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

(11) EP 1 386 993 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.02.2004 Bulletin 2004/06

(51) Int Cl.[7]: **D06B 3/20**

(21) Application number: **03017047.6**

(22) Date of filing: **28.07.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: **30.07.2002 IT MI20021696**

(71) Applicant: **H.T.P. Unitex S.p.A.**
20123 Milano (IT)

(72) Inventor: **Sacchi, Giorgio**
20129 Milano (IT)

(74) Representative: **Faraggiana, Vittorio, Dr. Ing.**
Ingg. Guzzi & Ravizza S.r.l.
Via Vincenzo Monti 8
20123 Milano (IT)

(54) Method and machine for scouring of textile strip products

(57) A scouring method and a scouring machine for a textile product in strip is described. A scouring path along which the product (11) runs calls for at least one section (14) of running while immersed in a scouring liquid and at least one other section (16) of the path along which the product is struck by a series of fluid streams at least partially in the vapor state.

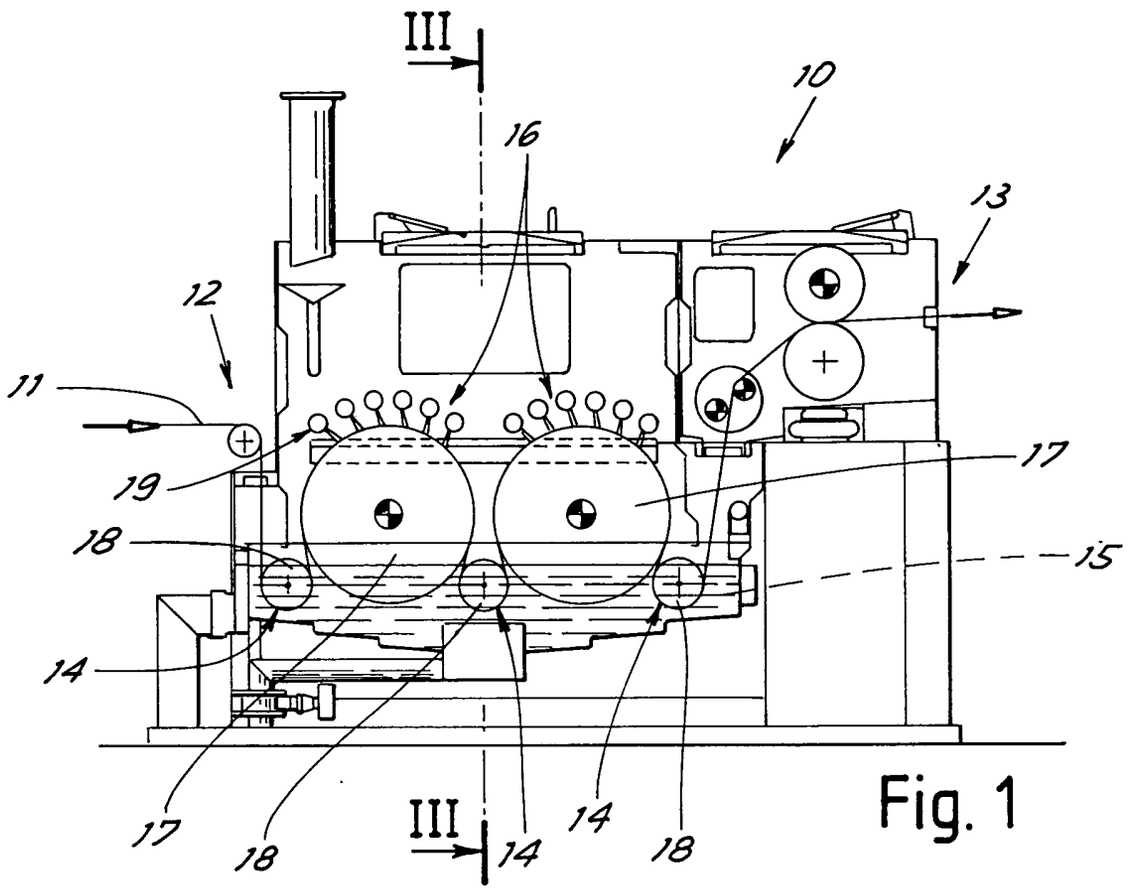

Fig. 1

EP 1 386 993 A2

Description

[0001] The present invention relates to a method and a machine for industrial scouring of textile products in strip.

[0002] In the industrial processing of fabrics, scouring operations performed on fabric in continuous strip (or, in accordance with specific terminology of the textile industry "in bolts") running rapidly through the scouring machine, for example between an unwinding spool and a winding spool, is known.

[0003] In the known art, scouring machines generally comprise in them a sinuous path identified by appropriate transmission rollers and along which the fabric runs so that sections of it will be immersed in scouring liquid, usually water with appropriate additives. Between one immersion and the next the fabric is also exposed to sheets of hot liquid which are sprayed on it. This type of machine is often employed when relatively delicate fabrics are to be treated.

[0004] The efficiency of this machine is however relatively limited and requires a relatively low product running speed to secure a satisfactory result.

[0005] In another type of machine, between one immersion and the next in the scouring liquid bath there is a point of exposition to a mixed stream of steam and water in general opposite the upper generator of a horizontal roller on which the fabric is sent back to the bath. This machine is however unsuited to use with delicate fabrics because of the concentrated stream and the high number of transmissions with limited radius to which the fabric is subjected.

[0006] The general purpose of the present invention is to remedy the above mentioned shortcomings by making available a high efficiency method and machine capable of treating even delicate textile products.

[0007] In view of this purpose it was sought to provide in accordance with the present invention a machine for scouring a strip textile product in which the product runs along a scouring path providing at least one running section for immersion in a scouring liquid characterized in that in at least one other section of the path the product is struck by a series of fluid streams at least partially in the vapor state.

[0008] In accordance with the present invention it was also sought to realize a strip textile product scouring method which would run the product along a scouring path and for at least one section of said scouring path immerse the product in a scouring liquid and for at least one other section of the path strike the product with a series of fluid streams at least partially in vapor state.

[0009] To clarify the explanation of the innovative principles of the present invention and its advantages compared with the prior art there is described below with the aid of the annexed drawings a possible embodiment thereof by way of non-limiting example applying said principles. In the drawings:

FIG 1 shows a partially cross sectioned diagrammatic side elevation view of a machine in accordance with the present invention,
FIG 2 shows a plan view of the machine of FIG 1,
FIG 3 shows a partial view of a cross section along plane of cut III-III of FIG 1,
FIG 4 shows a partially cross sectioned plan view of a detail of the machine of FIG 1, and
FIG 5 shows an enlarged side view of a detail of the machine as shown in FIG 1.

[0010] With reference to the figures, FIG 1 shows a strip textile product scouring machine 11 designated as a whole by reference number 10. The product runs in the machine from an inlet 12 to an outlet 13 covering inside the machine a scouring path calling for one or more sections 14 of running immersed in a scouring liquid 15. The scouring liquid usually has an aqueous base, i.e. water with appropriate known additives.

[0011] The strip 11 also covers at least one other section 16 of the path in which it is struck by a series of fluid streams at least partially in vapor state.

[0012] Thus is applied the method in accordance with the present invention which calls for at least one section of path for treating the product immersed in a scouring liquid and at least one other section of the path striking the product with the continuous series of fluid streams at least partially in vapor state.

[0013] Advantageously as may be seen in FIG 1, in accordance with an advantageous aspect of the method in accordance with the present invention the path section 16 is arranged between two sections 14 of running while immersed. In addition the sections 16 are at least two separated by an intermediate immersion section.

[0014] The section of exposition to the water and steam streams is curved to keep the product well stretched and well exposed to the streams during application of the latter. The curved section is advantageously realized by having the fabric strip partially wrapped around a supporting roller 17 for all of the stream application section 16. The roller 17 has advantageously a surface with longitudinal finning 28 for support of the product as may be seen in FIG 5. It was found advantageous that the curved section 16 of exposition to the streams extend for an angle between 40° and 90°.

[0015] As may be seen again in FIG 1, in the immersion sections the product is guided around a transmission roller 18. It was found advantageous that the diameter of the support roller 17 remain between 2 and 5 times the diameter of said transmission roller 18.

[0016] As may be seen better on the right in FIG 5, in the path section exposed to the streams the product runs practically in a tunnel 29 along which rows of nozzles emitting mixed steam and water streams are arranged at intervals in the running direction of the product. The tunnel can be delimited above by the nozzles and by their fluid feed ducts.

[0017] The fluid fed to the nozzles is advantageously

superheated water appropriately containing known additives useful in the treatment and which begins to vaporize at the nozzle outlets. As shown diagrammatically in FIG 2 the fluid flow is obtained by sucking the liquid 15 by means of a pump 30 with intake 20 in the tank containing the immersion scouring liquid. The pump 30 sends the liquid through a heat exchanger 21 to take it to the correct temperature and send it therefrom to deliveries 22 connected to the nozzles. The liquid is thus continually recirculated.

[0018] The heat exchanger superheats the water to take it to a temperature between 100°C and 110°C and advantageously around 105°C at a pressure in the system between 1 and 1.5 bar.

[0019] As may be seen in FIGS 3 and 4 the fluid streams are emitted from nozzles 19 arranged in a series in parallel rows transversal to the product running direction (upward in FIG 4). The nozzles have a stream breadth sufficient to overlap transversally to the product ribbon so as not to leave zones in the width of the ribbon uncovered. This is diagrammed in FIG 4.

[0020] Advantageously each row of nozzles faces from the wall of a fluid feed duct 23 arranged transversely to the fabric ribbon running direction. All the ducts 23 are connected to a side manifold 24 which is in turn connected with the deliveries 22.

[0021] In accordance with another aspect of the present invention the nozzles can be rotated between a straight delivery position of the streams on the product (for example, shown on the right in FIG 5) and a delivery position of the streams on a deflection surface thereof toward the product (shown on the left in FIG 5). In the case described of nozzles on the wall of a duct 23 extending transversely to the product, the passage between the two operational positions can easily be obtained by axial rotation of the duct appropriately mounted with the ends equipped with sealed rotatable joints 25.

[0022] In this manner the violence and/or quantity of steam reaching the products can be reduced at will. In particular, steam condensation time can be allowed. It is thus possible to pass from an operational mode with steam jets in accordance with the present invention to an operational mode with liquid streams.

[0023] In the embodiment shown here, for simplicity and modularity of the structure each of at least some nozzle rows with their duct 23 support the deflection surface 26 for the jets of a neighboring row. The last row of nozzles sprays onto a fixed surface 27.

[0024] It is now clear that the predetermined purposes have been achieved.

[0025] With a method and a machine in accordance with the present invention an increase with a factor even above 3 or 4 in scouring efficiency was surprisingly noted with a perfect result both for heavy fabrics and light fabrics and no damage even with very light and delicate textile products.

[0026] Naturally the above description of an embodiment applying the innovative principles of the present invention is given by way of non-limiting example of said principles within the scope of the exclusive right claimed here.

Claims

1. Machine for scouring strip textile product (11) in which the product runs along a scouring path providing at least one running section (14) for immersion in a scouring liquid **characterized in that** in at least one other section (16) of the path the product is struck by a series of fluid streams at least partially in the vapor state.

2. Machine in accordance with claim 1 **characterized in that** the fluid has an aqueous base.

3. Machine in accordance with claim 1 **characterized in that** said other path section is arranged between two immersed running sections.

4. Machine in accordance with claim 1 **characterized in that** said other path sections are at least two separated by an immersed running section.

5. Machine in accordance with claim 1 **characterized in that** said other path section is curved.

6. Machine in accordance with claim 5 **characterized in that** in said other path section the product is wound partially on a supporting roller (17).

7. Machine in accordance with claim 6 **characterized in that** the supporting roller (17) has a surface with longitudinal finning (28) for support of the product.

8. Machine in accordance with claim 5 **characterized in that** said other section (16) extends for an angle between approximately 40° and approximately 90°.

9. Machine in accordance with claim 1 **characterized in that** in said other path section the product runs in a tunnel (29) along which are arranged nozzles (19) at intervals for emission of said fluid streams in the product running direction.

10. Machine in accordance with claim 9 **characterized in that** superheated water is fed to the nozzles (19).

11. Machine in accordance with claim 10 **characterized in that** the superheated water is at a temperature between 100° and 110° and at a pressure between 1 and 1.5 bar.

12. Machine in accordance with claim 1 **characterized in that** the fluid streams are emitted from nozzles

arranged in series and in parallel rows arranged transversely to the product running direction.

13. Machine in accordance with claim 12 **characterized in that** the nozzles are rotatable between a position of direct sending of the streams onto the product and a position of sending the streams onto a surface (26) for deflection thereof to the product.

14. Machine in accordance with claim 13 **characterized in that** at least some nozzle rows each support the deflection surface (26) of a neighboring row.

15. Machine in accordance with claim 13 **characterized in that** each row of nozzles is made up of a plurality of side-by-side nozzles (19) facing from the wall of a fluid feed duct (23) with the duct being arranged transversely to the product running direction and being rotatable axially to move the nozzles on it between said first and second positions.

16. Machine in accordance with claim 1 **characterized in that** in said at least one immersion section the product is guided around a transmission roller (18).

17. Machine in accordance with claims 6 and 16 **characterized in that** the supporting roller (17) has a diameter between 2 and 5 times the diameter of the transmission roller (18).

18. Strip textile product scouring method calling for running of the product along a scouring path and for at least one section of said scouring path immersing the product in a scouring liquid and for at least one other path section striking the product with a series of fluid streams at least partially in the vapor state.

19. Method in accordance with claim 18 in which up- and downstream of said other path section the product covers a section of running while immersed.

20. Method in accordance with claim 18 in which said other path sections are at least two separated by an immersion running section.

21. Method in accordance with claim 18 in which said other path section is curved.

22. Method in accordance with claim 21 in which said other section extends for an angle between approximately 40° and approximately 90°.

23. Method in accordance with claim 18 **characterized in that** the fluid at least partially in vapor state is obtained from a flow of superheated water emerging from the nozzles.

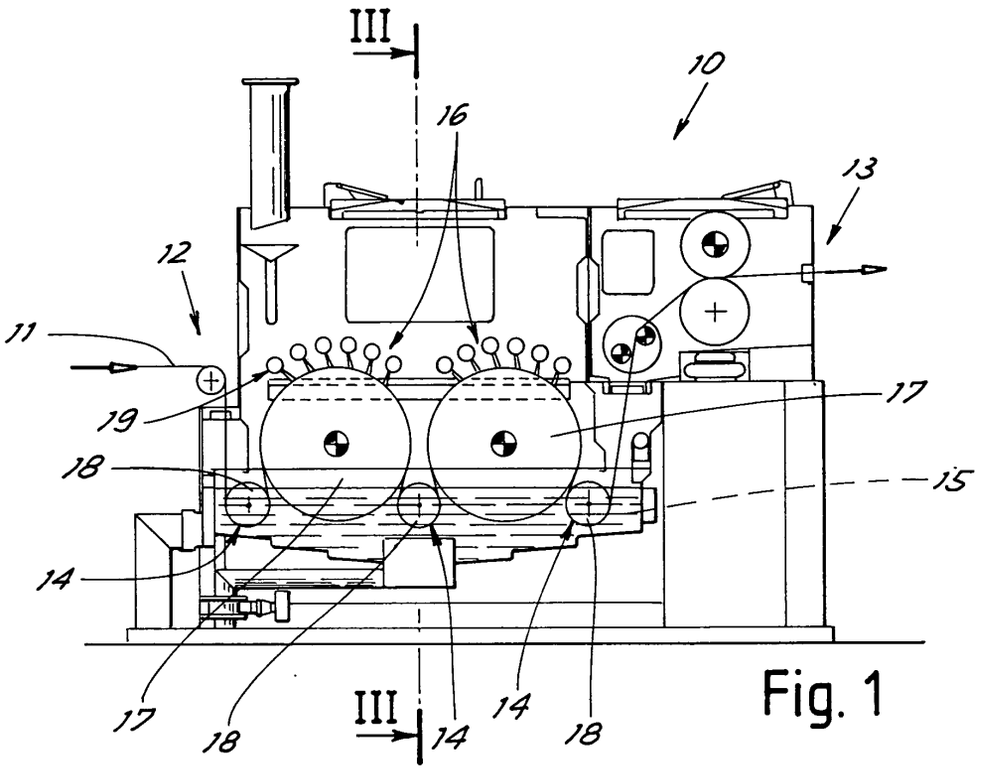
III
10
16
13
12
11
19
17
18
15
14
17
18
III
14
14
18

Fig. 1

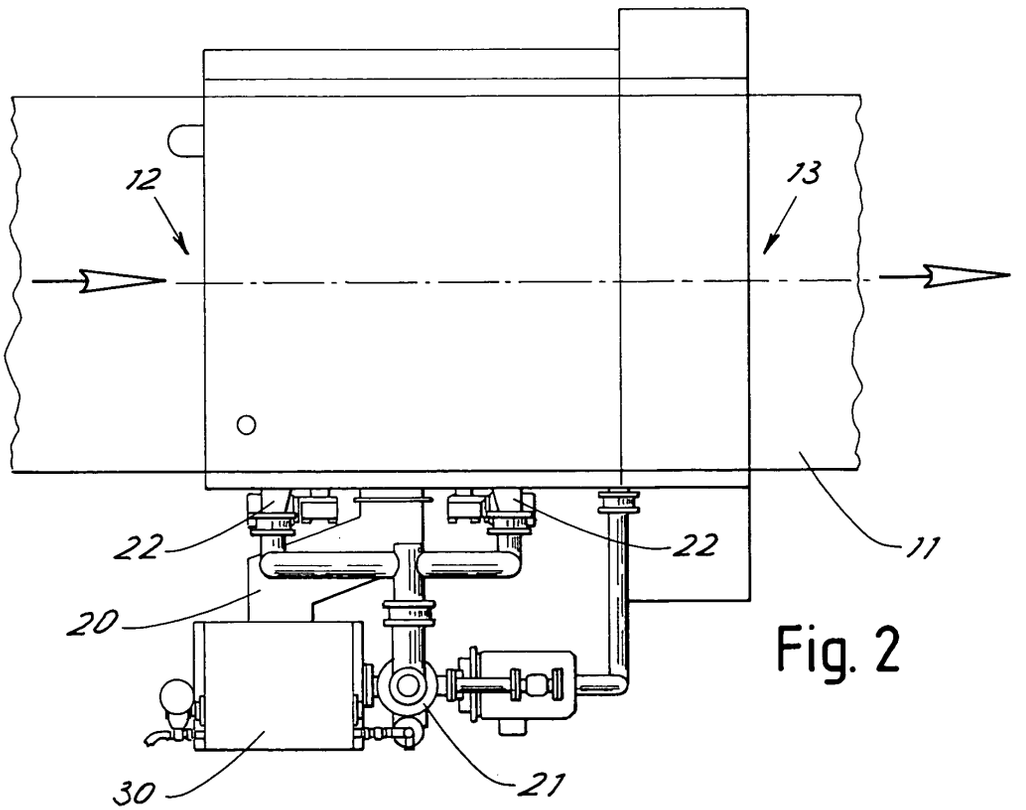
12
13
22
22
11
20
30
21

Fig. 2

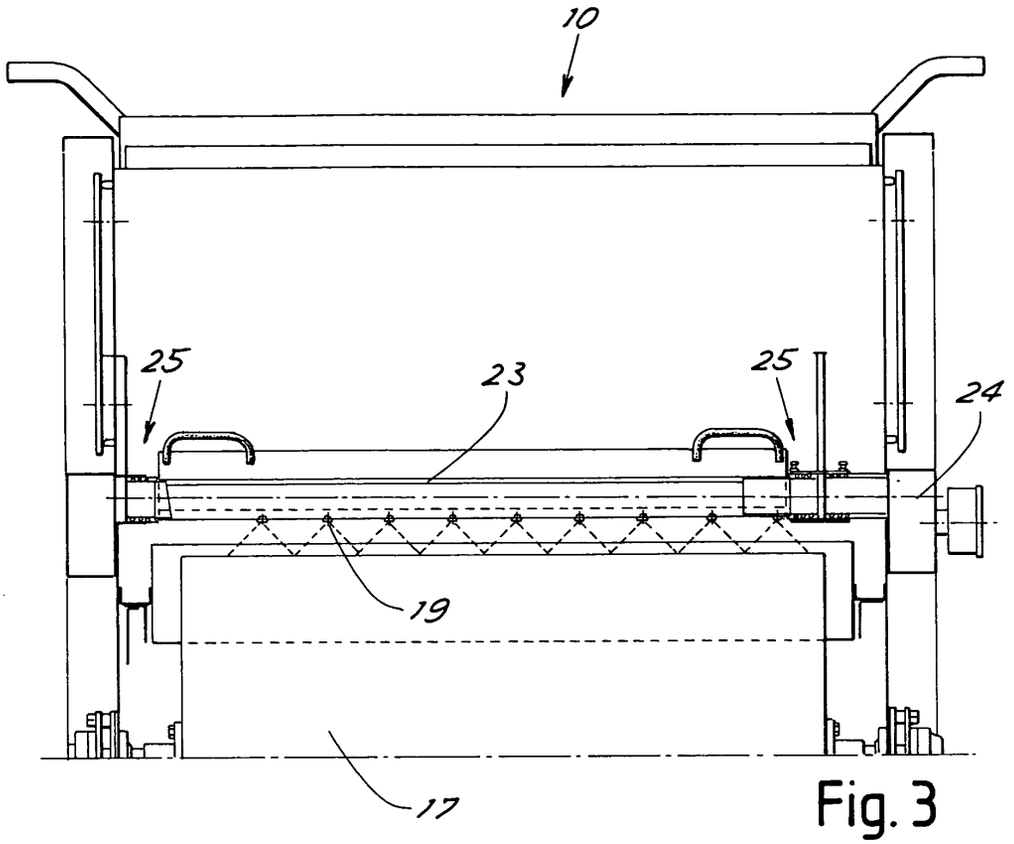

Fig. 3

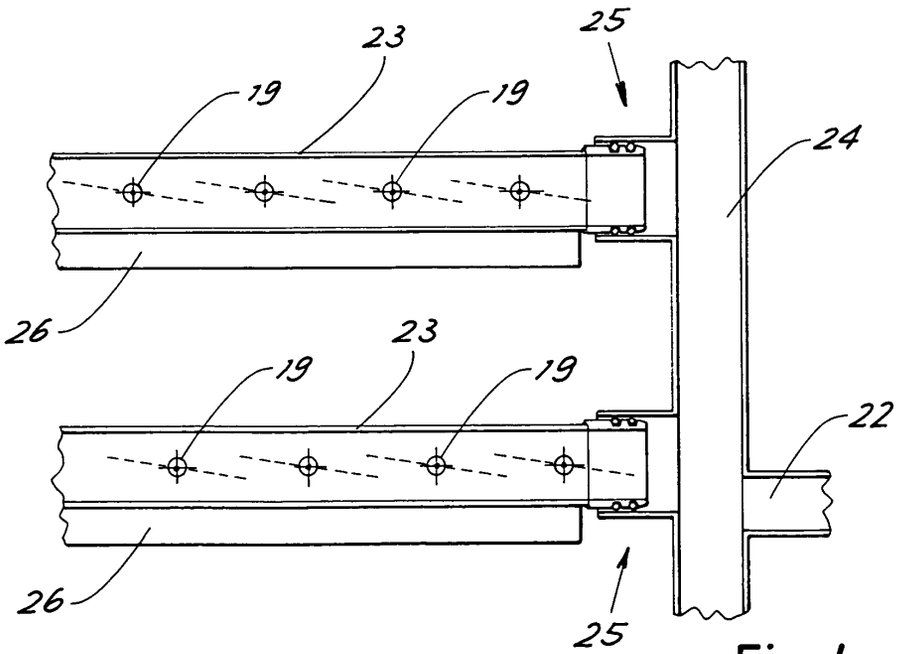

Fig. 4

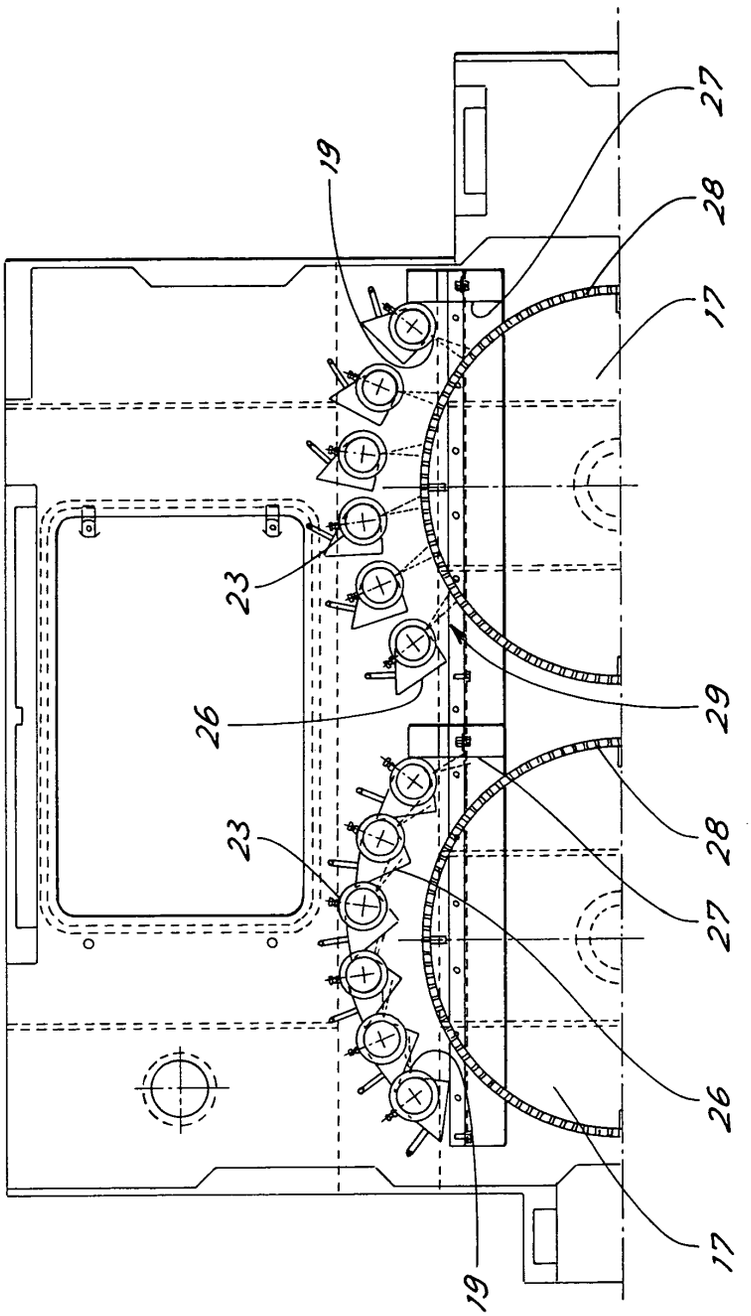

Fig. 5