(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 497 745 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **92830031.8**

(51) Int. Cl.[5] : **D01G 15/24,** D01G 15/32

(22) Date of filing : **28.01.92**

(30) Priority : **28.01.91 IT 1091**
28.01.91 IT 1291

(43) Date of publication of application :
05.08.92 Bulletin 92/32

(84) Designated Contracting States :
BE CH DE ES FR GB LI PT

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(54) Device for cooling the flat assembly in a card.

(57) In the flat assembly (114) of a card for natural or artificial fibres, at least part of the flats (14) is at least partially hit by a cooling fluid, which can flow in an interspace between an inlet (15E) and an outlet (15U), in order to lick the flats (14).

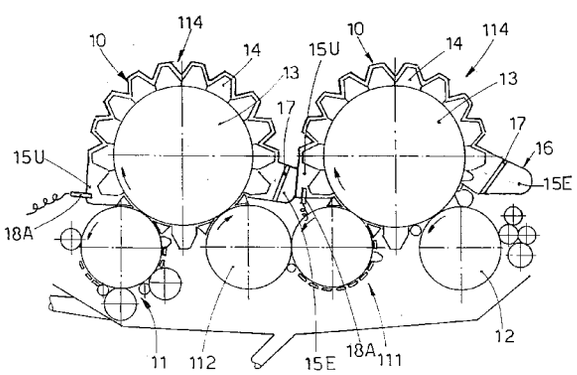

fig. 1

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FIELD OF APPLICATION

The present invention refers to an improvement in carding machines in order to create such localized environment conditions in the carding process or in the process for the preparation of the fibres to the spinning phase and, in particular, within the area of the flats, so as to favour the card-working of natural as well as artificial fibres.

The invention is advantageously applicable in case of natural fibres, especially cotton, which are contaminated by the so-called honey-dew, i.e. those sugary substances produced by the aphids and other insects.

Such honey-dew contaminated fibres are increasingly present in the agricultural habitat.

STATE-OF-ART

It is known that the air plays an important role in the disposition and cleaning of the fibres during carding.

The air is a major factor in the proper development of the carding action, which is assessed also in relation to the results obtained after cleaning and parallelizing the fibres.

In particular, air is used in the regions where the fibres are tranferred from one member of the card to another, in the region where the fibres are parallelized and cleaned in correspondence of the flat assembly and in the regions where the impurities are discharged in cooperation with the lower grids of the machine.

The carding process which takes place in the region of the flats is by far the most important factor for obtaining the best carding effect of the machine.

The air at the working region of the flats goes through turbolent and laminar flows, and is subject to actions of compression and expansion as it is forced to flow through spaces delimited by members moving at high speed (about 100 km/h) at short distance from stationary, or nearly stationary elements; all this happens between walls made-up of clothings with card hooks of various density which project irregularly therefrom.

In addition, the fibres are subject to a straightening and parallelizing action, as well as to a cleaning action performed by the clothings provided on the drum in cooperation with those provided on the flats.

This multiple action takes place in the presence of slippages between the fibres and between the latter and the clothing members.

These slippages take place in an environment where the friction conditions and friction factors are of considerable importance.

This friction brings about significant increases of temperature in the flats, and this contributes to keep a high temperature in the working region. Also the air which is present in this region undergoes a heating of several degrees with respect to the environment outside the machine.

This situation is aggravated by a further heating factor; in fact, during the straightening, parallelizing and cleaning phases of the fibres, there occur continuous slippages between said fibres and between the latter and the carding members, under conditions of high friction factors.

This friction usually causes considerable increases in the temperature of the carding members and, especially, of the flats which thus contribute to keep the temperature of the working area high.

Under these conditions, the air undergoes an overheating of several degrees with respect to the external work environment.

The fibres contaminated by the so-called honey-dew can only be worked in the card with huge difficulties because of the stickiness caused by the presence of these sugary substances which tend to soften as the temperature rises.

The huge difficulty in the working is caused by the deposits which rapidly clot on the clothings, the formation of said deposits being actually favoured by the high temperature of the air.

It is important, therefore, that the fibres arrive cooled as much as possible at these working zones in order to eliminate or, at least, greatly reduce these problems.

More generally, it is important at any rate that all the substances, which are present on the fibres and may be melt or softened under the heat action, do not reach such condition.

In view of the above, the inventor has studied, experimented and carried out the present invention.

DESCRIPTION OF THE INVENTION

In order to solve the above mentioned problems, the object of the invention is to provide a card for natural fibres, and in particular for vegetable fibres, and for synthetic fibres as well, of the type comprising at least one drum the peripheral clothing of which cooperate with the clothings of flats which are provided along at least a portion of the peripheral development of the drum. In said card there is provided at least one circuit for a cooling medium, in order to keep the temperature of the clothings of the flats at relatively low values.

Further advantageous features of the invention are set out in the dependent claims, which refer to cooling arrangements for cards having stationary or movable flats.

Some preferred embodiments of the invention are described hereinbelow with reference to the attached drawings, given by way of example and not to be considered in a limiting sense.

Fig. 1 shows a general and schematic side view

of a card of the type disclosed in IT-A-9431 A/81 with the sound-insulating pads;

Fig. 2 shows a modified version of the embodiment of Fig.1;

Figs. 3 shows two sections of possible embodiments of the stationay flats;

Fig. 4 shows the invention applied to the flats of Fig. 3 with water as refrigerating fluid;

Fig. 5 shows the invention applied to the flats of Fig. 3 with refrigerating liquid fluid;

Fig. 6 shows a generic and schematic side view of a feasible card with mobile flats and sound-insulating and air-conveying pads;

Fig. 7 shows schematically a card with mobile flats in a first embodiment of the invention;

Fig. 8 shows a modified version of the embodiment of Fig. 7;

Fig. 9 shows a further modified version of the embodiment of Fig. 7.

DESCRIPTION OF THE DRAWINGS

Fig. 1 shows diagrammatically the card with a stationary flat assembly 114 of the type disclosed in IT-A-9431 A/81.

The card according to the present invention is one having a stationary flat assembly 114 formed, in this case, by substantially trapezoidal flats 14 which cooperate over a substantial length with the periphery of the drum 13, the clothings of drum 13 and those borne by the flats 16 being brought to cooperate with each other in order to parallelize the fibres as desired.

By way of example, the card of Fig. 1 is provided with a set of feeders 11, a collecting group 12, two drums 13, two intermediate groups 112 and 111 and the stationary flats 14.

Each stationary flat 14 carries a relevant clothing with suitable hooks which, as stated, cooperate with the hooks of the clothing provided on drum 13.

As can be seen in Fig. 1, the stationary flats 14 of each drum 13 are covered by a hood 10.

Such hood 10 has a distributing region 15E and a suction region 15U.

The air flow from the conduit 16 goes through the cooled or refrigerating battery 17, enters the distributing region 15E and, from this, goes to the suction region 15U.

It is evident that the portion of the inlet 15E and the outlet 15U of the air may be reversed.

The suction is performed by means known per se.

The cooler 17 may be of direct evaporation type or of cooled liquid circulation type, which is indifferent as far as the invention is concerned, both types being easily available and within the reach of any skilled in the art.

According to the modified embodiment shown in Fig. 2, the hood may actually consist of a plurality of cooperating hoods, with a plurality of inlets and outlets in order to enhance the cooling effect and, at the same time, to allow a more accurate control of said cooling.

Fig. 2 shows, for,example, two cooperating hoods.

It is within the scope of the invention to provide even three or more hoods.

Each of said hoods is provided with an inlet 115E, 215E and an outlet 115U, 215U.

Advantageously, the outlet 115U and the inlet 215E may be made to communicate by providing cleaning filters and/or further refrigerating batteries.

It should be noted that the hood 10 must advantageously be adherent to the outer surface of the flats 14.

Such adhesion may be improved by spreading, between the hood 10 and the outer surface of flats 14, suitable plastic substances having high conductivity.

According to a modified embodiment, the outer surfaces of flats 14 make up the wall of hood 10.

In this case, the outer surface of the flats 14 may have thermal exchange-enhancing elements.

When the hood 10 is tight-sealed, the refrigerating fluid may be a gas or a liquid.

To regulate the refrigerating system, provision is made, in this case, for the use of suitable probes 18A (Fig. 1) for sensing the temperature in proximity of the air flow outlet.

According to a modified embodiment (Fig. 3b), such probes are inserted into suitable seats on flats 14 so as to measure the actual temperature of flats 14.

Figs. 3a and 3b show a cross-section of two stationary flats 14 having a modified profile.

Said stationary flats 14 having modified profile are provided with a plurality of axial conduits 20 which allow the transit of refrigerating fluid which suitably cools the connecting and driving elements and, by conduction, cools also the clothing 19 of flat 14 and the relevant hooks connected thereto.

In the case shown by way of example in Fig. 3a, the hood 10 cooperates directly with the outer wall of flat 14, bridge elements 110 being provided able to prevent any leakage of refrigerating fluid.

The bridge elements 110 are applied to the flats 14 by interposing an elastic layer.

Similarly, the hood 10 is, in this case, made up of elements 26 which can be disconnected at 23 in correspondence of elastic layers.

In the case of Fig. 3b, two possible solutions are illustrated in which the probes 18B may be applied to the flats 14.

In this case, said probes 18B are shown as inserted from one side, but they may be inserted also axially.

Fig. 4 shows a cooperation between the hood 10 and the axially-operated refrigerating system where the fluid is fed through the axial conduits 20 to the flats 14.

In this case, feeding conduits 21E and aspirating

conduits 21U are provided which cooperate with the ends of flats 14.

Fig. 5 shows a modified embodiment wherein the cooling is provided by liquid refrigerating fluid which flows from the distributing conduit 22E via the axial conduits 20 to the collecting conduit 22U.

In this case, provision is made for compensation sleeves 24 and sealing gaskets 25.

Fig. 6 diagrammatically shows a feasible card of the type having a mobile flat assembly.

The mobile flat assembly card illustrated herein is given only by way of example as further embodiments and types of cards may be provided to which the solution idea of the present invention may be applied.

The card considered as an example is one having a mobile flat assembly 315 carrying flats 316 which cooperate, over a substantial length, with the periphery of the drum 314, the clothings of drum 314 and those of flats 316 being brought to cooperate with each other in such a way as to parallelize the fibres as desired.

By way of example, the card of Fig. 6 is provided with a fibres-supplying group 311, feeding means 312, a collecting cylinder 313, a drum 314 and a mobile flat assembly 315.

The feeding means 312, in this case, consist of three cylinders, but they may be one or more, or they may consist of a feeding table of known type.

The flats 316 are disposed substantially parallel to the axis of the drum 314 and annularly connected to each other.

Each of said flats 316 carries a clothing with suitable hooks which, as stated, cooperate with the hooks of the clothing provided on drum 314.

Cooperating with the mobile flats assembly there may be one or more stripping rollers 317 located at any point of the free portion of the mobile flat assembly 315.

The card 310 shown in Fig. 6 is, in this case, encased by pad panels to sound-insulate it and, at the same time, to direct the suction and cleaning air flow as desired.

As stated, the card indicated herein by way of example is one provided with a mobile flat assembly 315, and it is on the basis of such exemplary card that the invention will be illustrated in the following description and with reference to the drawings.

Fig. 7 shows an enlarged sectional view, where the cooperation region of the mobile flat assembly 315 and relevant flats 316 with the large drum 314 is shown.

In the example of Fig. 7, the mobile flat assembly 315 is covered by a distributing hood 320E bordering with a suction hood 320U.

The flow of air from the conduit 319 goes through the cooled or refrigerated battery 318, enters the distributing hood 320E and from the latter reaches the suction hood 320U through the filter 322.

The aspiration and blowing action is performed, in this case, by the fan 321 which directs the thus collected air-flow into the conduit 319.

A filter 322, shown by way of example as the only filter being present and directly positioned between the distributing hood 320E and the suction hood 320U, may be of replaceable type or of self-cleaning type, in order to recover any fibres likely to deposit thereon.

Cooperating with the vacuum region a shutter 323 may be provided to restore the desired volume of air possibly lost both through the always present dispersions and through the traditional suction system.

The cooler 318 may be of direct evaporation type or of cooled liquid circulation type, which is indifferent as far as the invention is concerned, both types being easily available and within the reach of any skilled in the art.

Fig. 8 shows a modified version of the embodiment of Fig. 7; in this modified embodiment the distributing hood 420E is in the route defined by the mobile flat assembly 315 and is provided with a plurality of holes and/or slits 324 which deliver incoming cold air inside the distributing hood 420E.

The cold air flowing through the holes and slits licks both the rear part of the mobile flat assembly 315 and directly the flats 316, as well as the joining and driving elements of said flats 316.

In this way, said flats 316 and their linking elements are cooled and they transfer the cold by conduction to the clothing provided on each flat 316 and, through it, to the hooks which must work the fibre.

The cold air flowing through the holes and slits licks the flats 316 and the mobile flat assembly 315 over the whole width thereof.

The relationship between the pressure of the cold air entering the distributing hood 420E and the dimension of the holes or slits 324 is such as to give rise to a predetermined speed of cold air impinging on the flats 316, thereby allowing the heat to be removed also by dynamic action.

Said cold air may be recovered by a suction hood 320U and a subsequent suction fan 321, or may be dispersed in the atmosphere.

Fig. 9 shows a further modified embodiment which provides, by means of the distributing hood 520E, for delivering-jets of cold air onto at least a portion of the periphery of the mobile flat assembly 315 and, in particular, onto at least the portion just before the length in which the mobile flat assembly 315 cooperates with the drum 314, said jets of cold air hitting directly the hooks and the clothing and transmitting by conduction the cold to the flats 316 which thus act as a thermal accumulator.

In this case too the cold air may be dispersed or be aspirated through a suction hood 320U which cooperates with a suction fan 321.

In all the three cases the air may be either dis-

persed or brought in circulation to a partial or total extent.

Claims

1. A card for natural, in particular vegetable, fibres and synthetic fibres comprising at least one drum having a peripheral clothing which cooperates with the clothings of flats which are provided along at least a portion of the peripheral development of the drum, characterized by at least one circuit for a cooling medium, in order to keep the temperature of the clothings of the flats at a limited value.

2. A device for cooling the stationary flats assembly (114) in a card for natural or synthetic fibres, characterized in that at least a portion of the stationary flats (14) are hit at least partially by a refrigerating fluid.

3. Cooling device according to claim 2, characterized in that the refrigerating fluid is of gaseous type, advantageously air.

4. Cooling device according to claim 2, characterized in that the refrigerating fluid is liquid.

5. Device according to any preceding claims, characterized by the presence of distributing means (15E-115E-215E) which cooperate with the outer surface of the stationary flats (14).

6. Device according to any preceding claims, characterized in that the distributing means (15E-115E-215E) are tight-sealed and are applied to the stationary flats (14).

7. Device according to any preceding claims, characterized in that the distributing means (15E-115E-215E) cooperate directly with the outer surface of the stationary flats (14).

8. Device according to any preceding claims, characterized in that the distributing means (15E-115E-215E) are formed by elements (26) which can be disconnected.

9. Device according to any preceding claims, characterized in that the distributing means (15E-115E-215E) cooperate directly with internal axial conduits (20) of the stationary flats (14).

10. A device for cooling the mobile flat assembly in a card for natural or synthetic fibres, characterized in that distributing hood means (320E, 420E, 520E) for conveying cold air are provided which cooperate with at least a portion of the mobile flat assembly (315) and with suction fan means (321).

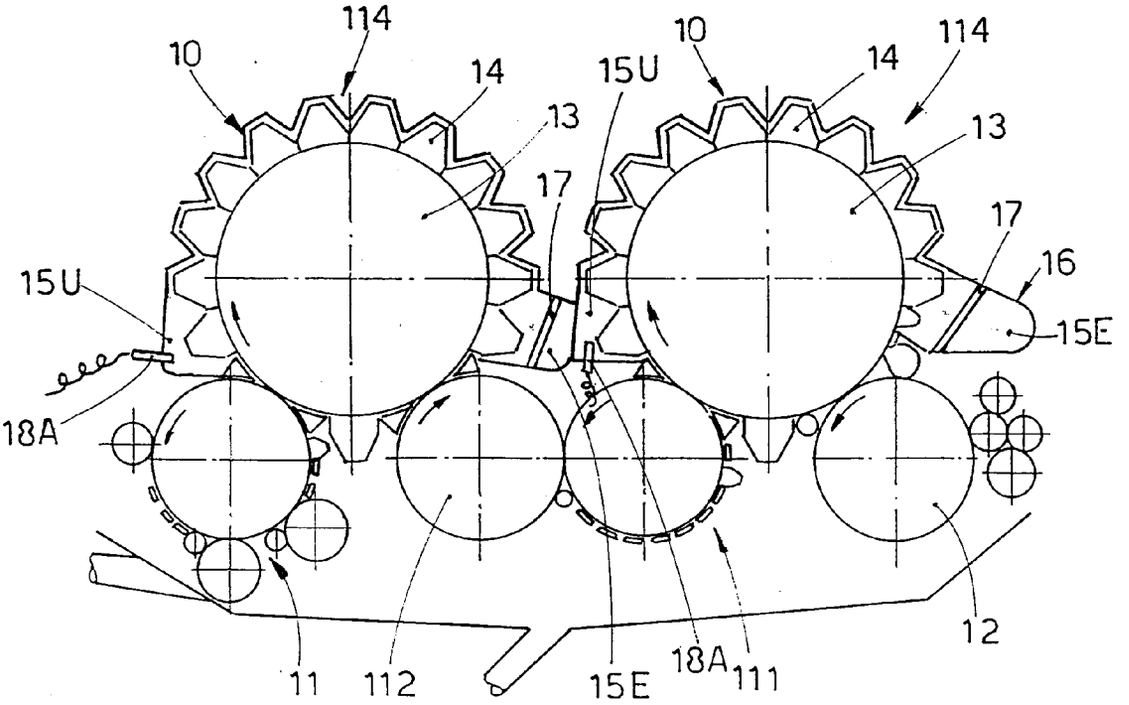
11. Cooling device according to claim 10, characterized in that the distributing hood means (420E) cooperate directly with the flats (316) of the mobile flat assembly (315).

12. Device according to claim 10 or 11, characterized in that the distributing hood means (320E-520E) cooperate directly with the clothings of the flats (316) of the mobile flat assembly (315).

13. Device according to any preceding claims, characterized by the presence of suction hood means (320U).

14. Device according to any preceding claims, characterized by the presence of filter means (322) immediately upstream of the suction hood (320U).

15. Device according to any preceding claims, characterized by the presence of an air-integrating shutter (323) immediately upstream of the suction fan (321).


114
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14
15U
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14
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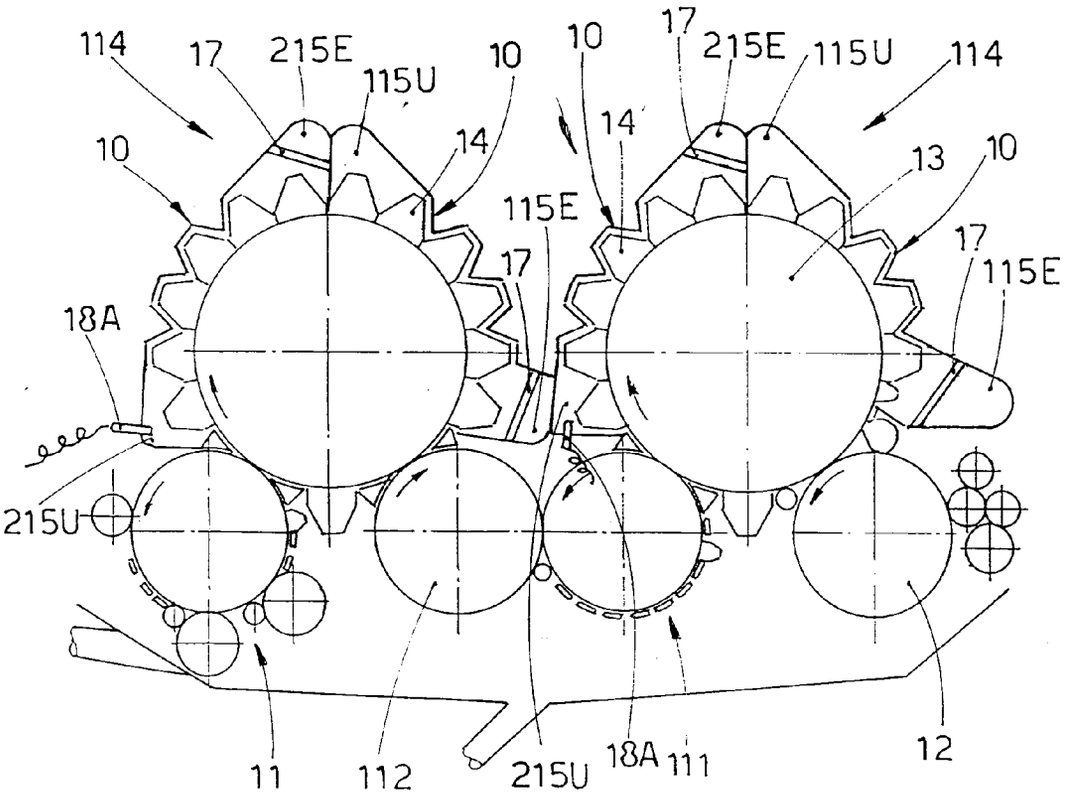
16
15U
15E
18A
12
11
112
15E
18A
111

fig. 1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115U
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112
215U
18A
111
12

fig. 2

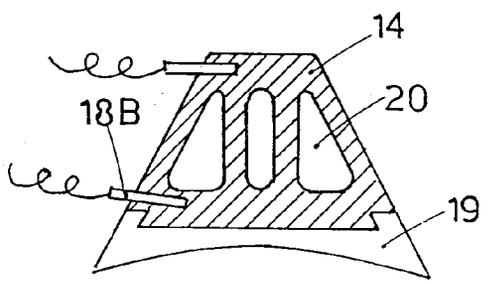


fig.3b

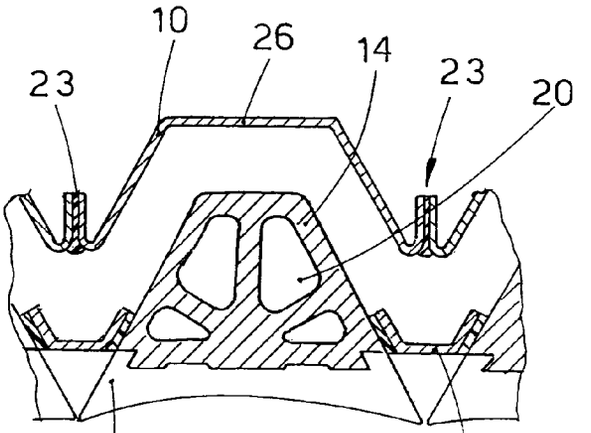


fig.3a

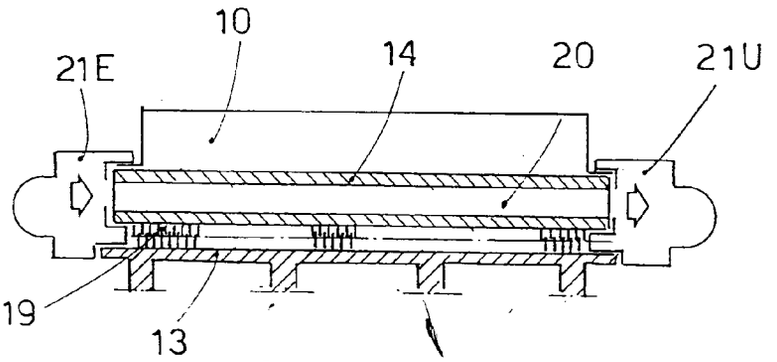


fig.4

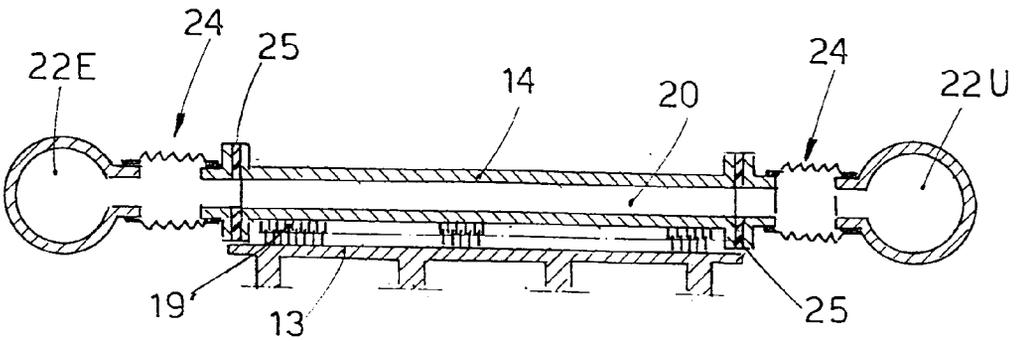
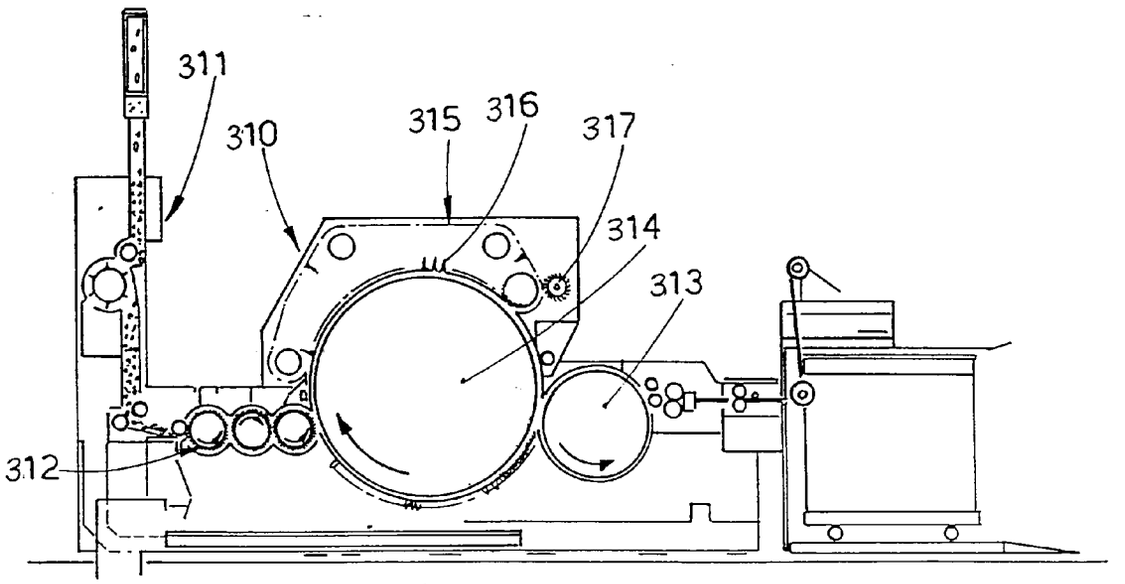


fig.5


311
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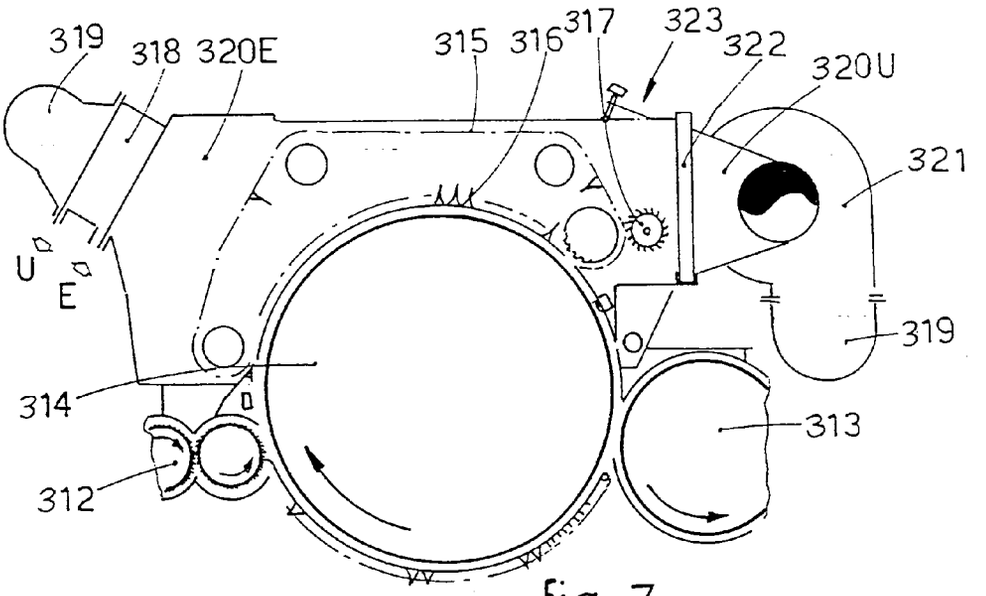
312

fig.6


319
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320E
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323
322
320U
321
U
E
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313
312

fig.7

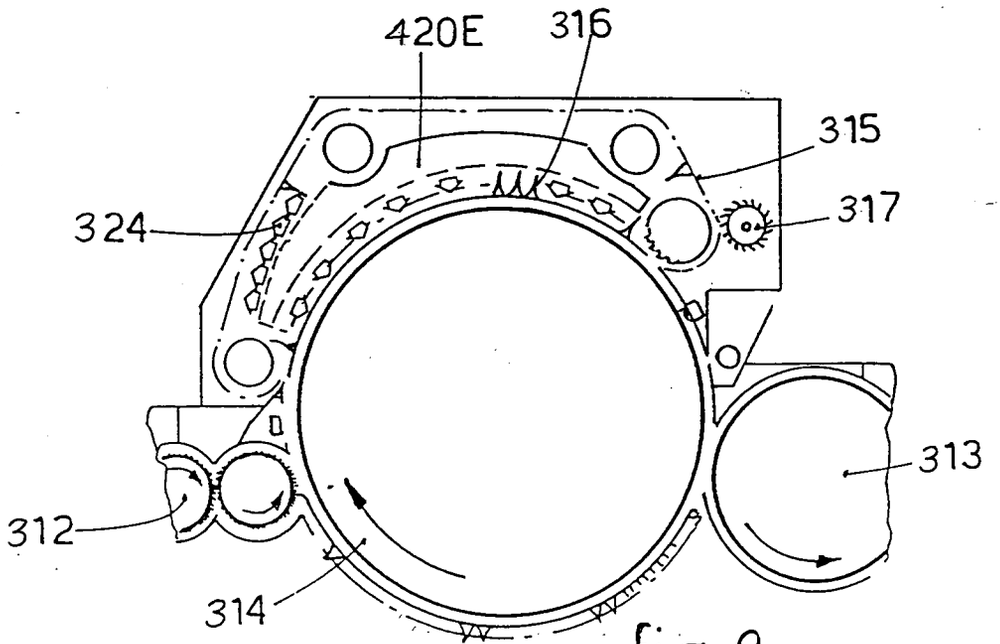
420E
316
315
317
324
313
312
314

fig.8

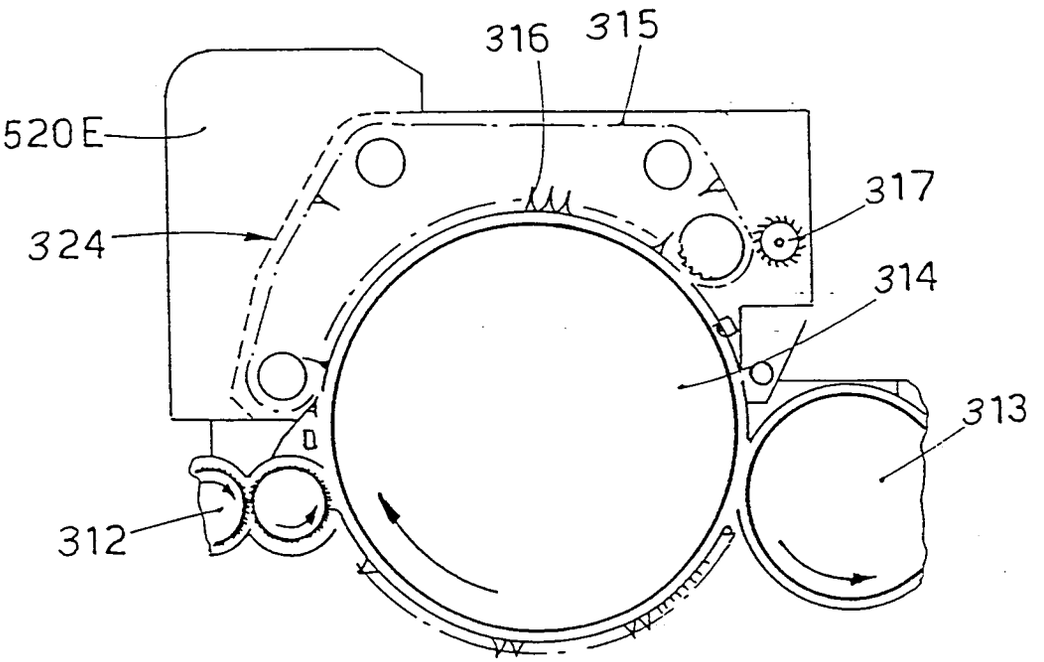
316
315
520E
317
324
314
313
312

fig.9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 83 0031

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
P,X	EP-A-0 431 485 (MASCHINENFABRIK RIETER AG) * column 2, line 10 - column 3, line 31; figures 1,6,8 *	1,2	D01G15/24 D01G15/32
A	---	3,4,5	
A	EP-A-0 167 722 (RAMISCH KLEINEWEFERS GMBH) ---	1,2,3,4	
A	EP-A-0 077 166 (CARDING SPECIALISTS(CANADA)LTD) * page 2, line 16 - page 3, line 23; figure 1 * ---	1	
A	CH-A-390 109 (MASCHINENFABRIK RIETER AG) -----		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

D01G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 MAY 1992	MUNZER E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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