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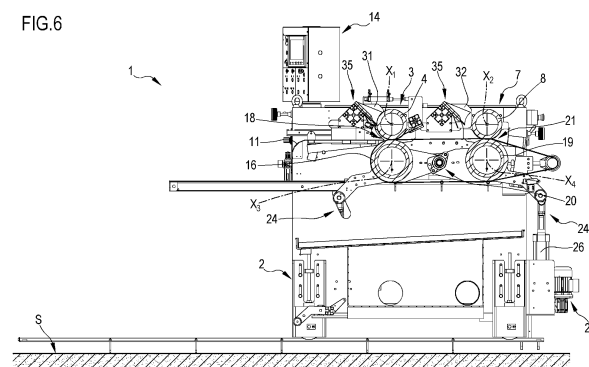
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(54) **MACHINE FOR DECORATING FLEXIBLE LAMINAR SURFACES USED TO COVER OBJECTS**

(57) A machine (1) for decorating flexible laminar surfaces (P) comprising a bearing frame (2) resting on a reference surface (S), a first coating unit (3) comprising a first coating cylinder (4), coupled to the bearing frame (2), provided with an outer wall (4a) engraved with a first patterned design (5) and operatively connected to first motor means (6) which rotate the first coating cylinder (4) about a first transverse axis (X_1) to deposit by pressure, while the first coating cylinder (4) rotates about the first transverse axis (X_1), a first liquid product (L_1) on an upper face (P_s) of flexible laminar surfaces (P) advancing along a preset direction (F), so that said first patterned design (5) made of the first liquid product (L_1) is imprinted on the upper face (P_s) of the flexible laminar surfaces (P). In detail, the machine (1) includes a second coating unit (7) which comprises at least a second coating cylinder (8) coupled to the bearing frame (2), operatively arranged downstream of the first coating cylinder (4) from which it is separated by a predetermined distance (D), measured along the preset direction (F), provided with an outer wall (8a) engraved with a second patterned design (9) and operatively connected to second motor means (10) which rotate the second coating cylinder (8) about a second transverse axis (X_2), parallel to said first axis (X_1), to deposit by pressure and after the first coating cylinder (4), while the second coating cylinder (8) rotates about the second transverse axis (X_2), a second liquid product (L_2), different in color from the first liquid product

(L_1), on the upper face (P_s) of the flexible laminar surfaces (P) advancing along the preset direction (F) on a conveyor belt (11) below the coating cylinders (4, 8), so that the second patterned design (9) made of the second liquid product (L_2) is imprinted on the upper face (P_s) of the flexible laminar surfaces (P) in a given combination with the first patterned design (5) already imprinted on the upper face (P_s).

FIG.6



Description

[0001] The present invention relates to a machine for decorating flexible laminar surfaces used to cover objects, items and or products of various kind: to this end, flexible laminar surfaces processed by the machine of the invention comprise cattle hide, imitation leather, regenerated leather, leather, synthetic material, fabric and/or the like (with specific exclusion of paper).

[0002] In other words, the machine of the invention is useful for creating a determined embellishing ornamental design on flexible laminar surfaces intended for the world of furnishing, fashion (for example, women's shoes) and cars, but especially for fashion accessories and leather goods (such as bags, belts, straps, shoulder bags, luggage, card holders, wallets, and so on).

[0003] As is known, in the process of finishing flexible laminar surfaces such as cattle leathers of the tanning industry, finishing machines (better known in industry jargon as "roller coaters", "coating machines" or more simply, "coaters") are mainly used to perform a decorating processing thereon, in which the hide to be finished, for example conveyed by a conveying and stretching unit, transits on a lower transport and contrast cylinder made of rubber (so-called rubber cylinder) and functionally and constructionally arranged downstream of said conveying and stretching unit.

[0004] At the same time, by pressing on the upper face of the advancing leather, an upper coating cylinder, provided with an outer wall (so that the cylinder or roller is commonly defined "engraved") engraved with a patterned design and facing and opposing the underlying rubber lower cylinder which counters the action thereof, transfers and indelibly imprints a liquid product (in the form of film) on such an upper face, the patterned design of the outer wall of the engraved upper cylinder, removing the excess liquid product through distribution means (such as a transverse blade, generally referred to as "blade"), thus obtaining the aesthetical effect (the so-called "fashion effect", as commonly known in tanning industry jargon) given by the patterned design itself on the outside of the upper coating cylinder.

[0005] The engraved upper cylinder (like the rubber lower cylinder) is rotated by the respective motor means installed on the bearing frame of the decorating machine in a synchronous manner with the direction of advancement of the leather on the related feed belt, or inversely, that is in the direction opposite to the direction of advancement of the leather: this means that when successive portions of the outer surface of the rotating engraved upper cylinder progressively meet the underlying leather linearly advancing, such portions of the outer surface of the engraved cylinder are moved in sequence, or not, with the leather, according to whether the operating mode is synchronous or inverse.

[0006] Generally speaking, in the current state, simple leather finishing processes (especially if the leather is soft) in the aforesaid inverse mode are performed by tak-

ing advantage of a rubber conveyor belt on which the leather is laid out and which wide surface front ensures the adhesion and traction of the leather itself, while the more detailed and complicated leather finishing processes involving printing (or imprinting) with patterns and/or various types of effects occur in a synchronous manner preferably by means of the aforesaid rubber lower transport and contrast cylinder in order to obtain a more accurate contact between the engraved upper coating cylinder and the leather to be finished.

[0007] The present invention is specifically oriented towards finishing machines of flexible laminar surfaces (used as covering of objects, items and/or products intended for the end consumer) which involve imprinting (or printing), on the upper face thereof, by means of an actual print, a given effect or embellishing or ornamental aesthetical pattern given by the engraving presented by the outer wall of the coating cylinder.

[0008] An at least optimal result, even if not perfect, of the finishing operation, and therefore of the decorating operation by printing a given patterned design, in the leathers, in addition to depending on a regular and constant traction thereof in the passage gap created between the engraved upper cylinder and the rubber lower cylinder, mainly depends on the effectiveness with which the engraved upper cylinder transfers, deposits or spreads the liquid product over the whole upper face of the laminar material to be treated (such as, for example the single cattle leathers advancing one by one along a preset direction).

[0009] This is apparently impacted (and largely known in the field) first by the fact that the leathers have an irregular, inconstant thickness and then the fact that the outer faces of the leathers often have folds resulting from previous processing and/or several defects such as scratches, holes, marks, micro-cracks, and so on, which the liquid product is not always able to cover and conceal.

[0010] However, most importantly for the subject of the present invention, it's apparent that the patterned design imprinted on the flexible laminar surface of the type listed above exclusively depends on the morphology and depth of the engraving performed (by photogravure) in the outer part of the upper coating cylinder, as well as by the liquid product (generally referred to as a "polish", a natural coloring material or an artificial coloring material) which is inevitably unique in the specific composition thereof.

[0011] Therefore, the aesthetical effect which currently may be attributed, in the technical field involved, to a flexible laminar surface such as cattle hide, imitation leather, leather, synthetic material, fabric and/or the like, is exclusively dictated by the type of patterned design imprinted on the engraved coating cylinder and by the color of the liquid product applied on such a laminar surface by the rotating engraved cylinder: any color variations in the patterned design printed on the upper face of the flexible laminar surface indeed are exclusively attributable to a different depth of certain areas with respect to others of the engraved part of the outer wall of the

coating cylinder and in any case, constitute simple tone variations of that single specific color associated with that liquid product applied by pressure by the rotating coating cylinder.

[0012] As a consequence, also to meet the increasingly diversified, distinctive, original and personalized needs of the end client, although there is a wide range of aesthetical effects which, in the prior art, is provided by flexible laminar surfaces treated by a decorating finishing machine of the known type, it is not optimal and at least requires being expanded not only with respect to the obtainable patterned designs, but also with respect to the variety of colorings which can be associated with each of such patterned designs, without disadvantageously (given the related cost) requiring each time a different engraving on the outer wall of the coating cylinder.

[0013] Indeed, by following this operating logic, to comprehensively and effectively meet the aforesaid originality needs of the market, the manufacturer of flexible laminar surfaces decorated with patterned designs and intended to form objects, items or products of various nature and various use in everyday life, in particular fashion accessories and leather goods, should have a significant number of engraved coating cylinders, which is an economically disadvantageous, unsustainable strategy and which not surprisingly is not pursued, resulting in a limitation of the choices that customers can make.

[0014] In any case, patent document published as EP2251205 A2 shows a system of the known type for the surface decoration of rigid surfaces, such as boards, panels, plates and the like, by applying vanishes or paints aiming to cover such rigid surfaces, thus forming a structural surface with reliefs.

[0015] Therefore, starting from the awareness of the aforesaid drawbacks affecting the current state of the art herein considered, the present invention aims to obviate them in a complete and effective manner.

[0016] In particular, it is the main purpose of the present invention to provide a machine for decorating flexible laminar surfaces used to cover objects, items or products of various kind which allows expanding the range of aesthetical effects of such flexible laminar surfaces offered by the market as compared to the known art. Therefore, within the scope of such a purpose, it is the task of the invention to conceive a machine for decorating flexible laminar surfaces which is able to meet the customers' needs in a broader and more varied manner than the current state of the art, or in other words, which is able to meet a wider range customers' needs than currently allowed without resulting in an excessive multiplication of the models of engraved coating cylinders.

[0017] Within the cognitive realm of the aforesaid main purpose, it is also a task of the present invention to identify a machine for decorating flexible laminar surfaces which produces new, innovative and original aesthetical effects on the latter, which cannot be obtained with equivalent machines of the known type.

[0018] It is a second purpose of the invention to provide

a machine for decorating flexible laminar surfaces used to cover objects, items or products which, the profile of the patterned design printed on such flexible laminar surfaces being equal, allows attributing a greater number of aesthetical effects than that being obtainable with the equivalent decorating machines of the known art.

[0019] Last but not least, it is a purpose of the invention to provide a machine for decorating flexible laminar surfaces used to cover objects, items or products or various kind which allows achieving the preceding objects while operating efficiently and effectively.

[0020] Said purpose are achieved by a machine for decorating flexible laminar surfaces used to cover objects as per appended claim 1, to which reference is made for brevity of disclosure.

[0021] Further detailed technical features of the machine for decorating flexible laminar surfaces of the invention are contained in the corresponding dependent claims. The aforesaid claims, hereinafter specifically and concretely defined, are intended as an integral part of the present description.

[0022] Advantageously, as compared the similar machines of the known type, the decorating machine of the invention is capable of expanding the range of aesthetical effects offered by (or associated with) flexible laminar surfaces used to cover objects, items or products, without requiring excessive adaptations or changes to the components causing such aesthetical effects, in particular in the patterned design with which the coating cylinders are engraved.

[0023] This is by virtue of the fact that in addition to a conventional first coating unit, the machine of the invention also includes a second coating unit comprising a second coating cylinder, which is:

- coupled to the bearing frame;
- operatively placed downstream of the first coating cylinder of the first coating unit from which it is separated by a predetermined distance measured along the preset direction of advancement of the flexible laminar surface to be decorated;
- provided with an outer wall engraved with a second patterned design, freely established during production and generally obtained by photogravure, as the first patterned design obtained in the outer wall of the first coating cylinder;
- operatively connected to second motor means adapted to rotate the second coating cylinder about a second transverse axis, parallel to the first axis defined by the first coating cylinder, to deposit by pressure and after (and continuously) the latter, while such a second coating cylinder itself rotates about the second transverse axis, a second liquid product, different in color from the first liquid product, on the upper face of the various flexible laminar surfaces advancing in sequence along the aforesaid preset direction on a motorized conveyor belt below the two coating cylinders, so that the second pat-

terned design made of (or colored with) the second liquid product is indelibly imprinted (or printed) on the upper face of the flexible laminar surfaces in a given combination with the first patterned design made of (or colored with) the first liquid product and already imprinted on the upper face of the flexible laminar surfaces.

[0024] Equally advantageously, therefore, the decorating machine allows effectively printing, on the upper face of the flexible laminar surfaces advancing on a motorized conveyor belt, two patterned designs, conveniently combined with each other (preferably, one within the other) and filled with liquid products which are different in color from each other.

[0025] Equally advantageously, the so-called "fashion effect" obtained by the decorating machine of the invention is just as different from the binding and substantially single-color one (albeit in iridescent grading, which in any case can also be obtained with the machine of the invention, depending on the possible variety of the level of engraving in each of the two coating cylinders) caused by the decorating machines of the prior art which are comparable to the machine of the invention.

[0026] The aforesaid purposes and advantages, like other ones which will emerge later, will become more apparent from the following description related to a preferred embodiment of the machine for decorating flexible laminar surfaces to cover objects, items or products, given indicatively by mere way of non-limiting example, with the aid of the accompanying drawings, in which:

- figure 1 is an assonometric view of the decorating machine of the invention;
- figure 2 is the simplified front view of figure 1;
- figure 3 is the simplified plan view of figure 1;
- figure 4 is a first simplified side view of figure 1;
- figure 5 is a second simplified side view of figure 1, on the opposite side of figure 4;
- figure 6 is the view in figure 2 according to the section plane VI-VI.

[0027] The machine for finishing (in the sense of decorating) flexible laminar surfaces P, preferably such as the tanning industry leathers used for the outer covering of objects such as, by way of example, shoes, bags, belts, card holders, is depicted in figure 1, where it is indicated by reference numeral 1 as a whole.

[0028] In other words, the invention machine 1 is expressly used to apply, on flexible laminar surfaces (paper excluded), an embellishing pattern (and therefore, providing an aesthetical effect) of any kind, generally irregular and random (a kind of spot or a livery, for example replicating a snake hide), previously engraved (by photogravure) on coating cylinders rotating about a rotation axis orthogonal to an advancement direction of the flexible laminar surfaces to be decorated.

[0029] Leathers P which can be processed with the

decorating machine 1 of the current invention not only comprise the smaller ones (so-called "sides" and having a width in the range of values of 1,800-2,400 mm), but also those reaching a greater width, up to 3,400 mm.

[0030] The machine 1 for decorating the flexible laminar surfaces P used to cover objects comprises:

- a bearing frame 2 adapted to rest on a reference surface S, such as the floor of a production factory;
- a first coating unit (indicated as a whole by 3) comprising a first coating cylinder 4 coupled to the bearing frame 2 and provided with an outer wall 4a engraved with a first patterned design 5; the first coating cylinder 4 is also operatively connected to first motor means (indicated as a whole by 6) adapted to rotate the first coating cylinder 4 about a first transverse axis X_1 to deposit by pressure, while such a first coating cylinder 4 rotates about the first transverse axis X_1 itself, a first liquid product L_1 on an upper face P_s of flexible laminar surfaces P advancing along a preset direction F so that said first patterned design 5 made of (or colored with) the first liquid product L_1 is indelibly imprinted (or printed) on the upper face P_s of the flexible laminar surfaces P.

[0031] According to the invention, the machine 1 comprises a second coating unit (indicated as a whole by 7) which in turn comprises a second coating cylinder 8 which is:

- coupled to said bearing frame 2;
- operatively placed downstream of the first coating cylinder 4 from which it is separated by a predetermined distance D measured along the aforesaid preset direction F;
- provided with an outer wall 8a engraved with a second patterned design 9, established as desired during production and generally obtained by a process of photogravure (as it also occurs for the first patterned design 5);
- operatively connected to second motor means (indicated as a whole by 10) adapted to rotate the second coating cylinder 8 about a second transverse axis X_2 , parallel to the first axis X_1 , to deposit by pressure and after the first coating cylinder 4, while the second coating cylinder 8 rotates about the second transverse axis X_2 , a second liquid product L_2 , different in color from the first liquid product L_1 , on the upper face P_s of the flexible laminar surfaces P advancing along the preset direction F on a conveyor belt 11 below the coating cylinders 4, 8 so that the second patterned design 9 made of (or colored with) the second liquid product L_2 is indelibly imprinted (or printed) on the same upper face P_s of the flexible laminar surfaces P in a given and qualitatively effective combination with the first patterned design 5 already imprinted on the upper face P_s .

[0032] It is worth noting that the second product, generally colored L_2 , is spread into the engraving of the outer wall 8a of the second coating cylinder 8 and from here, progressively transferred by pressure onto the initial part of the upper face P_s of each flexible laminar surface P, thus determining the print of the second patterned design 9, as soon as each flexible laminar surface P reaches the second coating cylinder 8 which starts to rotate and while also the first coating cylinder 4, rotating about the transverse axis X_1 , is still spreading the first product L_1 , it also generally colored, into the engraving of the outer wall 4a of the first coating cylinder 4, thus printing the first patterned design 5 on the end part of the upper face P_s of the involved flexible laminar surface P advancing along the preset direction F.

[0033] In particular, the second patterned design 9 is inserted or contained within said first patterned design 5 with respect to which it has a smaller surface extension: the resulting aesthetical effect is a double different coloring (yellow and green, for example) of the patterned designs 5, 9 printed on the upper face P_s of the flexible laminar surface P which, basically has a further different base, blue or black, for example; this is in plain and considerable contrast with that allowed by the machines of the known type which create designed effects with at most different tones of a same color (black, for example) on a flexible laminar surface which, basically has a different color (brown, for example).

[0034] Preferably, but not necessarily, the second patterned design 9 has an equal profile to the profile of the first patterned design 5, albeit preferably smaller dimensions, as mentioned above, so as to determine a regular aesthetical effect, albeit with different colorings, at patterned designs 5, 9 printed on the upper face P_s of each flexible laminar surface P.

[0035] It is understood that in other embodiments of the machine for decorating flexible laminar surfaces of the invention not depicted below, the second patterned design may have a different profile from a profile of the first patterned design.

[0036] With reference to the above-mentioned predetermined distance D, it coincides with the circumference of the upper engraved coating cylinders 4, 8, which preferably is equal for both upper engraved upper coating cylinders 4, 8.

[0037] Even more specifically, but not limitedly, such a predetermined distance D coincides with the interaxis between the first coating cylinder 4 and the second coating cylinder 8 and has a value in the range of 530-555 mm.

[0038] More preferably, the value of the predetermined distance D between the transverse axes X_1 and X_2 is equal to 543.5 mm, according to what is indicated in figure 3.

[0039] As for the first motor means 6, they are separate from the second motor means 10 and, as best shown in figure 4, comprise a first electric motor 12 cooperating with the first coating cylinder 4, as in turn the second motor means 10 comprise a second electric motor 13

cooperating with the second coating cylinder 8. Advantageously, the first motor means 6 are actuated in a synchronized manner with the second motor means 10 by virtue of the provision of linear transduction means (not depicted in the accompanying drawings) firstly to make the rotation of the second coating cylinder 8 compatible, that is to say synchronized, with the rotation of the first coating cylinder 4, conveniently avoiding over-tensioning, curling, rippling and/or wrinkling of the flexible laminar surfaces P while they advance on the conveyor belt 11 along the preset direction F, where they are (in a critical manner, and therefore to be managed) doubly placed under tension in two distinct and separate points, by the first coating cylinder 4 and by the second coating cylinder 8.

[0040] Moreover, the last aim of the provision of linear transduction means is to make the progressive deposition of the second liquid product L_2 - and the subsequent progressive print of the second patterned design 9 by the second cylinder 8 - on the upper face P_s of the flexible laminar surfaces P compatible, according to what is set, with the already occurred deposition of the first liquid product L_1 - and with the already occurred subsequent progressive print of the first patterned design 5 on the upper face P_s of the flexible laminar surfaces P.

[0041] In a preferred but non-binding manner, the linear transduction means comprise an encoder arranged at the second upper coating cylinder 8 and electrically connected to a central processing and control unit installed in a control panel 14, shown in all the accompanying drawings, coupled to the bearing frame 2 and accessible to an operator.

[0042] In a preferred but non-limiting manner, the first motor means 6 and the second motor means 10 are contained in a first box-shaped protection body 15 laterally coupled to the bearing frame 2 by fastening means (not numbered for simplicity), in themselves of the known type, and provided with a rotating door 36 useful for allowing its access, in safety conditions, limited to the personnel involved, as also shown in figure 2.

[0043] According to the preferred embodiment herein described of the invention, as shown in detail in figures 4 and 6, the first coating unit 3 also comprises a first contrast cylinder 16, firmly fixed to the bearing frame 2 and operatively connected to third motor means (indicated as a whole by 17 and shown in figure 5) adapted to rotate it about a third transverse axis X_3 , which is as parallel to the first transverse axis X_1 as to the second transverse axis X_2 , and defined by the first contrast cylinder 16 which inferiorly faces the first coating cylinder 4 from which it is spaced apart so as to define, between the first coating cylinder 4 and the first contrast cylinder 16, an initial passage gap 18 (only shown in figure 6) adapted to receive, sliding one by one, the flexible laminar surfaces P supported in an extended manner by the conveyor belt 11.

[0044] The second coating unit 7 in turn preferably comprises a second contrast cylinder 19 firmly fixed to

the bearing frame 2, defining a fourth transverse axis X_4 parallel to the third transverse axis X_3 and operatively connected in an idle (i.e., not motorized) manner, by transmission means (indicated as a whole by 20 and shown in figure 6), to the first contrast cylinder 16 from which it is separated by the predetermined distance D (or inter-axis), inferiorly facing the second coating cylinder 8 from which it is spaced apart so as to define, between the second coating cylinder 8 and the second contrast cylinder 19, a final passage gap 21 (it also only shown in figure 6) adapted to receive, sliding one by one, only the flexible laminar surfaces P supported in an extended manner by the conveyor belt 11.

[0045] In light of the above disclosure, it emerges that the conveyor belt 11 is interposed between the upper coating cylinders 4, 8 and the lower contrast cylinders 16, 19, as seen arranged below said coating cylinders 4, 8.

[0046] In a preferential but non-essential manner, the initial passage gap 18 and the final passage gap 21 have equal heights according to the thickness of the flexible laminar surface P which transit therein under the movement action applied by the conveyor belt 11.

[0047] Additionally, figure 5 shows that the third motor means 17 preferably comprise a third electric motor 22 cooperating with the first contrast cylinder 16.

[0048] Moreover, the third motor means 17 are contained in a second box-shaped protection body 23, opposite to said first box-shaped protection body 15 along the transverse axes X_1 , X_2 , laterally coupled to the bearing frame 2 and provided with a rotating door 37 useful for its access, in safety conditions, limited to the personnel involved.

[0049] Preferably, but not exclusively, the machine 1 of the invention also comprises adjustment means (indicated as a whole by 24) which are useful for adjusting the height of the initial passage gap 18 and the final passage gap 21, they also being coupled to said bearing frame 2.

[0050] In essence, the adjustment means 24 serve the function of varying the distance of the lower contrast cylinders 16, 19 from the respective upper coating cylinders 4, 8 according to the thickness of the flexible laminar surfaces P to be decorated by the patterned designs 5, 9 and the respective liquids products L_1 and L_2 .

[0051] More in detail, the adjustment means 24 include, in a preferred but non-limiting manner, two pairs of pneumatic actuators 25, 26 operatively connected to respective auxiliary motorization means (indicated by 27 and 28 as a whole): the pneumatic actuators 25, 26 of the adjustment means 24 are coupled to the bearing frame 2 on opposing sides along the transverse axes X_1 , X_2 and symmetrically arranged with respect to the longitudinal extension axis Y, orthogonal to the transverse axes X_1 , X_2 , of the bearing frame 2.

[0052] Figures 3-5 highlight that also the rear-most linear actuators 25, 26 of the adjustment means 24 and the respective auxiliary motorization means 27 and 28 are

arranged outside the respective box-shaped protection body 15 and 23, but, in any case, are delimited by a safety casing 29, 30 which allows preventing uncontrolled access (and therefore, dangerous for physical safety) by unauthorized persons.

[0053] For their part, the front-most linear actuators 25, 26 instead are contained into the first box-shaped protection body 15 and second box-shaped protection body 23.

[0054] As for the first liquid product L_1 and the second liquid product L_2 , figures 1-3 show that they are contained in a respective shaped cup 31, 32 facing the related outer wall 4a, 8a of the first engraved coating cylinder 4 and the second engraved coating cylinder 8, respectively, and it extends transversely to the preset direction F of advancement of the flexible laminar surfaces P on the conveyor belt 11 and over the entire length of such engraved coating cylinders 4, 8.

[0055] In a convenient, albeit non-limiting manner for the purposes of the primary inventive concept expressed by the present invention, the claimed machine 1 comprises a pair of transverse distribution blades 33, 34, each of which commonly referred to as a "blade" in tanning field jargon, coupled to the bearing frame 2 and operatively connected to the respective upper coating cylinder 4, 8.

[0056] The transverse distribution blade 33 serves the function of evenly distributing the first liquid product L_1 in the first patterned design 5 engraved on the outer wall 4a of the first coating cylinder 4, while the transverse distribution blade (not shown but in any case equal to the transverse blade 33 and generally indicated in figure 1 by reference numeral 34, with the purpose of generally indicating the position thereof) serves the function of evenly distributing the second liquid product L_2 in the second patterned design 9 engraved on the outer wall 8a of the second coating cylinder 8.

[0057] Therefore, the transverse distribution blades 33, 34 remove, by scraping, the amount of the first liquid product L_1 and the second liquid product L_2 which is to be considered in excess and which remains outside the patterned designs 5, 9 engraved in the respective upper coating cylinders 4, 8 and to be imprinted (or printed) on the upper face P_s of the flexible laminar surfaces P.

[0058] It is understood that in further embodiments of the invention, not accompanied below by explanatory reference drawings, the machine for decorating flexible laminar surfaces intended to cover objects, items or products herein claimed may also comprise a single transverse distribution blade facing the outer wall of one only of the upper engraved coating cylinders.

[0059] Advantageously, the machine 1 for decorating flexible laminar surfaces P of the invention comprises detachment means (indicated by 35 as a whole) comprising a so-called "blade-remover" of the conventional type, coupled to the bearing frame 2 and operatively connected to both coating cylinders 4, 8, adapted to prevent the flexible laminar surfaces P from unusually and acci-

mentally adhering to the engraved coating cylinders 4, 8, inevitably soaked with liquid product L_1 and L_2 , while they advance along the preset direction F.

[0060] Also in this case, other embodiments of the machine for decorating flexible laminar surfaces (not disclosed in the accompanying drawings) may include detachment means operatively connected only to one of the engraved coating cylinders. Based on the description provided above, it is thus, understood, that the machine for decorating flexible laminar surfaces for covering objects, items or products of the present invention achieves the purposes and reaches the advantages indicated above.

[0061] During the operation, changes could be made to the machine for decorating flexible laminar surfaces for covering objects, items or products of the invention, for example consisting of a second coating unit which comprises further second coating cylinders capable of applying, by pressure, on the upper face of the flexible laminar surfaces, further second patterned designs, different in color from the others applied by the first coating cylinder and by the primary one of the second coating cylinders.

[0062] Moreover, it is worth noting that the first patterned design and second patterned design engraved in the outer wall of the first coating cylinder and in the outer wall of the second sealing cylinder, respectively, and therefore printed in a convenient mutual combination on the upper face of the flexible laminar surfaces, may take any shape, composition or surface extension and thus differ from the patterned designs illustrated, by mere way of indicative example, in the accompanying drawings, which does not affect the resulting advantage of the present invention. Finally, it is apparent that several other variations may be made to the machine for decorating flexible laminar surfaces in hand, within the limited scope of the appended claims, as it is apparent that any materials, shapes and sizes of the details shown may be used as needed in the practical implementation of the invention, and may be replaced by other technically equivalent elements.

[0063] Where the constructional features and techniques mentioned in the following claims are followed by reference signs or numerals, such reference signs were introduced for the sole purpose of increasing the intelligibility of the claims themselves, and therefore such reference signs have no limiting effect on the interpretation of each element identified by way of example only by such reference signs.

Claims

1. A machine (1) for decorating flexible laminar surfaces (P) used to cover objects comprising:

- a bearing frame (2) adapted to rest on a reference surface (S);

- a first coating unit (3) comprising a first coating cylinder (4), coupled to said bearing frame (2), provided with an outer wall (4a) engraved with a first patterned design (5) and operatively connected to first motor means (6) adapted to rotate said first coating cylinder (4) about a first transverse axis (X_1) to deposit by pressure, while said first coating cylinder (4) rotates about said first transverse axis (X_1), a first liquid product (L_1) on an upper face (P_s) of flexible laminar surfaces (P) advancing along a preset direction (F) so that said first patterned design (5) made of said first liquid product (L_1) is imprinted on said upper face (P_s) of said flexible laminar surfaces (P),

characterized in that it comprises a second coating unit (7) which comprises at least a second coating cylinder (8) coupled to said bearing frame (2), operatively placed downstream of said first coating cylinder (4) from which it is separated by a predetermined distance (D), measured along said preset direction (F), provided with an outer wall (8a) engraved with a second patterned design (9) and operatively connected to second motor means (10) adapted to rotate said second coating cylinder (8) about a second transverse axis (X_2), parallel to said first axis (X_1), to deposit by pressure and after said first coating cylinder (4), while said second coating cylinder (8) rotates about said second transverse axis (X_2), a second liquid product (L_2), different in color from said first liquid product (L_1), on said upper face (P_s) of said flexible laminar surfaces (P) advancing along said preset direction (F) on a conveyor belt (11) below said coating cylinders (4, 8), so that said second patterned design (9) made of said second liquid product (L_2) is imprinted on said upper face (P_s) of said flexible laminar surfaces (P) in a given combination with said first patterned design (5) already imprinted on said upper face (P_s).

2. A machine (1) according to claim 1), **characterized in that** said second patterned design (9) is inserted or contained within said first patterned design (5) with respect to which it has a smaller surface extension.
3. Machine (1) according to claim 1) or 2), **characterized in that** said second patterned design (9) presents a profile equal to a profile of said first patterned design (5).
4. Machine according to claim 1) or 2), **characterized in that** said second patterned design has a different profile from a profile of said first patterned design.
5. Machine (1) according to any of the preceding claims, **characterized in that** said predetermined distance (D) coincides with the circumference of said engraved coating cylinders (4, 8) that is equal for

both said engraved coating cylinders (4, 8).

6. Machine (1) according to any of the preceding claims, **characterized in that** said predetermined distance (D) coincides with the interaxis between said first coating cylinder (4) and said second coating cylinder (8) and has a value in the range of 530-555 mm. 5
7. Machine (1) according to any of the preceding claims, **characterized in that** said first motor means (6) are operated in a synchronized manner with said second motor means (10) through linear transduction means to make the rotation of said second coating cylinder (8) synchronized with the rotation of said first coating cylinder (4), avoiding over-tensioning and/or wrinkling of said flexible laminar surfaces (P) advancing on said conveyor belt (11) along said preset direction (F), and to make the progressive deposition of said second liquid product (L_2) compatible according to what has been set with the yet occurred deposition of said first liquid product (L_1) on said upper face (P_s) of said flexible laminar surfaces (P). 10
8. Machine (1) according to claim 7), **characterized in that** said linear transduction means comprise an encoder arranged at said second coating cylinder (8) and electrically connected to a central processing and control unit installed in a control panel (14) coupled to said bearing frame (2) and accessible to an operator. 15
9. Machine (1) according to any of the preceding claims, **characterized in that** said first motor means (6) and said second motor means (10) are contained in a first box-shaped protection body (15) laterally coupled to said bearing frame (2) and provided with a rotating door (36) for its access, in safety conditions, limited to the personnel involved. 20
10. Machine (1) according to any of the preceding claims, **characterized in that** said first coating unit (3) comprises a first contrast cylinder (16), firmly fixed to said bearing frame (2) and operatively connected to third motor means (17) adapted to rotate it about a third transverse axis (X_3), parallel to said first and second transverse axes (X_1 , X_2), defined by said first contrast cylinder (16) which inferiorly faces said first coating cylinder (4) from which it is spaced apart so as to define, between said first coating cylinder (4) and said first contrast cylinder (16), an initial passage gap (18) adapted to receive, sliding one by one, said flexible laminar surfaces (P). 25
11. Machine (1) according to any of the preceding claims, **characterized in that** said second coating unit (7) comprises a second contrast cylinder (19) firmly fixed to said bearing frame (2), defining a fourth transverse axis (X_4) parallel to said third transverse axis (X_3) and operatively connected, in an idle manner, by transmission means (20), to said first contrast cylinder (16) from which it is separated by said predetermined distance (D), inferiorly facing said second coating cylinder (8) from which it is spaced apart so as to define, between said second coating cylinder (8) and said second contrast cylinder (19), a final passage gap (21) adapted to receive, sliding one by one, said flexible laminar surfaces (P) supported by said conveyor belt (11). 30
12. Machine (1) according to claim 11), **characterized in that** said conveyor belt (11) is placed between said coating cylinders (4, 8) and said contrast cylinders (16, 19) placed below said coating cylinders (4, 8). 35
13. Machine according to claim 11) or 12), **characterized in that** said initial passage gap (17) and said final passage gap (21) have equal heights. 40
14. Machine (1) according to any of the claims 10) to 13) when dependent on claim 9), **characterized in that** said third motor means (17) are contained in a second box-shaped protection body (23), opposite to said first box-shaped body (15) along said transverse axes (X_1 , X_2), laterally coupled to said bearing frame (2) and provided with a rotating door (37) for its access, in safety conditions, limited to the personnel involved. 45
15. Machine (1) according to any of the claims 10) to 14), **characterized in that** it comprises adjustment means (24) of the height of said initial passage gap (18) and said final passage gap (21), coupled to said bearing frame (2), adapted to vary the distance of said contrast cylinders (16, 19) from said coating cylinders (4, 8) depending on the thickness of said flexible laminar surfaces (P) to be decorated. 50
16. Machine (1) according to claim 15), **characterized in that** said adjustment means (24) include a pair of pneumatic actuators (25, 26) operatively connected to auxiliary motorization means (27, 28) and coupled to said bearing frame (2) by opposing parts along said transverse axes (X_1 , X_2) and symmetrically arranged with respect to the longitudinal extension axis (Y) of said bearing frame (2). 55
17. Machine (1) according to any of the preceding claims, **characterized in that** said first liquid product (L_1) and said second liquid product (L_2) are contained in a respective shaped cup (31, 32) facing said outer wall (4a, 8a) of said first engraved coating cylinder (4) and of said second engraved coating cylinder (8), and extends transversely to said preset direction (F) of advancement of said flexible laminar surfaces (P)

on said conveyor belt (11) and over the entire length of said engraved coating cylinders (4, 8).

18. Machine (1) according to any of the preceding claims, **characterized in that** it includes at least one transverse distribution blade (33, 34), coupled to said bearing frame (2), operatively connected to at least one of said coating cylinders (4, 8) and adapted to evenly distribute said first liquid product (L₁) in said first patterned design (5) engraved on said outer wall (4a) of said first coating cylinder (4) and/or said second liquid product (L₂) in said second patterned design (9) engraved on said outer wall (8a) of said second coating cylinder (8) so as to remove by scraping the amount of said first liquid product (L₁) and/or said second liquid product (L₂) remaining outside said patterned designs (5, 9) engraved on said coating cylinders (4, 8).
19. Machine (1) according to any of the preceding claims, **characterized in that** it comprises detachment means (35), coupled to said bearing frame (2) and operatively connected to at least one of said coating cylinders (4, 8), adapted to prevent said flexible laminar surfaces (P) from unusually and accidentally adhering to at least one of said coating cylinders (4, 8) while advancing along said preset direction (F).

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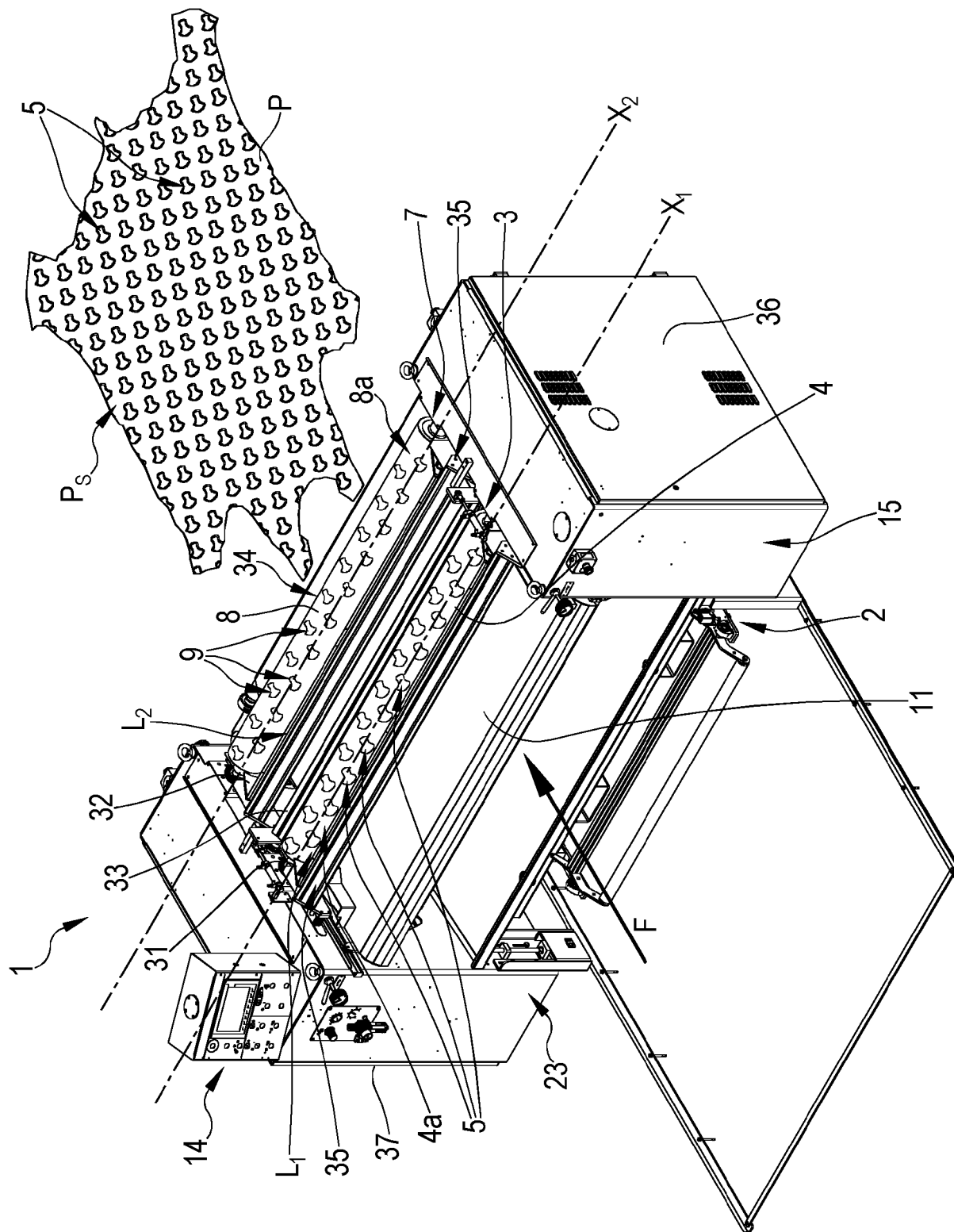


FIG. 1

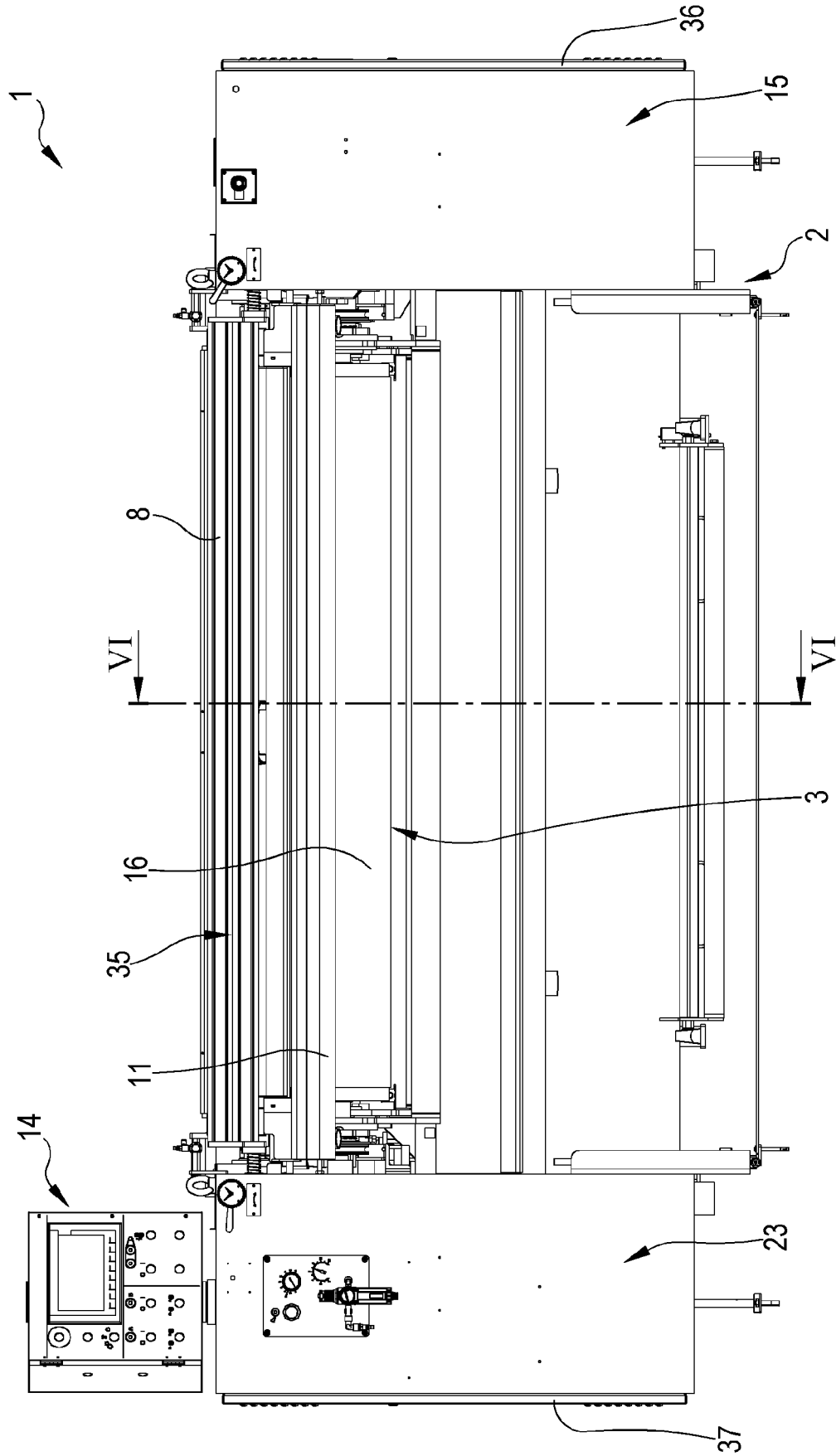


FIG.2

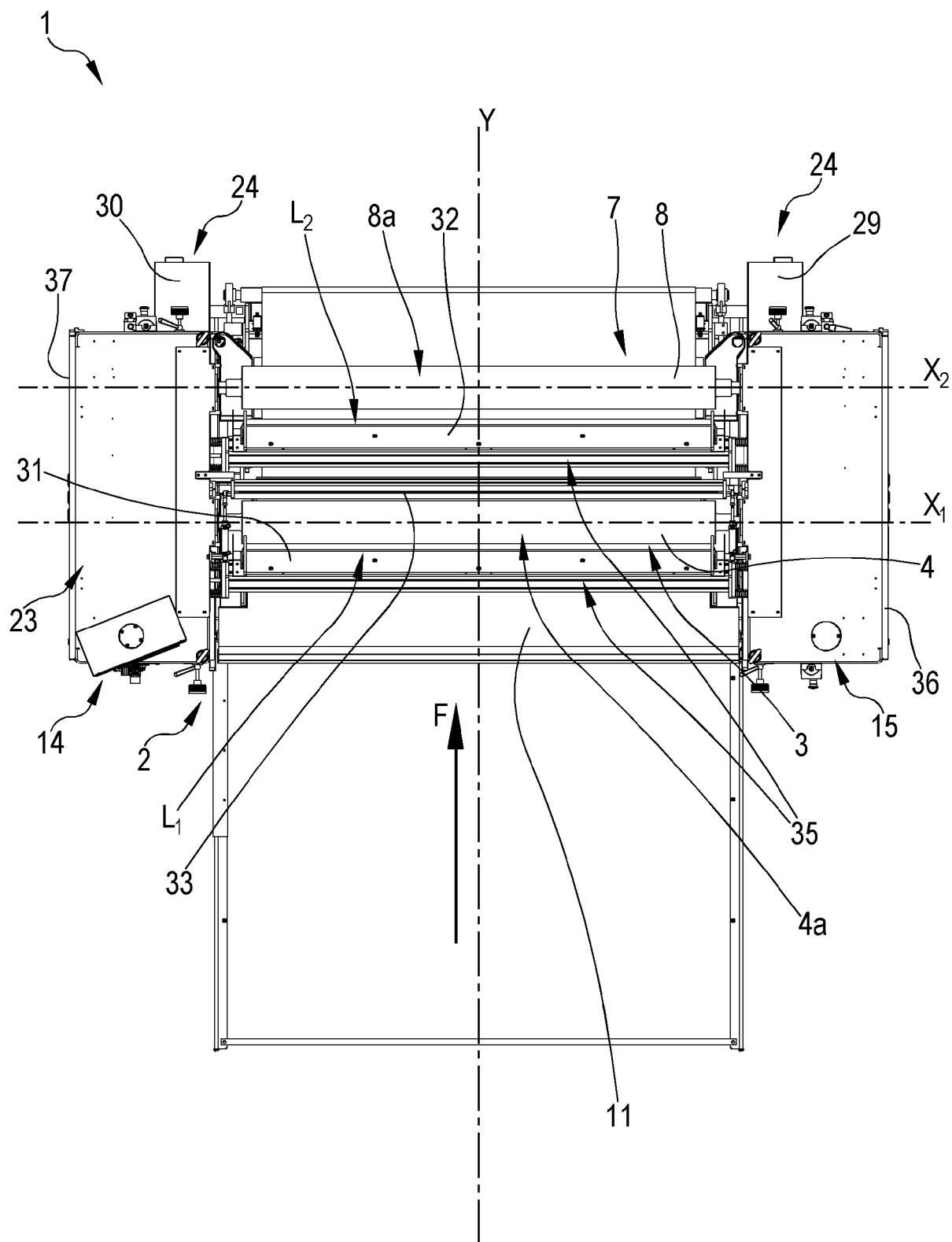


FIG.3

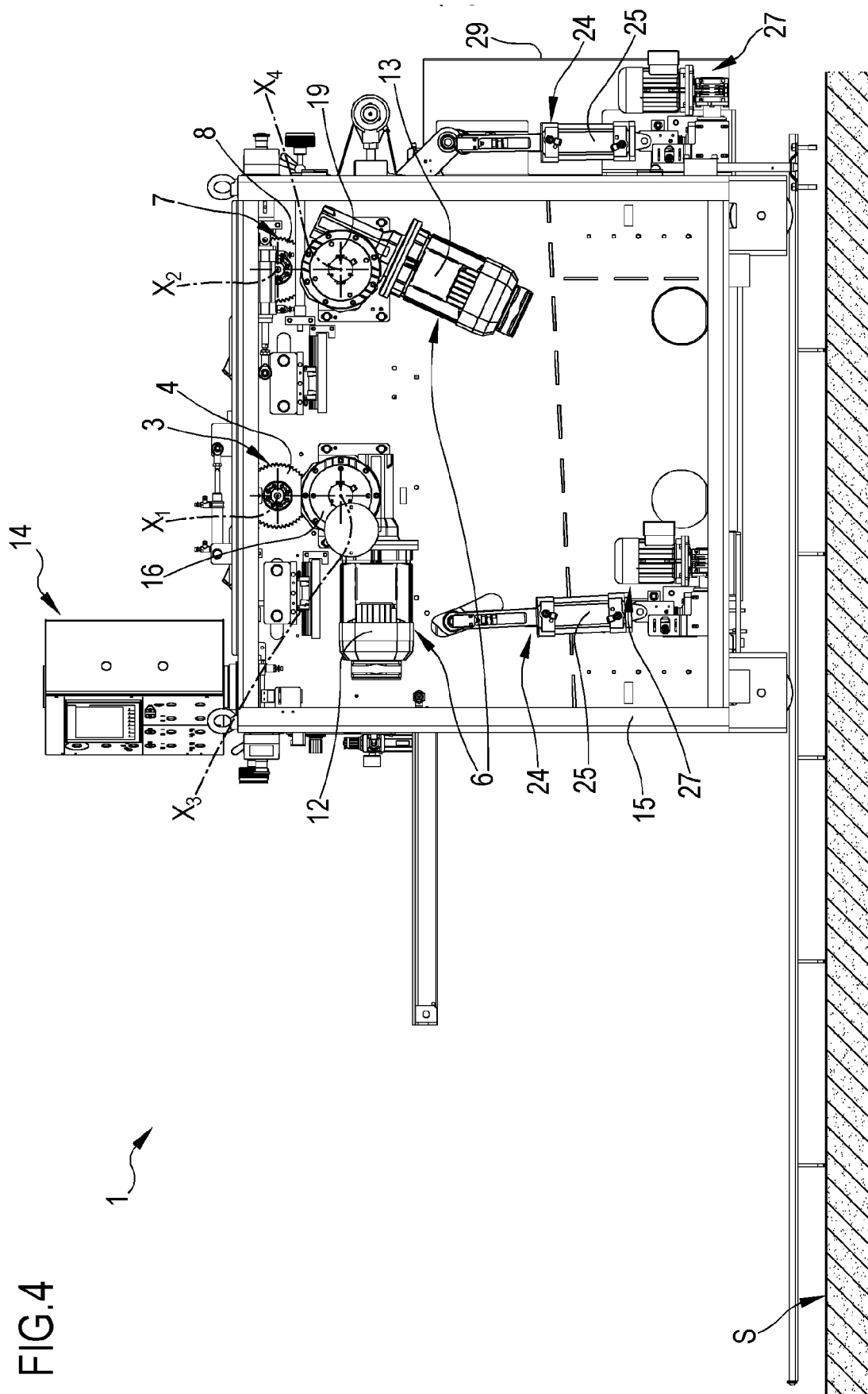
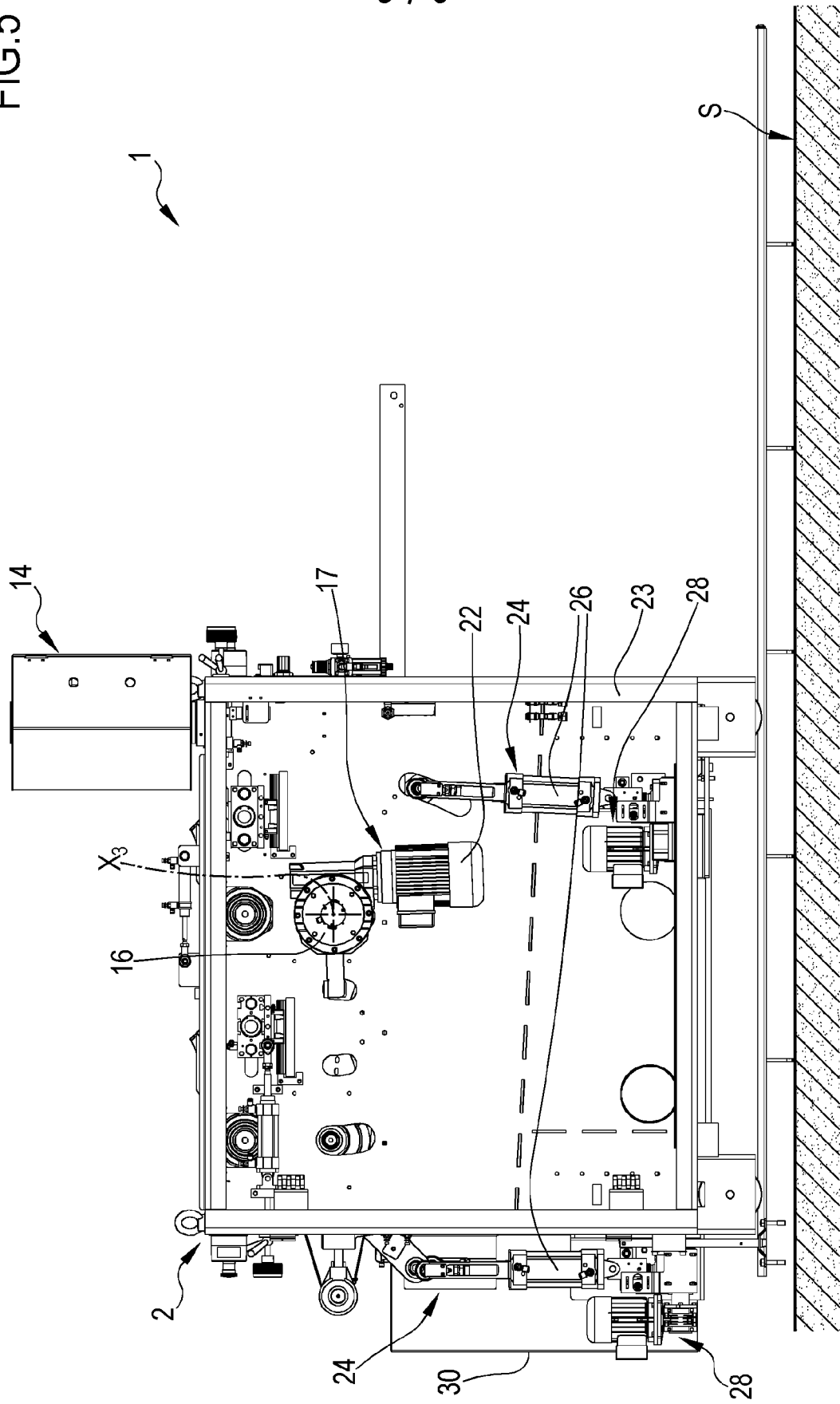


FIG. 4

FIG.5



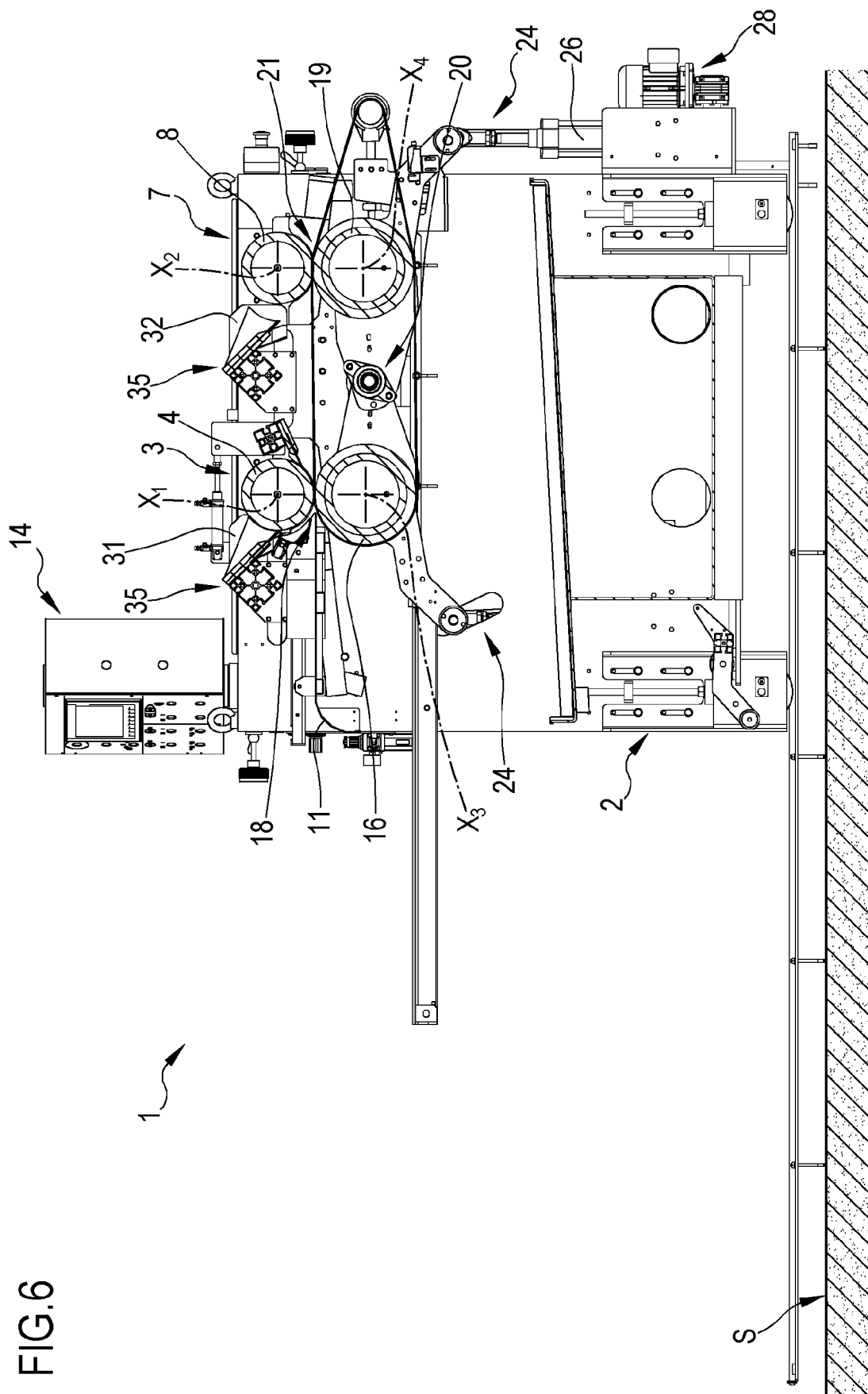


FIG. 6



EUROPEAN SEARCH REPORT

Application Number

EP 22 17 0507

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The present search report has been drawn up for all claims			
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The Hague		17 October 2022	Roldán Abalos, Jaime
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