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(54) **SANDING MACHINE FOR SANDING/FINISHING PANELS MADE OF WOOD, METAL, PLASTIC OR THE LIKE**

(57) A sanding machine for sanding/finishing panels (2) made of wood, metal, plastic or the like is provided with a feeding device (4) to feed at least one panel (2) in a first direction (5), with an abrasive belt (11) to sand a face (16) of the panel (2), and with a plurality of thrust elements (26) distributed inside the abrasive belt (11) in

a second direction (9) transverse to the first direction (5); the abrasive belt (11) extending and being movable in a third direction (17), which is inclined at angles other than 0° relative to the first direction (5) and to the second direction (9).

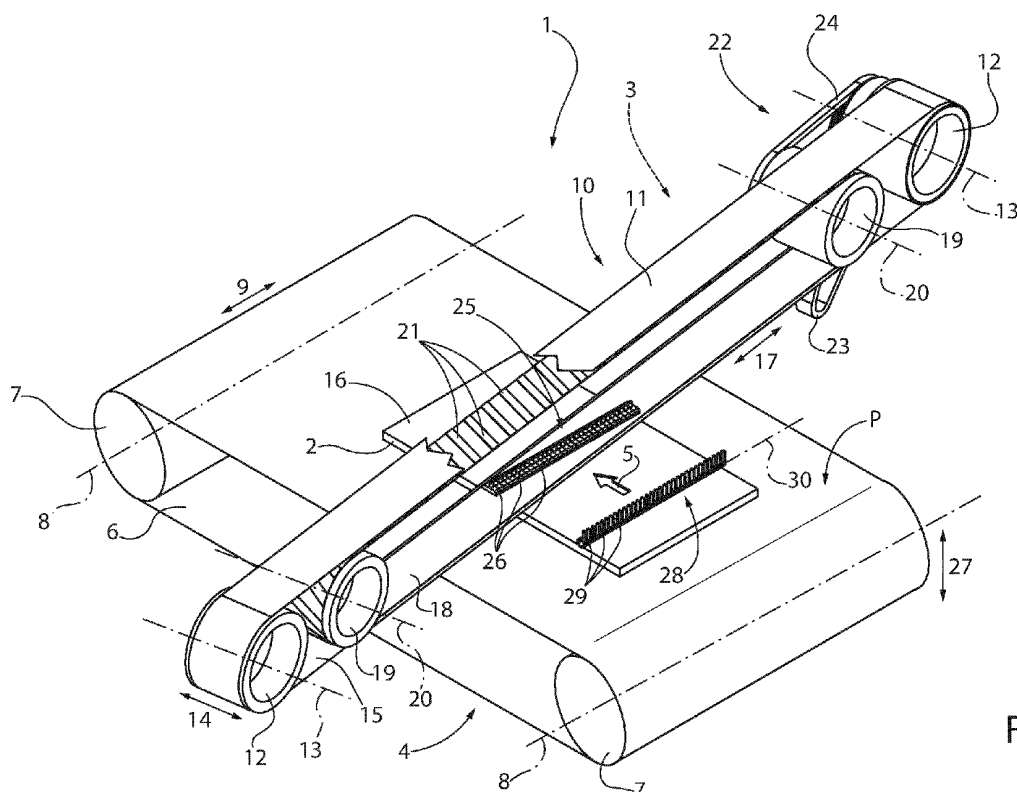


FIG.1

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This Patent Application claims priority from Italian Patent Application No. 102021000001613 filed on January 27, 2021.

TECHNICAL FIELD

[0002] The invention relates to a sanding machine for sanding/finishing panels made of wood, metal, plastic or the like.

BACKGROUND ART

[0003] When dealing with the sanding/finishing of panels made of wood, metal, plastic or the like, a sanding machine is known, which comprises a conveyor belt, which has an upper transport branch defining a substantially horizontal support surface for at least one panel and is designed to feed the panel in a first direction; and a sanding device, which is mounted above the support surface in order to sand an upper face of the panel.

[0004] The sanding device comprises an abrasive belt, which is wound in a ring shape around a plurality of idler rollers and extends in a second direction, which is transverse to the first direction.

[0005] The sanding device further comprises a plurality of thrust elements, which are distributed inside the abrasive belt in a third direction, which is inclined at angles other than 0° relative to the first direction and to the second direction, and have an active portion with a substantially rectangular shape acting upon the abrasive belt.

[0006] The thrust elements are movable independently of one another in a fourth direction, which is orthogonal to the support surface, between respective lowered operating positions, in which the corresponding portions of abrasive belt are moved so as to come into contact with the upper face of the panel, and respective raised rest position, in which the corresponding portions of abrasive belt disengage the upper portion of the panel.

[0007] Generally speaking, the sanding machine further comprises an intermediate belt interposed between the thrust element and the abrasive belt.

[0008] The intermediate belt is mounted inside the abrasive belt and is provided with a plurality of teeth, which project from the intermediate belt, are in contact with the abrasive belt in order to reduce the surface of the abrasive belt in contact with the panel and define, together with the abrasive belt, a plurality of cooling channels, which are flown through by air suited to ensure the cooling of the abrasive belt.

[0009] The sanding machine is further provided with a detection device to detect at least one geometrical feature of the panel.

[0010] The detection device normally comprises a plurality of contact rollers, which are distributed above the

support surface in the second direction and are mounted so as to rotate around respective rotation axes, which are parallel to the second direction.

[0011] Following the movement of the panel in the first direction, the contact rollers arranged inside the moving path of the panel are lifted from the panel so as to allow the detection device to detect the width of the panel in the second direction and/or the presence of possible openings made in panels used as, for example, frames for doors and/or windows.

[0012] Since the thrust elements are distributed in the third direction, the active portion of each thrust element has a width, measured parallel to the third direction, which is smaller than a width, measured parallel to the second direction, of the portion of abrasive belt and, hence, of panel engaged by the active portion.

[0013] As a consequence, known sanding machines for sanding/finishing of panels made of wood, metal, plastic or the like of the type described above suffer from a relatively small processing precision, in particular in the area of the longitudinal edges of the upper face of the panel parallel to the first direction.

[0014] Furthermore, since:

the contact rollers are distributed above the support surface in the second direction and the thrust elements are distributed inside the abrasive belt in the third direction, namely in directions that are inclined at an angle other than 0° relative to one another; the distances between the contact rollers and the relative thrust elements, measured parallel to the first direction, are different from one another; and each thrust element must be moved to its lowered operating position when the centre of gravity of the relative active portion is substantially coplanar to a front face of the panel; the time intervals between the detection of the contact rollers and the movements of the corresponding thrust elements to the relative lowered operating positions are all different from one another.

[0015] As a consequence, known sanding machines for sanding/finishing of panels made of wood, metal, plastic or the like of the type described above must be provided with an electronic control unit, which is configured to calculate the aforesaid time intervals and, therefore, is relatively complicated and expensive.

DISCLOSURE OF INVENTION

[0016] The object of the invention is to provide a sanding machine for sanding/finishing panels made of wood, metal, plastic or the like, which does not suffer from the drawbacks described above and is simple and economic to be actuated.

[0017] According to the invention, there is provided a sanding machine for sanding/finishing panels made of wood, metal, plastic or the like according to the appended

claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The invention will now be described with reference to the accompanying drawings showing a non-limiting embodiment thereof, wherein:

figure 1 is a schematic perspective view, with parts removed for greater clarity, of a preferred embodiment of the sanding machine according to the invention;

figure 2 is a schematic perspective view, with parts removed for greater clarity, of a first variant of the sanding machine of figure 1; and

figure 3 is a schematic perspective view, with parts removed for greater clarity, of a second variant of the sanding machine of figure 1.

BEST MODE FOR CARRYING OUT THE INVENTION

[0019] With reference to figure 1, number 1 indicates, as a whole, a sanding machine for sanding/finishing panels 2 made of wood, metal, plastic or the like with a substantially parallelepiped-like shape.

[0020] According to a variant which is not shown herein, the panel 2 has at least one opening and is used, for example, as frame for doors and/or windows.

[0021] The sanding machine 1 comprises a support frame 3 and a feeding device 4, which is mounted on the support frame 3 so as to move the panels 2 one after the other in a horizontal direction 5.

[0022] The device 4 comprises a conveyor belt 6, which has an upper transport branch defining a horizontal support surface P for the panel 2 and is wound in a ring shape around a pair of motor-driven pulleys 7 so as to rotate, relative to the frame 3, around respective longitudinal axes 8, which are parallel to one another and to a horizontal direction 9, which is transverse to the direction 5.

[0023] According to a variant which is not shown herein, the conveyor belt 6 is eliminated and replaced by a plurality of motor-driven feeding rollers, which are mounted so as to rotate around respective rotation axes, which are parallel to the axis 9.

[0024] The sanding machine 1 further comprises at least one sanding unit 10 comprising, in turn, an abrasive belt 11, which is wound in a ring shape around a plurality of idler rollers 12 (in this case, two rollers 12), which are mounted so as to rotate around respective longitudinal axes 13 parallel to a direction 14, which is oriented according to respective angles other than 0° relative to the direction 5 and to the direction 9.

[0025] The belt 11 has a lower sanding branch 15, which is moved so as to come into contact with an upper face 16 of the panel 2 in ways that will be better described below and extends as well as is movable in a direction 17, which is transverse to the direction 14 and is oriented

according to respective angles other than 0° relative to the direction 5 and to the direction 9.

[0026] The unit 10 further comprises an intermediate belt 18, which is mounted inside the belt 11, extends as well as is movable in the direction 17 and is wound in a ring shape around a plurality of idler rollers 19 (in this case, two rollers 19), which are mounted so as to rotate around respective longitudinal axes 20, which are parallel to the axes 13 and to the direction 14.

[0027] The belt 18 has a plurality of teeth 21 parallel to one another, which project from an outer surface of the belt 18 and face the belt 11.

[0028] The belts 11 and 18 are operated by an operating device 22 comprising, in this case, an electric motor (which is not shown herein), a first belt transmission 23 to connect an output rod of the electric motor (which is not shown herein) and one of the rollers 12 to one another and a second belt transmission 24 to connect the motor-driven roller 12 and one of the rollers 19 to one another.

[0029] The lower branch 15 of the belt 11 is selectively moved so as to come into contact with the face 16 of the panel 2 by a thrust device 25, which is mounted inside the belt 18.

[0030] The device 25 comprises, in particular, a plurality of thrust elements 26, which are distributed inside the belt 18 in the direction 9, are mounted above the branch 15 and are movable independently of one another in a vertical direction 27, which is orthogonal to the directions 5 and 9 and perpendicular to the surface P.

[0031] Each element 26 has an active portion (which is not shown herein) with a substantially rectangular shape and is movable in the direction 27 between a lowered operating position, in which the active portion of the element 26 moves the belt 18 so that it comes into contact with the belt 11 and the belt 11 so that it comes into contact with the face 16, and a raised rest position, in which the belt 11 disengages the face 16.

[0032] Following the movement of the elements 26 to their lowered operating position, the teeth 21 of the belt 18 are moved so as to come into contact with the belt 11 in order to reduce the surface of the belt 11 in contact with the face 16 and define, together with the belt 11, a plurality of cooling channels (not shown herein), which are flown through by air suited to ensure the cooling of the belt 11.

[0033] With regard to the information disclosed above, it should be pointed out that the width of the belt 11, measured parallel to the direction 14, is at least equal to twice the width of the active portion (not shown herein) of an element 26 measured parallel to the direction 5.

[0034] The sanding machine 1 is further provided with a detection device 28, which is mounted above and on the input side of the surface P in order to detect at least one geometrical feature of the panel 2.

[0035] In this case, the device 28 is a mechanical detection device, which is arranged upstream of the device 25 in the direction 5 and comprises a plurality of contact rollers 29, which are as many as the elements 26.

[0036] The rollers 29 are distributed above the surface P in the direction 9 and are mounted so as to rotate around respective rotation axes 30, which are parallel to the direction 9.

[0037] Following the movement of the panel 2 in the direction 5, the contact rollers 29 arranged inside the moving path of the panel 2 are lifted from the panel 2 so as to allow the detection device 28 to detect the width of the panel 2 in the direction 9 and/or the presence of openings (not shown herein) made in the panels 2 used as, for example, frames for doors and/or windows.

[0038] Each element 26 is aligned with a corresponding roller 29 in the direction 5 and is associated with the corresponding roller 29 so as to move between its lowered operating position and its raised rest position in response to a signal of the roller 29.

[0039] According to a variant which is not shown herein, the rollers 29 are eliminated and replaced by at least one detection device that is not in contact with the panels 2, for example an optical, inductive or capacitive device.

[0040] Since the elements 26 are distributed in the direction 9, the active portion (which is not shown herein) of each element 26 has a width, measured parallel to the direction 9, which is equal to a width, also measured parallel to the direction 9, of the portion of belt 11 and, hence, of panel 2 engaged by the active portion itself (which is not shown herein) and the sanding machine 1 has a relatively high processing precision, in particular in the area of the longitudinal edges of the face 16 parallel to the direction 5.

[0041] Furthermore, since both the elements 26 and the rollers 29 are distributed above the surface P in the direction 9, both the distances between the elements 26 and the relative rollers 29 and the time intervals between the detection of the rollers 29 and the movements of the corresponding elements 26 to their lowered operating positions are equal to one another.

[0042] As a consequence, the sanding machine 1 is provided with an electronic control unit 31, which is configured to calculate one single time interval and, therefore, is relatively simple and economic.

[0043] The variant shown in figure 2 is different from figure 1 in that, in the former, the sanding machine 1 comprises a further sanding unit 32, which is arranged between the detection device 28 and the unit 10 and is completely equivalent to the unit 10.

[0044] The sole difference between the unit 32 and the unit 10 lies in the fact that the branch 15 of the belt 11 of the unit 32 extends and is movable in a direction 33 converging towards the direction 17.

[0045] In particular, the belt 11 of the unit 10 is movable in a clockwise direction and the belt 11 of the unit 32 is movable in a counterclockwise direction. As a consequence, both the direction 17 and the direction 33 have a component that is parallel and contrary to the direction 5 and the sanding processing of the belts 11 of the two units 10 and 32 is oriented substantially crosswise to the direction 5.

[0046] The variant shown in figure 3 is different from figure 2 in that, in the former, the branch 15 of the belt 11 of the unit 32 extends and is movable in a direction 34 parallel to the direction 17.

[0047] In particular, the belt 11 of the unit 10 is movable in a clockwise direction and the belt 11 of the unit 32 is movable in a counterclockwise direction. As a consequence, the direction 17 has a component that is parallel and contrary to the direction 5, the direction 34 has a component that is parallel to and concordant with the direction 5, the sanding processing of the belt 11 of the unit 10 is oriented substantially crosswise to the direction 5, the sanding processing of the belt 11 of the unit 32 is oriented according to a relatively large angle relative to the direction 9 and, therefore, the sanding machine 1 has a relatively high finishing of the faces 16 of the panels 2.

[0048] According to a variant which is not shown herein, the conveyor belt 6 is eliminated and replaced by a plurality of motor-driven feeding rollers, which are mounted so as to rotate around respective rotation axes, which are parallel to the axis 9, and the sanding machine 1 is further provided with at least one sanding unit completely equivalent to the units 10, 32 and mounted under the surface P in order to sand/finish a lower face of the panels 2.

Claims

1. A sanding machine for sanding/finishing panels (2) made of wood, metal, plastic or the like, the sanding machine comprising a feeding device (4), which defines a support surface (P) for at least one panel (2) and is designed to feed the panel (2) in a first direction (5); at least one first sanding device (10), which is mounted above or under the support surface (P) and comprises, in turn, a first abrasive belt (11), which is wound in a ring shape around a plurality of idler rollers (12) so as to sand a face (16) of the panel (2); a plurality of first thrust elements (26), which are distributed inside the first abrasive belt (11) in a second direction (9), which is transverse to the first direction (5) and parallel to the support surface (P); and being **characterized in that** the first abrasive belt (11) has a sanding segment (15), which is in contact with the face (16) and extends as well as is movable in a third direction (17), which is parallel to the support surface (P) and is inclined at angles other than 0° relative to said first and second directions (5, 9).
2. The sanding machine according to claim 1 and further comprising a detection unit (28), which is mounted upstream of the first thrust elements (26) in the first direction (5) in order to detect at least one geometrical feature of the panel (2); the detection unit (28) comprising a plurality of detection devices (29), which are present in a number that is the same as the number of the first thrust elements (26) and are

- aligned with one another in the second direction (9) .
3. The sanding machine according to claim 2, wherein each detection device (29) is aligned with a corresponding first thrust element (26) in the first direction (5).
 4. The sanding machine according to claim 2 or 3, wherein each detection device (29) comprises a contact member, which is associated with a corresponding first thrust element (26) and is configured to be operated by the panel (2) following the feeding of the panel (2) in the first direction (5).
 5. The sanding machine according to any one of the preceding claims, wherein each first thrust element (26) is movable between an operating position, in which the first thrust element (26) moves a corresponding abrasive portion of the abrasive belt (11) so that it comes into contact with the face (16), and a rest position, in which the abrasive portion of the abrasive belt (11) disengages the face (16).
 6. The sanding machine according to any one of the preceding claims, wherein each first thrust element (26) comprises an active portion acting upon the abrasive belt (11); the abrasive belt (11) having a width, measured crosswise to the third direction (17), which is at least equal to twice a length of the active portion measured parallel to the first direction (5).
 7. The sanding machine according to any one of the preceding claims, wherein the third direction (17) has a component which is parallel to and concordant with the first direction (5) .
 8. The sanding machine according to any one of the claims from 1 to 6, wherein the third direction (17) has a component which is parallel to and contrary to the first direction (5).
 9. The sanding machine according to any one of the preceding claims and further comprising a second sanding device (32), which is mounted above or under the support surface (P) and comprises, in turn, a second abrasive belt (11), which is wound in a ring shape around a plurality of idler rollers (12) so as to sand the face (16) and has a sanding segment (15), which is in contact with the face (16) and extends as well as is movable in a fourth direction (33; 34), which is parallel to the support surface (P) and is inclined at angles other than 0° relative to said first and second directions (5, 9).
 10. The sanding machine according to claim 9, wherein the third direction (17) and the fourth direction (34) are parallel to one another.
 11. The sanding machine according to claim 9, wherein the third direction (17) and the fourth direction (33) converge towards one another.
 12. The sanding machine according to any one of the claims from 9 to 11, wherein the first abrasive belt (11) is movable in a clockwise direction and the second abrasive belt (11) is movable in a counterclockwise direction.
 13. The sanding machine according to any one of the claims from 9 to 12 and further comprising a plurality of second thrust elements (26), which are distributed inside the second abrasive belt (11) in the second direction (9).
 14. The sanding machine according to any one of the preceding claims and comprising, for each abrasive belt (11), a respective intermediate belt (18) interposed between the relative thrust elements (26) and the abrasive belt (11).
 15. The sanding machine according to claim 14, wherein the intermediate belt (18) has a plurality of teeth (21) projecting from the intermediate belt (18) and facing the abrasive belt (11).
 16. The sanding machine according to any one of the preceding claims and comprising two first sanding devices (10), which are arranged one above and the other one under the support surface (P) so as to sand an upper face and a lower face of the panels (2).

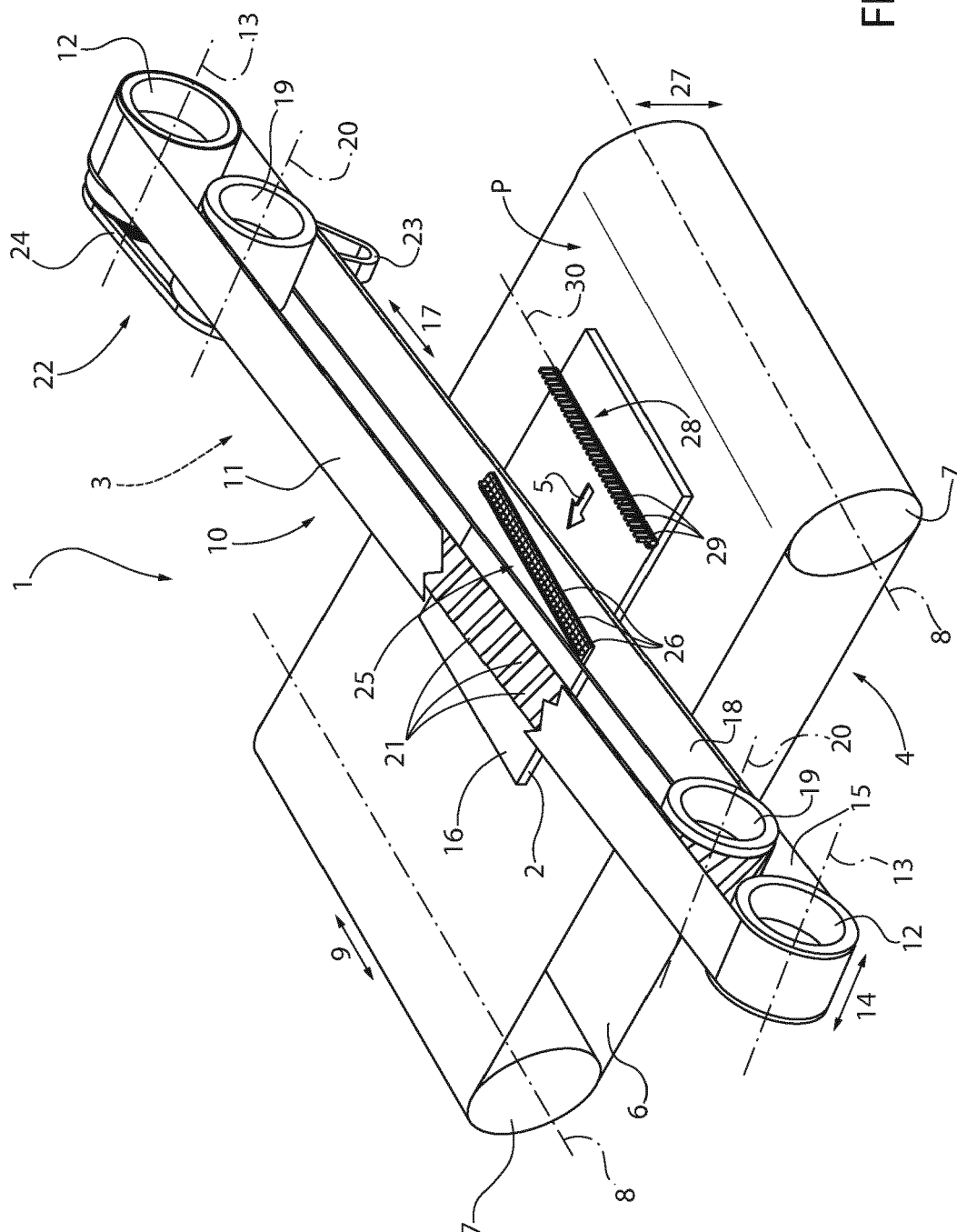


Fig. 1

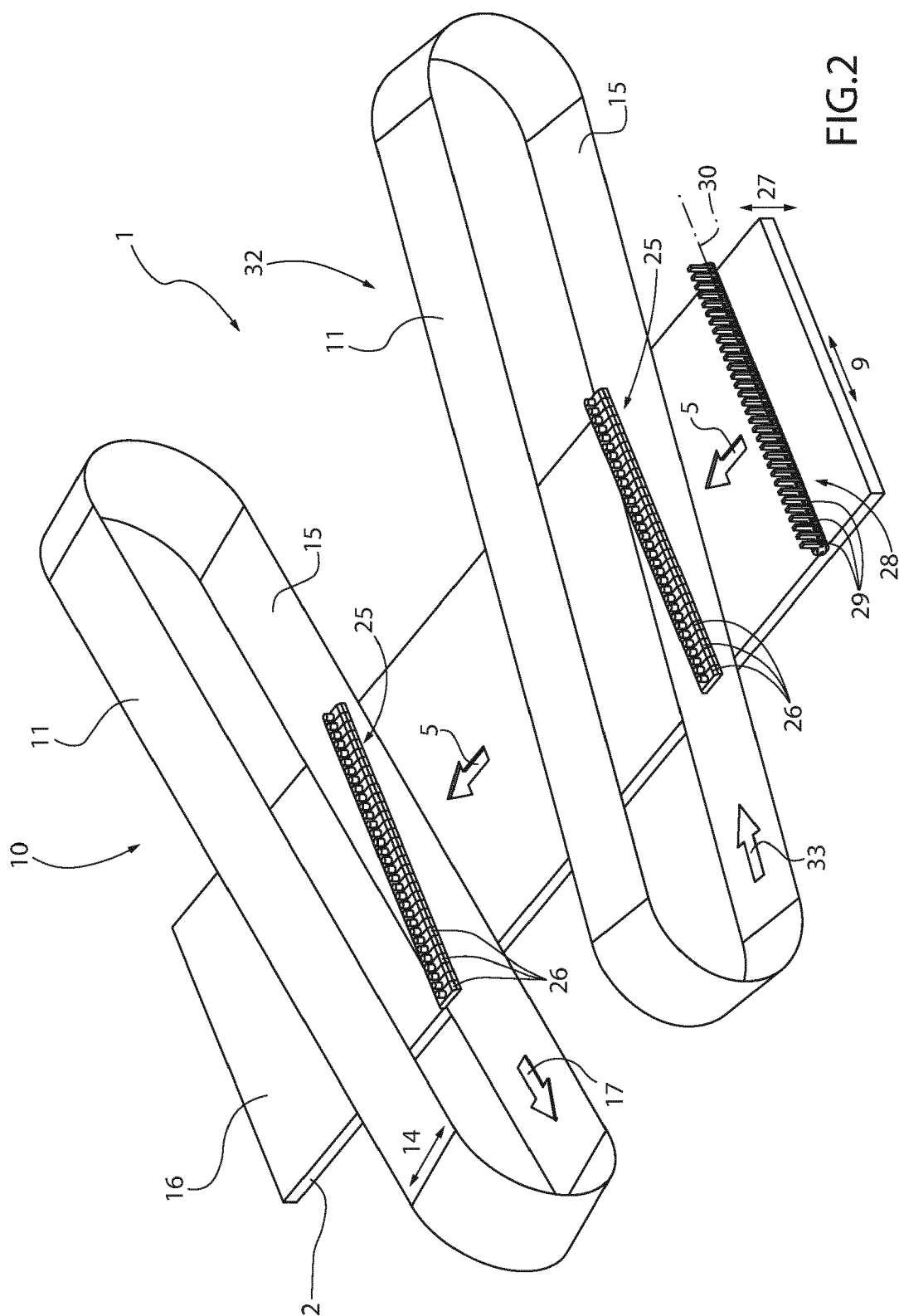


FIG. 2

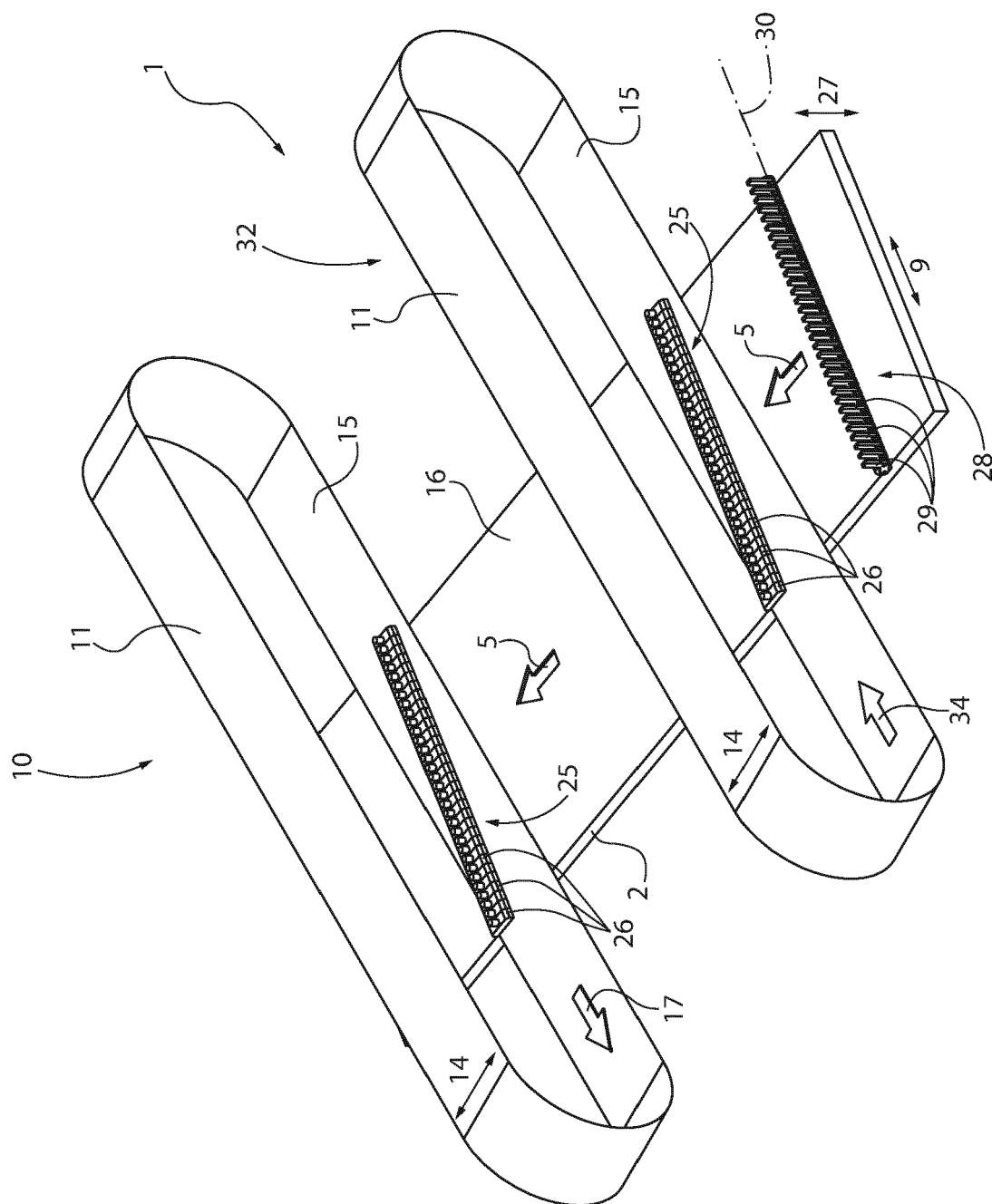


FIG. 3.



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Application Number

EP 22 15 3663

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The present search report has been drawn up for all claims			
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