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

(11) Publication number : **0 559 166 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **93103361.7**

(51) Int. Cl.^{5} : **C14B 1/26**

(22) Date of filing : **03.03.93**

(30) Priority : **05.03.92 IT VI920031**

(43) Date of publication of application :
08.09.93 Bulletin 93/36

(84) Designated Contracting States :
DE ES FR GB IT PT

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(54) Method for stretching hides and machine for applying this method.

(57) The invention discloses a method for stretching hides which comprises : a first step during which the hide (14) to be stretched is laid flat on a working bench (5) ; a second step during which the hide (14) is blocked against the working bench (5) by means of at least one pressing unit (10) ; a third step during which the hide (14) is stretched on the working bench (5) by means of one or more stretching rollers (8,9), wherein the stretching of said hide (14) is obtained by combining the rotational movement of each stretching roller (8,9) around its axis with a translation movement (27,28) of the roller (8,9) itself rotating away from the pressing unit (10).

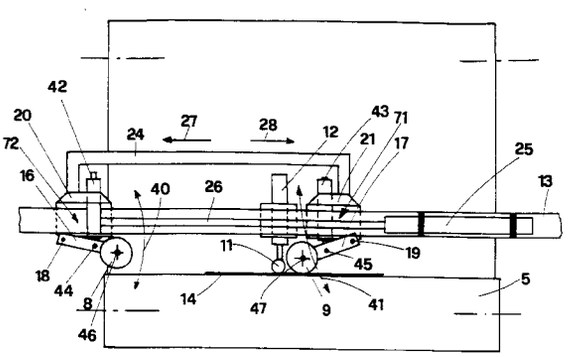

FIG.4

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The invention concerns a method for the stretching hides and a machine to carry out such a method.

It is a known fact that the hides, after having been treated in a drum-tumbler, are first of all pressed, usually through a felt press, then they are dried by means of vacuum driers or other types of driers.

It also a known fact that before the pressing process is performed, the hides are stretched to eliminate any possible creases which may have formed during the previous treatments in the drum-tumblers.

At present, to perform the stretching of the hides, stretching machines are used which consist of at least a pair of rollers for the feed of the hide to be stretched, and of a stretching roller which is positioned in contact with the surface of the hide. The stretching roller presents on its external surface, a plurality of helicoidal blades which, beginning from the center of the roller, are wound following directions opposite to one another, therefore, when the stretching roller is made to rotate, its helicoidal blades cause a stretching following the orthogonal direction in relation to the feed direction itself, because of the contact of the helicoidal blades against the hide which is conveyed forward by the feeding rolls.

Such machines, the manufacturing process of which is rather simple, present the inconvenience that they cannot perform a uniform stretching on the hide in all directions, but, as has already been said, mostly and almost exclusively following the orthogonal direction in. relation to the feed direction.

As a consequence, with such a method and with such machines, it is possible to eliminate mostly the creases which the hides present in the direction essentially according to the direction of advancement of the hides, viceversa, creases which have formed in different directiors are only partially eliminated or, can even persist after the stretching process has been completed.

It is easy to understand how this inconvenience can have a negative effect on the hide quality, as the permanence of creases after the drying process has been performed, causes the hide to be defective and as a consequence it must be discarded.

Another inconvenience is that, if an optimum stretching cannot be guaranteed, a sometimes considerable percentage of the surface of the hide is wasted after the drying operation.

It is with the purpose of limiting and, as much as possible eliminating such inconveniences, that the present invention is disclosed. Its main purpose is that of obtaining a method for stretching the hides and a stretching machine to perform such method, through which, in relation to methods and machines belonging to the known technique, it is possible to obtain an improved stretching of the hide and, as a consequence an improved quality of the same after the drying process.

Another purpose is to obtain a better use of the total surface of the hide. The mentioned purposes are reached by the invention of a method for stretching the hides which, in accordance with the main claim is characterized in that it comprises:

- a first step during which the hide to be stretched is laid flat on a working bench belonging to a stretching machine;
- an second step whereby the hide is blocked against the working bench by means of at least one pressure unit;
- a third step in which the hide is stretched on the working bench, by means of one or more stretching rollers having horizontal axes, each of them being complete with stretching elements on its external surface which are arranged so that they will adhere to the hide, wherein the stretching of said hide is obtained by combining the rotational movement that each stretching roller performs around its axis, with the translation movement of the roller itself following a direction moving away from the pressing unit.

The stretching machine carrying out the described stretching method comprises:

- a conveyor feeding belt, over which the hide to be stretched is laid, which slides along the surface of a working bench attached to the machine support;
- a frame, overhanging the working bench, which supports:
  - a pressing unit, arranged at an almost central position in relation to the working bench, equipped with at least a pressing element for blocking the hide against the working bench itself;
  - a pair of stretching rollers, each of them equipped with stretching elements parallel to the working bench and arranged at opposite positions in relation to the pressing unit, each roller being mechanically connected with a kinematic unit driving it into rotation around its own axis and provided both with a kinematic unit for the translation along the frame and with a unit for its vertical displacement in relation to the working bench;
- a unit for the removal of the hide after the stretching process has been completed, wherein said units for the vertical displacement hold one of the rollers lifted away from the hide and, simultaneously, hold the other roller adherent to the hide itself, when the latter roller is made to rotate around its axis and simultaneously to translate along the frame by the rotation and translation kinematic units respectively.

Advantageously, the method and the machine according to the invention allow an improvement of the stretching process and, as a consequence an

overall improvement of the hide quality after the same has been dried.

Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description, and from the drawings, wherein:

- Fig. 1 represents a partial axonometric view of the stretching machine according to the invention;
- Fig. 2 shows a top view of the stretching machine according to the invention;
- Fig. 3 shows a side view of the stretching machine of Fig. 2;
- Fig. 4 represents a partial front view of the stretching machine of Fig. 2 with the hide blocked in the working position and with one of the stretching rollers operating on the same;
- Fig. 5 shows a schematic representation of the stretching machine before starting the working process;
- Fig. 6 represents a schematic representation of the stretching machine at the beginning of the stretching operation;
- Fig. 7 shows a schematic representation of the stretching machine during the stretching operation;
- Fig. 8 is a schematic representation of the stretching machine during another stretching operation;
- Fig. 9 is a schematic representation of the stretching machine during one more stretching operation;
- Fig. 10 is a schematic representation of the stretching machine after the stretching operation has been completed.

As can be observed in Fig. 1, the stretching machine according to the invention, indicated as whole with 1, consists of a conveyor belt 2 on which the hide 14 to be stretched is laid flat and which, through the advancing of the conveyor belt 2 following direction 4, is brought into the position where it will be stretched over a working bench 5 which is attached to the support base 6 of the stretching machine.

As can also be observed in Fig. 1, and more specifically also in the Figs. 2 and 3, a frame 13 is attached to the support 6 of the machine by means of uprights 7, said frame overhanging the working bench 5 and supporting a pressing unit, indicated as a whole with 10, which is arranged at an essentially central position in relation to the working bench 5. Said frame also supports a pair of stretching rollers, 8 and 9 respectively, which are parallel to the working bench 5 and arranged at opposite positions in relation to the pressing unit 10.

It will be observed in particular that the pressing unit indicated as whole with 10, consists in turn, of a pressure roller 11 which can be displaced vertically in relation to the working bench 5 through a pair of pneumatic cylinders 12 arranged at the ends of said roller and attached to frame 13, through which, the pressing roller 11 blocks the hide 14 ready to be processed, against the surface of the working bench 5.

With regard to the stretching rollers 8 and 9, it will be observed in particular in Fig. 4, that the stretching roller 8 is supported at each of its ends , by a training plate 16 fulcred through a pivot 18 on a support plate 20 which insists on frame 13 through a gear wheel 22, visible in Fig. 1, which in turn engages a rack (not visible in Fig. 1) applied on frame 13. In the same way the stretching roller 9 is supported at each of its ends by a training plate 17 fulcred through a pivot 19 on a support plate 21 which insists on the same frame 13 through another gear wheel 23 engaging the same rack which is engaged by the previously mentioned gear wheel 22. The training plates 16 and 17 at one end of each roller, are in turn each in contact at one point, 44 and 45 respectively, with the ends 42 and 43 respectively of the stem of a pneumatic cylinders connected with the corresponding support plate 20 and 21, so that, when said cylinders are made to function by means of compressed air, each stretching roller can be displaced vertically in relation to the working bench 5, according to one of the two directions of arrows 40 and 41.

The support plates 20 and 21 of the stretching roller 8 and of the stretching roller 9 respectively, are joined together in correspondence with both ends of the rollers through a connecting rod 24, so that as a result, the rollers 8 and 9 are firmly connected with each other. Moreover, one of the support plates 20, is connected through a bracket 3, to the end of stem 26 of a pneumatic cylinder 25 attached to the frame 13 which, whenever it is supplied with compressed air, moves both the support plates 20 and 21 which are joined together, and, as a consequence, it also causes the rollers 8 and 9, which are supported by said plates, to move following the directions indicated by the arrows 27 or 28, along frame 13, subject to the movement of stem 26.

Therefore, on the whole, both stretching rollers 8 and 9 are bound to frame 13 by means of a translation kinematic unit, indicated as a whole with 70, along frame 13 itself, and comprising a pneumatic cylinder 25, whose stem 26 is mechanically connected to the support plates 20 and 21, each of them being equipped with a gear wheel, 22 and 23 respectively, engaging the rack attached to the frame 13.

Moreover, the stretching roller 8 is connected with the support plate 20 through a vertical displacement unit, indicated as a whole with 72, and compris-

ing a pneumatic cylinder 42 attached to the support plate 20 and whose stem is in contact with the training plate 16 at its point 44.

In the same way, the stretching roller 9 is connected with the support plate 21 through another vertical displacement unit, indicated as a whole with 71, and comprising a pneumatic cylinder 43 attached to the support plate 21 and whose stem is in contact with the training plate 17 at its point 45.

Each stretching roller 8 and 9 is also equipped with a kinematic rotation unit operated by an electric motor (not represented in the Fig.) which causes each roller to rotate around its horizontal axis, 46 and 47 respectively. It will be observed in particular in Fig. 1, that the stretching roller 8 is made to rotate around its axis 46 by a kinematic unit, indicated as a whole with 30, which consists of a pulley 32 keyed to the axis 46 of the roller itself, said pulley receiving through a driving belt 34, the motion of a driving pulley 36 keyed on the shaft of the driving motor. Similarly, the stretching roller 9 (not visible in Fig. 1) is made to rotate by the kinematic unit 31 which comprises a pulley 33 keyed to the axis 47 of the roller itself, said pulley being made to rotate by a driving pulley 37 keyed on the axis of the driving motor through the action of a belt 35.

Therefore, each stretching roller 8 and 9 can be displaced vertically so as to approach or move away from the working bench 5, and it can also rotate around its axis and simultaneously it can be translated along frame 13. Beyond the conveyor belt 2 and beyond the frame 13 which supports the pressing unit 10 and the stretching rollers 8 and 9, there is a removal unit for the hide, indicated as a whole with 50, which consists of a top motor-driven conveyor belt 51 adhering to a bottom motor-driven conveyor belt 52, both belts being made to move following respectively directions 55 and 56, and allowing the removal of the hide 14 from the machine after the stretching process has been completed.

It is with reference to the schematic drawings represented in the Figs. from 5 to 10 that it is possible to describe how the stretching machine according to the invention operates.

After the hide 14 has been laid flat on the conveyor belt 2, as can be observed in Fig. 1, the advancing movement of the conveyor belt 2 following direction 4, places the hide 14 itself on the working bench 5, so that it is ready to be stretched, as can be observed in Fig.5.

The working process starts when both the pressing roller 11 and the stretching rollers 8 and 9 are in the position represented in Fig. 5, that is to say, lifted away from the hide 14 so that, by operating the pneumatic cylinder 12, belonging to the pressing unit 10, the pressing roller 11 is forced against the hide 14, thus blocking the latter on the working bench 5, as can be observed in Fig. 6. Simultaneously, the stretching roller 9 is lowered too, by operating the pneumatic cylinder 43 belonging to the vertical displacement unit 71, while the stretching roller 8 remains in the lifted position.

From such a position the stretching operation starts, when the roller 9, as can be observed in Fig. 7, is made to rotate around its axis 47 by means of a kinematic unit 31 and simultaneously it is displaced following direction 28, through the action of the kinematic translation unit 70.

Thus begins the stretching process of portion 60 of the hide 14, such stretching occurring because of the action of the protruding helicoidal blades 41 applied on each stretching roller and visible in Fig. 3.

It will be observed in particular in Fig. 3, wherein only the stretching roller 9 is represented by way of illustration, that the stretching action occurs because of the adherence of its protruding blades 41 on the hide 14 being processed, since said blades present inclinations 42 opposed to one another, they cause in relation to the central area 43 of the hide, two stretching actions opposed to one another, 44 and 45 respectively, which cause the hide to be stretched. Simultaneously, as can be observed in Fig. 2, the displacement of the roller 9 following direction 28, cause on the hide 14 being processed also a stretching effect in the direction orthogonal to the directions 44 and 45 previously mentioned and, as a consequence, there is a uniform distribution of the stretching action all over the surface of the hide. On the contrary, in the stretching machines belonging to the known technique, the stretching of the hide occurs only in the opposite directions of winding of the stretching rollers. When the stretching roller 9, as will be observed in Fig. 7, has reached its end stroke toward direction 28, and, therefore, it has completed the stretching of area 60 of the hide 14 being processed, the stretching roller 9 is lifted up by means of a pneumatic piston 43, as will be observed in Fig. 8, while the stretching roller 8 is simultaneously lowered and is in turn made to rotate around its axis through the kinematic unit 30 and simultaneously it is also displaced following the direction of arrow 27 by the action of the kinematic translation unit 70. The roller 8 therefore, starts moving following direction 27, thus causing the stretching of the part 61 of the hide 14, visible in the schematic representation of Fig. 9.

The stretching operation is completed when the stretching roller 8 reaches the end of its stroke and, in such a position, it is lifted up again through the action of the pneumatic cylinder 42. Simultaneously the pressing roller 11 is lifted up, too, thus achieving the configuration represented in Fig. 10, wherein the hide 14, which has been stretched, can be removed from the stretching machine.

In order for this to occur, the conveyor belt 2 is made to roll again in direction 4, as can be observed in Fig. 3, so that the belts 51 and 52 of the removal unit 50 catch the hide 14 which will then be removed

from the machine.

On the basis of what has been described it has been explained how the stretching method according to the invention and the stretching machine through which such method can be carried out, reach the proposed purposes.

Firstly, it has been seen that the rotation movement of each stretching roller around its axis in combination with the transversal displacement of the roller itself, causes a stretching of the hide which is uniformly distributed all over the hide surface and in each of its directions. This allows to eliminate any possible creases regardless of where they are and, in conclusion, it permits to obtain a better quality of the finished product.

It could also be seen that the degree of stretching of the hide appears to be higher than the one obtained on the machines belonging to the known technique, thus yielding the advantage of a better use of the hide surface.

With regard to the helicoidal blades 41 wound on the surface of each roller and, beginning from the center, following opposed axial directions, they can be replaced with variously shaped rough-surfaced ribs, applied on the surface of the roller or with elements having different shape and dimensions however arranged with opposed and essentially helicoidal directions along the axial direction of the roller. Said surfaces or contact elements can be arranged according to one or more principles and they may acquire any configuration and any shape.

Moreover, with regard to the driving means of both the pressing roller 11 and the stretching rollers 8 and 9, they can be of any type, such as electrical, pneumatic, hydraulic, mechanical or others.

Finally, with regard to the number and arrangement of the stretching rollers, these can be modified, too. For instance, a different embodiment could foresee a single stretching roller placed at one side only in relation to the pressing unit, wherein said stretching roller always moves in the same direction in relation to the pressing unit, while the hide to be processed is placed on a rotating working bench. In this way the stretching roller performs the stretching of the hide with a back and forth movement following the same direction, wherein in the first movement it stretches half of the hide, while the other half, after the hide has been rotated by 180 degrees, is stretched during the backward movement. Another different embodiment can foresee the two stretching rollers to be independent of each other, each of them possibly performing the translation movement simultaneously with the other, each being driven by its own driving means.

Other different embodiments concerning the arrangement of the stretching rollers and of the possible pressing unit, as well as different ways of activating the stretching rollers and the pressing unit, and any possible modification of their sizes, must be considered as falling within the scope and spirit of the present invention.

Claims

1) A method for stretching the hides, characterized in that it comprises:

- a first step during which the hide (14)to be stretched is laid flat on a working bench (5) belonging to a stretching machine (1);
- an second step whereby the hide (14) is blocked against the working bench (5) by means of at least one pressing unit (10);
- a third step in which the hide is stretched (14) on the working bench (5), by means of one or more stretching rollers (8,9) having horizontal axes, each of them having stretching projecting elements (41) on its external surface, wherein the stretching of said hide (14) is obtained by combining the rotational movement that each stretching roller (8, 9) performs around its axis, with the translation movement (27, 28) of the roller (8, 9) itself following a direction moving away from the pressing unit (10).

2) A stretching machine (1), suited to carry out the described stretching method according to claim 1), characterized in that it comprises:

- a conveyor feeding belt (2), over which the hide (14) to be stretched is laid, which slides along the surface of a working bench (5) attached to the machine supporting base (6);
- a frame (13), overhanging the working bench (5), which supports:
  - a pressing unit (10), arranged at a substantial central position in relation to the working bench (5), equipped with at least one pressing element (11) for blocking the hide (14) against the working bench (5);
  - a pair of stretching rollers (8,9), each of them equipped with stretching elements (41) parallel to the working bench (5) and arranged at opposite positions in relation to the pressing unit (10), each roller being mechanically connected with a kinematic unit (30, 31) driving it into rotation around its own axis and provided both with a kinematic unit (70) for the translation along the frame (13) and with a unit (72, 71) for its vertical displacement in relation to the working bench (5);
- a unit (50) for the removal of the hide (14) after the stretching process has been completed, wherein said units (72, 71) for the vertical displacement hold one of the rollers (8, 9) lifted away from the hide (14) and, simultaneously, hold the other roller (9, 8) adherent to the hide itself, when the latter roller is made to rotate

around its axis and simultaneously to translate along the frame (13) by the rotation units (31, 30) and translation kinematic unit (70)) respectively

3) A stretching machine according to claim 2) characterized in that the kinematic unit (70) for the translation of the stretching rollers (8,9) along the frame (13), comprises a pneumatic cylinder (25), attached to the frame (13), the stem (26) of which is attached to at least one of the support plates (20,21) firmly connected with each other, each of them supporting one end of each of said stretching rollers, each of said support plates being provided with a gear wheel (22, 23), neutrally keyed on the same and matching a rack attached to the frame (13).

4) A stretching machine according to claim 3), characterized in that the unit (72, 71) for the vertical displacement of each roller (8,9) comprises a training plate (16,17) which supports the stretching roller in correspondence with its end and it is neutrally keyed to the corresponding support plate (20,21) belonging to the translation kinematic unit (70) by means of a pivot (18,19) around which it can rotate idly, whenever it is made to rotate by the action of a pneumatic cylinder (42,43) attached to the corresponding support plate (20,21) and the stem of which is in contact at a point (44,45) with its corresponding training plate (16,17).

5) A stretching machine according to claim 2), characterized in that the kinematic unit (30,31) for the rotation of each stretching roller (8,9) comprises a pulley (32,33) keyed to the axis (46,47) of the roller which, through a belt (34,35) receives the movement from a driving pulley (36,37) keyed to the axis of a driving motor.

6) A stretching machine according to claim 2), characterized in that the pressing element of the pressing unit (10) is a pressing roller (11) moving vertically in relation to the working bench (5) through at least one driving pneumatic cylinder (12) attached to the frame (13).

7) A stretching machine according to claim 2), characterized in that the stretching elements of each stretching roller (8,9) are a plurality of helicoidal blades (41) wound around its external surface with axial directions opposite to one another starting from the essentially central position (43) of each roller.

8) A stretching machine according to claim 2), characterized in that the unit (50) for the removal of the hide (14) after the stretching operation has been completed, comprises a pair of motor-driven conveyor belts (55, 56) adhering to one another and being aligned with the feeding belt (2) in correspondence with its position wherein the removal of the hides takes place after the stretching operation has been completed.

9) A stretching machine according to claim 3), characterized in that the support plates (20,21), each supporting the end of one stretching roller and placed at the same side, are firmly connected with each other through a connecting rod (24).

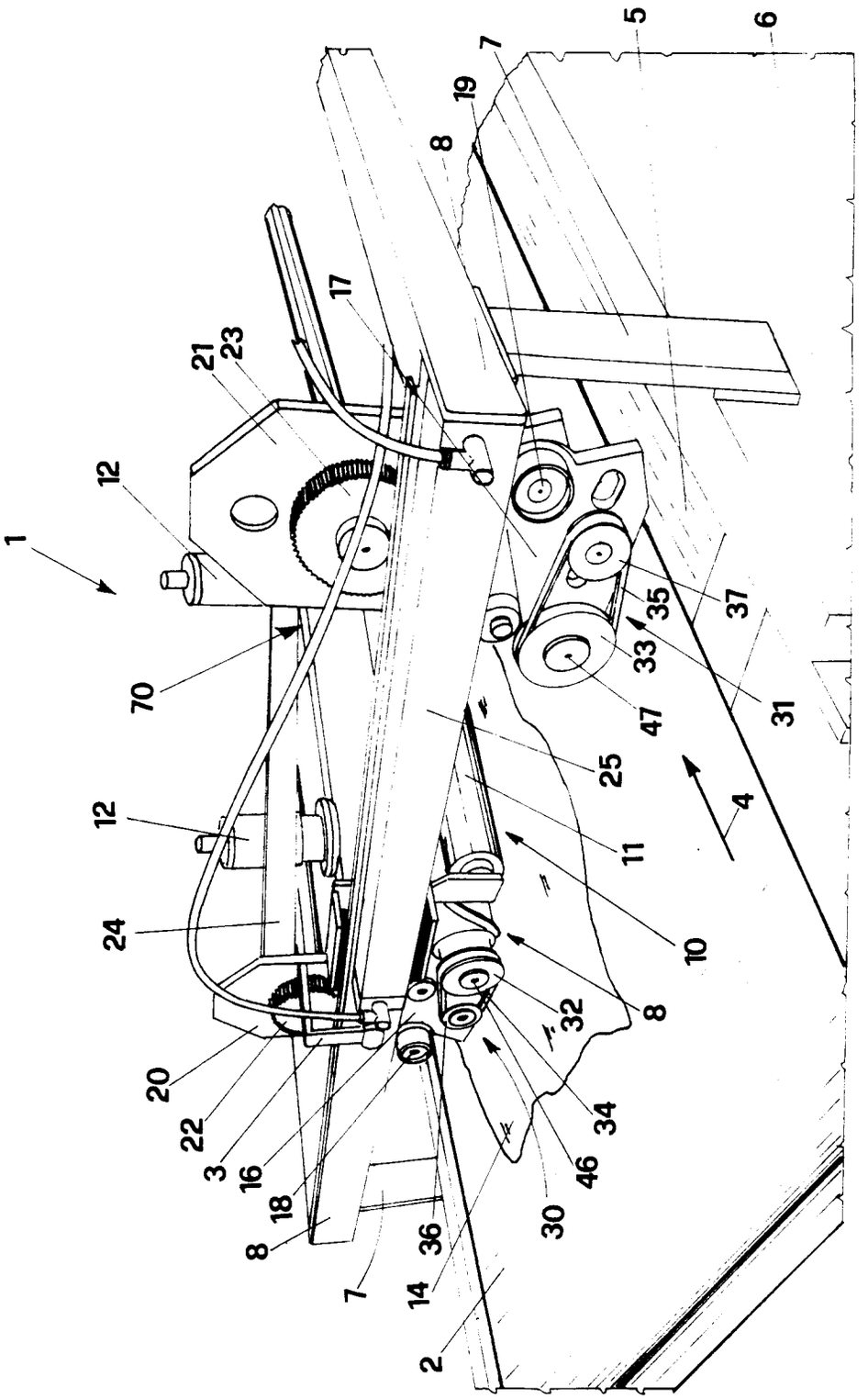
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FIG.1

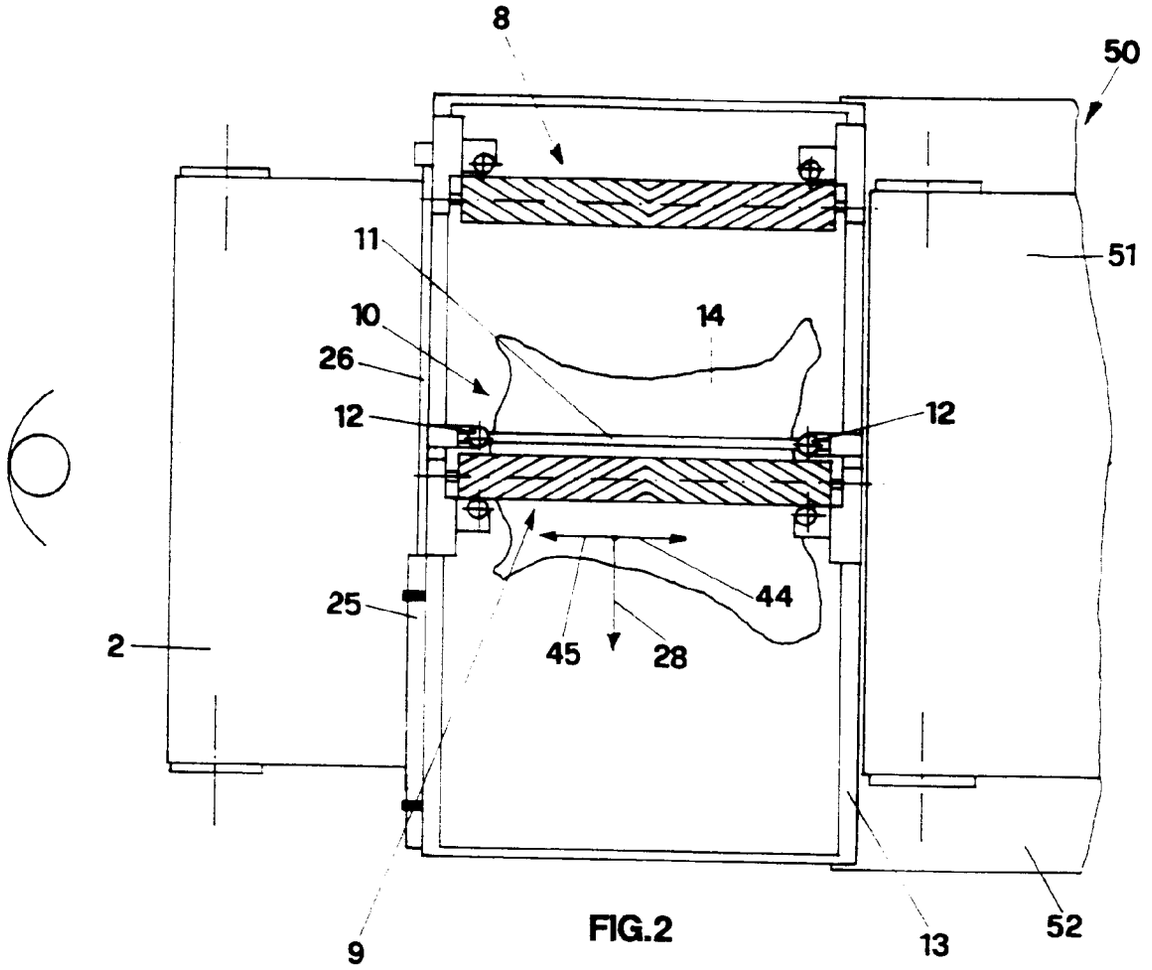
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FIG.2

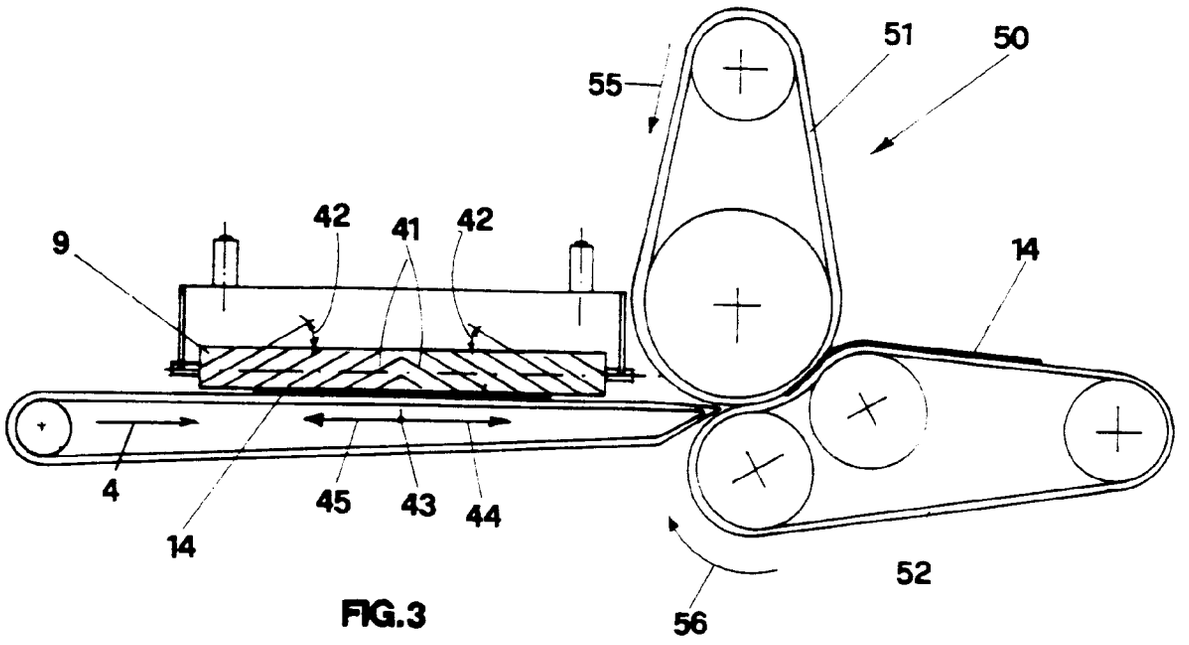
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FIG.3

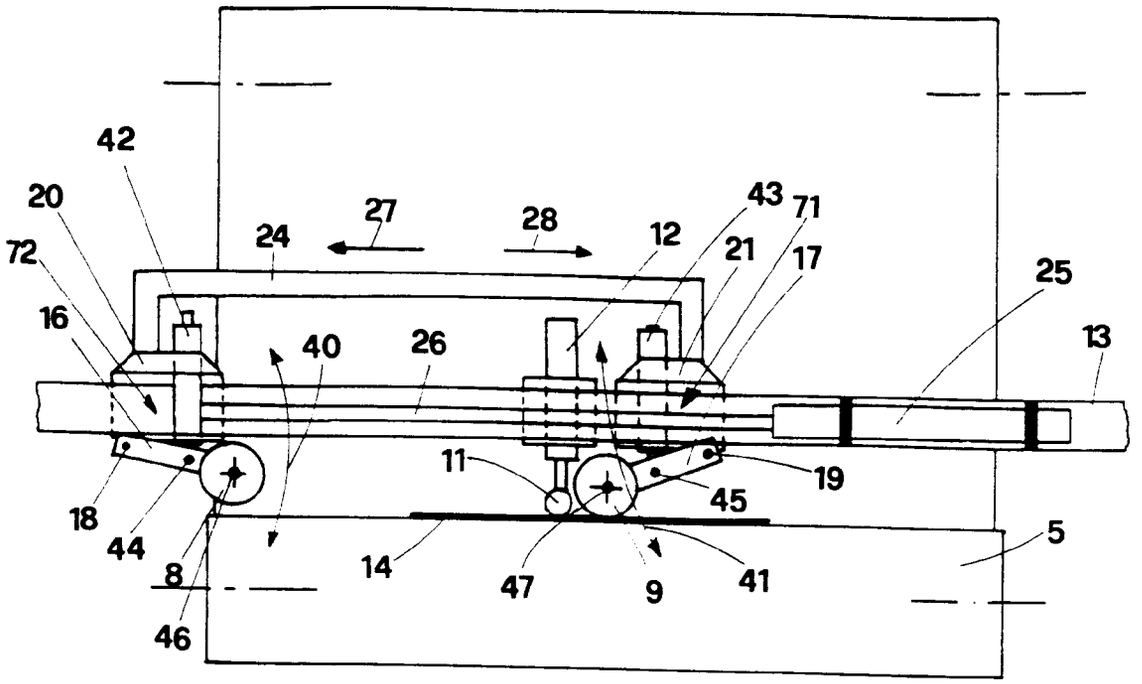

FIG.4

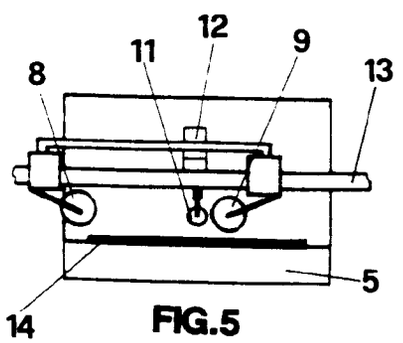

FIG.5

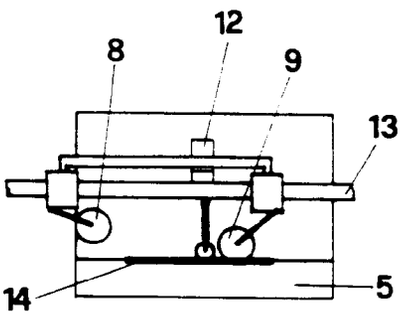

FIG.6

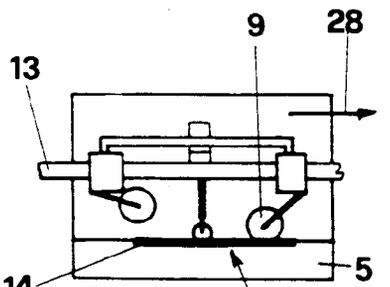

FIG.7

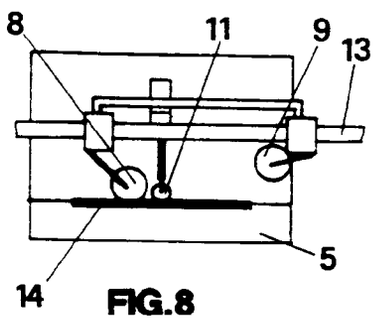

FIG.8

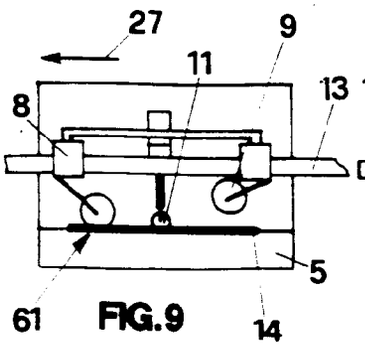

FIG.9

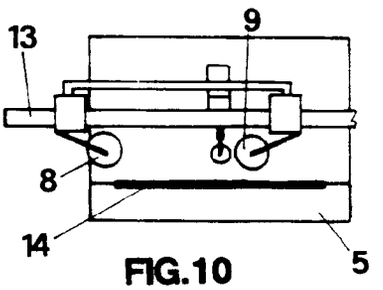

FIG.10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 10 3361

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)
X	US-A-1 715 582 (C. P. VOGEL ET AL) * the whole document *	1	C14B1/26
A		2,5,7	
A	FR-A-2 506 781 (CABROL) * the whole document *	1-3,5,7	
A	DE-C-242 875 (BAYERISCHE MASCHINEN-FABRIK) * the whole document *	1,2,5,7	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

C14B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 JUNE 1993	DE RIJCK F.

CATEGORY OF CITED DOCUMENTS

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Y : particularly relevant if combined with another document of the same category
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P : intermediate document

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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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EPO FORM 1503 03.82 (P0401)