(19) Europäisches Patentamt
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(11) **EP 3 943 616 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
26.01.2022 Bulletin 2022/04

(21) Application number: **21186342.8**

(22) Date of filing: **19.07.2021**

(51) International Patent Classification (IPC):
C14B 1/56 *(2006.01)* ***B05C 1/08*** *(2006.01)*
C14C 11/00 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
C14B 1/56; B05B 14/20; B05C 1/083; C14C 11/00; C14C 15/00; B05C 1/02; B05C 1/0808

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **23.07.2020 IT 202000017926**

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(54) MACHINE FOR ROLLER FINISHING OF HIDES

(57) This invention relates to a machine for roller finishing of hides, which comprises a rubber-coated mat (1), which transports said hides (P), wherein an engraved roller (2) deposits a uniform liquid film (L) on the surface of the aforementioned, a contrast roller (4) being present, arranged below the engraved roller (2), a return roller (5) being also provided, arranged inside the volume delimited by the rubber-coated mat (1), at which the hides (P) are deposited on a subsequent conveyor means (6), said machine also providing means (20) for washing and drying the rubber-coated mat (1), a first positioning roller (7) being also provided, with adjustable positioning, the positioning variation of said first positioning roller (7) determining the variation of the contact area between the hides (P) and the engraved roller (2). Said machine provides that at least one of the rollers arranged inside the volume delimited by the rubber-coated mat (1) and in contact with the inner surface thereof, distinct from the contrast roller (4) and from the first positioning roller (7), is also equipped with means adapted to enable its adjustable positioning and is able to determine the variation of the geometry of the aforesaid mat (1).

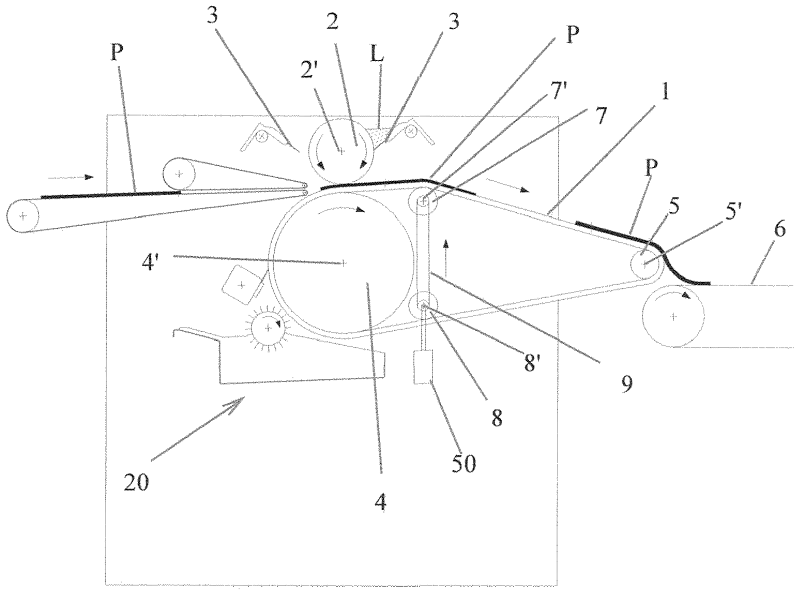


Fig. 3

EP 3 943 616 A1

Description

[0001] The present invention relates to a machine for roller finishing of hides, according to the general part of claim 1.

[0002] A known type of finishing machine for hides is illustrated in fig. 1.

[0003] As is well known, roller machines (commonly called roller coating machines) are used for the execution of the finishing operation in the tannery field, in which the hides P are transported by a rubber-coated mat 1 and pressed against an opposite engraved roller 2, which deposits on the surface of the hide a uniform liquid film L, previously distributed on said engraved roller by one or more scraper blades 3.

[0004] The engraved roller can rotate in "sync", i.e., in the direction in which the hide is advancing, or in "reverse", i.e., in the opposite direction to the aforesaid direction of the hide.

[0005] The perfect success of the hide finishing operation depends on many factors, among which the predominant ones are a regular entry of the hide into the restricted area, i.e., the area between the engraved roller and the underlying transport mat, and a well determined compression force of the portion of hide which comes into contact, in a substantially tangent way, with the surface of the aforesaid engraved roller. The uniformity of such a compressive force when the roller coating machine is provided with a rubber transport mat 1 depends on the tension of the mat itself to ensure that it is wound onto a towing roller and an underlying contrast roller 4, which in some designs are coincident.

[0006] It should be noted, however, that the configuration of the machines for finishing hides of known type may differ from that illustrated in figure 1.

[0007] In some of the machines of known type, such as the one explicitly illustrated in figure 1, the task of the motorised roller is performed by one of the rollers 4 or 5, the other of said two non-motorised rollers being in fact an idle roller. In some other finishing machines, the task of the motorised roller is, vice versa, carried out by a further roller placed near means 20 adapted to allow washing and drying the mat 1 which operate continuously on the outer surface thereof.

[0008] It is therefore reiterated that what is represented in figure 1 is only one of the possible forms for making machines of a known type for finishing hides and that the invention relates to all such machines made in accordance with the general part of claim 1.

[0009] As can be seen in such a figure 1, in the devices of the state of the art there is also a roller 7, placed within the volume delimited by the rubber-coated mat 1, in contact with the inner surface of the aforesaid mat and with adjustable positioning, arranged downstream of the contact zone between the engraved roller 2 and the rubber-coated mat 1. By suitably adjusting the position of said roller 7 and by keeping the wheelbase of the axes 2' and 4' of the rollers 2 and 4 unchanged, it is possible to exactly determine the extent of the contact area between the hides P and the engraved roller 2, acting on the geometry of the mat 1. It is thereby possible to act directly on the quantity of liquid which enters the pores of the hide and on the quality of the coating of the liquid itself on said hide, adapting the operation of the machine to the features required by the user, both as regards the type of hide on which it is desired to operate and as regards the liquid actually deposited on the hide P. This is particularly useful when the engraved roller operates in reverse mode.

[0010] In fact, for each type of hide and even, sometimes, for each batch of hide, 'field' tests are carried out, modifying the precise positioning of the roller with adjustable positioning mentioned several times above in order to obtain optimal results.

[0011] In the machine illustrated in figure 1, the introducer device 40 is also visible, as well as the means 20 for washing and drying the mat 1, already mentioned above, which comprise, in particular, a tank 23 containing the liquid cleaning solution, the toothed roller 21, as well as the blades 22 for continuously abrading the residues present on the mat 1.

[0012] The same figure also shows that the hides P, downstream of the return roller 5, are deposited on a conveyor means 6, generally consisting of a mat.

[0013] Furthermore, the rubber-coated mat 1, mentioned several times, has an outer surface covered with a layer of rubber, usually synthetic, which can vary from 2 mm to 20 mm in thickness, to which the hides adhere strongly by friction. Once again, it should be underlined that this constitutes a prior art.

[0014] However, it is important to note that modifying the position of the roller 7 results in a variation in the geometry of the mat 1 and therefore a variation in the length of the mat, with a consequent increase or decrease in the tension of the mat.

[0015] Although the rubber-coated mat 1 has intrinsic elasticity properties in the longitudinal direction (the longitudinal extension thereof can therefore be modified), it is destined to undergo considerable mechanical stress as a result of these continuous variations. Carried out tests have shown that variations in the longitudinal extension of the roller 7, which can exceed 5 - 10 mm, are caused by variations in the positioning of the roller, with high stresses on the mat; this necessarily leads to a reduction in the life of the mat, making it necessary to replace it when cracks or similar appear on the outer rubber layer. Furthermore, the more tense the aforesaid mat, the more difficulty there is in keeping the latter centred against the rollers around which it moves.

[0016] In patent document DE 9400543 U1, filed by the same applicant of the present application, a roller machine for roller finishing of hides is described, comprising (the cited references are relative to such a document) a rubber-coated mat (11), which transports hides (not shown) previously deposited manually or by means of one or more mats, and in which there is also an en-

graved roller (20) arranged above said hides (fig. 2), rotating synchronously or in reverse with respect to the advancement direction of the hides (fig. 2) and depositing on the surface of said hides a uniform film of liquid (par. 4), previously distributed on said roller by one or more scraper blades (22) (fig. 2), said mat (11) being supported by a plurality of rollers (10, 12, 12) arranged within the volume delimited by the rubber-coated mat (11) (fig. 2), at least one of said rollers (10) being motorised, a contrast roller (10) being present, arranged underlying the engraved roller (20) (fig. 2), each of said two rollers rotating respectively around mutually parallel axes (fig. 2), there being also a return roller (12), arranged within the volume delimited by the rubber-coated mat (11) (fig. 2), at which the deposit of the hides on a subsequent conveyor means occurs (not shown but implicitly present). However, such a document states that the technical problem to be resolved was to avoid varying the geometry of the mat (11) so as not to ruin it. In fact, the document provides that the tensioning rollers (12) of the mat (11) are integral with the side brackets (13). It is also specified that the geometry of the mat remains unvaried while the mat is being moved. In addition, there is an articulated quadrilateral with fixed joints integral with the load-bearing structure of the machine and shaped so that said movement occurs without varying the shape and therefore the tension of the mat itself. In conclusion, the object of such a finding is precisely to avoid significant variations in the geometry of the mat, while keeping the longitudinal extension thereof and consequently the tension thereof unvaried.

[0017] Other documents of the state of the art are KR 101779996 B1 and EP 0997538 A2; the latter document was also filed by the same applicant as that of the present application, this demonstrating the applicant's thorough knowledge of the state of the art.

[0018] The main object of the present invention is to realise a machine for roller finishing of hides which is able to overcome the above-mentioned considerable drawback concerning the variations in the longitudinal extension of the rubber-coated mat.

[0019] A further object of the invention is to ensure that the machine is simple in construction and at the same time particularly easy to use and effective for the user.

[0020] This is achieved, according to the invention, by conforming the machine to the features described in the characterising part of claim 1. Further features of the invention are present in the dependent claims. Furthermore, a particular operation of the machine of the invention is described in claim 9.

[0021] These and other features of the invention will now be described in detail below. Some of the particular embodiments thereof will be considered, as illustrated in the attached drawings and given as non-limiting examples, where:

- fig. 1 shows an overall schematic view of a finishing machine for hides according to the state of the art;
- fig. 2, 3 show two schematic side views of a first embodiment of the device of the invention, under two different operating conditions;
- fig. 4, 5 and 6 show an axonometric view and two side views, respectively, of a portion of the machine according to the invention is this first embodiment;
- fig. 7, 8 show two schematic side views of the first embodiment of the device according to the invention under two different operating conditions, but applied to a machine of a different type with respect to that illustrated in figures 2 and 3;
- fig. 9, 10 show two schematic side views of a second embodiment of the device of the invention under two different operating conditions;
- fig. 11, 12 show two schematic side views of a third embodiment of the device of the invention under two different operating conditions;
- fig. 13, 14 show two schematic side views of a fourth embodiment of the device of the invention under two different operating conditions;
- fig. 15, 16 show two schematic side views of a fourth embodiment of the device according to the invention under two different operating conditions, but applied to a machine of a different type with respect to that illustrated in figures 13 and 14;
- fig. 17, 18 show a portion of the machine according to the invention, in a particular embodiment described in one of the dependent claims, respectively under "usual" conditions and under the conditions in which the operating features of this particular embodiment are implemented.

[0022] The first embodiment of the devices which enable the machine for roller finishing of hides to act according to the objects of the invention is showed in figures 2 and 3. It should be noted that many of the numerical references in these figures have already been extensively cited in the description and in figure 1, which shows the state of the art. In this embodiment, it is particularly provided that a first positioning roller 7 with adjustable positioning acts jointly and oppositely with a second positioning roller 8, both being in contact with the inner surface of a rubber-coated mat 1. For this reason, when the second positioning roller 8 is present, the roller 7 is referred to as the first positioning roller. In particular, it is provided that said rollers 7, 8 extend longitudinally along the transversal extension of the rubber-coated mat 1. In practice, as can be deduced by carefully comparing the two figures 2 and 3 and as will be more fully explained below, said rollers act so as to maintain the longitudinal extension of the mat 1 substantially constant at each position of the rollers 7, 8. At a roller 5, the hide is delivered to a next conveyor means 6, consisting in fact of a mat.

[0023] From an operative point of view, as can be seen in figures 2 and 3, said rollers 7, 8 are hinged, at both ends thereof, to a single connection bar 9, such as to ensure the maintenance of the contact between said rollers 7, 8 and the inner surface of the mat 1. Constructively, as can be seen in figures 4 to 6, pins 11 are integral with

the rollers 7 and 8, which are hinged in special seats 11' (fig. 4) obtained on said bar 9. As can be seen in these figures, identical structures with all the above elements are provided at both sides of the machine. It is also provided that each of the bars 9 will be operated by a hydraulic, pneumatic or electrically actuation element 50. Therefore, it is quite clear that, by acting on the bars 9 by means of the element 50, the precise positioning of the pins 11 is determined, thereby determining the corresponding positioning of the rollers 7, 8. However, it is clear that, given the geometry of the system, a corresponding "lengthening" of the mat at the upper part determines a corresponding "shortening" of the mat 1 in the lower part, thus determining the substantial constancy of the longitudinal extension of the mat even when the geometry thereof varies.

[0024] It should be noted that the term 'substantial constancy of the longitudinal extension of the mat' means that, advantageously, the variation of the longitudinal extension of the mat is of a value less than 1 mm at the variation in geometry thereof.

[0025] Figures 7 and 8 show that, as mentioned above, the system illustrated and described above can also be used with machines which have different configurations than the one illustrated in figures 2 and 3, which reflects the configuration illustrated in figure 1. In particular, in the machine illustrated in figures 7 and 8, the function of the motorised roller is performed by the roller 100, arranged near the washing and drying means 20 of the mat 1. Otherwise, both structurally and functionally, the means which maintain the longitudinal extension of the mat 1 substantially constant when the geometry thereof varies (rollers 7 and 8, bar 9, element 50, etc.) act exactly like those illustrated above, in addition to being identically shaped.

[0026] As can be seen in figures 9 and 10, according to another embodiment of the device referred to herein, it is provided that each of the two positioning rollers 7, 8 is hinged to an arm 14 thereof, which is susceptible to rotate around an end 15 thereof, opposite that to which said positioning rollers 7, 8 are hinged. In particular, it is provided that each of said arms 14 is supported by a fixed support element solidly constrained to the machine, not shown in the figure for simplicity. It is also provided that on the axes 7', 8' of the shaft around which said positioning rollers 7, 8 rotate, hydraulic, pneumatic or electrically actuation elements 19, handled by an electronic control unit, act. In practice, by actuating said elements 19, an upward and downward displacement of the rollers 7, 8 is determined, maintaining the axes 7', 8' parallel to axes 2', 4' of rollers 2, 4, thus determining the variation of the geometry of the mat 1.

[0027] Figures 11, 12 illustrate a further embodiment of the device according to the invention in which it is provided that, also in this case, the first positioning roller 7 is hinged, as in the previous case, to an arm 17, which is susceptible to rotate around the end 15 thereof which is opposite that to which said roller 7 is hinged. The arm 17 is supported by a fixed support element solidly constrained to the machine, not shown in the figure for simplicity. On the hinge at the axis 7' of the shaft around which said first positioning roller 7 rotates, there is a hydraulic, pneumatic or electrically actuation element 19 managed by an electronic control unit. All this in a manner which corresponds exactly to the previous embodiment of the invention.

[0028] In this case, however, there is an element 21, also of hydraulic, pneumatic or electrically actuation, which is managed by an electronic control unit, which acts on at least one end of the axis 5' around which said roller 5 rotates, at which the positioning of the hides P on a next conveyor means 6, constituted in the figures by a mat, occurs.

[0029] A comparison of figures 11 and 12 shows that in figure 11 the roller 7 is in the "raised" position, which corresponds to the "retracted" position of the roller 5; in figure 12, the roller 7 is in the "lowered" position, which corresponds to the "lengthened" position of the roller 5. In any event, it is evident that, by virtue of the corresponding and coordinated positioning of the two rollers 5, 7, the longitudinal extension of the mat 1 is maintained substantially constant, while varying the geometry thereof.

[0030] Figures 13, 14, 15 and 16 illustrate a fourth embodiment of the device according to the invention, applied by way of non-limiting example to two different machines of two different types; in particular, figures 13, 14 are applied to the machine illustrated in figures 2, 3, while figures 15, 16 relate to the machine illustrated in figures 7, 8. This alternative embodiment provides that the bar 9 has a region of adjustable elasticity guaranteed by the presence of an elastic element 60, equipped with an adjustable load, and that the element 50 acts only on the axis 7' of the roller 7. In particular, figures 13, 15 refer to situations in which the positioning of the mat 1 at the engraved roller 2 minimises the contact area between said engraved roller 2 and the hide P; vice versa, figures 14, 16 refer to a positioning of the mat 1 with a maximum contact area between said engraved roller 2 and hide P.

[0031] This latter solution is capable of compensating even more for the tension of the mat as the geometry changes and to keep the extension of the mat 1 almost constant, with variations of less than 1 mm as the geometry thereof varies.

[0032] Figure 17 illustrates a particular embodiment of the device according to the invention; in this figure, which substantially reproduces what is showed in figure 4 above, the positioning rollers 7, 8 in particular are clearly visible. In the situation showed in figure 17, these positioning rollers 7, 8 are presented in the usual situation in which they are in contact with the inner surface of the mat and in a position perpendicular to the advancement direction of the hides, which is not showed in this case. In fact, those skilled in the art, when considering the normal "positioning" of any of the rollers present in the machine (for example, the contrast roller 4, the engraved roller 2, the return roller 5, etc.), clearly intends that the

axis thereof, in such a "normal" condition, is precisely arranged perpendicularly to the advancement direction of the hides and parallel to the axes of the other rollers.

[0033] On the other hand, as can be seen in figure 18, the second positioning roller 8 has a pin 11 arranged in a seat 12, schematically showed in the figure with a diameter greater than that of the pin 11, so as to allow slight displacements from the "normal" position of said pin 11. In fact, a hydraulic, pneumatic or electrically actuation cylinder 90 acts on the end of said pin 11, so as to determine the displacement of the end of said pin 11. In figure 18, the end of one of the pins 11 of the roller 8 is displaced from the "normal" position thereof, but a similar structure may also be present on the opposite side of the machine, acting in a coordinated manner and opposite to that just described.

[0034] In fact, one of the problems encountered when using the machine according to the invention is that sometimes the mat 1 changes the "centred" position thereof, which is exactly that showed in figure 17, giving rise to bad finishing results. Tests have shown that, by deviating the second positioning roller 8 from the so-called "normal" position thereof, in which, inter alia, said second positioning roller 8 is arranged parallel to the first positioning roller 7, transverse forces are generated on the rubber-coated mat 1, so that it is returned to the correct "centred" position thereof.

[0035] It should also be noted that the same configuration does not necessarily have to be applied to the second positioning roller 8, which is, moreover, sometimes not present in the various embodiments of the machine described above. By way of example, such a configuration can also be applied to the return roller 5. It should be noted that such a configuration may, however, be applied to any roller within the extension of the rubber-coated mat 1 other than the contrast roller 4 and the first positioning roller 7.

[0036] In all the embodiments of the device according to the invention, which provide the use of a second positioning roller 8, it is possible to apply an electronic, pneumatic or mechanical device capable of inclining the axis 8' (figures 15, 16) of said roller with respect to the axis 4' of the contrast roller 4 so as to maintain the centring of the rubber-coated mat 1. The same device may advantageously be applied to the roller 5 for inclining the relative axis 5' (figures 13, 14) in embodiments where the use of a second positioning roller 8 is not provided.

[0037] It can therefore be seen that by means of the various devices illustrated above, it is possible to obtain the prefixed object of keeping the longitudinal extension of the mat substantially constant, while also considerably varying the geometry thereof, particularly at the area in which the engraved roller is present, which undoubtedly allows to state that the objects of the invention have been amply achieved.

[0038] It is, however, once again reiterated that in all the embodiments of the present invention, both those described and illustrated, as well as others falling within the scope of the following claims, the term substantially constant, referring to the longitudinal extension of the mat, is advantageously to be understood as a variation of said extension of less than 1 mm in value at the variation of the geometry of the mat.

[0039] Lastly, it should be noted that the present invention can take forms and aspects other than those described, without prejudice to the essential features thereof, as defined in the following claims, and without thereby departing from the scope of the patent.

Claims

1. MACHINE FOR ROLLER FINISHING OF HIDES, which comprises a rubber-coated mat (1), which transports said hides (P) previously deposited manually or by means of one or more mats and wherein there is also an engraved roller (2) arranged above said hides (P), which rotates in a synchronous or reverse way with respect to the advancement direction of the hides and which deposits on the surface of the aforesaid a uniform liquid film (L), previously distributed on said roller by one or more scraper blades (3), said mat (1) being supported by a plurality of rollers arranged within the volume delimited by the rubber-coated mat (1), at least one of said rollers being motorised, a contrast roller (4) being present, arranged underneath the engraved roller (2), each of said two rollers (2, 4) rotating respectively about mutually parallel axes (2', 4'), a return roller (5) also being provided, arranged inside the volume delimited by the rubber-coated mat (1), at which the deposit of the hides (P) takes place on a subsequent conveyor means (6), in said machine being also present washing and drying means (20) of the mat (1), which operate continuously on the outer surface thereof, inside the volume delimited by the rubber-coated mat (1) a first positioning roller (7) further being provided, with adjustable positioning, placed in contact with the inner surface of said rubber-coated mat (1) and downstream of the contact zone between the engraved roller (2) and the aforesaid, the positioning variation of said first positioning roller (7) determining the variation of the geometry of the rubber-coated mat (1) and therefore the variation of the contact area between the hides (P) and the engraved roller (2), with the same distance between the axes (2', 4') respectively of the engraved roller (2) and the contrast roller (4),
said machine **being also characterised in that** at least one of the rollers arranged inside the volume delimited by the rubber-coated mat (1) and in contact with the inner surface thereof, distinct from the contrast roller (4) and from the first positioning roller (7), is also provided with means adapted to enable the adjustable positioning thereof and to determine the variation of the geometry of the aforesaid mat (1).

2. MACHINE, according to claim 1, **characterised in that** the roller provided with adjustable positioning, distinct from the first positioning roller (7) and that allows the geometry of the mat (1) to be modified, consists of a second positioning roller (8), connected to the first positioning roller (7) by means of a bar (9), it being provided that said positioning rollers (7, 8) extend for at least the entire width of the rubber-coated mat (1), it also being provided that means act on the supports of said rollers (7, 8) to determine their displacement.

3. MACHINE, according to claim 1, **characterised in that** the roller provided with adjustable positioning, distinct from the first positioning roller (7) and that allows the geometry of the rubber-coated mat (1) to be modified, consists of a further positioning roller (8), not mechanically connected to the first positioning roller (7), each of said positioning rollers (7, 8) being hinged to an arm (14) thereof, said arm (14) providing two mutually opposite ends and being adapted to rotate about an end (15) thereof, opposite that to which said positioning rollers (7, 8) are hinged, said hinging being provided at a fixed support element solidly constrained to the machine, which also provides for the support of said positioning rollers (7, 8).

4. MACHINE, according to claim 3, **characterised in that** the shafts around which said further positioning rollers (7, 8) rotate, have axes (7', 8') and on said axes (7', 8') hydraulic, pneumatic or electrically actuation elements (19) act, handled by an electronic control unit.

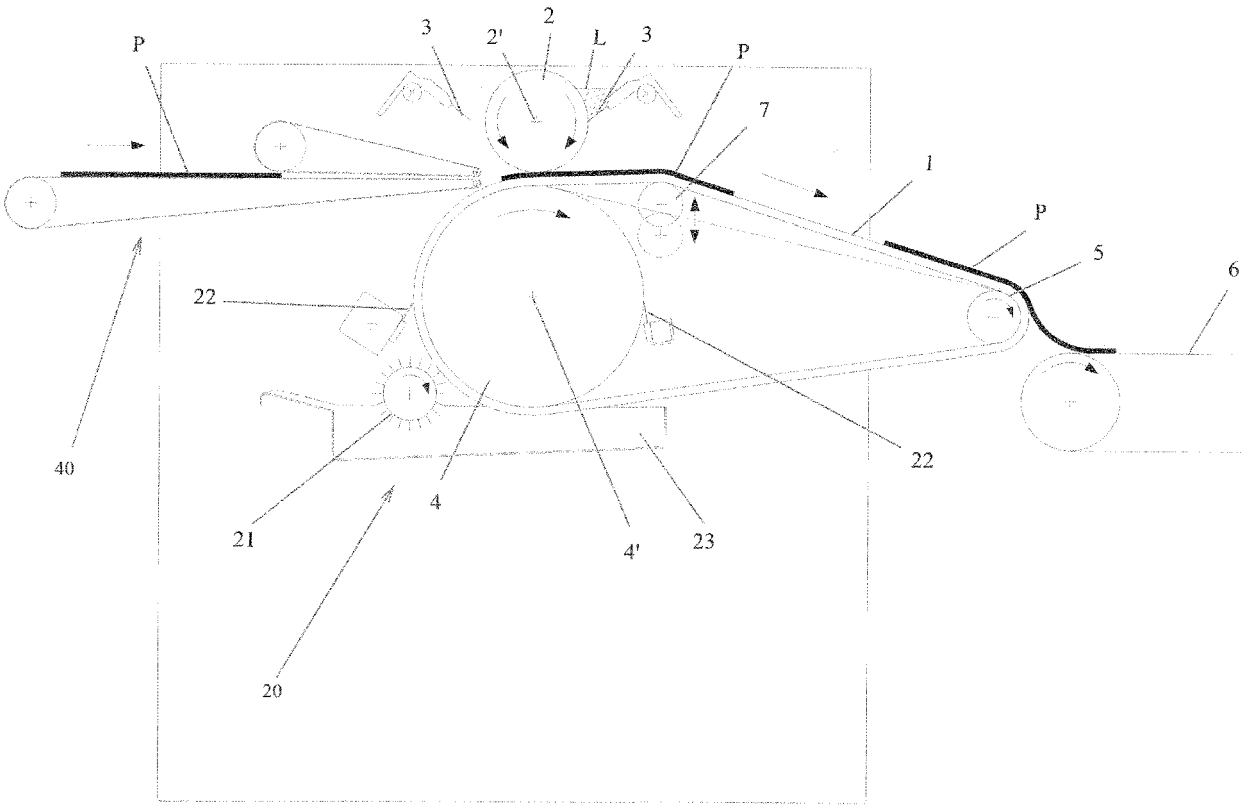
5. MACHINE, according to claim 1, **characterised in that** the roller provided with adjustable positioning, distinct from the first positioning roller (7) and that enables the geometry of the rubber-coated mat (1) to be changed, consists of the return roller (5), which is supported by a fixed support element solidly constrained to the machine, a further hydraulic, pneumatic or electrically activated element (21) being provided, managed by an electronic control unit, said return roller (5) presenting an axis (5'), on at least one of the ends of which said further element (21) acts.

6. MACHINE, according to claim 2, **characterised in that** it provides the connection bar (9) between the further positioning rollers (7, 8) being provided internally with an elastic element (60), equipped with an adjustable load.

7. MACHINE, according to claim 6, **characterised in that** the elastic element (60) is able to vary its load when resting.

8. MACHINE, according to any one of the preceding claims, **characterised in that** at least one of the ends of the roller provided with adjustable positioning, distinct from the first positioning roller (7) and that enables the geometry of the rubber-coated mat (1) to be changed, has a pin (11) arranged in a seat (12) on which acts a cylinder (90) with hydraulic, pneumatic or electric actuation, capable of moving one of the ends of said pin (11), the actuation of said cylinder (90) being able to modify the positioning of the roller with adjustable positioning from the "normal" condition in which it is arranged perpendicular to the direction of advancement of the hides and parallel to the axes of the other rollers, to a position different from the aforementioned.

9. OPERATION OF THE MACHINE, according to one or more of the preceding claims, **characterised in that** the variation of the geometry of the rubber-coated mat (1) induced by the displacement of at least one of the adjustable positioning rollers distinct from the first positioning roller (7) causes a variation of the longitudinal extension of said mat (1) opposite the variation of the longitudinal extension of the aforesaid mat (1) induced by the displacement of the first positioning roller (7), it being provided that the overall modification of the longitudinal development of the carpet (1) remains less than 1 mm.



STATE OF THE ART Fig. 1

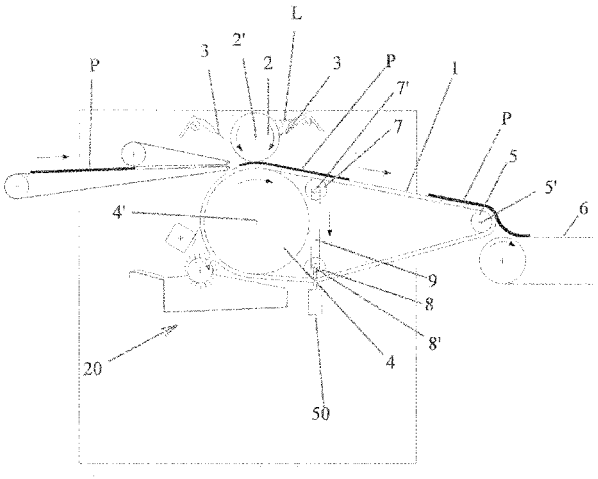


Fig. 2

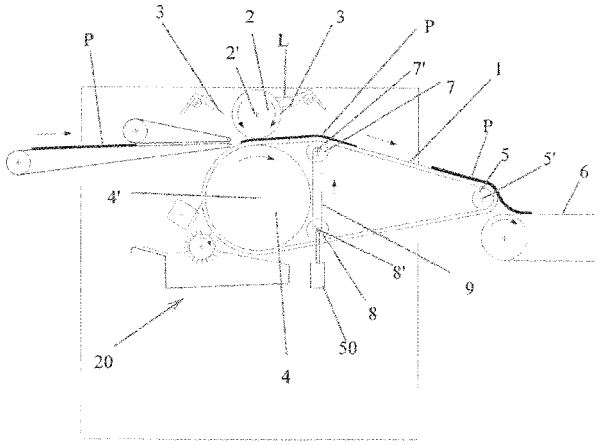


Fig. 3

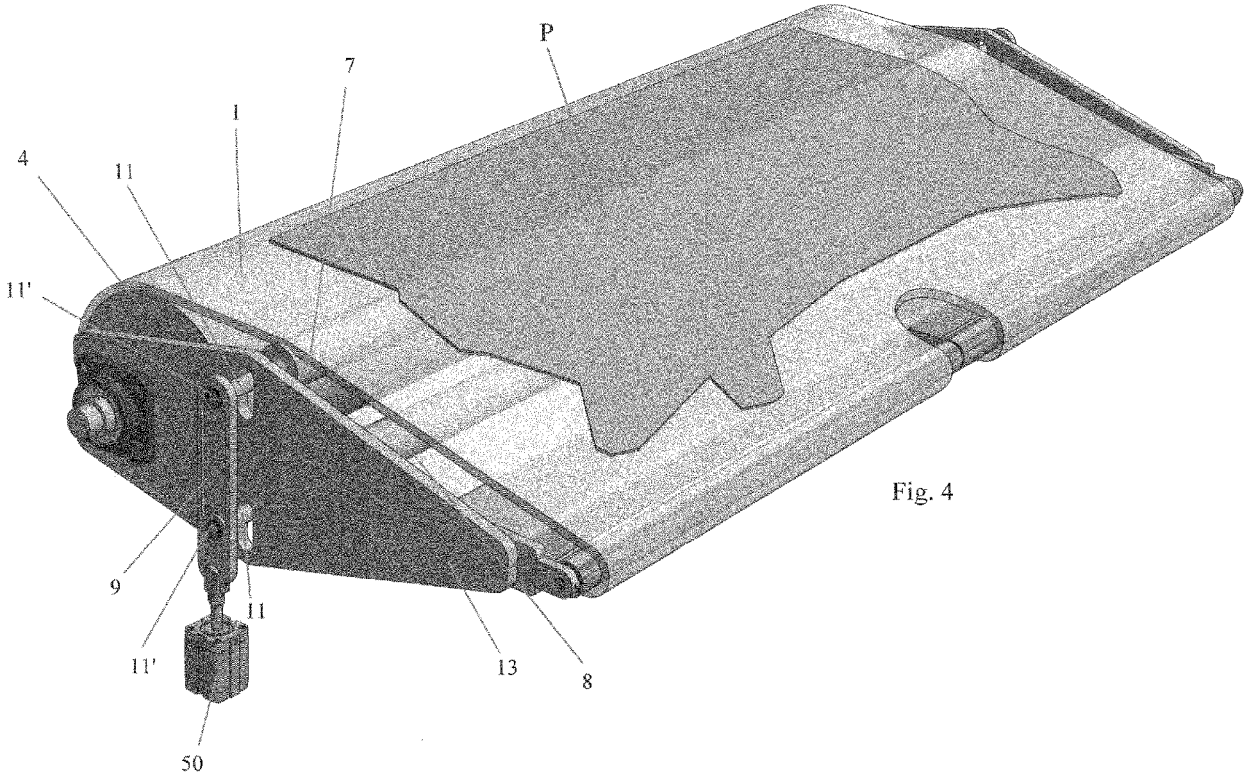


Fig. 4

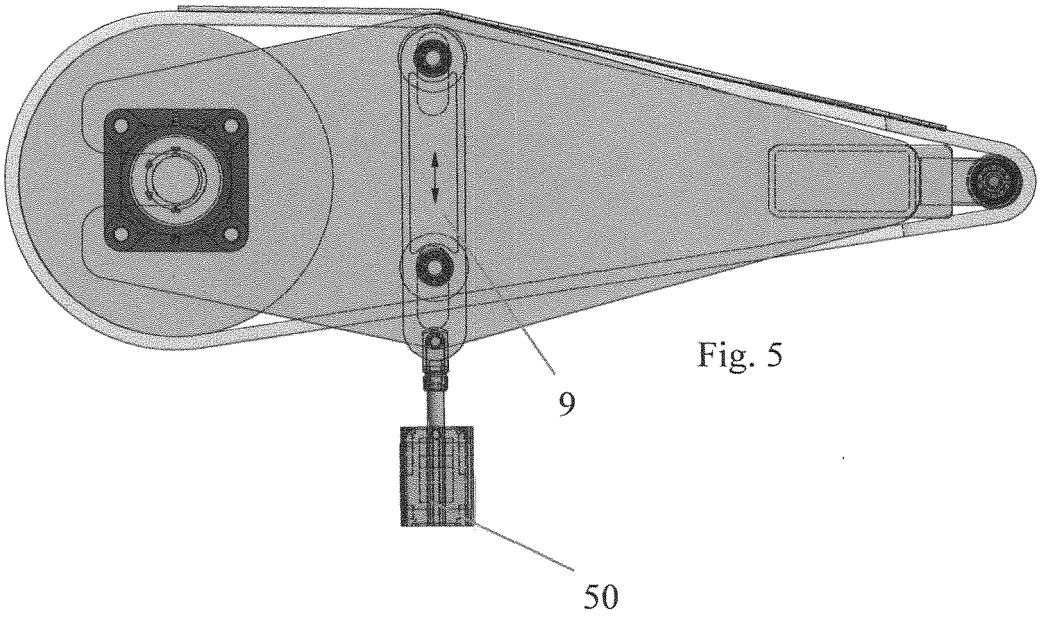


Fig. 5

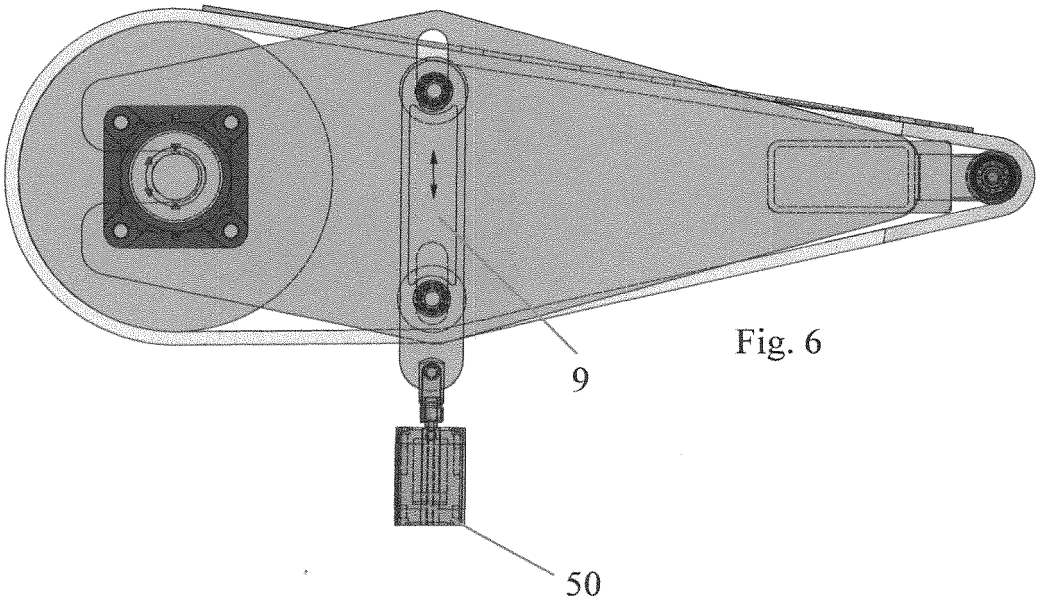


Fig. 6

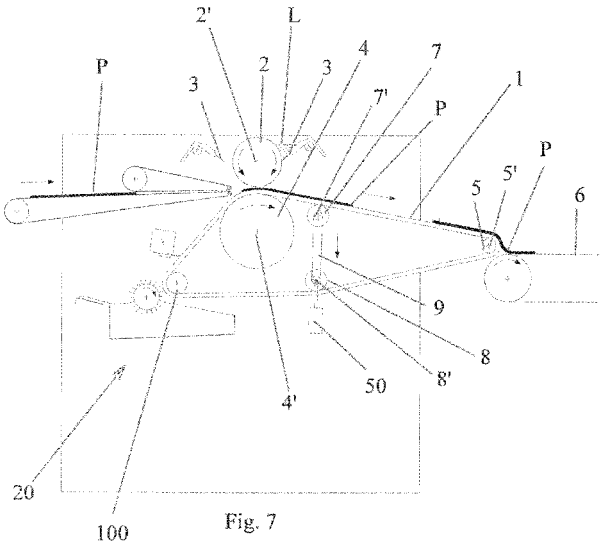

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Fig. 7

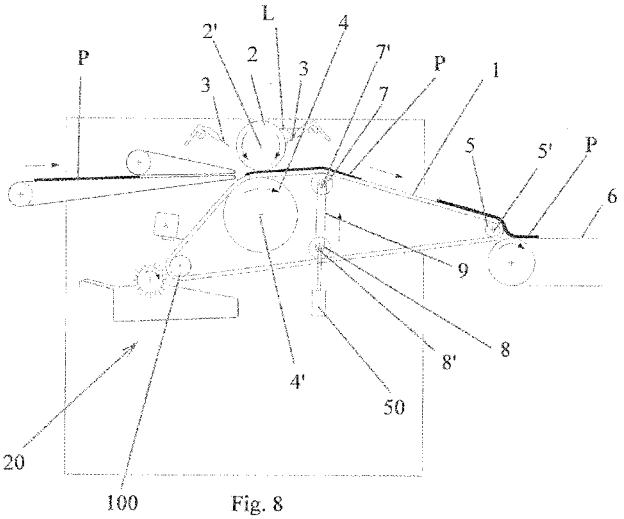
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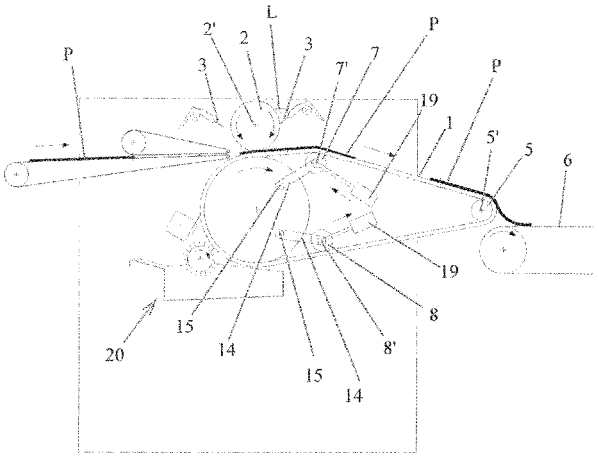
Fig. 8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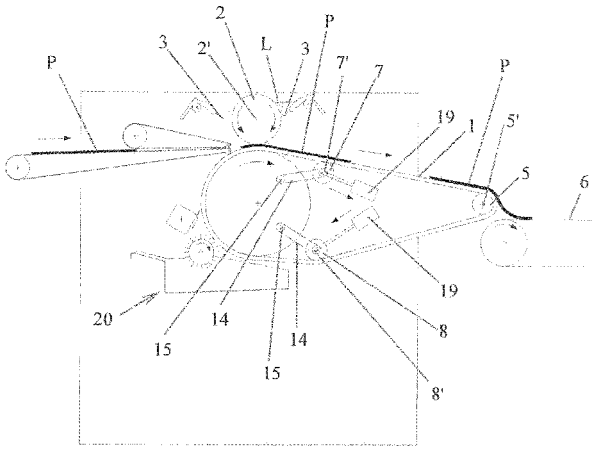
L
3
3
7'
7
P
19
1
P
5'
5
6
19
8
8'
20
15
14
15
14

Fig. 9


2
P
3
2'
L
3
7'
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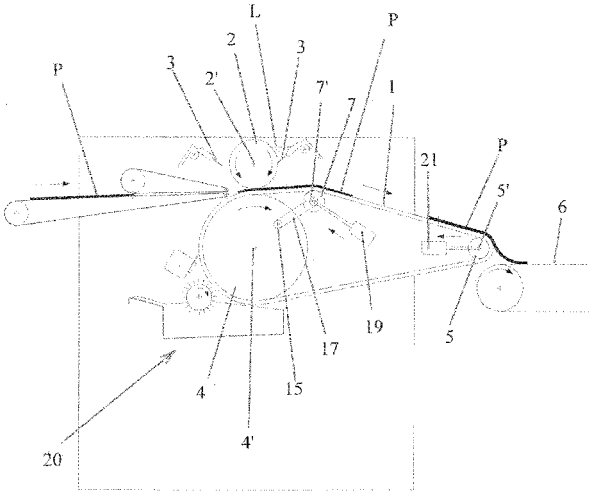
P
19
1
5'
5
6
19
8
20
14
15
14
15
8'

Fig. 10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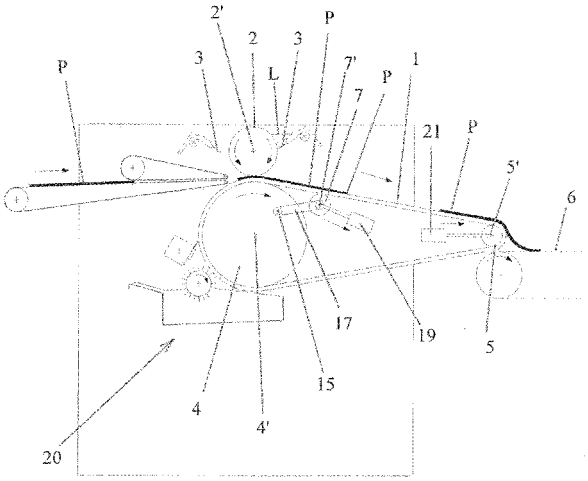
3
P
3
2'
7'
7
1
21
P
5'
6
19
17
5
4
15
4'
20

Fig. 11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3
P
P
3
L
7'
P
1
7
21
P
5'
6
17
19
5
4
15
4'
20

Fig. 12

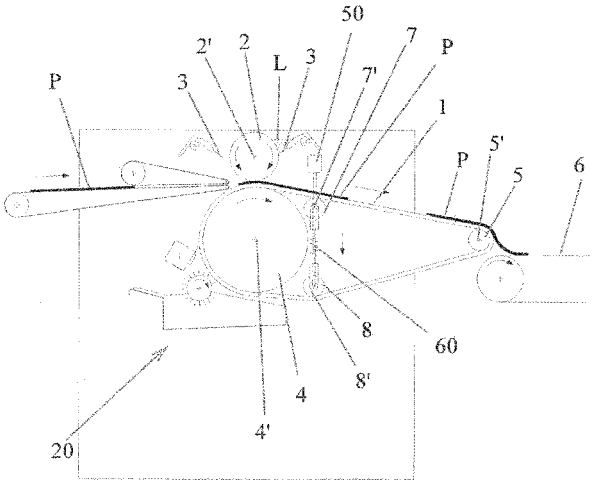


Fig. 13

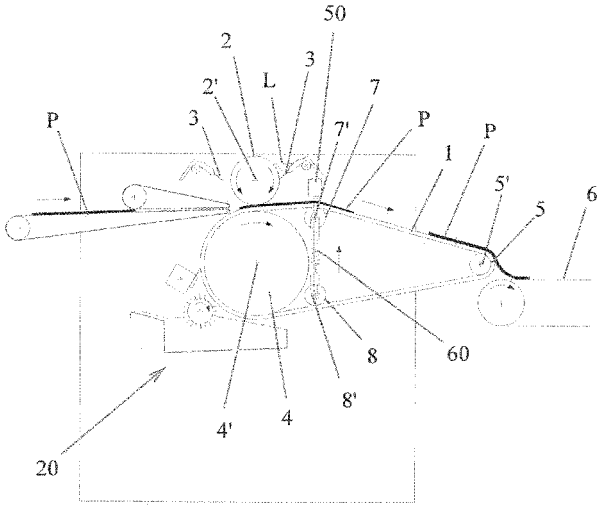
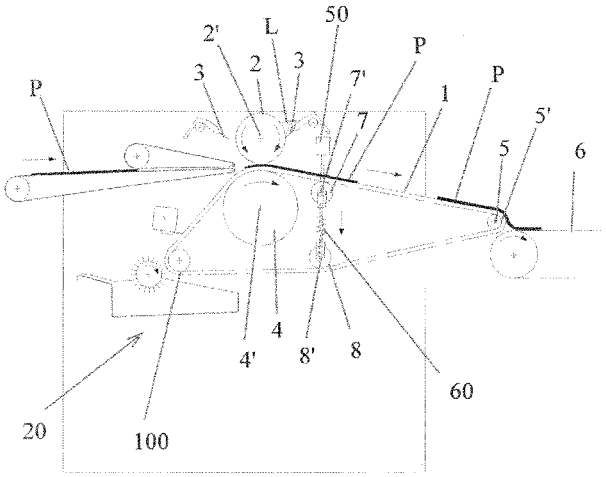


Fig. 14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3
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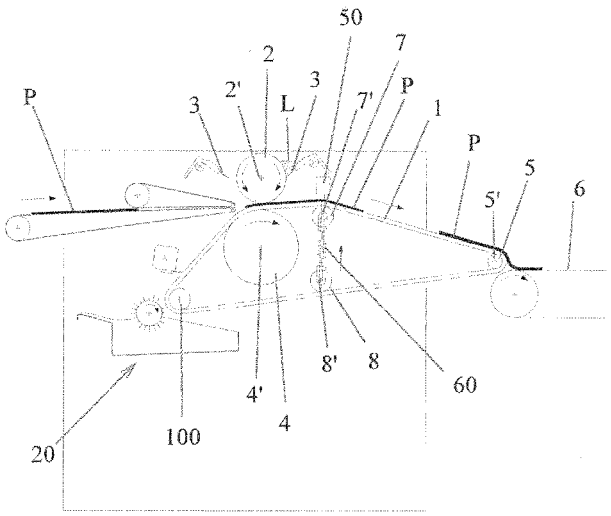
7'
P
1
P
5'
3
7
5
6
4
4'
8'
8
60
20
100

Fig.15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7
2
P
3
2'
L
3
7'
P
1
P
5
5'
6
4'
4
8'
8
60
20
100

Fig.16

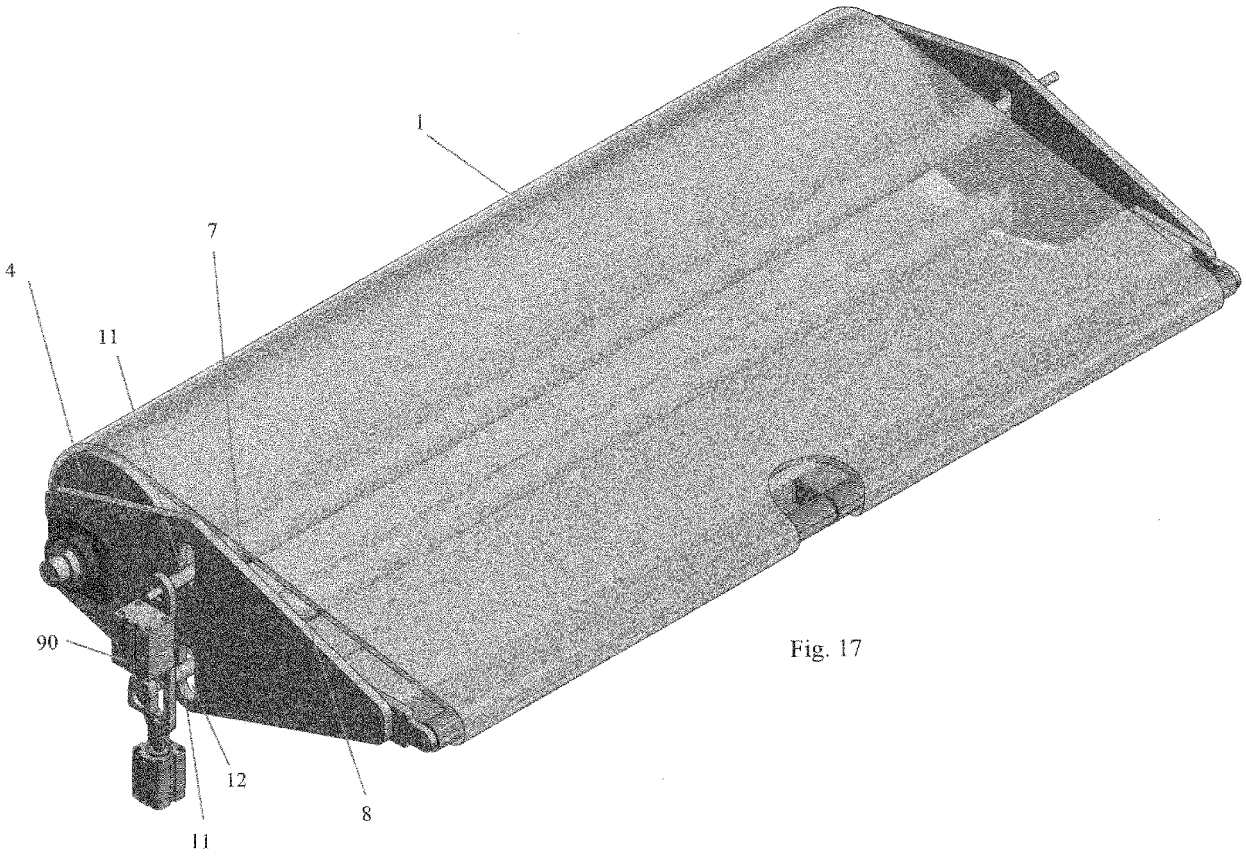

Fig. 17

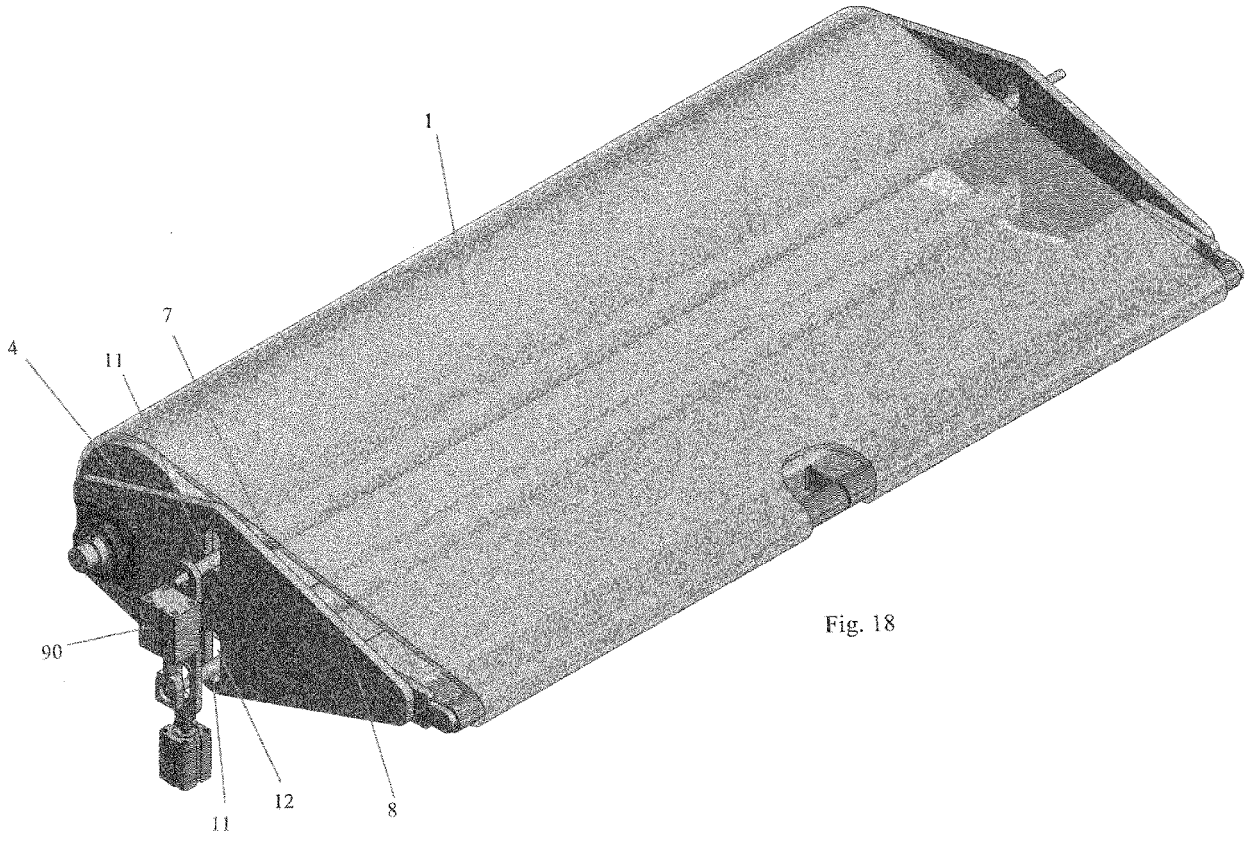

Fig. 18

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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 21 18 6342

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	KR 101 779 996 B1 (LEE KI YOON [KR]) 19 September 2017 (2017-09-19) * paragraphs [0048], [0056] - [0062]; figure 4 *	1,9	INV. C14B1/56 B05C1/08 C14C11/00
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TECHNICAL FIELDS SEARCHED (IPC)

C14B
B05C
C14C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 October 2021	Iamandi, Daniela

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05-10-2021

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