



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.03.2009 Bulletin 2009/12

(51) Int Cl.:
D06G 1/00 (2006.01) C14B 17/14 (2006.01)
B08B 1/00 (2006.01)

(21) Application number: **08425528.0**

(22) Date of filing: **30.07.2008**

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

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(30) Priority: **13.08.2007 IT VI20070235**

(54) **Device for removing residual objects from a surface of a thin, flexible layer**

(57) An improved machine (1) for the cleaning of flexible laminar surfaces including a support framework (2), which receives the flexible laminar surface and stands on a support structure (S), and cleaning means (3), facing the support framework (2), cooperating by contact with the laminar surface in order to remove impurities, dust

and/or the like from the laminar surface itself. The improved machine (1) comprises regeneration means (4) operatively connected with the cleaning means (3) in order to clean the cleaning means (3) themselves from impurities, dust or the like previously removed by them from the flexible laminar surface.

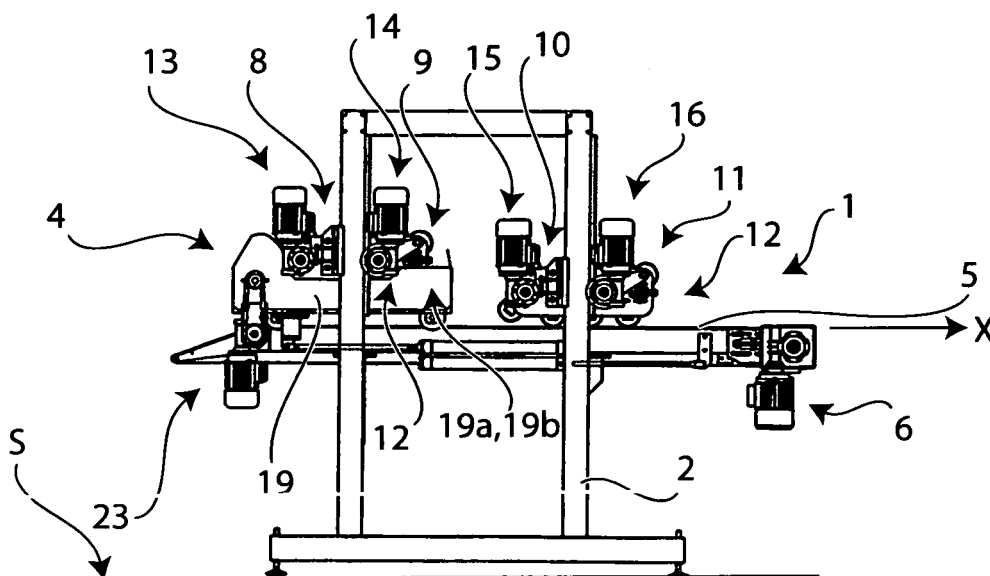


Fig. 2

Description

[0001] The attached invention relates to an improved machine for the cleaning of flexible laminar surfaces such as hide, artificial leather, textiles and/or similar.

[0002] The machine of the invention is particularly suitable for the use in the tan industry to remove the residual impurities, such as small shreds, fibres or fragments of hide unrelated to the hide surface in itself useful.

[0003] These impurities remain superficially on the hide even after the normal cleaning operations carried out, for example with dust removers or with suction machines, prior to the finishing operations or dressing such as the pigmentation or colour spraying. It is known that the industrial processing of flexible laminar surfaces, such as hides, artificial leathers or the like, consists of a series of mechanical operations with which it is provided, for example, the trimming, splitting, shearing or perching of the laminar surface.

[0004] Such operations are carried out through special equipment and take place in subsequent stages of the production process.

[0005] During the normal working to which the hides are subjected in the tan industry, it often happens that impurities or dust of various kind, as well as small scraps of fibre, settle on the side faces of the hides themselves and adhere to them to a marked extent, creating significant superficial defects.

[0006] This can be mostly noted after the processing of "milling" of the hides in machinery known as drum tumblers, or after their processing in machines known as perching machines and intended to soften the hides after appropriate drying and conditioning.

[0007] The processing of milling causes, in fact, a natural accumulation of electrostatic charges on the faces of the hides, favouring the sticking of extraneous particles, especially the fibres which usually get detached from the grain side of the hides, as known the lower and less valuable layer of the derma of the hide.

[0008] The processing of perching, with which the hides are stressed in order to soften them, causes, for its part, the partial or complete detachment of shreds from the grain side.

[0009] Furthermore, the development of superficial defects on side faces of the hides also derives from the fact that, due to production needs between a working and the next, they are usually stacked one on another, placing generally the grain side of the upper hide close to the flower side, the more valuable, of the lower hide.

[0010] With the hides pressed one on another, it is inevitable that shreds or impurities on the grain side of a hide are transmitted and permanently adhere to the flower side of the adjacent hide, compromising the quality of the latter.

[0011] It seems, therefore, essential to remove from the hides impurities and dust to avoid the degrading of the quality of the finished product or, as a result of the trimming of the faulty area, the net loss of part of the

available surface of the hides.

[0012] The elimination of defects must occur before the dressing operations which, typically, include the spraying of chemicals such as colours, pigments, solvents or binders.

[0013] More in general, the defects must be eliminated before the semifinished hides are subjected to another processing.

[0014] Indeed, the processing of hides having certain impurities creates or amplifies superficial defects which declass so heavy the finished product and can be removed only by cutting the faulty areas.

[0015] According to a well-established technology in the tanning field, the cleaning of flexible laminar surfaces from impurities, particles, fragments or extraneous fibres is entrusted to machines known in the field as "dust removers" and "brushing machines", used at any stage of the processing cycle.

[0016] The functioning of the dust removers firstly consists of blowing air on the hide, to raise the dust, the impurities or other extraneous particles, and subsequently of sucking them.

[0017] However, these machines of the known type used to clean hides or similar present the drawback of not being able to completely remove impurities from the hides, especially those one stuck.

[0018] The unfavourable effects of this situation are accentuated in the subsequent operations of spraying and painting which compact the impurities with the laminar surface making them more conspicuous and creating surface defects which, as scattered in sporadic way, are harmful.

[0019] Another drawback, direct consequence of what just said, is due to the fact that to remove the surface defects, it resorts to additional workings, always unwanted, such as trimming of the area of the laminar surface concerned, which cause inappropriate waste production and length manufacture time.

[0020] The alternative is the unavoidable degrading of the quality level of the finished product, with the unfavourable economic losses that this involves.

[0021] A machine of recent conception, which can be found in the tan field, allows to remove the residual impurities, which remain stuck to the laminar surface even after being treated with dust removers or brushing machines.

[0022] The machine in question includes a support framework which insists on a support structure and is provided with a conveyor belt receiving the flexible laminar surface to be cleaned.

[0023] The machine includes, also, cleaning means, for example, a series of rollers or a closed loop belt, facing the support framework, which cooperate by contact with the laminar surface in order to remove impurities, dust and/or the like thereof.

[0024] The cleaning means are provided with drawing means, more properly a superficial coating made of sticky substance which favours the detachment of impurities,

dust and the like from the laminar surface.

[0025] The sticky substance is constituted, for example, by a layer of polyurethan gel, silicone or other elastomers and/or natural and synthetic rubbers.

[0026] If on one hand such a machine carries out in extremely effective manner the cleaning of the flexible laminar surface, also eliminating the minimum impurities or the shreds of difficult removal, on the other hand, however, the cleaning means thanks to which said result is achieved retain the impurities removed from the laminar surface, gradually losing their cleaning ability.

[0027] In essence, therefore, there is at present the problem to clean up also the cleaning means with which the impurities or similar are detached from a flexible laminar surface such as the hide.

[0028] The present invention aims to overcome the drawback of the known art just highlighted.

[0029] In particular, the main purpose of the present invention is to provide an improved machine for the cleaning of flexible laminar surfaces which keeps unchanged its performance longer than the equivalent machines of the known type.

[0030] In other words, aim of the invention is to carry out an improved machine for the cleaning of flexible laminar surfaces in which the cleaning means remain for times longer than those of the prior art in a optimum efficiency state or at least adequate to the use, without this being due to their replacement and/or maintenance.

[0031] A last but not least aim of the present invention is to make available an improved machine for the cleaning of flexible laminar surfaces of simple and economic construction.

[0032] The aforesaid aims are achieved through an improved machine for the cleaning of flexible laminar surfaces according to the attached claim 1, to which they refer for the sake of brevity.

[0033] Other features of detail of the improved machine of the invention can be deduced from the dependent claims.

[0034] Advantageously, the improved machine of the invention restores at the original state or at an appropriate state the cleaning means which previously have removed impurities, shreds, dust or the like from a flexible laminar surface.

[0035] This is because, in the invention, the regeneration means remove from the cleaning means the extraneous bodies which have been collected by the flexible laminar surface, ensuring the same cleaning means the possibility of repeating effectively, at a later stage, the operation to which they are responsible.

[0036] Still advantageously, the improved machine of which the protection is required performs in line the operation of regeneration of the cleaning means, without the need to separate the members involved.

[0037] Equally advantageously, the regeneration of the cleaning means occurs using tools of simple construction, maintenance-friendly, able to keep intact over time their own function.

[0038] Furthermore, in an advantageous manner, the machine object of the present invention allows to achieve significant benefits both in terms of quality of the flexible laminar surfaces treated with it and in terms of production costs for its set up since the interventions of replacement, repair or maintenance of the regeneration means are strongly limited.

[0039] These aims and advantages will appear to a greater extent by the description of a preferred embodiment of the invention given by way of illustrative but not limited example with reference to the attached drawings where:

- figure 1 is a simplified perspective view of the improved machine of the invention;
- figure 2 is a side view of figure 1;
- figure 2a is the simplified and schematic cross section of an enlarged particular of figure 2;
- figure 3 is the side view from the rear of figure 1.

[0040] The improved machine of the invention, used to clean a flexible laminar surface, is shown in figure 1 where it is globally numbered with 1.

[0041] For ease of exposition, the flexible laminar surface, properly constituted by the hide or artificial leather treated in the tan industry, is not depicted in the attached drawings.

[0042] As it is observed, the improved machine 1 includes a support framework 2, standing on a support structure S and suitable to receive the laminar surface, and cleaning means, as a whole marked with 3, facing the support framework 2, cooperating by contact with the laminar surface to remove impurities, dust and/or the like from the laminar surface itself.

[0043] According to the invention, the improved machine 1 includes regeneration means, as a whole numbered with 4, operatively connected with the cleaning means 3 and used to clean the cleaning means 3 from impurities, dust or the like which have been previously removed by the latter from the laminar surface.

[0044] At preferential title, the machine 1 includes a conveyor belt 5, superiorly coupled with the support framework 2 and operatively connected with first motorization means, as a whole marked with 6.

[0045] The conveyor belt 5 receives the laminar surface, for example, placed there by an operator who picks it up from a support pallet where it is stacked with other laminar surfaces awaiting to be cleaned, in order to put it in advance along a predetermined longitudinal direction X, as shown in figure 2.

[0046] Figure 1 shows that the cleaning means 3 include in preferred but not exclusive way first rollers defining linear axes Y parallel one to each other and perpendicular to the longitudinal direction X along which the laminar surface advances on the conveyor belt 5.

[0047] Each of the first rollers revolves idle around the respective linear axis Y.

[0048] Please note that the number of first rollers

shown in the figures is given by pure way of pure illustration and example: indeed, in other embodiments, not shown, this number can take any value starting from one, depending on the operative needs or the customers requests.

[0049] The machine includes 1 drawing means, indicated as a whole with 7, facing the support framework 2, more precisely the conveyor belt 5, operatively connected with the cleaning means 3.

[0050] The drawing means 7 keep properly drawn the flexible laminar surface.

[0051] In the described example, similarly to the cleaning means 3, the drawing means 7 comprise seconds rollers defining linear axes, not shown, parallel to the linear axes Y of the first rollers.

[0052] Even each of the second rollers revolves idle around the corresponding linear axis.

[0053] It is understood, however, that other embodiments of the improved machine of the invention may include first and second rollers connected with motorization members.

[0054] The first rollers and the second rollers have variable length depending on the constructive choices and purchaser's requests, primarily dictated by the size of the hides to be worked.

[0055] However, the length of the rollers reaches values of about 3,5 m, allowing to work most of the animal hides.

[0056] As shown in figure 2, the improved machine 1 includes in this case a plurality of groups of first and second rollers, marked with 8, 9 and with 10, 11, arranged side-by-side one to another along the longitudinal direction X.

[0057] The groups of rollers are two by two reciprocally connected through transmission means, overall reported with 12 and of the type in itself known to the person skilled in the art, such as gear wheels and chains and/or belts or pulleys.

[0058] The first and second rollers of each of the groups 8, 9 and 10, 11 are separated from each other of an arc, of constant or variable value, along an imaginary circumference.

[0059] Each group of rollers 8, 9 and 10, 11 is operatively connected with respective motor means, as a whole numbered with 13, 14 and 15, 16.

[0060] The rollers of each of the groups 8, 9 and 10, 11 go along a circular path around a central reference axis, not shown in the drawings that follow.

[0061] In this execution, then, each of the rollers of the groups 8, 9 and 10, 11 moves around its own linear axis with relative motion with respect to the rotary motion of the group to which it belongs.

[0062] In particular, from figures 1 and 2 it is deduced that, preferably but not necessarily, the first groups of rollers 8, 9 are arranged at the regeneration means 4 in order to clean the outer surface, while the second groups of rollers 10, 11, separated and distinct from the previous ones, are facing the conveyor belt 5 in order to clean the

flexible laminar surface in advance.

[0063] Therefore, in the operative phase in which the second groups 10 and 11 play the action of cleaning and drawing of the laminar surface, the first groups 8 and 9, engaged in the same action in a previous operative phase, are subjected to the regeneration means 4 to be efficiently available in a further operative phase to follow, replacing the second groups 10 and 11.

[0064] In an advantageous way, the cleaning means 3 are provided with removal means 17 suitable to capture from the flexible laminar surface the above cited impurities, dust or the like.

[0065] More specifically, the removal means 17 include a superficial coating, applied on the entire outer surface of the first rollers, made in sticky substance which detaches, retaining them, impurities, dust and the like from the flexible laminar surface.

[0066] The sticky substance is any of the materials chosen from the group consisting of an adhesive paper, a layer of natural or synthetic glue, a layer of soft polymer such as polyurethan gel, silicone or other elastomers and/or natural and synthetic rubbers or similar.

[0067] A polymeric material superficial coating, in particular, has the considerable advantage of being reusable after appropriate washing.

[0068] Further embodiments of the invention, not represented, may provide that the removal means are placed only on one or more sections of the outer surface of the cleaning means, in this case consisting of the first rollers.

[0069] As far as the regeneration means 4 are concerned, they are coupled with the support framework 2.

[0070] According to the preferred embodiment here described of the invention, the regeneration means 4 include a longitudinal brush 18 which cooperates by contact with the superficial coating of the first rollers belonging to the cleaning means 3, as pointed out by the enlarged particular of figure 2a.

[0071] The regeneration means 4 also include a shaped container 19, fixed to the support framework 2, containing inside a detergent bath 20, a mixture of water and other liquids typically used in the tan industry.

[0072] Preferably, the longitudinal brush 18 includes:

- a central drum 21 revolvingly constrained to side edges 19a, 19b opposed one to each other of the shaped container 19 and having a central axis Y', parallel to the linear axes of the first and second rollers, arranged at a predefined distance D from the bottom 19c of the shaped container 19 itself;
- a plurality of bristles 22, projecting from the central drum 21, part of which, during the regeneration of the cleaning means 3, plunges in the detergent bath 20.

[0073] As it is clear from figure 3, the longitudinal brush 18 extends substantially for the entire width of the cleaning means 3, in this case for the entire length of the first

rollers.

[0074] The improved machine 1 includes second motorization means, as a whole numbered with 23, connected with the central drum 21 of the longitudinal brush 18.

[0075] Other embodiments, not shown, of the invention may provide that the regeneration means include one or more longitudinal finishing arms, positioned downstream the longitudinal brush, which remove the residual film of detergent bath remaining on each of the first rollers after the contact with the longitudinal brush.

[0076] The regeneration means may include also blowing means, placed downstream the longitudinal brush, which convey a flow of air under pressure towards the first rollers, achieving a further cleaning thereof.

[0077] The improved machine 1 also comprises other components usually provided in the machinery of the known art, such as the first detection means, not shown, placed upstream the cleaning means 3, which signal the advance of the laminar surface towards the cleaning means 3.

[0078] The first detection means include known devices, such as photocells, sensors and so on, piloted by a central processing and control unit, for example a programmable logic computer (PLC) apparatus, with which they are electrically connected.

[0079] In a preferred but not exclusive way, the machine 1 also includes drawing means, not shown, positioned downstream the cleaning means 3 and facing the conveyor belt 5, which cooperate by contact with the laminar surface in order to carry out on them the last action of stretching and cleaning.

[0080] The improved machine 1 also includes second detection means, also not shown, interposed between the cleaning means 3 and the drawing means.

[0081] The second detection means signal the end of the flexible laminar surface so that the drawing means are moved away from the conveyor belt 5, preventing or restricting the formation of unwanted folds on the laminar surface.

[0082] In use, the operator places the flexible laminar surface on the support framework 2, in particular on the conveyor belt 5.

[0083] Then, the operation of the first motorization means 6 moves the flexible laminar surface along the longitudinal direction X and the operation of the motor means 15, 16 rotates clockwise the groups of rollers 10, 11 around the central reference axis previously introduced.

[0084] The operation of the groups of rollers 10, 11 occurs when the first detection means signal the transit of the laminar surface and, therefore, its approach to the cleaning means 3.

[0085] In such a way, the first rollers of the groups 10, 11 meet the flexible laminar surface advancing along the same longitudinal direction X and the same side of the latter, as well as moving with relative motion around the linear axes Y as idle.

[0086] The special superficial coating with which they

are provided permits to the first rollers to detach from the flexible laminar surface impurities or shred of fibre also stuck, which are retained by the removal means 17.

[0087] The speed of rotation of the first and second rollers is greater than the speed of advance of the conveyor belt 5.

[0088] Such an operative condition avoids that the laminar surface wraps in a ruffled manner on the first rollers provided with superficial coating in essentially sticky substance, preventing malfunctions or even arrests of the improved machine 1.

[0089] Furthermore, this aid in collecting impurities or other extraneous fibres from the laminar surface and, at the same time, to effectively drawn it.

[0090] When the second detection means indicate that the end of the laminar surface has reached the last of the rollers of the group 11, the groups of rollers 10, 11 cease to rotate.

[0091] The groups of rollers 10, 11 are then placed close to the regeneration means 4 for cleaning the impurities just collected from the flexible laminar surface, while the groups of rollers 8, 9, previously inactive, are now moved by the motor means 13, 14 and carry out a cleaning and drawing action on another flexible laminar surface fully equivalent to that carried out by the groups 10, 11.

[0092] Moving the second motorization means 23, the central drum 21 of the longitudinal brush 18 rotates around the central axis Y' while the new operation of the motor means 15, 16 moves the groups of rollers 10, 11.

[0093] As a result, the bristles 22 of the longitudinal brush 18 arrange close to the removal means 17 (the superficial coating) of the first rollers from which remove or detach impurities or shreds of fibre, largely restoring the original state of efficiency of the first rollers.

[0094] In its rotation, the longitudinal brush 18 plunges the bristles 22 in the detergent bath 20 contained inside the shaped container 19, thus obtaining a cleaning at least partly of the bristles 22.

[0095] The improved machine 1 achieves the regeneration of the cleaning means 3 of a flexible laminar surface in an extremely practical, quick and easy way.

[0096] This happens without stopping the process of cleaning the laminar surface, but in line, while the machine 1 operates at full capacity.

[0097] In addition, with the same regeneration means the cleaning of the cleaning means 3 is carried out for several cycles, without the need to replace frequently the regeneration means, with the obvious economic and management benefits for the producer which come from this, in relation to quantity and codes article to be bought and stored.

[0098] The cleaning of the flexible laminar surface implemented by the improved machine 1 is optimal and efficient, being able to remove that sort of impurities hardly removable with equivalent machines of the known type.

[0099] From the description just proposed, it is understood, therefore, as the improved machine for the clean-

ing of flexible laminar surfaces according to the invention achieves the aims and realizes the advantages previously mentioned.

[0100] In terms of execution, it is possible to make changes to the improved machine of the invention which are realized, for example, in a support framework which differs from that one detectable by the drawings.

[0101] They may exist other embodiments of the invention, still not accompanied by drawings, in which the machine includes cleaning means which differ from those ones described during this work.

[0102] The cleaning means may include first rollers, each of which split into several cylinders arranged side-by-side and aligned one each other along each of the linear axes.

[0103] In this eventuality, the cylinders will present the same lengths and whose sum determines the length of the first rollers of the cleaning means.

[0104] The removal means will then be associated in an alternate way to the cylinders of the first rollers of each of the cleaning means.

[0105] In addition, the removal means of one of the first rollers may be staggered of a given length, equal to that one of each of the cylinders, with respect to the removal means of another first roller.

[0106] This ensures that every area of the flexible laminar surface is subjected to cleaning by the removal means and allows a good distribution and extension of the laminar surface itself, without the creation of unwanted folds.

[0107] Moreover, in other embodiment the cleaning means may include one or more buffer plates, operated alternately against the flexible laminar surface to be cleaned, obviously provided with the same removal means specified before.

[0108] In further embodiments of the machine of the invention, the cleaning means will also include at least one closed loop belt, always provided with the removal means of the type described above, supported by rotating cylinders which arrange stretches one consecutive to the other of the side surface of the closed belt close to the flexible laminar surface.

[0109] In such a circumstance, the regeneration means will act on the cleaning means from a remote location with respect to that one where the same cleaning means interfere with the flexible laminar surface, removing impurities, dust or shred of fibre from a portion of the closed belt while another portion of the latter is performing the cleaning of the flexible laminar surface.

[0110] This allows to the closed belt always to achieve in the best efficiency conditions the position facing the laminar surface.

[0111] In this regard, the regeneration means can conveniently provide in this case not only the longitudinal brush or other similar tools already mentioned, but also the longitudinal finishing arms and blowing means, arranged downstream the brush or tools themselves.

[0112] Furthermore, in accordance with other embod-

iments of the machine of the invention, not represented, the regeneration means cooperating with the aforesaid closed belt may include a plurality of spouts of detergent liquid, for example water, which, in use, interfere with the rotating belt itself.

[0113] These spouts of detergent liquid come out from a plurality of through holes made in a longitudinal tubular element facing the closed belt.

[0114] The tubular element belongs to a hydraulic blow-by circuit which includes a positive-displacement pump and an accumulation tank of the detergent treatment liquid, in communication one with each other and coupled with the support framework below the closed belt, as well as pipes of connection to the tubular element.

[0115] In advantageous way, the machine will in this case includes:

- a longitudinal collecting and conveying carter of the detergent liquid, arranged below the tubular element and one of the rotating cylinders which support the closed belt: the carter receives the dirty detergent liquid, containing impurities, dust or the like just removed by it from the flexible laminar surface undergoing treatment;
- an auxiliary container accessible by the operator, communicating on one side with one end of the longitudinal carter from which receives the detergent liquid which conveys impurities, dust or similar, and on the other side with the accumulation tank which conveys clean detergent liquid.

[0116] The container will be provided with auxiliary filtering means which retain the impurities, dust or the like and consist, for example, of a removable reticular fabric cloth which the operator can easily collect, clean and/or replace.

[0117] In other embodiments of the invention, moreover, the regeneration means may include one or more longitudinal rollers, each of which coated with a laminar layer made of porous material chosen from the group consisting of sponge, felt, fabric, rubber and the like.

[0118] It is, finally, clear that several other variations may be made to the improved machine in question, without for this reason going out of the novelty principles inherent to the inventive idea, as it is clear that, in the practical implementation of the invention, materials, shapes and sizes of the details could be any, depending on the needs, and could be replaced with others technically equivalent.

Claims

1. Improved machine (1) for the cleaning of flexible laminar surfaces including:

- a support framework (2) suitable to receive said flexible laminar surface and to stand on a sup-

port structure (S);
 - cleaning means (3), facing said support framework (2), suitable to cooperate by contact with said laminar surface to remove impurities, dust and/or the like from said laminar surface,

characterized in that it includes regeneration means (4) operatively connected with said cleaning means (3), suitable to clean said cleaning means (3) by said impurities, dust or the like removed from said flexible laminar surface.

2. Machine (1) as claim 1) **characterized in that** said cleaning means (3) are provided with removal means (17) in order to capture said impurities, dust or the like from said flexible laminar surface.

3. Machine (1) as claim 2) **characterized in that** said removal means (17) include a superficial coating made of sticky substance suitable to detach from said flexible laminar surface and to retain said impurities, dust and the like.

4. Machine (1) as claim 3) **characterized in that** said sticky substance is any of the materials chosen from the group consisting of an adhesive paper, a layer of natural or synthetic glue, a layer of soft polymer such as polyurethan gel, silicone or other elastomers and/or natural and synthetic rubbers or similar.

5. Machine (1) as any of the claims from 1) to 4) **characterized in that** said cleaning means (3) include a plurality of first rollers coupled with said support framework (2), revolving around linear axes (Y) parallel one to each other and perpendicular to the longitudinal direction (X) along which said laminar surface is advanced.

6. Machine as any of the claims from 1) to 4) **characterized in that** said cleaning means include at least one closed loop belt, supported by rotating rollers suitable to arrange stretches one consecutive to the other of the side surface of said closed belt close to said flexible laminar surface.

7. Machine (1) as any of the previous claims **characterized in that** said regeneration means (4) are coupled with said support framework (2).

8. Machine (1) as claim 3) **characterized in that** said regeneration means (4) include at least one longitudinal brush (18) which cooperates by contact with said superficial coating of said removal means (17) and extends substantially for the whole width of said cleaning means (3).

9. Machine (1) as claim 8) **characterized in that** said regeneration means (4) include a shaped container

(19), fixed to said support framework (2), containing inside a detergent bath (20).

10. Machine (1) as claim 9) **characterized in that** said longitudinal brush (18) includes:

- a central drum (21), connected with second motorization means (23) and revolvingly constrained to side edges (19a, 19b) opposed one to each other of said shaped container (19), having a central axis (Y') arranged at a predefined distance (D) from the bottom (19c) of said shaped container (19);
- a plurality of bristles (22), projecting from said central drum (21), part of which, during cleaning operations performed on said cleaning means (3), plunges at least partially in said detergent bath (20).

11. Machine as claim 9) **characterized in that** said regeneration means include at least one longitudinal finishing arm, placed downstream said longitudinal brush, suitable to remove the residual film of said detergent bath remaining on said cleaning means after the contact with said longitudinal brush.

12. Machine as claim 3) **characterized in that** said regeneration means include at least one longitudinal roller coated with a laminar layer made of porous material chosen from the group consisting of sponge, felt, fabric, rubber and the like.

13. Machine as any of the previous claims **characterized in that** said regeneration means include blowing means suitable to convey a flow of air under pressure against said cleaning means.

14. Machine as claim 6) **characterized in that** said regeneration means comprise a plurality of detergent liquid spouts, suitable to interfere with said rotating closed loop belt, coming out from a plurality of through holes made in a longitudinal tubular element facing said closed belt.

15. Machine as claim 14) **characterized in that** said tubular element belongs to a hydraulic blow-by circuit which includes a positive-displacement pump and an accumulation tank of said detergent liquid, in communication one with each other and coupled with said support framework, and pipes of connection to said tubular element.

16. Machine as claim 15) **characterized in that** it comprises:

- a longitudinal collecting and conveying carter of said detergent liquid, arranged below said tubular element and one of said rotating rollers

which support said closed belt, said carter being suitable to receive said detergent liquid containing said impurities, dust or the like just removed from said flexible laminar surface;

- an auxiliary container accessible by the operator, communicating on one side with said longitudinal carter from which receives said detergent liquid with said impurities, dust or the like, and on the other side with said accumulation tank to which conveys clean detergent liquid, provided with removable type filtering means suitable to retain said impurities, dust or the like.

17. Machine (1) as claim 1) **characterized in that** it includes a conveyor belt (5), coupled with said support framework (2) and operatively connected with first motorization means (6), suitable to receive said laminar surface proceeding along a predetermined longitudinal direction (X).

18. Machine (1) as claim 5) **characterized in that** it includes drawing means (7), coupled with said support framework (2), suitable to keep drawn said flexible laminar surface, said drawing means (7) including a plurality of second rollers defining linear axes, around which said second rollers rotates, parallel to each other and to said linear axes (Y) of said first rollers.

19. Machine (1) as claim 18) **characterized in that** it includes a plurality of groups (8, 9, 10, 11) of said first and second rollers, each of said groups (8, 9, 10, 11) being arranged side-by-side one each other and operatively connected with motor means (13, 14, 15, 16), said groups (8, 9, 10, 11) being two by two reciprocally connected by transmission means (12).

20. Machine (1) as claim 19) **characterized in that** said rollers of each of said groups (8, 9, 10, 11) go along a circular path around a central reference axis.

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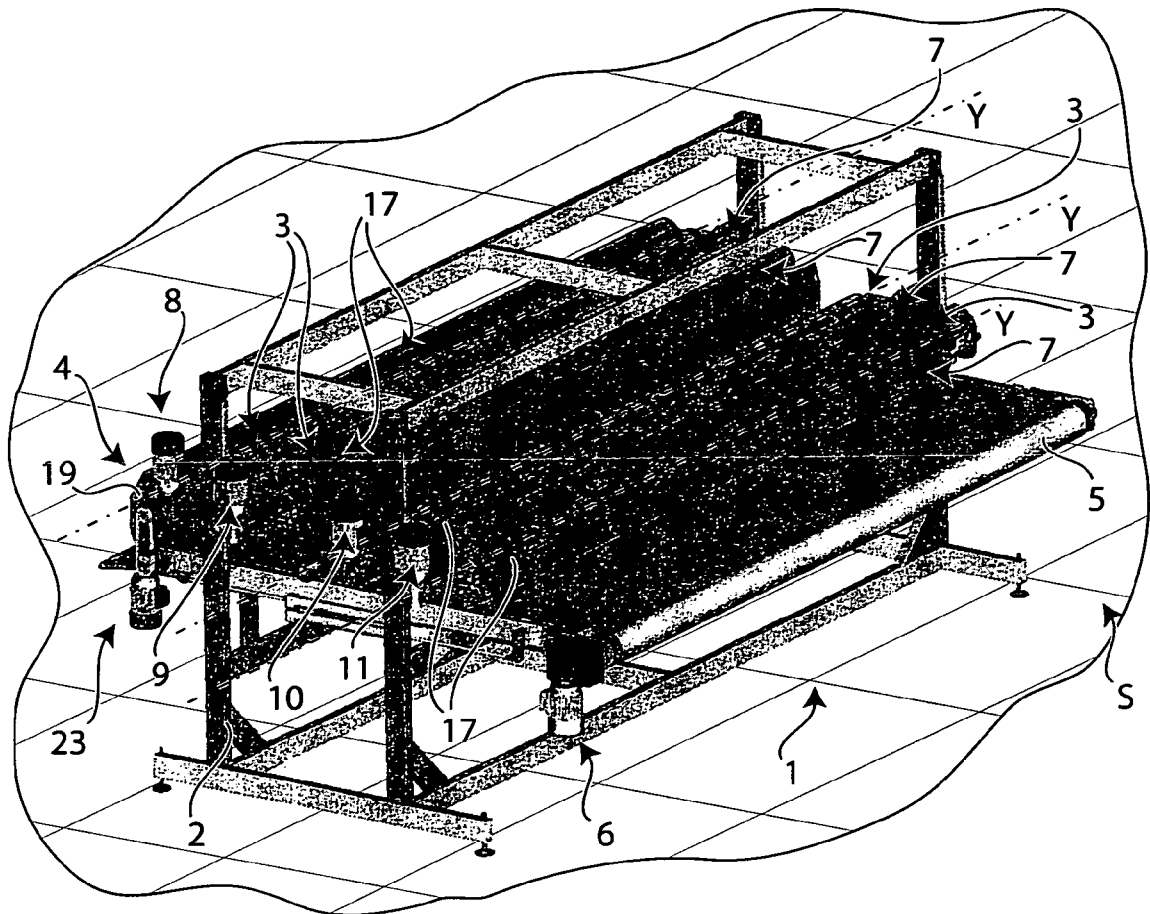


Fig. 1

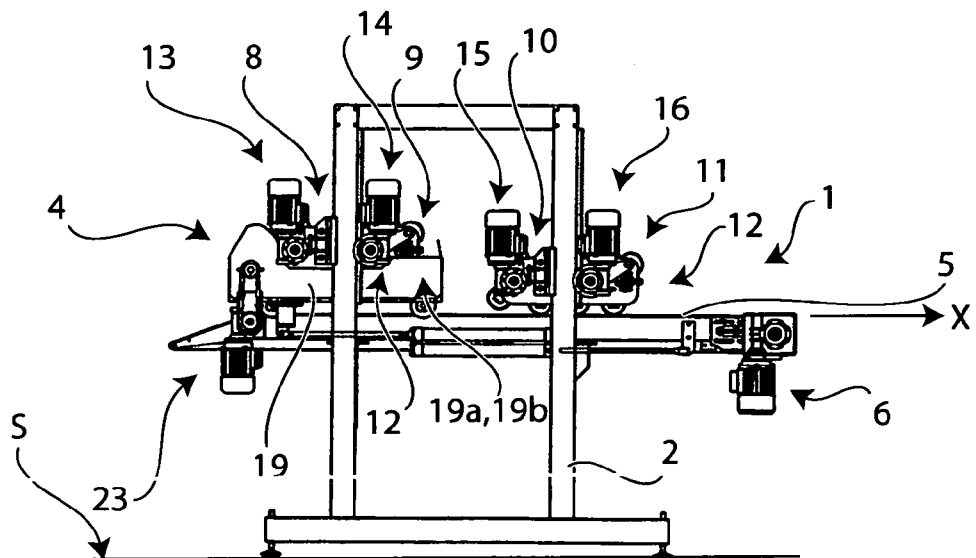


Fig. 2

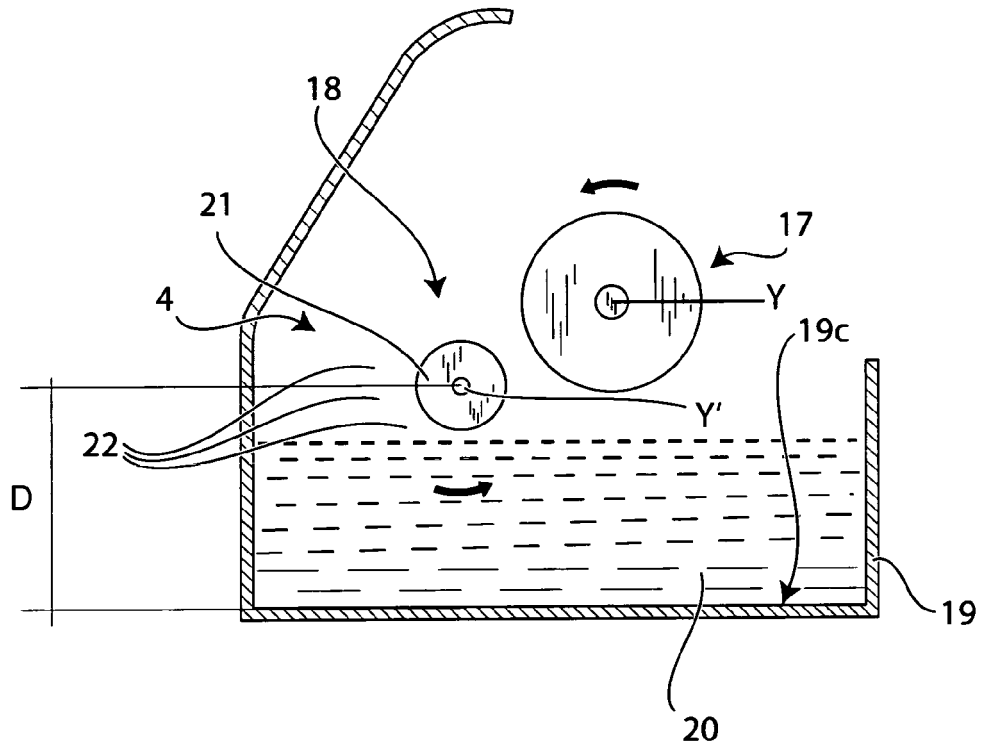


Fig. 2a

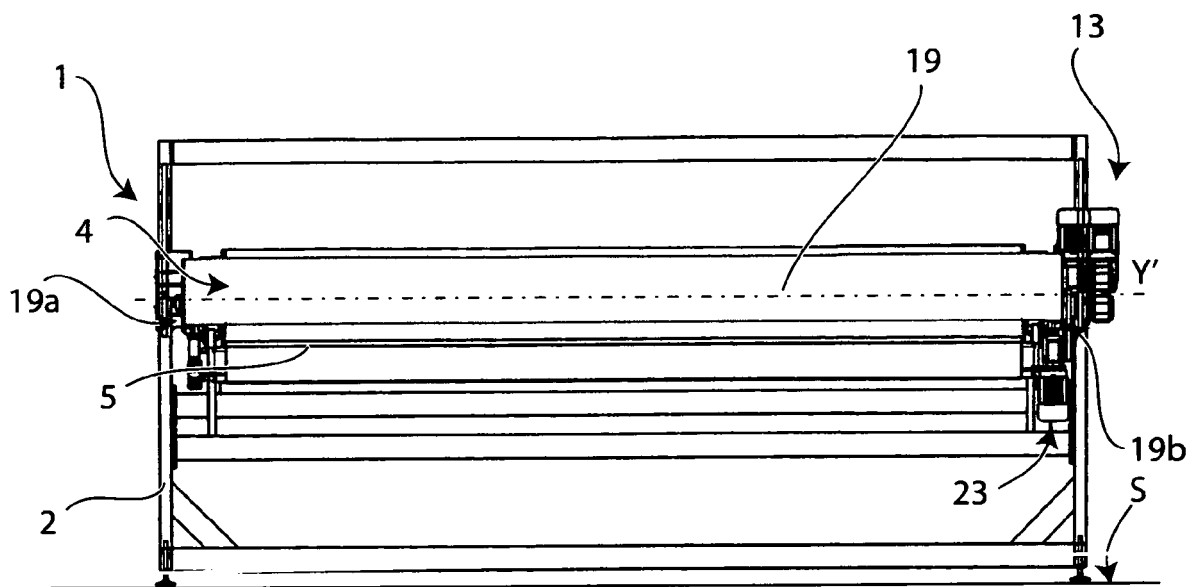


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5528

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