface I42 and serve to keep the blocks I8 themselves steady. Said arms II8 can be envisaged for every two or more blocks I8.

The surface I42 can be envisaged as having guide-cam functions only on part of the course of the blocks I8 and can also be conformed with a hollow 242 at least in certain tracts so as to restrict the swinging of the blocks I8 themselves.

Owing to their conformation itself the bars I8 thrust, one against another, with their substantially parallel faces 34 and 35 in the straight tracts, whereas in the curved tracts (see Figs. 4 and 5) they thrust with their back 36 cooperating with the hollow 33.

The blocks I8 run on a path delimited on its outside by the course 42 and on its inside by the course 43. The blocks I8 cooperate with the course 42 by means of their free head 3I.

To facilitate the fullest and widest journey for the bars 23, the blocks I8 comprise a cutaway portion 2I8, which

enables the bar 23 of the proceding block I8 to extend above the following block I8 (see Fig. 4). The cutaway portion 2I8 is at least as deep as the hollow 22.

According to the invention the sprocket 25 is moved by a shaft 38 which sets in rotation both the sprockets 25 of a needle field.

Said shaft 38 may comprise a bore 39 within which some fluid under pressure is made to flow through 40 so as to put and keep under pressure the chamber 4I formed by the needle field itself.

The holes I39 envisaged in the shaft 38 for discharging the fluid under pressure can cooperate with one or more specific zones of the needle field, or with one or more specific zones of the bars 23, or with one or more specific zones of the course of the bars 23, or else near to the cams which delimit the course of the blocks I8 and/or bars 23.

To replace the holes 39 in the side walls of the chambers 4I there may also be envisaged inlet holes I39 - 239 or drilled conduits for the immission of fluid under pressure, the purpose in both cases being to keep the chambers 4I under pressure.

Said conduits I39 - 239 can deliver fluid under pressure generically into the chamber 4I or into specific zones, for instance, in cooperation with the zone 44 of the detachment of the needles from the mass of fibres being processed.

The chamber 4I can include baffles I4I able to delimit specifically the zones of the outlet of the fluid under pressure from the chamber 4I. The chamber 4I can also be divided into zones having differentiated pressures.

The timing and setting of the gill box according to the invention is extremely easy in that the shafts 38 are activated by gear wheels 37 directly meshed therewith and therefore not causing alignment or adjustment problems, the align-

ment and adjustment having already been arranged during the design work.

Therefore, when the gill box 10 is opened according to II7, during the closure phase there are the same gear wheels 37 as those which provide for the automatic timing of the needle fields.

As said earlier, the combs 23 are inserted in the hollows 22. Said combs 23 slide with their ends I23 within the hollows 22 which serve for their lengthwise drawing, whereas their crosswise position is determined by the preferential course formed by the cams 29 and 30. Said preferential course, in cooperation with the conformation of the bars 23 and in cooperation with the courses 42 and 43 that condition the blocks I8, determines the gradual and progressive approach of the needles 24 into the two needle fields II and I2 and determines the rapid and perpendicular departure of the needles 24 themselves at the end 44 of the working field, as shown in Figs. 4 and 5.

As shown in Figs. I - 4 - 5 the zone 44 of the course 42 is conformed advantageously in such a way as to determine a departure of the needles 24 in a substantially normal manner, that is, substantially perpendicularly to the sliver as it is processed.

This conformation, in cooperation with the course imposed on the blocks I8 by the guide-cams 42, 43 and I42, enables a very short spacing to be obtained; that is to say, it makes it possible to obtain a minimum distance between the grip of the drawing device I4 and the release of the fibres of the needles 24. This minimum distance is about 20-27 mm. and thus enables yarns with a very short cotton staple length to be processed.

In the body 45 which determines the course 28, an element 46 (Fig. I) can be envisaged (perhaps one per side)

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which can be removed so as to enable the combs 23 to be readily and quickly replaced by withdrawing them from the hollows 22 in the blocks I8.

According to the invention the blocks I8 can also rest on the path 30 in the tract in cooperation with the sprockets 25 and 26.

Moreover, the geometric conformation of the blocks I8 can reflect the dimensions of the sprockets 25 and 26 as well as the course of departure from the needle field.

Furthermore, the sprockets 25 and 26 can be mutually connected so as to facilitate the movement of the blocks I8 around the sprocket 26.

Again, before the needle fields II and I2 a suitable taker-in 2I7 can be visualized which is able to guide and condense the sliver of fibres to be processed.

In addition, according to the invention the crosswise conformation of the blocks I8 may reflect specific design requirements, and therefore said part is irrelevant in itself for the purposes of the invention itself.

The conformations of the groups transmitting motion and of the groups sustaining the shafts 38 can be readily modified to meet specific design requirements and have therefore been shown in the tables but not described.

According to the invention only one needle field II or I2 can be employed without the cooperation of the other I2 or II. In this case the transmission of motion (for instance, gear wheel 37) can undergo modifications which are even substantial but which are irrelevant regarding the idea of the solution.

We have described here a preferential solution, but variants are possible within the scope of the idea of the solution without departing thereby from the invention.

Thus it is possible to vary shapes and dimensions and

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to add, replace or integrate parts and to envisage alternative parts, and so on. These and other variants are all possible for a technician in this field.

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C L A I M S

I. Head with combs, being advantageously a head with combs with double needle field (II-I2), for the processes of drawing and combing slivers of textile fibres, whereby the possible upper (II) needle field can be opened as wished, and devices for cleaning the needles (I5), suction groups (I6) and drawing and feeding groups (13-14) are envisaged, and whereby the needles (24) are caused to move forward by a thrust action, said head being characterized by the fact that each needle field (II-I2) comprises a double opposed plurality, closed in a ring (20), of blocks (I8) side by side, perhaps connected together and thrust by sprocket means (25) positioned upstream from said needle field (II-I2), whereby said opposed blocks (I8) are in pairs, and in the inner opposed faces of said blocks (I8) a hollow (22)is envisaged which is oriented vertically and within which a needle-bearing (24) bar (23) is lodged in a movable manner (I23), and whereby at least part of the course of said blocks (I8) cooperates with stationary cam means (42-43-I42), and the vertical positioning of said needle-bearing (24) bars (23) is conditioned by a trajectory determined by stationary cam means (29-30).

2. Head with combs, as in Claim I, characterized by the fact that the blocks (I8) thrust each other into the needle field (II-I2) with their side faces (34-35) substantially parallel, whereas at least in the departure zone (44) they thrust each other with their backs (36) also cooperating with a notch (33).

3. Head with combs, as in Claims I and 2, characterized by the fact that at least part of the blocks (I8) comprises at least one steadying and guiding arm (II8).

4. Head with combs, as in Claim I and in one or the other

Gilberto Pelizzo

of the Claims thereafter, characterized by the fact that the blocks (18) have in their inner opposed face: a hollow (22) with a substantially vertical development, whereby the lower part of said inner opposed face comprises advantageously a cutaway portion (218).

5. Head with combs, as in Claim I and in one or another of the Claims thereafter, characterized by the fact that the arm (118) of the blocks (18) cooperates in at least part of its course with at least one stationary cam (142-242).

6. Head with combs, as in Claim I and in one or another of the Claims thereafter, characterized by the fact that the blocks (18) have at their lower end some pin means (27) cooperating at least with the drive sprocket (25), whereby there are advantageously present some connecting chain element means (21).

7. Head with combs, as in Claim I and in one or another of the Claims thereafter, characterized by the fact that the end parts (123) of the needle-bearing (24) bars (23) slide within the hollows (22) present in the opposed inner faces of the blocks (18).

8. Head with combs, as in Claim I and in one or another of the Claims thereafter, characterized by the fact that the needle-bearing (24) bars (23) cooperate in at least part of their course with at least one stationary cam (29-30).

9. Head with combs, as in Claim I and in one or another of the Claims thereafter, characterized by the fact that there is envisaged in the body (45) of the needle fields (11-12) at least one element (46) which can be removed for replacement of the bars (23) by their withdrawal from the hollows (22) in the blocks (18).

10. Head with combs, as in Claim I and in one or another of the Claims thereafter, characterized by the fact that the needle fields (11-12) can be opened (117) with a fulcrum

(I7) as desired.

II. Head with combs, as in Claim I and in one or another of the Claims thereafter, characterized by the fact that the drive sprockets (25) are connected to gear wheels (37) which also serve for independent timing.

I2. Head with combs,as in Claim I and in one or another of the Claims thereafter, as described and shown and for the purposes allowed.

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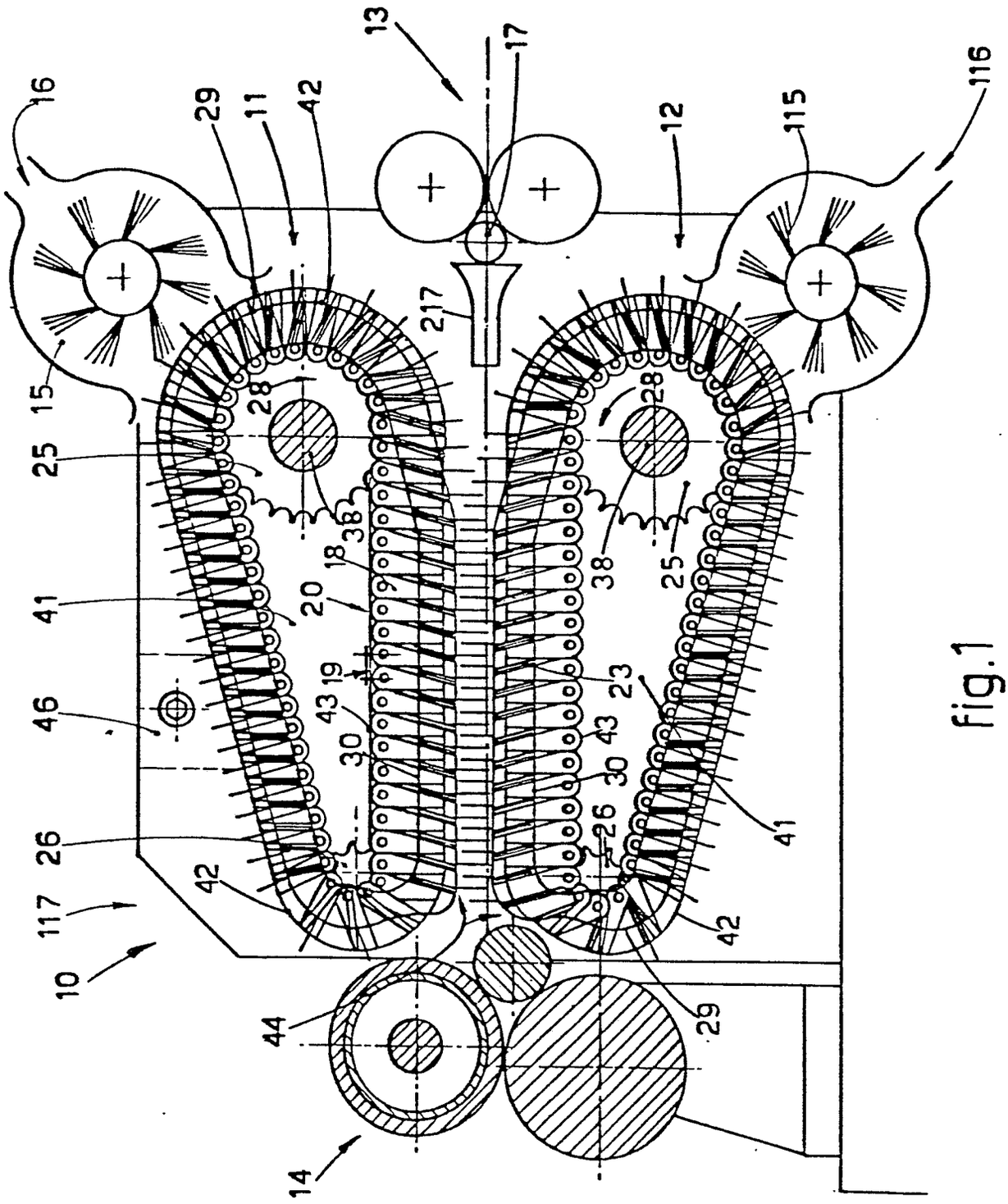

fig.1

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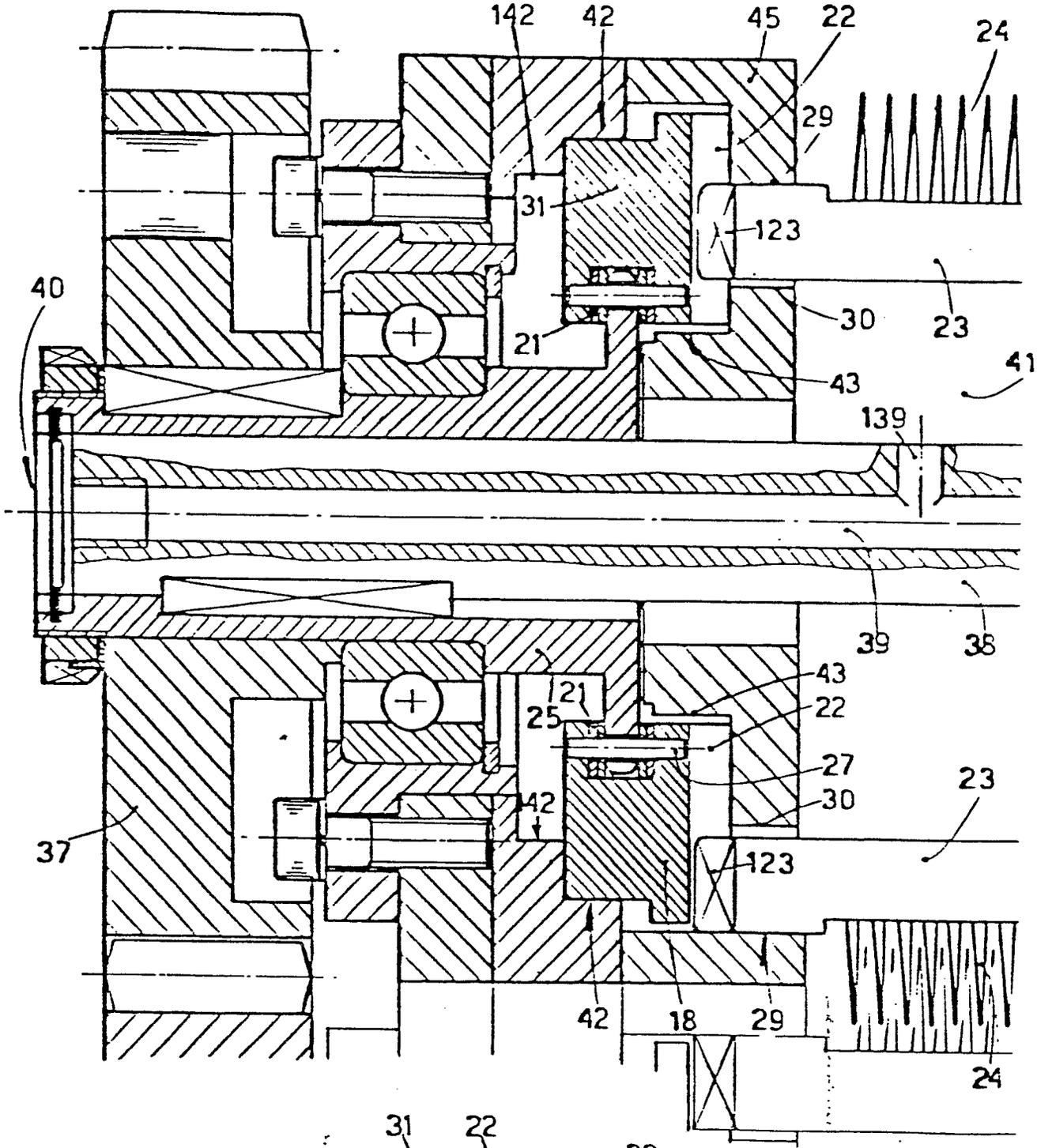

fig.2

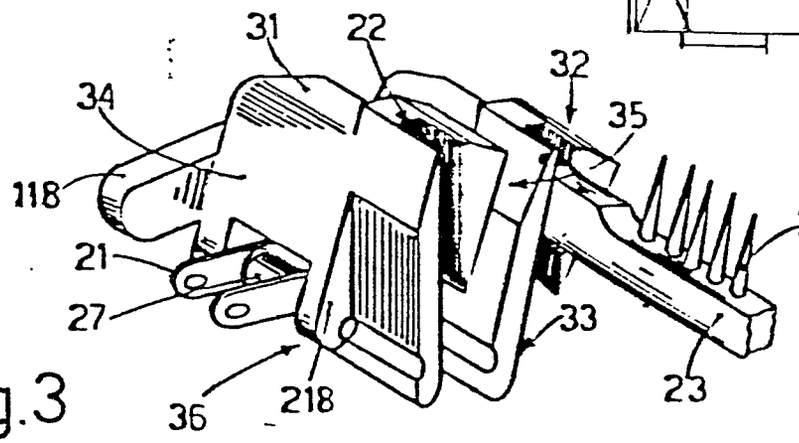

fig.3

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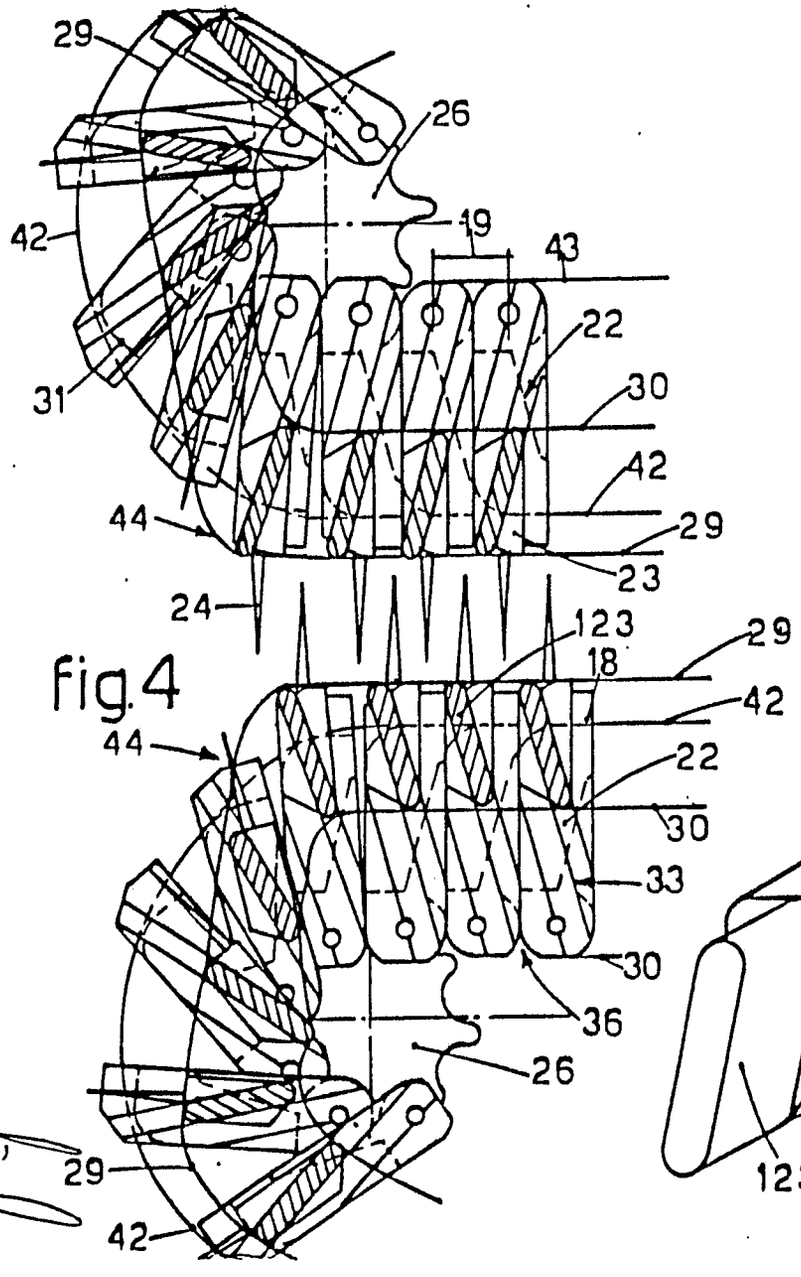


fig.4

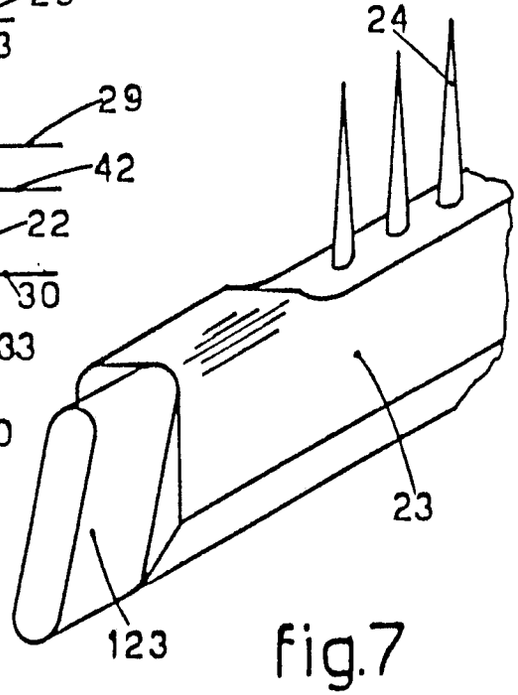
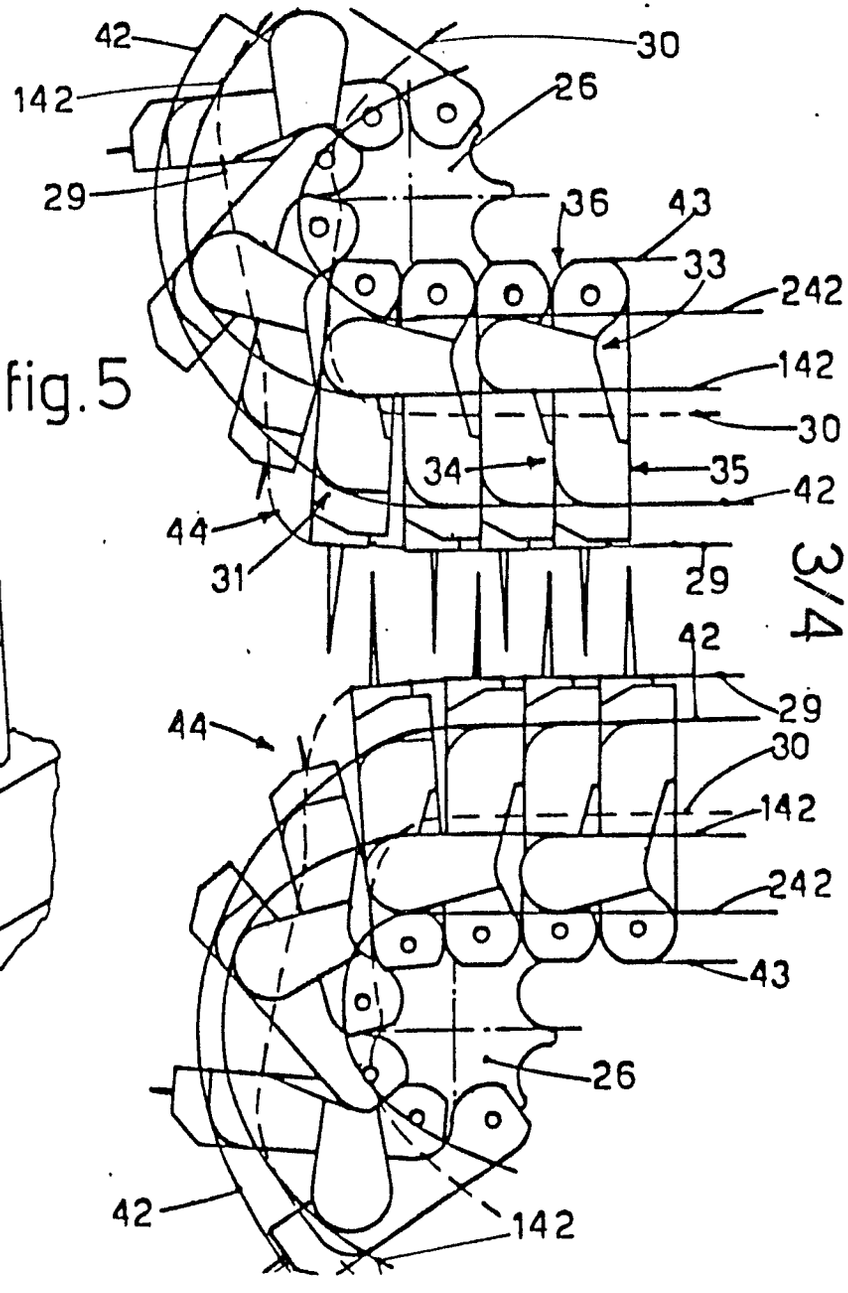


fig.7

fig.5



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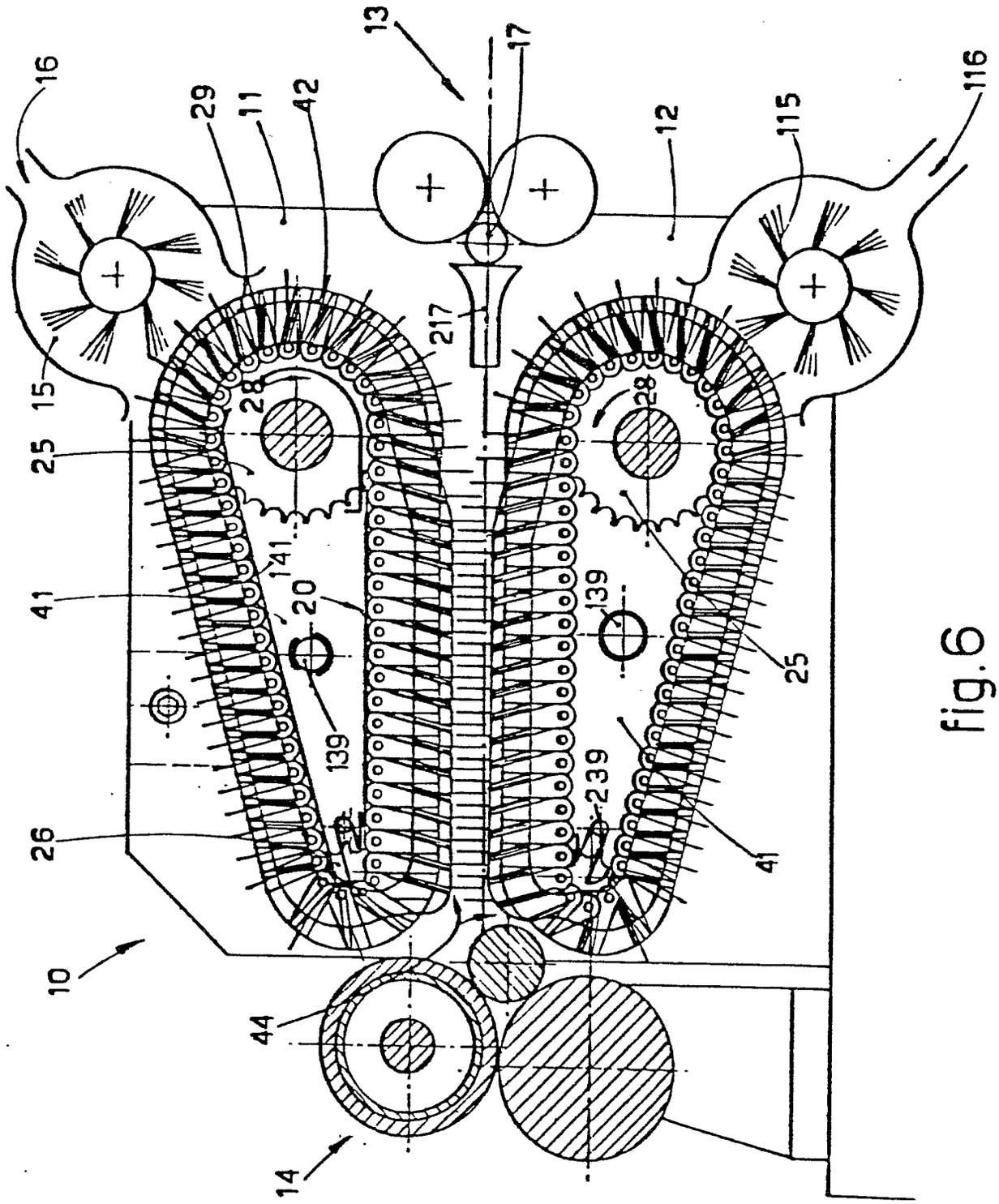

fig.6

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European Patent Office

EUROPEAN SEARCH REPORT

Application number EP 81 83 0143

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	FR - A - 2 352 083 (CASTELLA-JULIA) * Whole document * ----	

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

D 01 H 5/08

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

D 01 H

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20-10-1981	DEPRUN