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

(57) A machine for the surface finishing of panels (2) made of wood, metal, plastic or the like has a finishing device (10) mounted above a panel (2) and provided with an abrasive belt (11) wound in a ring shape around at least a drive roller (12) and a tensioning roller (13), with two actuator cylinders (20, 21) to move the tensioning

roller (13) relative to the drive roller (12) so as to tension the abrasive belt (11), and with a coupling device (25) to connect the output rods (22, 23) of the actuator cylinders (20, 21) to one another so as to synchronize the movements of the output rods (22, 23) with one another.

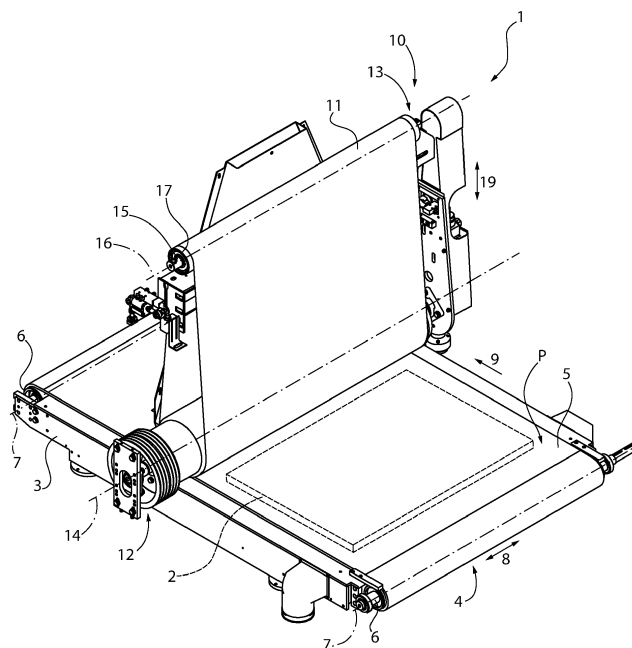


FIG.1

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This Patent Application claims priority from Italian Patent Application No. 102021000008375 filed on April 02, 2021.

TECHNICAL FIELD

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

[0003] In particular, the invention relates to a machine for the surface finishing of panels, such as, for example, a sanding machine, a deburring machine, a calibrating machine or a finishing machine.

BACKGROUND ART

[0004] The machine 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 move the panel under a finishing device comprising, in turn, an upper tensioning roller, a lower drive roller and an abrasive belt wound in a ring shape around the tensioning roller and the drive roller in order to subject an upper face of the panel to a finishing processing.

[0005] The machine is further provided with an operating unit to move the tensioning roller relative to the drive roller and tension the abrasive belt.

[0006] The operating unit comprises a pair of actuator cylinders, which are mounted at the free ends of the tensioning roller and are provided with respective output rods connected to the tensioning roller and movable along the actuator cylinders between respective extracted positions and respective retracted positions.

[0007] Since the abrasive belt substantially has the shape of a truncate cone and, hence, tends to move along the tensioning roller in the direction of its end with the smaller diameter, the tensioning roller is mounted so as to:

move with an oscillatory reciprocating motion around the longitudinal axis of one of the actuator cylinders;
move the abrasive belt with a straight reciprocating motion along the tensioning roller and the drive roller;
and
hold the abrasive belt in a centred position on the tensioning roller and on the drive roller.

[0008] Known machines for the surface finishing of panels of the type described above suffer from some drawbacks, which are mainly due to the fact that the structural and functional features of the two actuator cylinders do not ensure a synchronized movement of the output rods between the relative extracted positions and the relative retracted positions and, therefore, do not prevent

the tensioning roller from tilting and/or getting stuck, thus jeopardizing the correct operation of the finishing device.

DISCLOSURE OF INVENTION

[0009] The object of the invention is to provide a machine for the surface finishing of 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.

[0010] According to the invention, there is provided a machine for the surface finishing of panels made of wood, metal, plastic or the like according to the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] 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 machine according to the invention;
figure 2 is a schematic side view, with sectional parts and with parts removed for greater clarity, of a detail of the machine of figure 1;
figure 3 is a schematic front view, with sectional parts and with parts removed for greater clarity, of the detail of figure 2; and
figure 4 is a schematic side view, with sectional parts and with parts removed for greater clarity, of a detail of figures 2 and 3.

BEST MODE FOR CARRYING OUT THE INVENTION

[0012] With reference to figure 1, number 1 indicates, as a whole, a machine for the surface finishing of panels 2 made of wood, metal, plastic or the like with a substantially parallelepiped-like shape.

[0013] The sanding machine 1 comprises a support frame 3; and a feeding device 4 comprising, in turn, a conveyor belt 5, which is wound in a ring shape around a pair of motor-driven pulleys 6 mounted so as to rotate around respective longitudinal axes 7 parallel to one another and to a horizontal direction 8, has an upper transport branch defining a horizontal support surface P for at least one panel 2 and is designed to move the panels 2 in a horizontal direction 9 transverse to the direction 8.

[0014] The sanding machine 1 is further provided with a sanding unit 10, which is mounted above the surface P and comprises an abrasive belt 11 wound in a ring shape around at least a lower drive roller 12 and an upper tensioning roller 13.

[0015] The roller 12 is mounted so as to rotate around a longitudinal axis 14 of its, which is parallel to the axes 7 and to the direction 8; and the roller 13 comprises a support shaft 15, which has a longitudinal axis 16 sub-

stantially parallel to the direction 8, and a sleeve 17, which extends around the shaft 15 coaxially to the axis 16 and is coupled to the shaft 15 in a rotary manner so as to rotate, relative to the shaft 15, around the axis 16.

[0016] The roller 13 is movable, relative to the frame 3 and due to the thrust of an operating unit 18, in a vertical direction 19 orthogonal to the directions 8 and 9 between a lowered rest position, in which the belt 11 is engaged on/disengaged from the rollers 12, 13, and a lifted operating position, in which the belt 11 is tensioned by the roller 13.

[0017] According to figures 2 and 3, the unit 18 comprises two actuator cylinders 20, 21, which are fixed to the frame 3 parallel to the direction 19 and have respective output rods 22, 23 which are connected to respective free ends of the shaft 15 axially projecting from the sleeve 17 and are movable along the cylinders 20, 21.

[0018] Each rod 22, 23 has an upper free end, which extends on the outside of the relative cylinder 20, 21 and is connected to the shaft 15, and a lower free end, which extends on the outside of the relative cylinder 20, 21 and is provided with a rack 24 parallel to the direction 19.

[0019] The racks 24 define part of a mechanical coupling device 25, which connects the rods 22, 23 to one another and is configured so as to synchronize the movements of the rods 22, 23 with one another and is further configured so that the movement of one of the rods 22, 23 causes the movement of the other rod 22, 23.

[0020] The device 25 further comprises a transmission shaft 26, which is mounted so as to rotate around a rotation axis 27 substantially parallel to the direction 8 and comprises, in turn, a first segment 28, which is provided with a pinion 29 coupled to the rack 24 of the rod 22, and a second segment 30, which is provided with a pinion 31 coupled to the rack 24 of the rod 23.

[0021] The two segments 28, 30 are coupled to one another in a rotary manner and are connected to one another by means of an elastic joint 32 comprising an outer half-joint 33, which is angularly integral to the segment 30 and is delimited by an inner surface with a substantially square shape.

[0022] The elastic joint 32 further comprises an inner half-joint 34, which is angularly integral to the segment 28, extends inside the half-joint 33 and is delimited by an outer surface with a substantially square shape, which is inclined at a 45° angle relative to the inner surface of the half-joint 33.

[0023] The two half-joints 33, 34 are coupled to one another in a rotary manner through the interposition of a plurality of elastic elements 35, specifically four elastic material bars 35, interposed between the two half-joints 33 and 34 in order to selectively control the rotation of the two segments 28 and 30 relative to one another.

[0024] Each bar 35 is parallel to the axis 16 and to the direction 8 and is mounted between a longitudinal corner of the inner surface of the half-joint 33 and a flat surface of the outer surface of the half-joint 34.

[0025] With regard to the disclosure above, it should

be pointed out, in addition, that the shaft 15 is connected to the rods 22, 23 so as to move with an oscillatory reciprocating motion around the longitudinal axis of one of the cylinders 20, 21 so as to cause a straight reciprocating motion of the belt 11 along the rollers 12 and 13.

[0026] The coupling device 25 offers some advantages, which are mainly due to the fact that the assembly defined by the racks 24, by the transmission shaft 26 and by the pinions 29, 31 allows the movements of the output rods 22, 23 to be synchronized and, hence, allows the movement of each rod 22, 23 to automatically activate the movement of the other rod 22, 23.

[0027] Furthermore, since the belt 11 substantially has the shape of a truncated cone and, hence, is axially delimited by a circular end with a larger diameter and by a circular end with a smaller diameter, the coupling device 25 offers a further advantage lying in the fact that the elastic joint 32 allows the segments 28 and 30 to rotate relative to one another around the axis 27.

[0028] As a consequence, when the roller 13 is in its lifted operating position, the elastic joint 32 allows the rod 22, 23 of the cylinder 20, 21 mounted in the area of the circular end of the belt 11 with the larger diameter to make a further movement relative to the rod 22, 23 of the cylinder 20, 21 mounted in the area of the circular end of the belt 11 with the smaller diameter, so as to correctly tension the belt 11.

Claims

1. A machine for the surface finishing of panels (2) made of wood, metal, plastic or the like and comprising a support surface (P) for at least one panel (2); a finishing device (10), which is mounted above the support surface (P) and comprises, in turn, at least one drive roller (12), a tensioning roller (13) and an abrasive belt (11) wound in a ring shape around said drive and tensioning rollers (12, 13); and an operating unit (18) configured to move the tensioning roller (13) relative to the drive roller (12) and tension the abrasive belt (11); the operating unit (18) comprising, in turn, a pair of actuator cylinders (20, 21) provided with respective output rods (22, 23) connected to the tensioning roller (13) and movable along the actuator cylinders (20, 21); and **characterized in that** the operating unit (18) further comprises a coupling device (25) configured to connect the output rods (22, 23) to one another and to synchronize the movements of the output rods (22, 23) with one another.
2. The machine according to claim 1, wherein the coupling device (25) is a mechanical coupling device configured in such a way that the movement of one of the output rods (22, 23) causes the movement of the other output rod (22, 23).
3. The machine according to claim 1 or 2, wherein each

output rod (22, 23) is provided with a rack (24) defining part of the coupling device (25), which further comprises a transmission shaft (26) provided with two pinions (29, 31) coupled to the racks (24).

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4. The machine according to claim 3, wherein each output rod (22, 23) has two free ends, which project out of the relative actuator cylinder (20, 21), one of them being connected to the tensioning roller (13) and the other one being provided with the relative rack (24). 10

5. The machine according to claim 3 or 4, wherein the transmission shaft (26) comprises a first segment (28), which is coupled to a first pinion (29) in an angularly fixed manner, a second segment (30), which is coupled to a second pinion (31) in an angularly fixed manner, and elastic means (35) for torque transmission, which are interposed between said first and second segments (28, 30). 15

6. The machine according to claim 5, wherein said first and second segments (28, 30) are coupled to one another in a rotary manner and are connected to one another by means of an elastic joint (32). 20

7. The machine according to claim 6, wherein the elastic joint (32) comprises a first half-joint (33), which is angularly integral to the second segment (30), a second half-joint (34), which is angularly integral to the first segment (28), and a plurality of elastic elements (35) interposed between the two half-joints (33, 34) so as to selectively control the rotation of the segments (28, 30) relative to one another. 25

8. The machine according to any one of the preceding claims, wherein the tensioning roller (13) comprises a support shaft (15), which is connected to the output rods (22, 23) of the actuator cylinders (20, 21), and a sleeve (17), which is coupled to the support shaft (15) in a rotary manner. 30

9. The machine according to any one of the preceding claims and further comprising a feeding device (4), which defines the support surface (P) and is configured to feed the panel (2) under the finishing device (10). 35

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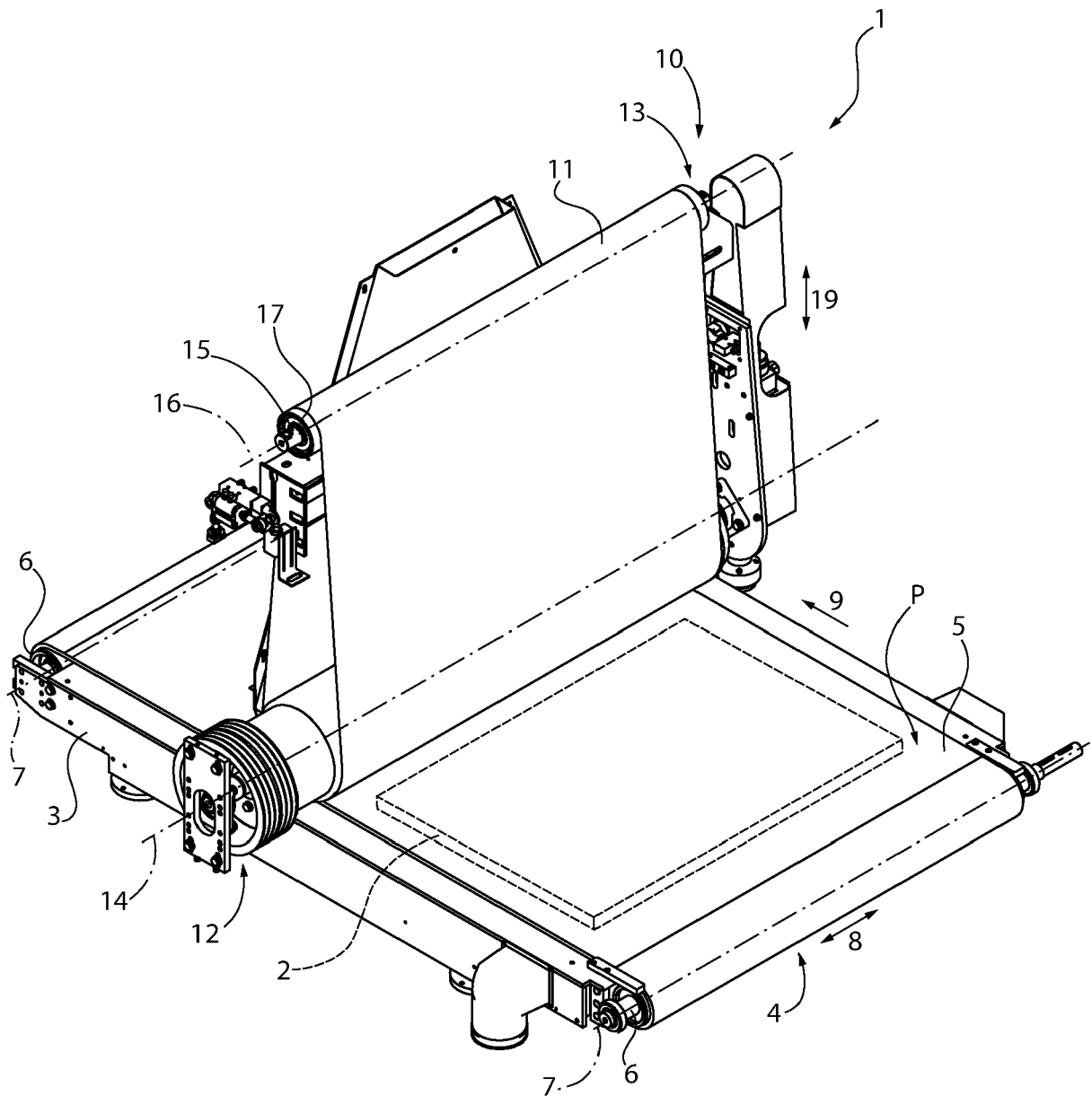


FIG.1

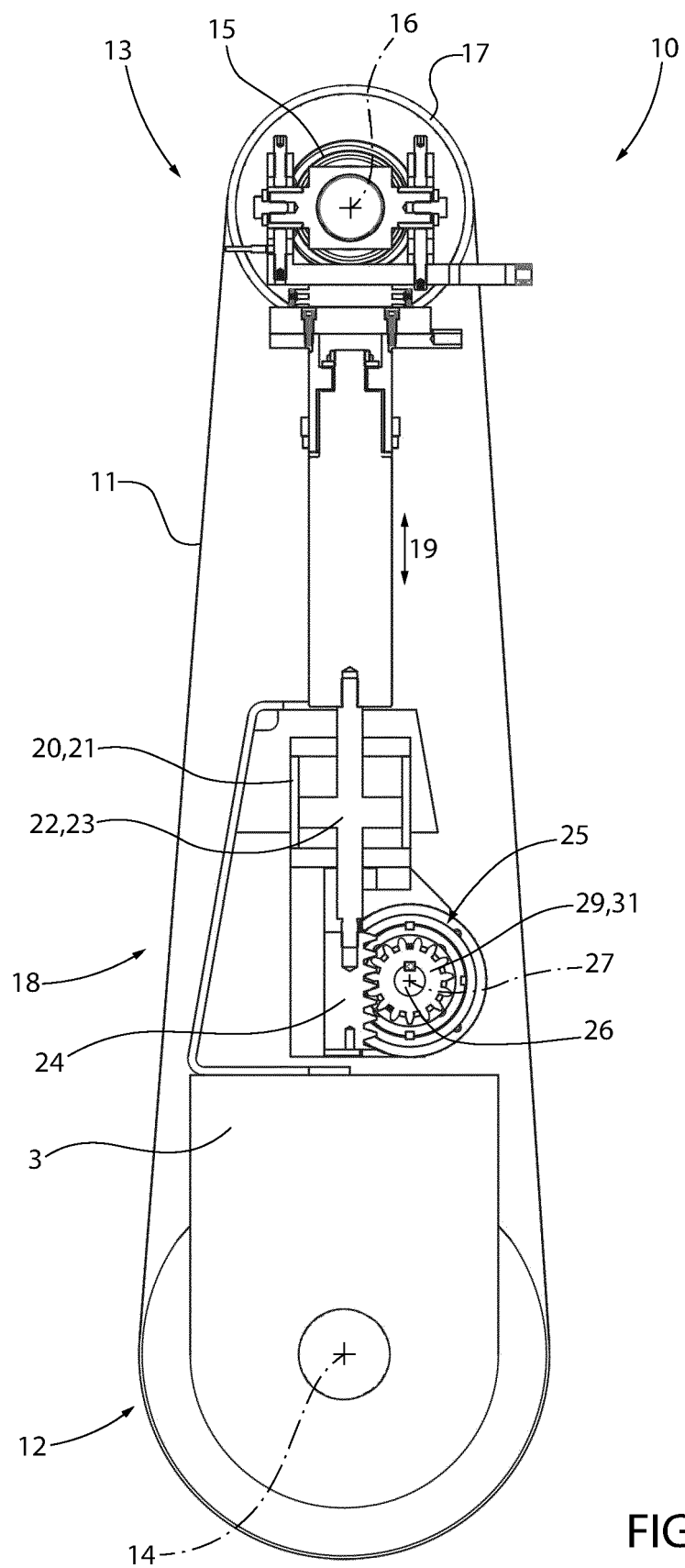


FIG.2

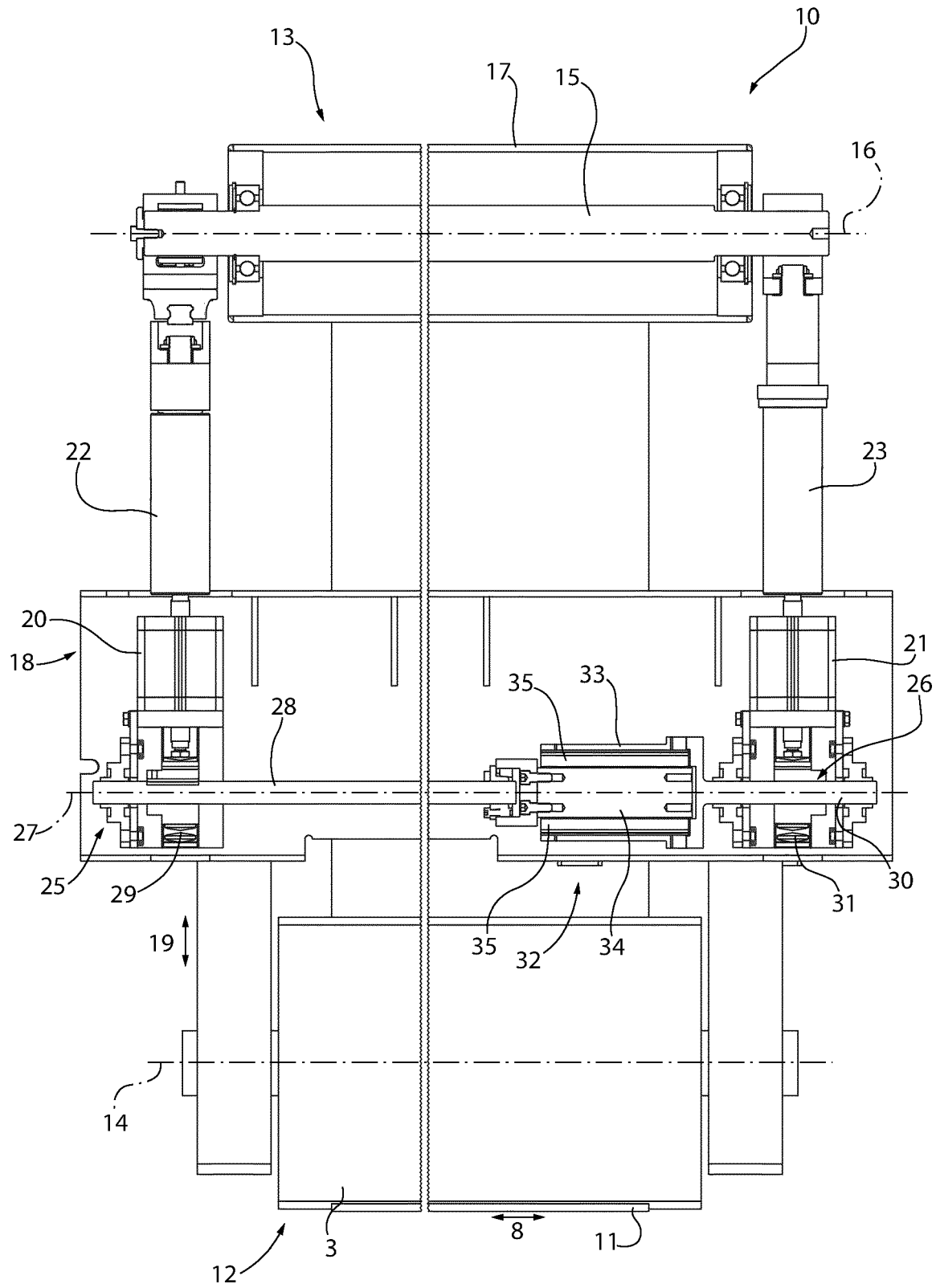


FIG.3

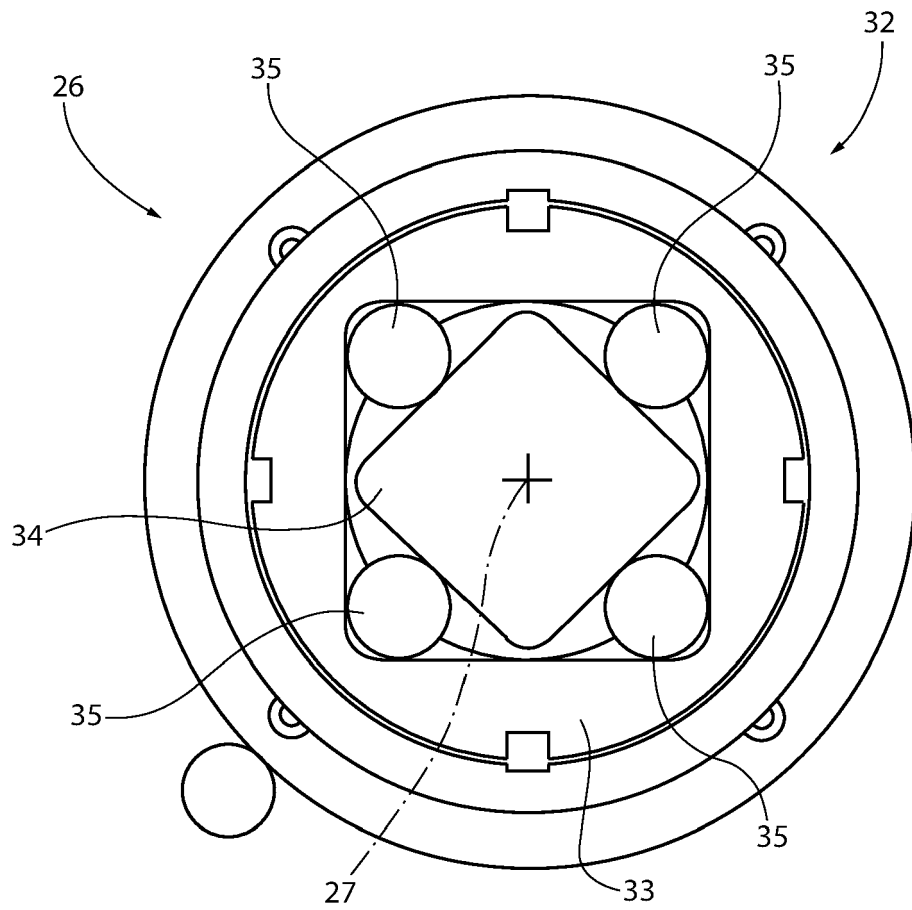


FIG.4



EUROPEAN SEARCH REPORT

Application Number

EP 22 16 6391

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 210 705 A2 (STEINEMANN TECHNOLOGY AG [CH]) 28 July 2010 (2010-07-28)	1, 2	INV.
A	* paragraphs [0001], [0004], [0006], [0007]; figures 1, 2, 3 *	3-8	B24B7/06 B24B7/28 B24B7/30 B24B19/24 B24B21/12
X	DE 296 00 447 U1 (ERNST MASCHF GMBH PAUL [DE]) 29 February 1996 (1996-02-29)	1-4, 8, 9	
A	* paragraphs [0002], [0015], [0016]; figures 1, 2 *	5-7	
A	US 6 299 512 B1 (COSTA ALESSANDRO [IT] ET AL) 9 October 2001 (2001-10-09)	1-9	
	* column 4, line 4 - line 45; figures 1, 2 *		
			TECHNICAL FIELDS SEARCHED (IPC)
			B24B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		30 June 2022	Bonetti, Serena
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EP 22 16 6391

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2210705 A2	28-07-2010	CH 700303 A2	30-07-2010
		EP 2210705 A2	28-07-2010
		PL 2210705 T3	30-04-2015
DE 29600447 U1	29-02-1996	NONE	
US 6299512 B1	09-10-2001	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- IT 102021000008375 [0001]