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(54) **DE-DUSTING MACHINE FOR CLEANING LEATHERS**

(57) It is an improved de-dusting machine (1) for cleaning leathers (P) which comprises a load-bearing framework (2) suitable to rest on a reference surface (S), a conveyor belt (3), coupled with the load-bearing framework (2), provided with an upper surface (3a) suitable to receive leathers (P) of various sizes in spread position and operatively connected with first driving means suitable to move the conveyor belt (3) to put the leathers (P) advancing along a predetermined longitudinal direction (X), and cleaning means (4), associated with the conveyor belt (3), suitable to cooperate by contact with the leathers (P) spread out on the conveyor belt (3) so as to remove impurities, dust and/or shreds (B) present on the front (S_a) and/or rear surface (S_p) of the leathers (P), the cleaning means (4) comprising a surface coating (5) made of adhesive material suitable to remove by detachment from the leathers (P) and retain the impurities, dust and/or shreds (B). In particular, the improved de-dusting machine (1) of the invention comprises grinding means (6), operatively connected with the cleaning means (4) and operated in such a way as to define a rest position, in which the grinding means (6) are far away from the cleaning means (4), and a working position in which the grinding means (6) are arranged adjacent to the surface coating (5) of the cleaning means (4) with which cooperate by contact in order to remove by abrasion a part of the material of the surface coating (5) of the cleaning means (4) restoring the cleaning ability of the cleaning means (4).

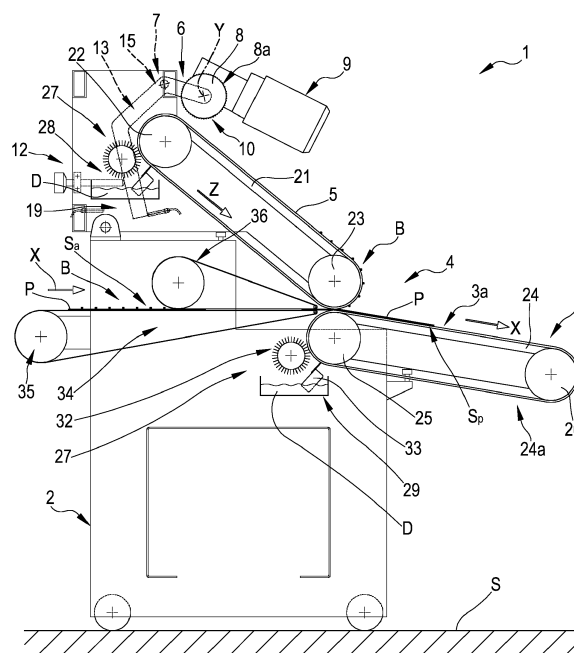


FIG.1

Description

[0001] The present invention relates to an improved de-dusting machine for cleaning leathers to be used in the leather industry in order to remove residual impurities, such as small shreds, fibres or fragments of leather extraneous to the surface of the leather itself.

[0002] In the field of tannery, these residual impurities remain superficially on the leather even after the usual cleaning operations, performed, for example with de-dusting or suction machines, before the finishing operation such as the pigmentation or spraying of colour.

[0003] It is known that the industrial processing of the animal leathers includes a series of mechanical operations with which there is provided for example for trimming, splitting, shaving or staking the leathers.

[0004] These operations are performed by special machines and take place in subsequent and mutually consecutive stages of the entire production process of treatment of the leathers.

[0005] During the usual processing which they are subjected to the leathers in the tanning industry it often happens that impurities or dusts of various types, as well as small pieces of fibre, are deposited on the side faces of the leathers themselves and adhere markedly on them, creating substantial surface defects.

[0006] This can be seen especially after the processing of "milling" of the leathers in machines commonly known as drums, or after their processing in machines known as staking machines and intended to soften the leathers after appropriate drying and the conditioning. The milling processing causes, indeed, a natural accumulation of electrostatic charges on the front face, the most valuable one ("grain side"), of the leathers, favouring sticking on it of foreign particles, especially the fibres which break off especially from the "flesh side" of the leathers themselves, as known the back layer and less valuable of the dermis of the animal leather.

[0007] For its part, the staking processing, with which leathers are worked in order to soften them, causes the partial or complete removal of shreds from the flesh side.

[0008] Furthermore, the development of surface defects on the side faces ("grain side" and "flesh side") of the animal leathers also stems from the fact that, due to production requirements between a processing and the next one, they are usually stacked one on another, generally placing the "flesh side" of the upper leather in contact with the "grain side", as said the most valuable, of the lower leather.

[0009] With leathers pressed one on another, it is inevitable that the shreds or the impurities present on the flesh side of a leather are transmitted and adhere permanently to the grain side of the leather adjacent, compromising the quality thereof with consequent negative need of downgrading if not even reduction of the usable surface of the leather.

[0010] It appears, therefore, essential to eliminate from the animal leathers processed in the tanning industry an-

imal impurities and dusts in order to avoid qualitative downgrading of the finished product or, as a result of the trimming of the defective area, net loss of part of the useful surface of the leathers.

[0011] The elimination of impurities and/or dusts must take place before the execution of the finishing operations which include, typically, depositing of chemical substances such as colours, pigments, solvents or binders.

[0012] More generally, the impurities must be eliminated before the semi-finished leathers are subjected to another processing.

[0013] Indeed, processing of leathers having impurities and/or dusts creates or amplifies any surface defects present which considerably downgrade the finished product and are removable only by cutting the defective areas.

[0014] According to an established technology in the field of tanning, the cleaning of flexible laminar surfaces from impurities, particles, fragments or extraneous fibers is entrusted to machines known in the industry as "de-dusters" and "brushers", employed at any stage of the processing cycle.

[0015] The operation of the de-dusters consists firstly in the blowing of air on the leather, in order to lift dusts, impurities or other foreign particles, and subsequently in the aspiration of these.

[0016] However, such de-dusters of known type used in the tanning industry in order to clean animal leathers or the like have the limitation of not being able to completely remove the impurities present on them, especially those ones which still adhere as a result of static electricity.

[0017] The adverse effects of this situation are accentuated in the subsequent operations of spraying and varnishing which compact the impurities with the laminar surface, thus bringing them out and creating surface defects which, as scattered sporadically, are harmful, in accordance with what has been already indicated above.

[0018] It follows that, in order to eliminate the surface defects, in similar circumstances it is used to perform additional workings, always undesired in the tanning industry, such as trimming of the zone concerned of the laminar surface, which generate inconvenient production waste and lengthen processing time.

[0019] The alternative is the inevitable downgrading of the overall quality of the finished product, with the unfavorable economic losses that this entails.

[0020] A newly designed machine, available in the leather sector, allows to eliminate the remaining impurities, which remain attached to the leather even after being treated with de-dusting or brushing machines, and includes, as essential technical features:

- a load-bearing framework which rests on a support structure and is provided with a conveyor belt which receives on the upper surface the animal leather to be cleaned;
- cleaning means, for example a series of rollers or a

ring-closed conveyor belt, facing to the load-bearing framework and provided with a surface coating made of adhesive material which by cooperating by contact with the leather removes from this impurities, dusts or shreds of any nature.

[0021] On one hand, this machine produces very effectively cleaning of the animal leather, eliminating even the smallest impurities, shreds or dusts of difficult removal.

[0022] On the other hand, the cleaning means, thanks to which such a result is achieved, effectively contain the impurities removed from the surface of the leather, without in any case losing their cleaning capacity due to the regeneration means which are provided in the de-dusting machine and which operate on the cleaning means in such a manner as to remove also from them impurities, shreds and/or powders which they have detached from the surface of the leather.

[0023] For example, the regeneration means comprise at least one longitudinal brush which cooperates by contact with the cleaning means extending itself substantially along the entire width of the cleaning means themselves, generally consisting of rotatable rollers defining linear axes mutually parallel and orthogonal to the longitudinal direction along which the leather advances on the conveyor belt.

[0024] In such case, the regeneration means often comprise also a shaped receptacle fixed to the load-bearing framework and containing inside a detergent bath which permanently retains impurities, shreds and/or dusts captured by the bristles of the longitudinal brush which, while the brush itself rotates, are partially immersed into it.

[0025] In other embodiments, the regeneration means may alternatively or further comprise at least one longitudinal finishing arm, arranged downstream the longitudinal brush and suitable to remove the residual film of detergent bath which remains on the cleaning means after contact with the bristles of the longitudinal brush.

[0026] Even these de-dusting machines of recent conception are not in any case free from some acknowledged technical drawbacks.

[0027] Indeed, after a few cycles of work or operation (whose duration can be estimated in about 15÷20 days), the adhesive material which constitutes the surface coating of the cleaning means looks shiny and is not more viscous and sticky: in practice, such adhesive material loses in time and with use, its own adhesion, gripping, retention or elasticity ability, de facto limiting if not also compromising the actual operative effectiveness of the cleaning means. The reason for this stands in the fact that the continuous contact of the surface coating with leathers inevitably leads to a progressive loss of the sticky ability of the adhesive material with which such a surface coating of the cleaning means is made of.

[0028] In addition, the surface coating directly contacts the mat of the conveyor belt at its own ends and not the

leathers supported by the belt itself as it happens in its central part; moreover, due to the fact that each leather is different one from the other in shape and area, the direct contact between the of the conveyor belt and surface coating of the cleaning means does not always occur at the same points of these components.

[0029] This factor compromises the planarity of the surface coating of the cleaning means at its end areas.

[0030] In order to overcome these obvious negative situations, it is currently necessary to replace, at the best, the surface coating (if of removable type) or, at the worst, the entire conveyor belt (if the surface coating is integrated to it), with the obvious economic disadvantages that this entails both in relations to the spare parts and in relation to the machine downtimes.

[0031] The present invention intends to overcome the drawbacks of the known technique herewith considered just mentioned.

[0032] In detail, the primary purpose of the present invention is to provide an improved de-dusting machine for cleaning leathers which allows to restore in line the capacity of gripping, hooking, withdrawal or detachment of the surface coating belonging to the cleaning means, without the need to proceed to onerous interventions of maintenance and/or replacement of these constructional details of the machine, as it happens with the current technology. Otherwise said, the main purpose of the invention is to make available an improved de-dusting machine for cleaning leathers that restores the original level of effectiveness the gripping function of the surface coating of the cleaning means more quickly and easily than the case of the prior art.

[0033] Within the cognitive sphere of those purposes, it is task of the invention to minimize if not clear the actual manual intervention that an operator of the tanning industry must perform in order to restore (or revive) the effective cleaning power of the cleaning means of the adhesive surface coating type, in a de-dusting machine for cleaning animal leathers.

[0034] It is a further purpose of the present invention to devise an improved de-dusting machine for cleaning leathers which presents an efficiency higher than that one of equivalent machines of known type.

[0035] It is a last but not least purpose of the invention to implement an improved de-dusting machine for cleaning leathers whose duration of dead times of operation is shorter than those ones which can be verified in equivalent machines of known type.

[0036] Said purposes are achieved by means of an improved de-dusting machine for cleaning leathers according to claim 1, as hereinafter referred for the sake of exposure brevity.

[0037] Other technical features of detail of the improved de-dusting machine of the present invention are reported in the corresponding dependent claims.

[0038] The above-mentioned claims, hereinafter specifically and concretely defined, shall be meant as integral part of the present description.

[0039] Advantageously, the improved de-dusting machine of the invention allows to restore the adhesive ability (or even sticking or viscosity) and planarity of the surface coating of the cleaning means which act on the leathers in a more simple, rapid and immediate way than the known machines.

[0040] This is due to the fact that the improved de-dusting machine of the invention includes grinding means operatively connected with the cleaning means and operated in such a way as to define a rest position in which the grinding means are far away from the cleaning means, and a working position in which the grinding means are arranged adjacent to the surface coating of the cleaning means with which they cooperate by contact in order to abrade part of the material of the surface coating of the cleaning means restoring the original adhesiveness that allows to capture impurities, dusts and/or shreds present on the leather cleaning them.

[0041] Equally advantageously, the improved de-dusting machine for cleaning leathers of the invention allows to limit over the prior art interventions of repair, replacement and/or maintenance of the cleaning means, in particular of the adhesive surface coating belonging to them, with consequent reduction of the costs concerned with respect to those ones that currently have to be sustained.

[0042] Still advantageously, the improved de-dusting machine for cleaning leathers of the invention reduces the efforts and the operations that an operator of the tanning industry must perform in order to bring through grinding means the surface coating of the cleaning means back to the original state, restoring its cleaning capacity.

[0043] Equally advantageously, thanks to the invention it is possible for the operators of the tanning field to greatly reduce compared to similar known machines the dead times of operation of a de-dusting machine for cleaning leathers, evidently favoured by the presence in the machine of the invention of the grinding means which are periodically actuated in the work position in order to restore the cleaning capacity of the cleaning means in quick time and in an easy manner, without the need to perform the typical and laborious operations of replacement of the current state of the technique.

[0044] Said purposes and advantages shall appear to a greater extent from the description of a preferred embodiment of the improved de-dusting machine for cleaning leathers of the invention, given by illustrative and indicative, but not limitative, way with reference to the accompanying sheets of drawing in which:

- figure 1 is a simplified and schematic side view of the improved de-dusting machine of the invention;
- figure 2 is an enlargement of a first constructive assembly of figure 1, comprising the grinding means in the rest position;
- figure 3 is the enlargement of the assembly constructive of figure 2 but with the grinding means in the working position;
- figure 4 is an enlargement of a second constructive

assembly of figure 1.

[0045] The improved de-dusting machine for cleaning leathers of the invention is illustrated in figure 1 where it is globally numbered with 1.

[0046] As it can be observed, the improved de-dusting machine 1 comprises:

- a load-bearing framework 2 adapted to insist on a reference surface S, such as the paving of a manufacturing factory of the tanning industry;
- a conveyor belt, as a whole numbered with 3, coupled with the load-bearing framework 2, provided with an upper surface 3a adapted to receive leathers P of various sizes in spread position and operatively connected with first driving means (not shown for simplicity of explanation) which move the conveyor belt 3 to put the leathers P advancing along a predetermined longitudinal, generally substantially horizontal, direction X;
- cleaning means, generally indicated with 4 and associated with the conveyor belt 3, suitable to cooperate by contact with the leathers P spread out on the conveyor belt 3 in such a manner as to remove impurities, dusts and/or shreds B present on the front S_a and/or rear surface S_p of the leathers P, the cleaning means 4 including a surface coating 5 made of adhesive material and suitable to remove by detachment from the leathers P and retain the impurities, dusts and/or shreds B.

[0047] In accordance with the invention, the de-dusting machine 1 comprises grinding means, overall indicated with 6, operatively connected with the cleaning means 4 and operated in such a way as to define a rest position in which the grinding means 6 are far away from the cleaning means 4, and a working position in which the grinding means 6 are arranged adjacent to the surface coating 5 of the cleaning means 4 with which they cooperate by contact in order to remove by abrasion a part of the material of the surface coating 5 of the cleaning means 4 restoring the cleaning capacity of the cleaning means 4 themselves.

[0048] In particular but not binding way, the grinding means 6 are coupled with the load-bearing framework 2 through support means, overall indicated with 7, and furthermore extend for the entire width of the cleaning means 4, as it will be made clear later.

[0049] Preferably but not necessarily, the grinding means 6 comprise:

- a transverse roller 8 defining a longitudinal axis Y which, for a first aspect, is orthogonal to the longitudinal direction of advancement X of the leathers P on the conveyor belt 3 and around which, for a second aspect, the transverse roller 8 is rotated by second driving means, indicated as a whole with 9, when the grinding means 6 take the working position;

- abrasion means, generally indicated with 10, arranged on the outer surface 8a of the transverse roller 8, which cooperate by contact, touching it on, with the surface coating 5 of the cleaning means 4 again when the grinding means 6 take the working position.

[0050] In particular, the aforesaid abrasion means 10 are any of the wrinkled abrasive systems selected from the group consisting of abrasive paper 11, abrasive cloth with interchangeable weft and/or similar knurled, rough, or wrinkled surfaces.

[0051] By way of preferred but non-limiting title, in this case the abrasion means 10 are detachably coupled with the transverse roller 8, thus allowing any replacement only of the abrasion means 10, for example in case of their excessive wear, deterioration or breakage in a focal point, while remaining understood that in other embodiments of the grinding means of the improved de-dusting machine of the invention, the abrasion means could be coupled in a stable and definitive manner with the transverse roller.

[0052] In addition, the grinding means 6 are operated between the rest position and the working position previously defined by actuation means, as a whole numbered with 12, associated with the load-bearing framework 2 and managed by the operator to which they are easily accessible from a location adjacent to the load-bearing framework 2 itself.

[0053] For moving the grinding means 6 between the rest position and the working position, the actuation means 12 directly operate on a lever arm 13 which is operatively connected with a central shaft 14 belonging to the transverse roller 8 and defines a rotation fulcrum 15 around which the lever arm 13 is set in rotation by actuation means 12 in such a way as to define the aforesaid rest position and the aforesaid working position for the grinding means 6.

[0054] More specifically, the rotation fulcrum 15 defines the point at which the support means 7 are arranged with which the grinding means 6 are bound (or pivoted) to the load-bearing framework 2, which the actuation means 12 are also connected with.

[0055] In this respect, the latter are in this case, in a purely preferential way, of the manual type, preferably comprising a worm screw 16 arranged in contact with the lower portion 17 of the lever arm 13, and an adjusting nut 18 which engages in the worm screw 16 and which, rotated by the operator, causes advancement or retraction of the worm screw 16 itself and the corresponding rotation of the lever arm 13 (and with this of the grinding means 6 integral with it) around the rotation fulcrum 15 in order to position the grinding means 6 in the rest position and in the working position respectively, as it is well obtained by observing figures 2 and 3.

[0056] The figures mentioned so far show that, suitably although not necessarily, the improved de-dusting machine 1 of the invention also includes end-of-stroke means, indicated as a whole with 19, having the function

to stop the movement of the grinding means 6 at the rest position and at the working position.

[0057] According to the preferred embodiment described herein of the invention, the end-of-stroke means 19 are operatively connected with the lever arm 13 of the actuation means 12 which interfere with in such a way as to define the rest position and the working position of the grinding means 6: namely, the end-of-stroke means 19 cooperate with the lower end 13a of the lever arm 13 in each of the two relevant positions defined above of the grinding means 6. It should be noted that the end-of-stroke means 19 are any of the technical components selected from the group consisting of position sensors 20 (as in the case under examination and description), mechanical stops and/or the like.

[0058] In relation to the cleaning means 4, in this case the cleaning means 4 are partly distinct and separate from the conveyor belt 3 and partly integrated (or integral) with the conveyor belt 3 in order to allow cleaning of the front surface S_a and simultaneously of the rear surface S_p of the leathers P.

[0059] In a preferred but not exclusive manner, the cleaning means 4 comprise a first ring-closed belt 21, arranged above the conveyor belt 3 and supported between rotating rollers 22, 23 parallel and spaced apart each other and between which the first ring-closed belt 21 extends. These rotating rollers 22, 23 are placed in rotation by third drive means, not shown for convenience of presentation, in such a way that consecutive portions of the outer surface 21a of the first ring-closed belt 21 cooperate by contact with the front surface S_a (grain side) of the leathers P for removing impurities, dusts and/or shreds B therefrom.

[0060] Still preferably although not in a binding way, the cleaning means 4 also comprise a second ring-closed belt 24, belonging to the conveyor belt 3 that receives the leathers P to be cleaned: the second ring-closed belt 24 is supported and extends between respective rotating rollers 25, 26 parallelly spaced apart each other which are placed in rotation by fourth driving means, yet not illustrated for simplicity, in such a way that consecutive portions of the outer surface 24a of the second ring-closed belt 24 cooperate by contact with the rear surface S_p of the leathers P in order to remove from them the relative impurities, dusts and/or shreds B: in practice therefore also the conveyor belt 3 that receives the leathers P to be cleaned integrates, in this case, a part of the cleaning means 4 of which the improved de-dusting machine 1 of the invention is equipped with.

[0061] In this way, the cleaning action of the leathers P operated by the improved de-dusting machine 1 of the invention is complete and detailed, such as to allow that a possible but frequent subsequent stacking of the leathers P just cleaned happens without involving risks of downgrading and/or trimming of the leathers P, necessary instead if the flesh side (or the crust side) would present minimal residues of shreds, dusts and/or impurities that would adhere stably, also due to the pressure

exerted by the various leathers stacked one on another, on the grain side of the underlying leather.

[0062] When the grinding means 6 take the working position, the third driving means put in rotation the ring-closed belts 25, 26 of the cleaning means 4 at a reduced speed, lower than the speed at which the cleaning means 4 cooperate by contact with the leathers P, touching them on; furthermore, in such a working position of the grinding means 6, the transverse roller 8 of the grinding means 6 rotates, for about ten minutes, in direction opposite to that one of the respective ring-closed belt 25, 26.

[0063] Recovering a technical feature previously described, according to which the grinding means 6 extend for the entire width of the cleaning means 4, it is highlighted first of all as the longitudinal axis Y of the transverse roller 8 is parallel to the linear axes Y' parallel and spaced apart each other of the rotating rollers 22, 23, 25 and 26 and, in addition, as the width (or front) of the transverse roller 8 is substantially equal to the width (or front) of the rotating rollers 22, 23, 25 and 26 themselves.

[0064] As far as the adhesive material of the surface coating 5 is concerned, it is any of the materials selected from a self-adhesive paper, a layer of natural or synthetic glue, a layer of soft polymer such as polyurethane gel, silicone or other elastomers and/or natural and synthetic rubbers.

[0065] Preferably but not necessarily, the improved de-dusting machine 1 of the present invention comprises regeneration means, indicated as a whole with 27, operatively connected with the cleaning means 4, suitable to continuously remove from the cleaning means 4, the impurities dusts and/or shreds B that the surface coating 5 has previously collected from the leathers P themselves.

[0066] More specifically, the regeneration means 27 are preferentially coupled with the load-bearing framework 2 and in this case are covered by a pair of protective casing, not indicated with a reference numeral in the attached figures, rotatably coupled one with the upper part and the other with the lower part of the load-bearing framework 2 in such a way as to allow the operator inspection, maintenance, repair and/or replacement of the regeneration means 27. In particular, the regeneration means 27 comprise a first operating group, overall indicated by 28, cooperating with the first ring-closed belt 21 of the cleaning means 4, and a second operating group, as a whole numbered with 29, cooperating with the second ring-closed belt 24 of the cleaning means 4.

[0067] According to the description just given on the construction details of the regeneration means 27, it follows that the first and the second operating group 28, 29 of the regeneration means 27 are covered by a respective protective casing.

[0068] In addition, it is highlighted that, in a preferred but not exclusive way, the regeneration means 27 include any (or an appropriate combination) cleaning devices selected from the group consisting of:

- two longitudinal brushes 30, each of which continu-

ously cooperates by contact with the surface coating 5 of the cleaning means 4 and extends substantially the entire width of the cleaning means 4, and two shaped containers 31, each of which is fixed to the load-bearing framework 2 and containing inside a detergent bath (illustrated only in figure 1 where it is indicated with D) in which the bristles 32 of the respective longitudinal brush 30 are at least partially immersed, as shown in particular by figure 4;

- two longitudinal finishing arms (or blades) 33, better visible in the enlargement of figure 4, each of which is arranged downstream the longitudinal brush 30, suitable to remove the residual veil of the cleaning bath D which remains on the cleaning means 4 after the contact with the respective longitudinal brush 30;
- at least one longitudinal roller coated with a laminar layer made of a porous material selected from sponge, felt, fabric, rubber and the like;
- a plurality of jets of cleaning liquid, suitable to interfere with said rotating ring-closed belt, coming out from a plurality of through holes in a longitudinal tubular element facing said closed belt.

[0069] In preferred but not necessary way, the improved de-dusting machine 1 of the present invention also includes a mechanical introduction and distension assembly of the leathers P, overall numbered with 34 in figure 1: such a mechanical assembly 34 is arranged upstream the conveyor belt 3 and is suitable to stretch the leathers P in such a way that they reach the conveyor belt 3 and the cleaning means 4 in the correct position, perfectly spread and unwrinkled.

[0070] The mechanical introduction and distension assembly 34 of the leathers P includes, as a pure example, two transport mats 35, 36 suitably mounted one above the other which allow the distension and the correct insertion of the leathers P between the two ring-closed belts 21 and 24 which in the case concerned define the cleaning means 4 of the de-dusting machine 1 of the invention.

[0071] In operation, the leathers P reach one at a time the conveyor belt 3 after having been spread by the mechanical of introduction and distension assembly 34, and are placed in advancement by the first driving means along the longitudinal direction X until reaching the first ring-closed belt 21 of the cleaning means 4 and contacting or touching their surface coating 5 on.

[0072] With the continuous contact, the viscosity or the adhesive strength of the surface coating 5 (for example made of silicone) of the first ring-closed belt 21 allows to remove by detachment impurities, dusts and/or the shreds B present on the grain side (the front surface S_a) of the leathers P.

[0073] It should be observed that the first ring-closed belt 21 rotates in the same direction (indicated by the arrow Z) along which the leathers P advances on the conveyor belt 3 (indicated by the arrow X), in such a way that the action of removal of impurities, dusts and/or shreds B occurs with full and effective efficiency.

[0074] The consecutive portions of the outer surface 21a of the first ring-closed belt 21 which have progressively already cooperated by contact with the leathers P, in particular with the (nobler) grain side of the latter, are subjected to the action of the longitudinal brush 30 of the regeneration means 27 which provides to retain (or withdraw) from the adhesive surface coating 5 impurities, dusts and/or the shreds B, while the longitudinal finishing arm 33 removes the residual veil of detergent bath D which remains on the surface coating 5 after contact with the longitudinal brush 30: the consecutive portions of the outer surface 21a of the first ring-closed belt 21 (in particular of its surface coating 5) are thus totally cleaned, ready to perform a new cleaning action of a further portion of the same leather P just cleaned or of the subsequent leather P coming from, in this specific constructive example, the mechanical introduction and distension assembly 34.

[0075] At the same time and without solution of continuity, the leathers P, in their advancement along the longitudinal direction X, meet the second ring-closed belt 24 of the cleaning means 4 where also takes place the cleaning of the flesh side or crust side (the rear surface Sp, that one less valuable) of the leathers P, so as to perform a deep and thorough cleaning which also takes into account the risks, in order to eliminate or minimize them, that could result from the subsequent condition in which the leathers P are arranged, that is stacked.

[0076] As said, over time and with the continuous cycles of processing and use, the adhesive material of the surface coating 5 of the cleaning means 4 loses its capability of gripping and it is therefore necessary to reactivate it: it is at that point that the operator temporarily stops loading leathers P on the conveyor belt 3 through the mechanical introduction and distension assembly 34, stops the operation of the first driving means and operates the actuation means 12 in order to position the grinding means 6 from the rest position of figure 2 to the working position of figure 3 where the slight but effective contact takes place between the surface coating 5 and the abrasion means 10 (in this case consisting of the abrasive paper 11).

[0077] In such a position (maintained for an appropriate and predetermined time, for example, ten minutes), the transverse roller 8, and with it the abrasion means 10, of the grinding means 6 is set in rotation by the second driving means 9 around the longitudinal axis Y in an angular direction, indicated by the arrow G in figure 3, contrary to the angular direction Z which is moved with the first ring-closed belt 21: in this phase, the first ring-closed belt 21 rotates at a speed lower than that one at which it rotates to clean the leathers P from dusts, impurities and/or shreds B.

[0078] In this way, the abrasion means 10 rub against the surface coating 5 of the first ring-closed belt 21, restoring the ability of gripping of the adhesive material with which the surface coating 5 itself is made of.

[0079] After the grinding step of the surface coating 5

of the cleaning means 4 is ended, the operator intervenes again on the actuation means 12, operating them in direction opposite to the previous one in such a way as to move the grinding means 6 from the cleaning means 4 and bring them back in the rest position of figure 2, due to the counterclockwise rotation of the lever arm 13 around the rotation fulcrum 15.

[0080] On the basis of the description just given, it is understood, therefore, that the improved de-dusting machine for cleaning leathers, subject of the invention, achieves the purposes and reaches the advantages mentioned previously.

[0081] Upon execution, changes could be made to the improved de-dusting machine for cleaning animal leathers in the tannery field, subject of the invention, which are constituted, for example, in a load-bearing framework having a constructive composition different from that one detectable, event of schematically, from the accompanying drawings.

[0082] In addition, in other embodiments of the invention, not shown, the improved de-dusting machine for cleaning leathers could comprise a conveyor belt of constructive conception different from that one previously described and which is based on the attached figures.

[0083] In addition, further embodiments of the present invention, again not illustrated, could provide that the improved de-dusting machine for cleaning leathers includes cleaning means of constructive composition and articulation different from those ones described above: in particular, the cleaning means of the improved de-dusting machine for cleaning leathers of the invention could comprise, in a first alternative, only one ring-closed belt, forming a distinct and spaced apart element from the conveyor belt and arranged generally superiorly to this in order to clean the grain side (or valuable upper side) of the animal leathers.

[0084] In a second alternative, yet not shown in the attached drawings, the cleaning means of the improved de-dusting machine for cleaning leathers of the invention could belong and be integrated or integral with the conveyor belt in order to clean the flesh side (or crust side or lower side) of the animal leathers.

[0085] In both cases just cited, the construction of the regeneration means (although optional elements in the innovative de-dusting machine of the invention) could vary accordingly.

[0086] Moreover, in alternative embodiments of the present invention, yet not shown in the attached figures, the improved de-dusting machine for cleaning leathers of the invention could comprise grinding means associated with both the first assembly of the cleaning means and with the second assembly of the cleaning means and not only to the first assembly of the cleaning means, as it can be deduced by observing the appended figures. Finally, the actuation means could be of automatic type (for example hydraulic or pneumatic linear actuators operated by a central processing and control unit) in alternative embodiments of the improved de-dusting machine

for cleaning leathers which is claimed here in exclusive, which does not affect the advantage brought by the present invention.

[0087] It is, finally, clear that several other changes could be made to the improved de-dusting machine concerned, without departing from the principle of novelty intrinsic in the inventive idea expressed herein, as it is clear that, in the practical implementation of the invention, materials, shapes and sizes of the illustrated details could be changed, as needed, and replaced with others technically equivalent.

[0088] Where the constructive features and techniques mentioned in the following claims are followed by reference numbers or signs, those reference signs have been introduced with the sole objective of increasing the intelligibility of the claims themselves and therefore they have no limiting effect on the interpretation of each element identified, by way of example only, by these reference signs.

Claims

1. Improved de-dusting machine (1) for cleaning leathers (P) comprising:

- a load-bearing framework (2) suitable to rest on a reference surface (S);
- a conveyor belt (3), coupled with said load-bearing framework (2), provided with an upper surface (3a) suitable to receive leathers (P) of various sizes in spread position and operatively connected with first driving means suitable to move said conveyor belt (3) to put said leathers (P) advancing along a predetermined longitudinal direction (X);
- cleaning means (4), associated with said conveyor belt (3), suitable to cooperate by contact with said leathers (P) spread out on said conveyor belt (3) so as to remove impurities, dust and/or shreds (B) present on the front (S_a) and/or rear surface (S_p) of said leathers (P), said cleaning means (4) comprising a surface coating (5) made of adhesive material suitable to remove by detachment from said leathers (P) and retain said impurities, dust and/or shreds (B),

characterized in that it comprises grinding means (6), operatively connected with said cleaning means (4) and operated in such a way as to define a rest position, in which said grinding means (6) are far away from said cleaning means (4), and a working position in which said grinding means (6) are arranged adjacent to said surface coating (5) of said cleaning means (4) with which cooperate by contact in order to remove by abrasion a part of the material of said surface coating (5) of said cleaning means (4) restoring the cleaning ability of said cleaning

means (4).

2. De-dusting machine (1) according to claim 1), **characterized in that** said grinding means (6) are coupled with said load-bearing framework (2) through support means (7).

3. De-dusting machine (1) according to claim 1) or 2) **characterized in that** said grinding means (6) comprise:

- a transverse roller (8) defining a longitudinal axis (Y) which is orthogonal to said longitudinal direction of advancement (X) of said leathers (P) and around which said transverse roller (8) is rotated by second driving means (9) when said grinding means (6) take said work position;
- abrasion means (10), arranged on the outer surface (8a) of said transverse roller (8) and suitable to cooperate by contact with said coating surface (5) of said cleaning means (4) when said grinding means (6) take said work position.

4. De-dusting machine (1) according to claim 3), **characterized in that** said abrasion means (10) are any of wrinkled abrasive systems selected from the group consisting of abrasive paper (11), abrasive cloth with interchangeable weft and/or similar knurled, rough or wrinkled surfaces.

5. De-dusting machine (1) according to claim 3) or 4), **characterized in that** said abrasion means (10) are removably coupled with said transverse roller (8).

6. De-dusting machine (1) according to any of the preceding claims, **characterized in that** said grinding means (6) are driven between said rest position and said working position by actuation means (12) operated by the operator and associated with said load-bearing framework (2).

7. De-dusting machine (1) according to claim 6), **characterized in that**, for moving said grinding means (6) between said rest position and said working position, said actuation means (12) directly operate on a lever arm (13) which is operatively connected with a central shaft (14) belonging to said transverse roller (8) and defines a rotation fulcrum (15) around which said lever arm (13) is rotated by said actuation means (12) in such a way as to define said rest position and said working position for said grinding means (6).

8. De-dusting machine (1) according to any of the preceding claims, **characterized in that** it comprises end-of-stroke means (19), applied to said load-bearing framework (2) and suitable to stop the movement of said grinding means (6) at said rest position and at said working position.

9. De-dusting machine (1) according to claim 8) and 7), **characterized in that** said end-of-stroke means (19) are operatively connected with said lever arm (13) of said actuation means (12) which interfere with in such a way as to define said rest position and said working position of said grinding means (6).
10. De-dusting machine (1) according to claim 8) or 9), **characterized in that** said end-of-stroke means (19) are any of the technical components selected from the group consisting of position sensors (20), mechanical stops and/or the like.
11. De-dusting machine (1) according to any of the preceding claims, **characterized in that** said cleaning means (4) are separated and distinct from said conveyor belt (3) and/or belonging to said conveyor belt (3) in order to allow cleaning only of said front surface (S_a) of said leathers (P), only of said rear surface (S_p) of said leathers (P) or simultaneously of said front surface (S_a) and said rear surface (S_p) of said leathers (P).
12. De-dusting machine (1) according to any of the preceding claims, **characterized in that** said cleaning means (4) comprise a first ring-closed belt (21), arranged above said conveyor belt (3) and supported between rotating rollers (22, 23) parallel and spaced apart each other and between which said first ring-closed belt (21) extends, suitable to be placed in rotation by third driving means in such a way that consecutive portions of the outer surface (21a) of said first ring-closed belt (21) cooperate by contact with said front surface (S_a) of said leathers (P) for removing said impurities, dust and/or shreds (B) therefrom.
13. De-dusting machine (1) according to any of the preceding claims, **characterized in that** said cleaning means (4) comprise a second ring-closed belt (24), belonging to said conveyor belt (3) that receives said leathers (P) to be cleaned, said second ring-closed belt (24) being supported and extending between rotating rollers (25, 26) parallel and spaced part each other suitable to be placed in rotation by fourth driving means in such a way that consecutive portions of the outer surface (24a) of said second ring-closed belt (24) cooperate by contact with said rear surface (S_p) of said leathers (P) for removing said impurities, dust and/or shreds (B) therefrom.
14. De-dusting machine (1) according to any of the preceding claims, **characterized in that** it comprises regeneration means (27) operatively connected with said cleaning means (4), suitable to remove from said cleaning means (4) said impurities, dust and/or shreds (B) that said surface coating (5) has previously captured from said leathers (P).
15. De-dusting machine (1) according to claim 14), **characterized in that** said regeneration means (27) are coupled with said load-bearing framework (2) and are covered by at least one protective casing rotatably coupled with the upper and/or to the lower part of said load-bearing framework (2) in such a way as to allow the operator inspection, maintenance, repair and/or replacement of said regeneration means (27).
16. De-dusting machine (1) according to claim 14) or 15) and claim 11) **characterized in that** said regeneration means (27) comprise a first operating group (28), cooperating with said first assembly (22) of said cleaning means (4), and a second operating group (29), cooperating with said second assembly (23) of said cleaning means (4).
17. De-dusting machine (1) according to any of the claims 14) to 16), **characterized in that** said regeneration means (27) comprise any, or a suitable combination, of the cleaning devices selected from the group consisting of:
- at least one longitudinal brush (30) which cooperates by contact with said surface coating (5) of said cleaning means (4) and extends substantially for the entire width of said cleaning means (4), and a shaped container (31), fixed to said load-bearing framework (2) and containing inside a cleaning bath (D) in which the bristles (32) of said longitudinal brush (30) are at least partially immersed;
 - at least one longitudinal finishing arm (33), arranged downstream said longitudinal brush (30), suitable to remove the residual veil of said cleaning bath (D) which remains on said cleaning means (4) after contact with said longitudinal brush (30);
 - at least one longitudinal roller coated with a laminar layer made of a porous material selected from sponge, felt, fabric, rubber and the like;
 - a plurality of jets of cleaning liquid, suitable to interfere with said rotating ring-closed belt, coming out from a plurality of through holes made in a longitudinal tubular element facing said closed belt.
18. De-dusting machine (1) according to any of the preceding claims, **characterized in that** it comprises a mechanical introduction and distension assembly (34) of said leathers (P), arranged upstream said conveyor belt (3), suitable to stretch said leathers (P) in such a way that said leathers (P) reach said conveyor belt (3) and subsequently said cleaning means (4) in the correct position, perfectly spread.

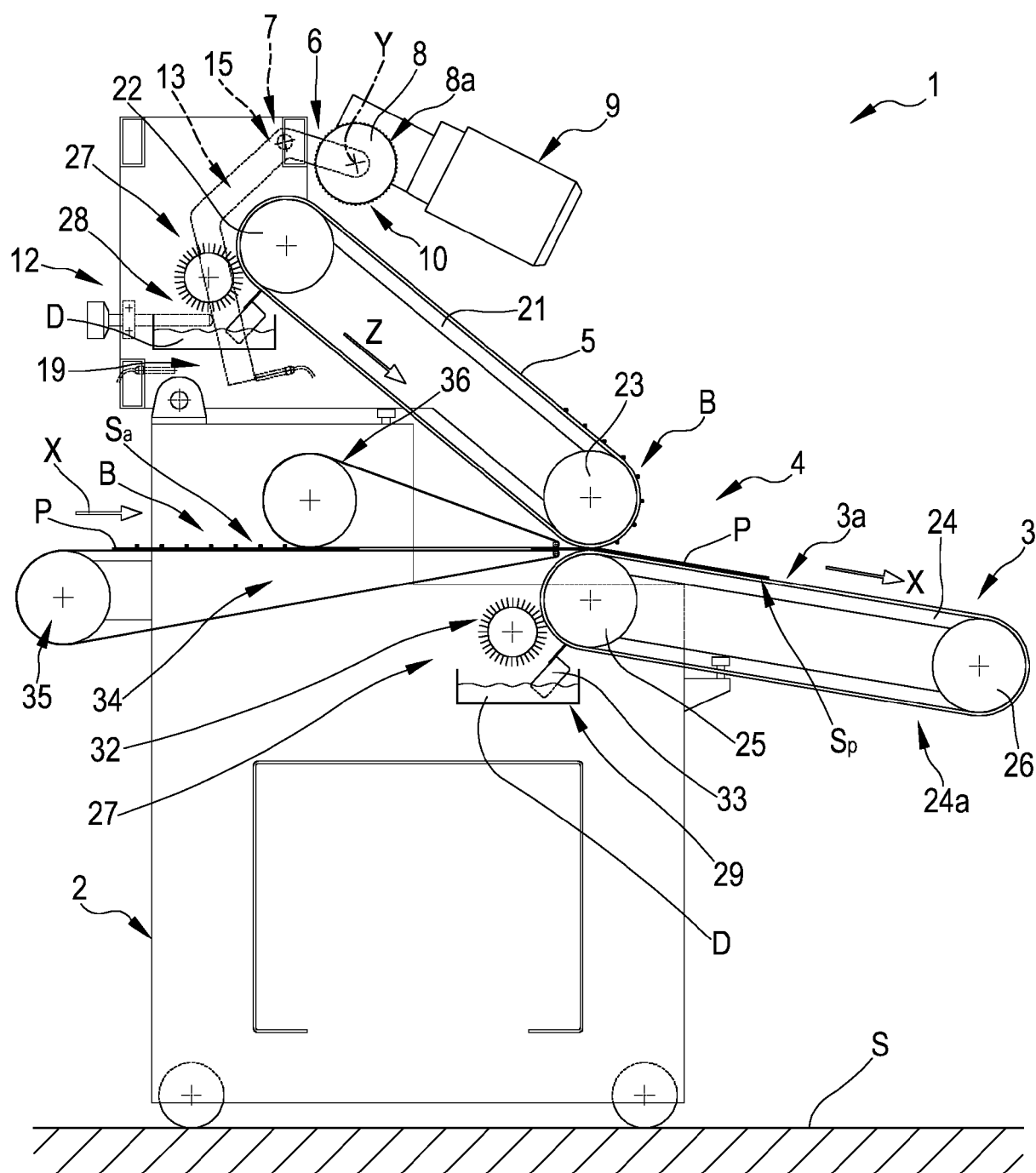


FIG.1

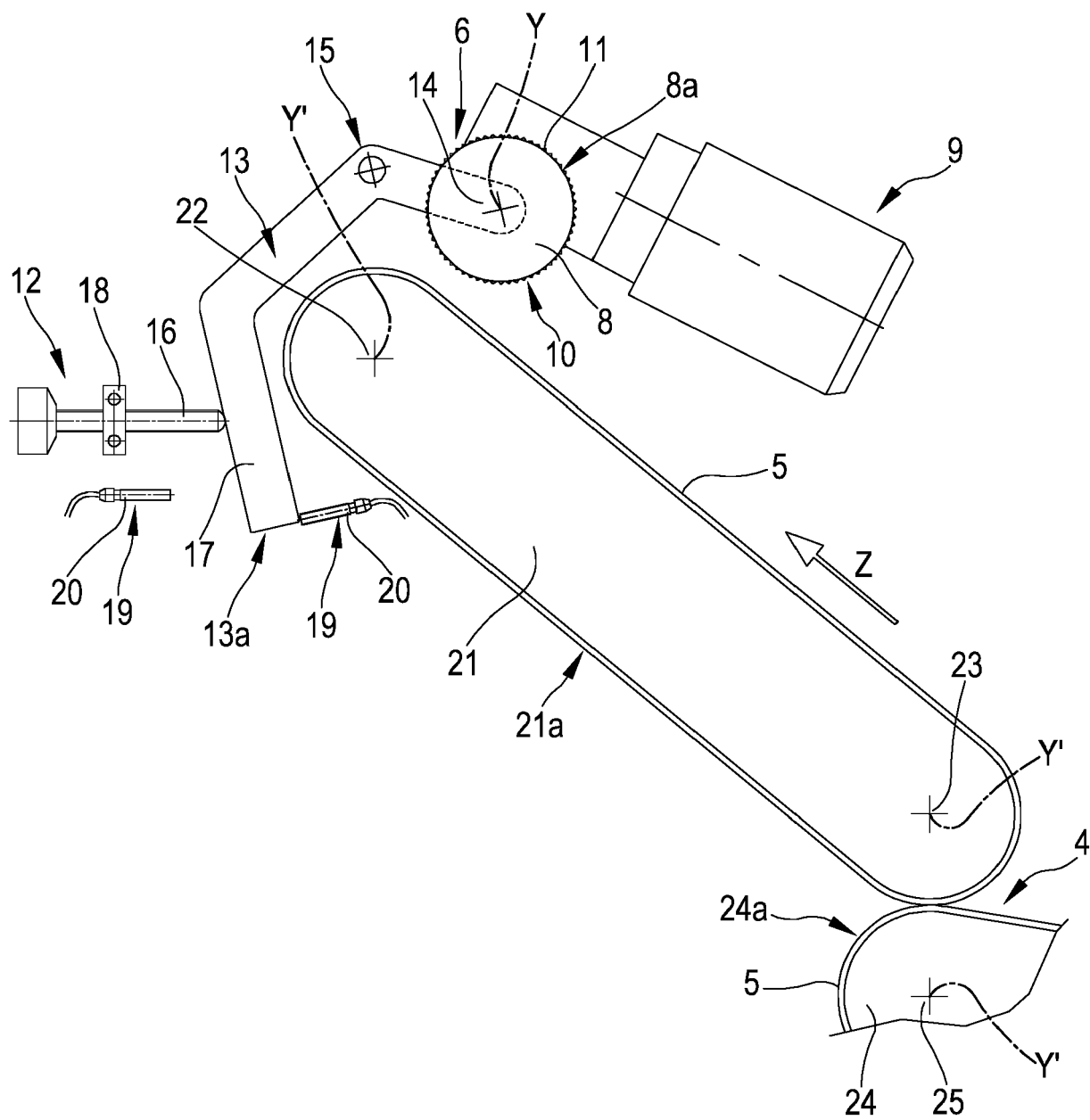


FIG.2

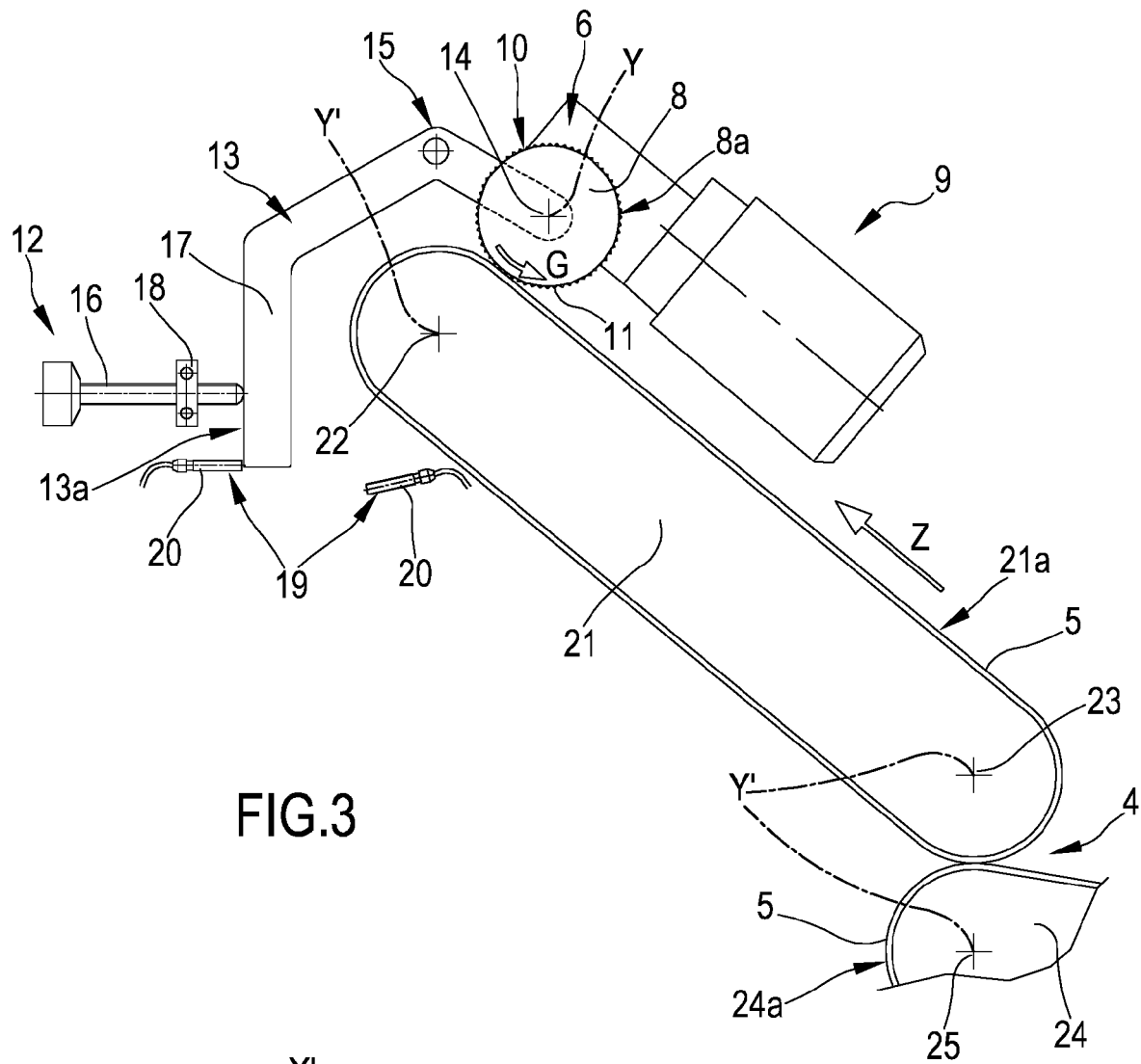


FIG.3

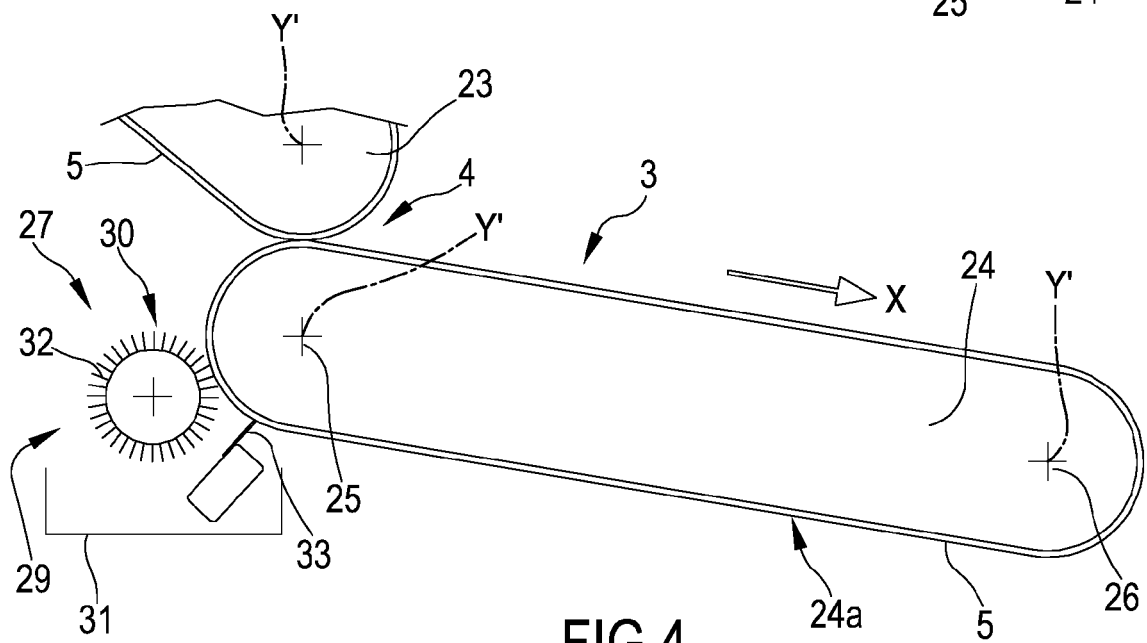


FIG.4



EUROPEAN SEARCH REPORT

Application Number
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			C14B B08B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 20 June 2016	Examiner Bichi, Marco
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