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(54) IMPROVED SANDING MACHINE

(57) The present invention relates to a machine (M) for sanding pieces made of wood, metal, ceramic, plastic, composite materials and the like, comprising: a frame (2); and at least one sanding unit (1), installed on said frame (2), comprising in turn at least a first motorized operating roller (12), an idle roller (14), and an abrasive belt (11), arranged so as to form a closed loop, around said first operating roller (12) and said idle roller (14), to sand a surface of a piece to be sanded, movable with respect to said sanding unit (1).

The present invention also relates to a replacement assembly (10) and an operating method of a sanding machine (M).

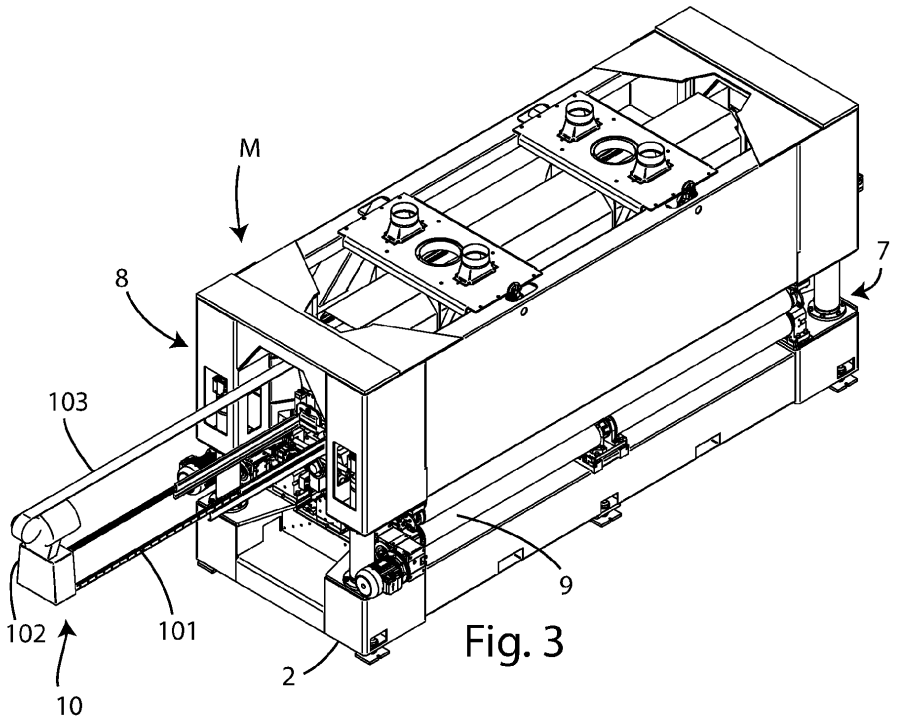

Fig. 3

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Description

[0001] The present invention relates to an improved sanding machine, in particular a sanding machine comprising an abrasive belt replacement assembly.

Field of invention

[0002] More specifically, the invention relates to a sanding machine comprising a replacement assembly for an abrasive belt, designed and manufactured in particular to support the abrasive belt which has to be replaced in a sanding machine.

Prior art

[0003] As is well known, there are currently sanding machines for pieces made of wood, metal, ceramic, plastic, composite materials, and the like, to perform sanding operations on the surfaces of such pieces and to reduce their roughness, by means of abrasion.

[0004] Some sanding machines are equipped with sanding belt sanding units closed in a loop, arranged around two or more cylindrical rollers, and possibly around a pad, for sanding moving parts in one feed direction.

[0005] Said sanding machines generally comprise a transport device, for moving the pieces, a frame, a supporting column, a motor unit, a transverse upright, at least one operating roller, an idle roller, a pneumatic actuator for stretching the abrasive belt.

[0006] The supporting column is the element through which the sanding unit is coupled to the machine frame. Generally, on the supporting column, there are installed the motor unit, having a motor, a pulley, and a disc brake, and the transversal upright, on which in its turn the operating roller is installed.

[0007] The operating roller is driven by the motor, by means of a transmission generally of the belt type.

[0008] The cross upright is a structural element that extends horizontally above the operating roller and supports it by means of two vertical shoulders placed at the end of the cross upright itself.

[0009] The pneumatic actuator, for stretching the abrasive belt, arranged so as to have a base on the transverse upright, comprises a cylinder and a piston equipped with a rod, and supports, at the end of the rod, a cross member with an idle roller, the whose function is to keep the abrasive belt in tension.

[0010] The sanding unit can also comprise a second operating roller, powered in the same way as the first, and a flat-shaped pad, placed between the two operating rollers, to increase the contact surface between the abrasive belt and the piece.

[0011] Abrasive belts generally have a fabric support, an anchoring resin for the abrasive, in which the abrasive granules are immersed, i.e., particles having a certain degree of angularity, of highly hard materials, such as zirconium oxide, aluminum oxide, silicon carbide, and finally a resin covering the granules.

[0012] The sanding process of the pieces causes the loss of part of the covering resin in the abrasive belt and the flattening of the sharp edges of the abrasive grains, to the point where the abrasive belt is so worn that it is no longer able to penetrate the piece to perform the workings.

[0013] Therefore these abrasive belts must be replaced periodically.

[0014] The abrasive belts of the machines described above are replaced manually. In wide belt sanding machines, in particular, from 1650 mm to 3700 mm in width, the belt replacement procedure is particularly complex, due to the natural flexibility of the belts, and requires the presence of at least two operators and the use of auxiliary equipment. This auxiliary equipment has a base plane coupled to wheels, a vertical upright and a transverse element, slidably coupled to the vertical upright, so that the distance of said transverse element from the base plane can be adjusted, a locking element of the cross member on the vertical post. The auxiliary equipment is manually approached to the sanding machine, and the distance of the transversal element from the base plane is then adjusted, according to the height above the ground of the top of the closed ring formed by the abrasive belt. The auxiliary equipment is therefore positioned on the side of the sanding machine set up for the belt change, which is generally the one opposite the side where the motor is present. The belt is made to slide by operators on the cross element in such a way as to be supported by the latter. The procedure for inserting the new abrasive belt takes place in the same way.

[0015] This procedure, as can be seen, is very laborious, as indicated above, with consequent spending of time.

Scope of the invention

[0016] In light of the above, it is, therefore, a scope of the present invention to provide an improved sanding machine having an assembly for replacing the abrasive belt, capable of facilitating the replacement of the abrasive belt itself, making the presence of several operators no longer necessary.

[0017] Another scope of the invention is to provide an improved sanding machine comprising a replacement assembly for replacing the abrasive belt, without using auxiliary equipment external to the machine.

[0018] A further scope of the present invention is to speed up the replacement of the abrasive belt in a sanding machine.

Object of the invention

[0019] It is, therefore, specific object of the present invention a Machine for sanding pieces made of wood, metal, ceramic, plastic, composite materials and the like,

comprising: a frame; and at least one sanding unit, installed on said frame, comprising in turn at least a first motorized operating roller, an idle roller, and an abrasive belt, arranged so as to form a closed loop, around said first operating roller and said idle roller, to sand a surface of a piece to be sanded, movable with respect to said sanding unit; characterized in that it comprises a replacement assembly, coupled to said frame, comprising a support member, and a roll-up element, coupled to said support member, wherein said support member is capable of assuming a retracted position, in which said roll-up element is rolled, and an extracted position, in which said roller shutter element is extended, and wherein said roll-up element is capable of supporting, in said extracted position, said abrasive belt, when it is removed from said first operating roller and from said idle roller.

[0020] Always according to the invention, said replacement assembly may be arranged inside said closed loop formed by said abrasive belt.

[0021] Still according to the invention, said roll-up element may have one end fixed at said idle roller.

[0022] Advantageously according to the invention, said sanding machine may comprise guiding means, fixed to said support member and to said frame.

[0023] Advantageously according to the invention, said guiding means may be telescopic.

[0024] Always according to the invention, said roll-up element may be a tape, which in said rolled position is rolled up on itself in the form of a reel.

[0025] Still according to the invention, said roll-up element may be made of polymeric fiber.

[0026] Further according to the invention, said roll-up element may have an upper layer made of elastomeric material or PVC and is able to drag with it, by friction, said abrasive belt when said roll-up element is made to pass from said rolled position to said extended position.

[0027] Preferably according to the invention, said sanding machine may comprise an input station, for the insertion of said pieces to be machined, an output station, for the output of said pieces, and a conveyor device, to transport said workpieces from said input station to said output station.

[0028] Advantageously according to the invention, said sanding unit may comprise a second motorized operating roller, and said abrasive belt may be also arranged around said second operating roller.

[0029] Always according to the invention, said sanding assembly may comprise a skid, and wherein said abrasive belt is also arranged around said skid.

[0030] It is further object of the present invention a replacement assembly, which can be installed in a sanding machine, of the type having a sanding unit with at least one motorized first operating roller, an idle roller, an abrasive belt, arranged in a closed loop around said first operating roller and said idle roller, comprising: a support member; and a roll-up element, coupled to said support member, having one end that can be fixed in correspondence with said idle roller, movable between a rolled position and an extended position; wherein said roll-up element is able to support, in use, in said extended position, said abrasive belt when it is removed from said first operating roller and from said idle roller.

[0031] It is also object of the present invention an operating method of a sanding machine as defined above, comprising the steps of: pulling said roll-up element so as to make it pass from said rolled position to said extended position; removing said abrasive belt from said first operating roller and from said idle roller so that it is supported by said roll-up element; and removing said abrasive belt from said roll-up element.

[0032] Always according to the invention, said method may comprise the steps of: pulling said roll-up element so as to make it pass from said rolled position to said extended position, dragging said abrasive belt with it by friction, removing said abrasive belt from said roll-up element.

[0033] Still according to the invention, said method may further comprise the steps of: inserting an abrasive belt, closed in a loop around said roll-up element, when this is in said extended position, in such a way that said roll-up element supports said abrasive belt; transferring said abrasive belt into said sanding unit so as to arrange it closed in a ring around said first operating roller and said idle roller; and pushing said roll-up element so as to make it pass from said extended position to said rolled position.

Brief description of the figures

[0034] The present invention will be now described, for illustrative but not limitative purposes, according to its preferred embodiments, with particular reference to the figures of the enclosed drawings, wherein:

figure 1 shows an isometric view of a sanding machine according to the invention;
figure 2 shows an isometric view of a sanding unit of the machine in figure 1;
figure 3 shows an isometric view of a sanding machine according to the invention;
figure 4 shows an isometric view of a polishing group of the machine of figure 1;
figure 5 shows a side view of a machine according to the invention when the replacement assembly according to the invention is in an extracted position;
figure 6 shows a side view of a machine according to the invention when the replacement assembly according to the invention is in a retracted position; and
figure 7 shows a front view of auxiliary equipment for replacing an abrasive belt in a sanding machine according to the prior art.

Detailed description

[0035] In the various figures, similar parts will be indicated with the same reference numbers.

[0036] The attached figures show a sanding machine M for pieces made of wood, metal, ceramic, plastic, composite materials, and the like, equipped with at least one sanding unit 1, for smoothing said pieces, comprising an abrasive belt 11 closed in a loop, a first operating roller 12, a second operating roller 13, an idle roller 14, a pad 15, wherein the abrasive belt 11 is arranged around the first operating roller 12, the second driving roller 13, the idle roller 14 and the pad 15.

[0037] The sanding machine M also comprises a frame 2, a supporting column 3, a motor unit 4, a transversal upright 5, a crosspiece 6, for supporting said idle roller 14, a pneumatic actuator for tensioning the abrasive belt (not shown in the figures).

[0038] In the sanding machine M there are also an input station 7, an output station 8, a conveyor device 9 for transporting the pieces to be worked from said input station 7 to said output station 8.

[0039] The input station 7 allows the insertion of the pieces.

[0040] The output station 8 allows the pieces to come out the pieces machined by sanding unit 1.

[0041] The conveyor device 9, equipped with one or more motors (not shown in the figures), transports each piece to be machined from said input station 7 towards said output station 8, in an advancement direction X.

[0042] In the embodiment described, the conveyor device 9 comprises a plurality of transport rollers.

[0043] The sanding unit 1 is positioned above said conveyor device 9 and extends mainly in a Z direction, perpendicular to said X advancement direction, and in a Y direction perpendicular to said X and Z directions.

[0044] The first operating roller 12, the second operating roller 13, and the idle roller 14 have a cylindrical shape and are arranged with their longitudinal axes in the Y direction.

[0045] The sanding unit 1 is movable in the Z direction, so as to be able to carry out a sanding operation on pieces of different thicknesses. In fact, during a machining, the sanding unit 1 must be arranged at a height such that the first operating roller 12, the second operating roller 13, and the pad 15 face the piece, and the portion of abrasive belt 11 arranged between said first operating roller 12 and said second operating roller 13, is in contact with a surface of the piece, placed on said conveyor device 9.

[0046] The sanding unit 1 performs a smoothing process on the surface of a piece when the motor unit 4 rotates the first operating roller 12 and the second operating roller 13, which transmit motion to the abrasive belt 11.

[0047] Said first operator roller 12 and second operator roller 13 rotate in a discordant direction with respect to the rotation direction of the conveyor rollers of the conveyor device 9.

[0048] The supporting column 3 is the element through which the sanding unit 1 is coupled to the frame 2 of the machine. On the supporting column 3, in general, the transversal upright 5 is installed, on which the first operating roller 12 and the second operating roller 13 are in turn installed, and the motor unit 4, having a motor 41, a pulley, not shown in the figures, and a disc brake, not shown in the figures. The first operating roller 12 and the second operating roller 13 are driven by the motor 41, by means of a belt-type transmission.

[0049] The transversal upright 5 is a structural element that extends horizontally above the first operating roller 12 and the second operating roller 13, and supports them by means of two vertical shoulders placed at the end of the transversal upright 5 itself.

[0050] The pneumatic actuator, for tensioning the abrasive belt, arranged so as to have a base on the transversal upright 5, comprises a cylinder and a piston, equipped with a stem, and supports, at the end of the stem, the crosspiece 6, which supports the idle roller 14, whose function is to keep the abrasive belt 11 in tension.

[0051] In other embodiments, the sanding unit 1 can comprise a first operating roller 12 and an idle roller 14, and provide that the abrasive belt 11 is arranged, closed in a loop, around the first operating roller 12 and the idle roller 14.

[0052] The sanding machine M according to the invention also comprises a replacement assembly 10 for the abrasive belt 11, coupled to said frame 2.

[0053] The replacement assembly 10 is equipped with guiding means 101, with a support member 102, with a roll-up element 103.

[0054] The replacement assembly 10 is also arranged inside the closed loop formed by the abrasive belt 11.

[0055] The support member 102 is coupled to the guiding means 101.

[0056] In the embodiment described, the guiding means 101 are telescopic guides.

[0057] The roll-up element 103 is coupled to the support member 102 and has one end fixed in correspondence with said idle roller 14.

[0058] The support member 102 is able to assume a retracted position, in which said roll-up element 103 is wound, and an extracted position, in which said roll-up element 103 is extended.

[0059] When the roll-up element 103 is in the extended position, it is able to support said abrasive belt 11 when the latter is withdrawn from said first operating roller 12 and from said idle roller 14 to be replaced.

[0060] In the embodiment described, the roll-up element 103 is a tape that in the wound position is rolled up on itself in the form of a reel.

[0061] In the embodiment described, the roll-up element 103 is made of polymeric fiber, preferably nylon fiber or aramid fiber.

[0062] In another embodiment, the roll-up element 103 is equipped with an upper layer of elastomeric material or PVC, so as to increase the friction with the abrasive belt 11.

[0063] The functioning of the replacement assembly 10 described above is as follows.

[0064] When the abrasive belt 11 needs to be replaced

because it is worn, the replacement assembly 10 is moved in the Y direction, away from the machine, so that the roll-up element 103 passes from the wound position to the extended position.

[0065] In this way, an operator can slide the abrasive belt 11, to be replaced, on the roll-up element 103 in an extended position, which acts as a support, and remove the abrasive belt 11.

[0066] Similarly, the new abrasive belt 11 is inserted into the machine, arranging it closed in a loop around the roll-up element 103, when this is in the extended position and subsequently making it slide in the Y direction, approaching the machine, to arrange it closed in a loop around said first operating roller 12 and said idle roller 14.

[0067] Subsequently, the replacement assembly 10 is moved in the Y direction, approaching the machine, so that the roll-up element 103 passes from the extended position to the wound position.

[0068] In the embodiment in which the roll-up element 103 is provided with an upper layer of elastomeric material or PVC, the roll-up element 103 is such as to generate a friction force on the abrasive belt 11, so as to drag the abrasive belt 11 along with it, when the replacement assembly 10 is moved in the Y direction, away from the machine and the roll-up element 103 is brought from the wound position to the extended position.

Advantages

[0069] An advantage of the present invention is that of providing an improved sanding machine equipped with an assembly for replacing the abrasive belt integrated in the machine, so as to eliminate the use of auxiliary equipment for changing the belt.

[0070] A further advantage of the invention is that of reducing the maneuvering spaces required in the vicinity of the sanding machine.

[0071] Another advantage of the present invention is that of reducing the risk of damaging the abrasive belt during the replacement phase of the same.

[0072] The present invention has been described for illustrative but not limitative purposes, according to its preferred embodiments, but it is to be understood that modifications and/or changes can be introduced by those skilled in the art without departing from the relevant scope as defined in the enclosed claims.

Claims

1. Machine (M) for sanding pieces made of wood, metal, ceramic, plastic, composite materials, and the like, comprising:

a frame (2); and
at least one sanding unit (1), installed on said frame (2), comprising in turn
at least a first motorized operating roller (12),
an idle roller (14), and
an abrasive belt (11), arranged so as to form a closed loop, around said first operating roller (12) and said idle roller (14), to sand a surface of a piece to be sanded, movable with respect to said sanding unit (1);

characterized in that it comprises a replacement assembly (10), coupled to said frame (2), comprising

a support member (102), and
a roll-up element (103), coupled to said support member (102),
wherein said support member (102) is capable of assuming a retracted position, in which said roll-up element (103) is rolled, and an extracted position, in which said roller shutter element (103) is extended, and
wherein said roll-up element (103) is capable of supporting, in said extracted position, said abrasive belt (11), when it is removed from said first operating roller (12) and from said idle roller (14).

2. Sanding machine (M) according to the preceding claim, wherein said replacement assembly (10) is arranged inside said closed loop formed by said abrasive belt (11).

3. Sanding machine (M) according to any one of the preceding claims, wherein said roll-up element (103) has one end fixed at said idle roller (14).

4. Sanding machine (M) according to any one of the preceding claims, comprising guiding means (101), fixed to said support member (102) and to said frame (2).

5. Sanding machine (M) according to the preceding claim, wherein said guiding means (101) are telescopic.

6. Sanding machine (M) according to any one of the preceding claims, wherein said roll-up element (103) is a tape, which in said rolled position is rolled up on itself in the form of a reel.

7. Sanding machine (M) according to any one of the preceding claims, wherein said roll-up element (103) is made of polymeric fiber.

8. Sanding machine (M) according to any one of the preceding claims, wherein said roll-up element (103) has an upper layer made of elastomeric material or PVC and is able to drag with it, by friction, said abra-

sive belt (11) when said roll-up element (103) is made to pass from said rolled position to said extended position.

9. Sanding machine (M) according to any one of the preceding claims comprising

an input station (7), for the insertion of said pieces to be machined,
an output station (8), for the output of said pieces, and
a conveyor device (9), to transport said workpieces from said input station (7) to said output station (8).

10. Sanding machine (M) according to any one of the preceding claims,

wherein said sanding unit (1) comprises a second motorized operating roller (13), and
wherein said abrasive belt (11) is also arranged around said second operating roller (13).

11. Sanding machine (M) according to the preceding claim, wherein said sanding assembly (1) comprises a skid (15), and wherein said abrasive belt (11) is also arranged around said skid (15).

12. Replacement assembly (10), which can be installed in a sanding machine (M), of the type having a sanding unit (1) with at least one motorized first operating roller (12), an idle roller (14), an abrasive belt (11), arranged in a closed loop around said first operating roller (12) and said idle roller (14), comprising:

a support member (102); and
a roll-up element (103), coupled to said support member (102), having one end that can be fixed in correspondence with said idle roller (14), movable between a rolled position and an extended position;
wherein said roll-up element (103) is able to support, in use, in said extended position, said abrasive belt (11) when it is removed from said first operating roller (12) and from said idle roller (14).

13. Operating method of a sanding machine (M) according to any one of claims 1-11 comprising the steps of:

pulling said roll-up element (103) so as to make it pass from said rolled position to said extended position;
removing said abrasive belt (11) from said first operating roller (12) and from said idle roller (14) so that it is supported by said roll-up element (103); and
removing said abrasive belt (11) from said roll-up element (103).

14. Operating method of a sanding machine (M) according to claims 1 and 8, comprising the steps of:

pulling said roll-up element (103) so as to make it pass from said rolled position to said extended position, dragging said abrasive belt (11) with it by friction,
removing said abrasive belt (11) from said roll-up element (103).

15. Operating method according to any one of claims 13 or 14 further comprising the steps of:

inserting an abrasive belt (11), closed in a loop around said roll-up element (103), when this is in said extended position, in such a way that said roll-up element (103) supports said abrasive belt (11);
transferring said abrasive belt (11) into said sanding unit (1) so as to arrange it closed in a ring around said first operating roller (12) and said idle roller (14); and
pushing said roll-up element (103) so as to make it pass from said extended position to said rolled position.

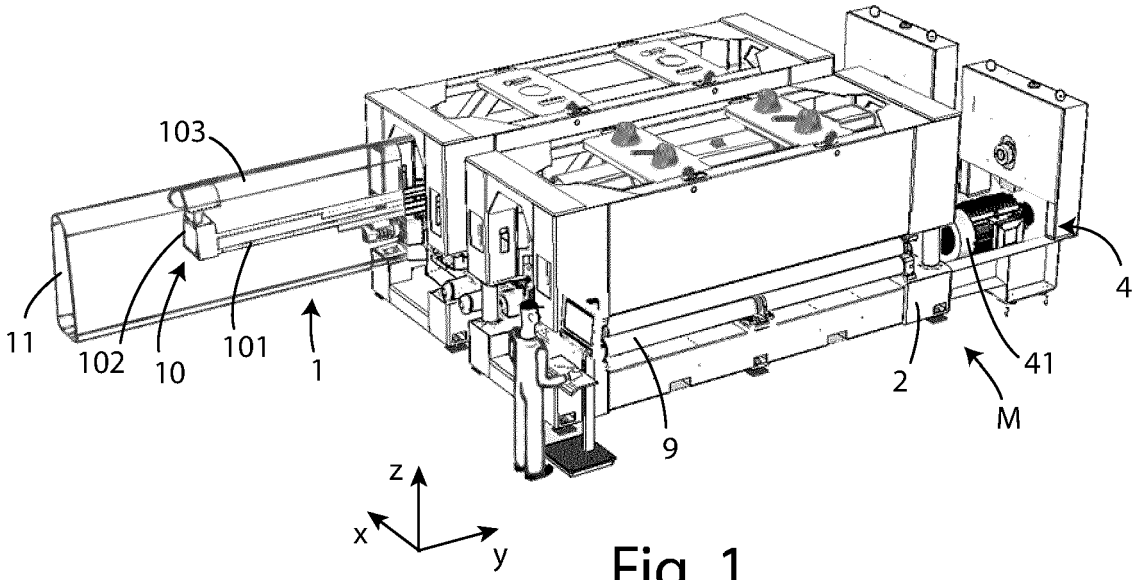

Fig. 1

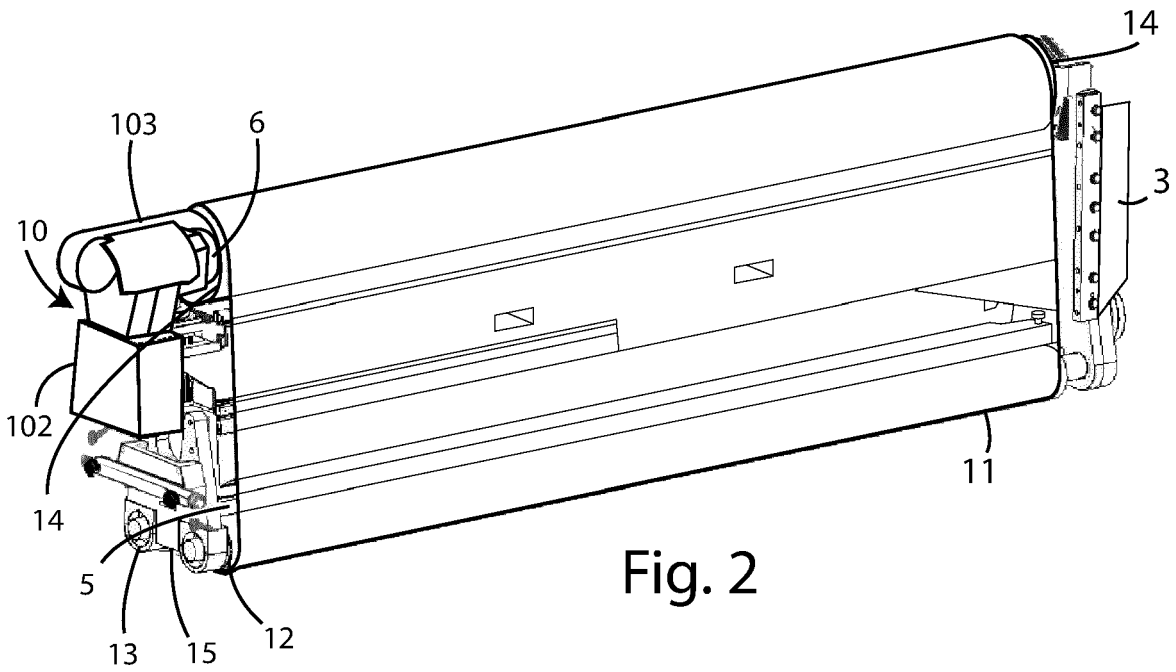

Fig. 2

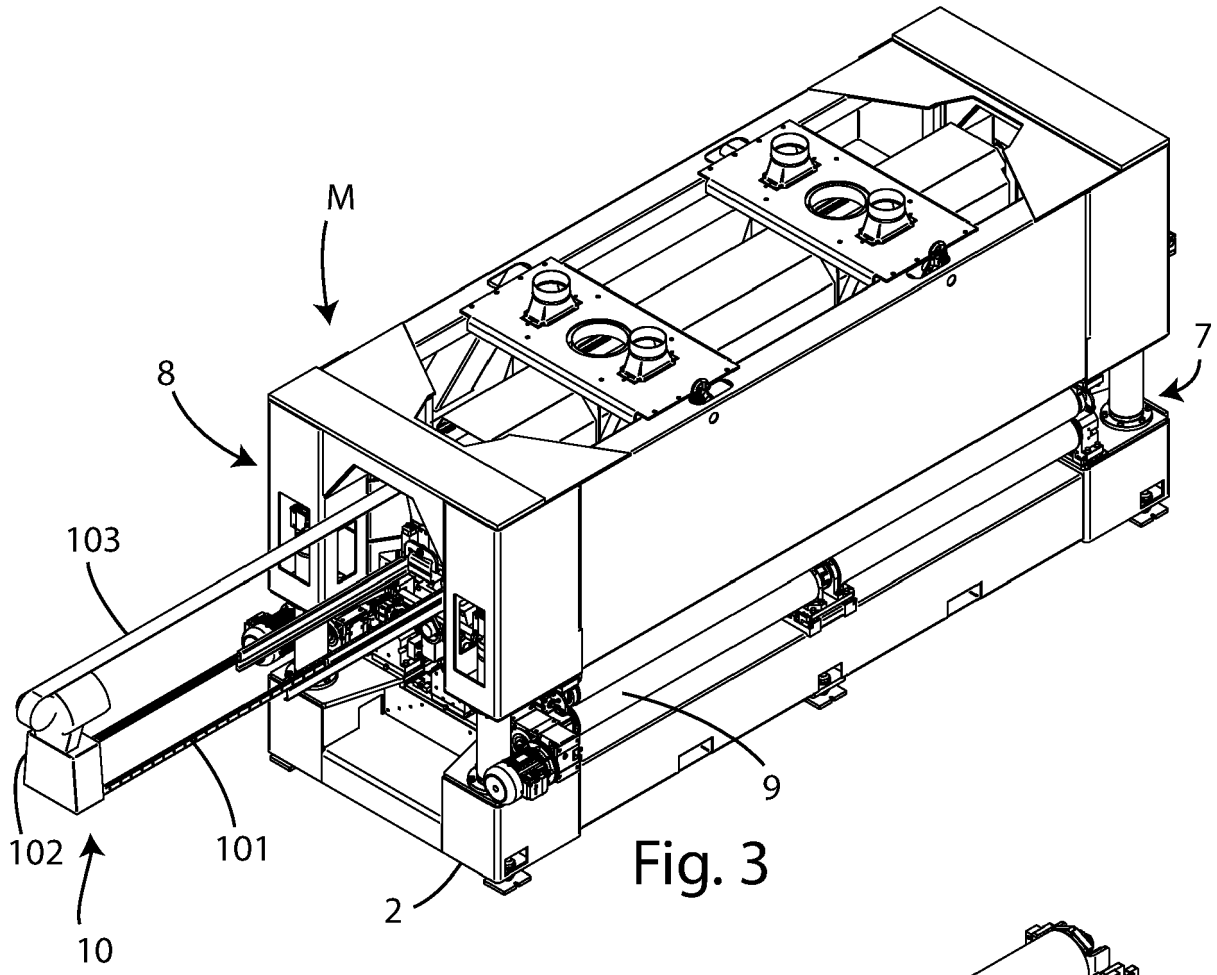

Fig. 3

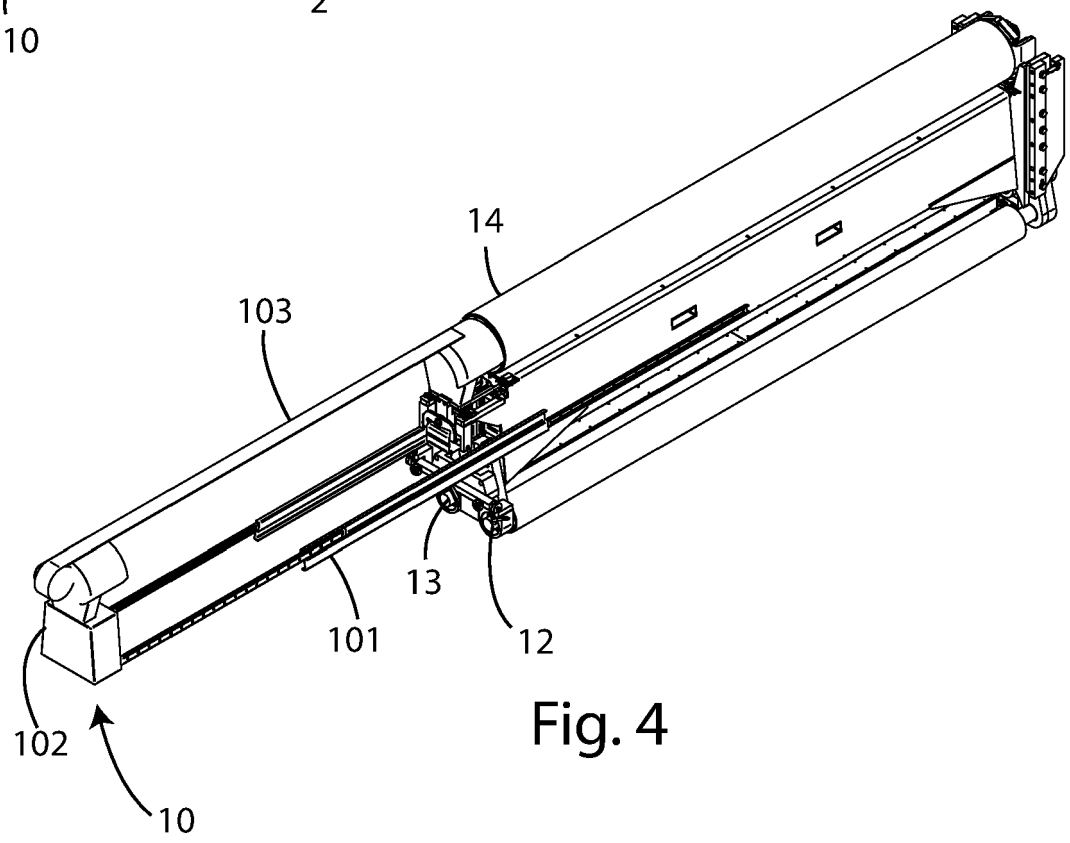

Fig. 4

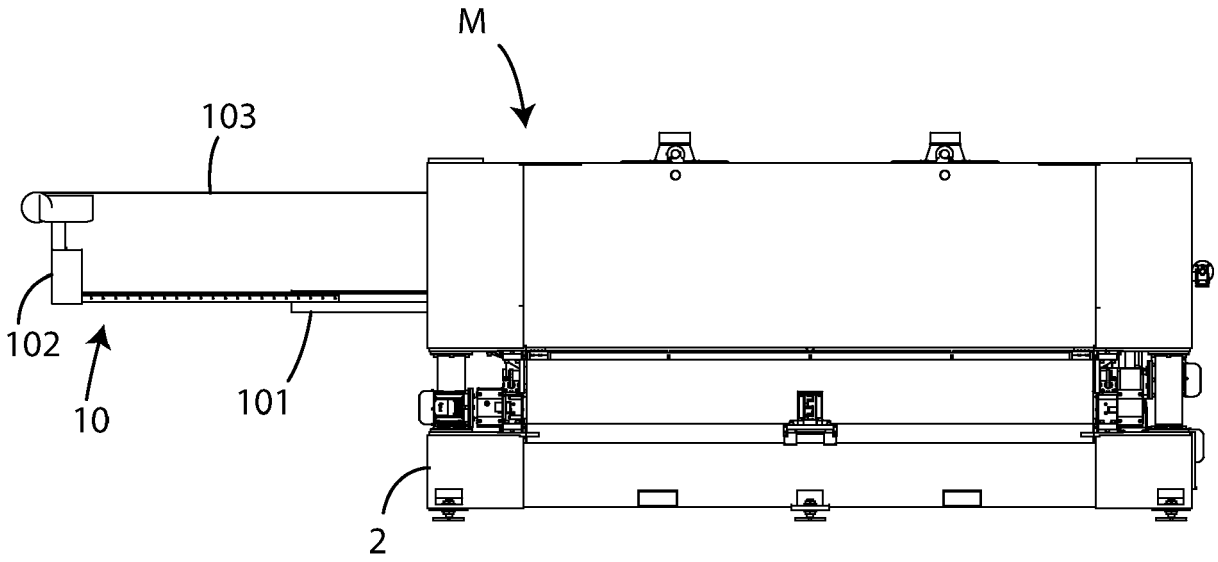

Fig. 5

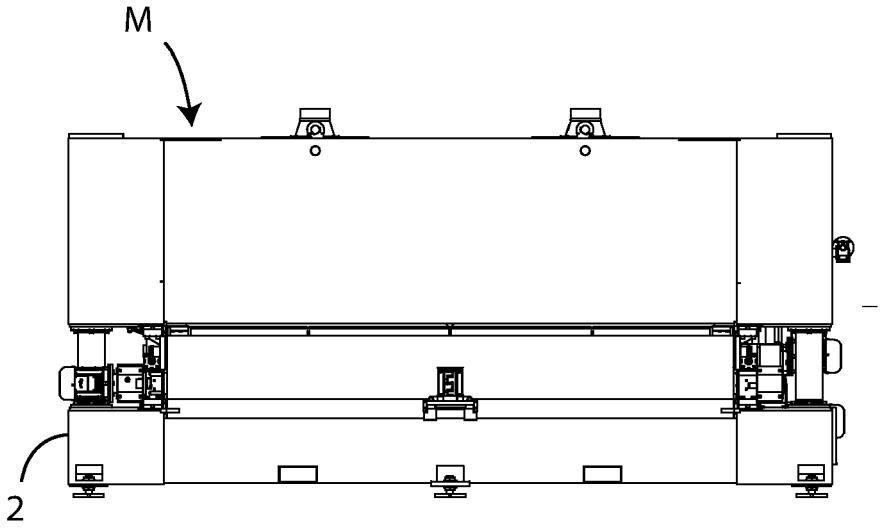

Fig. 6

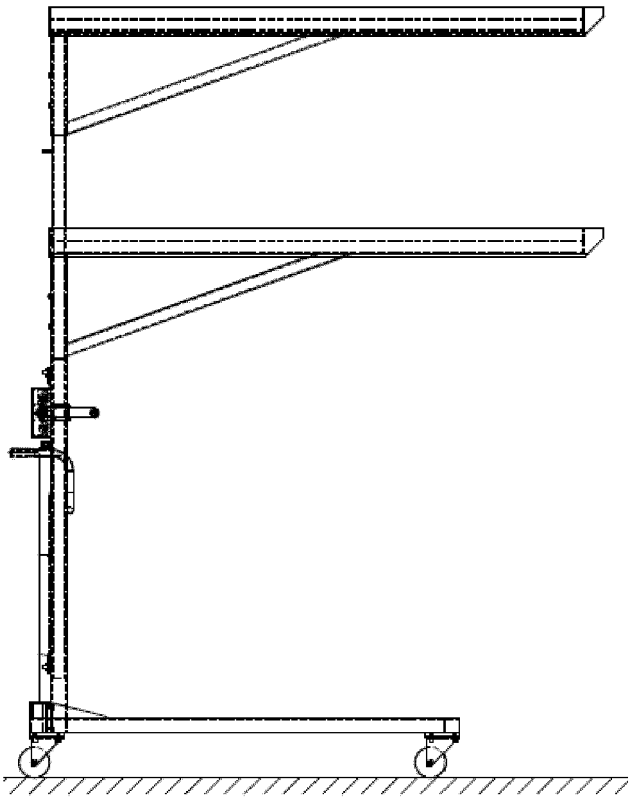

Fig. 7
(Priar Art)

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EUROPEAN SEARCH REPORT

Application Number
EP 23 18 9942

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	IT BO 940 228 A1 (DMC SPA [IT]) 18 November 1995 (1995-11-18)	1,3,4,7,	INV.
Y	* figures 1-5 *	9-13,15 5	B24B21/00 B24B21/12
A	* paragraph [0011] *	2,6,8,14	B24B21/18
	* paragraph [0020] *		B24B7/00
	* claim 1 *		B24B7/06

Y	EP 2 241 401 A1 (SCM GROUP SPA [IT]) 20 October 2010 (2010-10-20) * figure 4 * * paragraphs [0037] - [0044] * * paragraph [0051] * * claims 1, 5-13 *	5	

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	20 October 2023	Herrero Ramos, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 18 9942

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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EPO FORM P0459

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