



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.09.2015 Bulletin 2015/39

(51) Int Cl.:
B65H 19/12 (2006.01)

(21) Application number: **15157041.3**

(22) Date of filing: **27.02.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(72) Inventors:
• **Chiarini, Stefano**
I-48017 CONSELICE, Province of Ravenna (IT)
• **Pungetti, Cristian**
I-40064 OZZANO DELL'EMILIA, Province of Bologna (IT)

(30) Priority: **04.03.2014 IT BO20140105**

(74) Representative: **Porsia, Attilio**
Via Caffaro 3/2
16124 Genova (IT)

(71) Applicant: **CEFLA SOCIETA' COOPERATIVA**
40026 Imola (BO) (IT)

(54) **System for the conveyance and the support of rolls of flexible basically flat material for supplying a processing machine**

(57) System and method for supporting and conveying rolls of flexible basically flat material for supplying machines for industrial processing, said system comprising:

- a. a trolley (16), removable from the machine supplied by the roll itself, for the support of rolls, comprising: a shaft (17) to support said roll (14, 15), a frame (18),
 - b. an active pivoting assembly (30), allowing the hooking of trolley (16) to the machine supplied by the trolley, aid assembly comprising a frame (31), a connecting flange (29), a rotating hub (34) and a connecting platform (35),
- characterized in that**

said trolley (16) becomes active through to the connection to electric and/or pneumatic supply, realized fastening said trolley (16) to said pivoting assembly (30) and to said connecting flange (29).

Method for replacing rolls (14, 15) supplying machines for industrial processing, comprising a trolley (16) removable from the machine for the support of rolls, further comprising the following steps:

- a. interrupting the supplying of the flexible basically flat material to the machine supplied by the roll itself; said supplying occurs keeping trolley (16) shaft (17) in a given direction, generally perpendicular to the moving forward direction of the flexible basically flat material;

characterized in that

- b. said trolley (16) is extracted from the machine firstly rotating it thanks to the rotating hub (34) and then sliding it within pivoting assembly (30); said extraction occurs forming an angle equal or smaller than 60° between said shaft (17) of trolley and shaft (17) direction during step a).

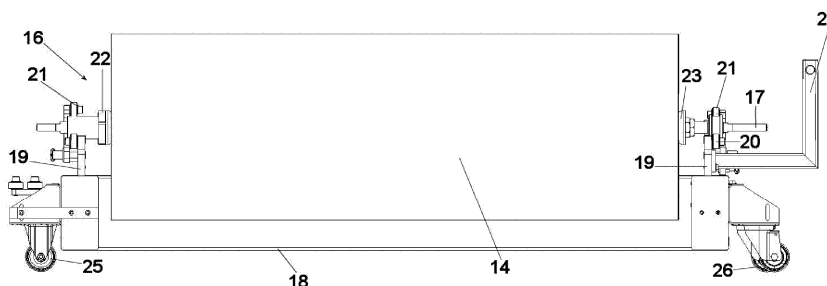


FIG. 5

Description

[0001] The invention refers to an apparatus and a method for conveying and supplying large rolls of flexible, basically flat material, said rolls supplying a machine for processing industrial manufactured products.

[0002] Apparatus and method will be hereafter described referring to a preferred embodiment, wherein paper rolls are inserted in a machine for painting basically flat parts. Nonetheless, it is apparent that the very same apparatus can be used in any industrial machine making use of rolls of paper, film, textile or other material having large dimensions and considerable weight (in the order of hundreds of kilograms).

[0003] Painting machines have been known for a long time, and are normally provided with a conveying system of the parts to be painted, consisting in a continuous conveying belt inserted in a painting booth which can be provided, for instance, of nozzles spraying paint on the parts to be painted. A share of paint typically ends, rather than on the part to be painted, on the conveying system, which gets dirty and must be cleaned, so as not to damage the parts under manufacturing.

[0004] The problem of the paint ending on the conveying system is usually solved according one of two broad families of solutions:

- Systems continuously recovering paint, making use of blades and solvents combined in different ways;
- Systems protecting the continuous conveying belt, superposing to the belt a protecting element, which is usually paper or plastic, so as to support the parts to be painted on an always clean surface.

[0005] Systems of the first and second kind have been known for a long time in the art; for instance, a plant belonging to the family protecting the conveying belt is described in Valtorta's utility model IT211906, filed on October 9th 1987, or in VD's patent IT1395165, wherein in Figure 2 two paper rolls are present, indicated with 11.

[0006] Generally, the reasons to choose one or the other family of solution can be resumed as follows.

[0007] The systems recovering paint are economically advantageous in the production of large lots painted with the same colour, and when the conveyance of parts occurs in a continuous way. As a matter of fact, when parts conveyance occurs in a discontinuous way, paint tends to dry on the continuous belt and its recovery becomes more difficult and less effective. Moreover, lot dimensions are important, too: if the lot is made of a small number of parts painted with the same colour, paint recovery allows to get reduced quantity of paint, while the time requested for setting up and cleaning the machine in the colour change becomes an important factor.

[0008] As a consequence, when small lots have to be produced, and when parts conveyance is non continuous, using a one-way protection of the conveying belt becomes economically interesting.

[0009] Painting machines of known type belonging to the second family of solutions have typically the same configuration shown in the already quoted utility model IT211906: the parts to be painted are supported on a continuous conveying belt allowing them to move forward. Between the conveying belt and the parts to be painted a layer of paper is interposed; said paper moves forward together with the continuous conveying belt; paper is unrolled from a supplying roll. When the by now dirty paper detaches from the continuous conveying belt at the end of the conveying plant, the dirty paper is rolled up on a second (recovery) roll. Once the whole clean paper roll is used, or the now dirty paper overfills the second roll, the problem of replacing the rolls arises.

[0010] The same technical problem of replacing rolls arises in the very same way in other kinds of plants, such as paper or textile printing plants, plants for wrapping food or cigarettes, calenders, etc.

[0011] The rolls used in such plants are large and heavy objects: in the case of painting plants, typically the width of a roll is 1520 mm, and the weight of a roll fluctuates between 100 and 300 kg. It is apparent that roll handling requires specific precautions and devices.

[0012] A trolley supporting a large and heavy roll is known e.g. from Voith's patent application DE102005000081A1, describing a trolley for conveying rolls for paper or paperboard plants, calenders or paper cutting machines. The trolley is only a support for the roll, and its coupling with the machine supplied by the roll is not highlighted.

[0013] Aim of the present invention is providing a system allowing the replacement of rolls of flexible basically flat material (paper, film, plastic sheets, textiles) in a simple and fast way, non laborious and safe for the human operator performing the roll change.

[0014] This aim is obtained through an apparatus and a method having the features of the independent claims. Advantageous embodiments and refinements are specified in claims dependent thereon.

[0015] A first advantage of the present invention consists in allowing roll replacement making use of a limited space near the machine supplied by the rolls, when compared with the space requested by prior art trolleys.

[0016] A second advantage consist in the small cost of the trolley, which has no electric or pneumatic consumption, and therefore can be present in a number greater than two.

[0017] A third advantage consists in the fact that the mounting of a roll on the trolley, and the removal of the roll from the trolley can be performed in an area which is remote from the machine supplied by the roll.

[0018] A fourth advantage consists in eliminating devices for conveying and mounting the roll: the present trolley performs the double function of conveying the roll within the factory and of supporting the roll while it is supplying the manufacturing machine; in the preferred embodiment here shown, in the conveying belt of a painting machine.

[0019] The present invention will now be described by way of non-limiting example with reference to the accompanying drawing:

Figure 1 Lateral view of a conveying system of a painting machine according to the prior art;

Figure 2 Top view of a conveying system of a painting machine according to the prior art, wherein rolls are shown during their replacement;

Figure 3 Top view of a conveying system of a painting machine according to the present invention, wherein rolls are shown during their replacement;

Figure 4 Top view of a detail of the conveying system of the painting machine, wherein a roll is shown during replacement;

Figure 5 Lateral view of the roll-supporting trolley;

Figure 6 Top view of the roll-supporting trolley

Figure 7 Perspective view of the pivoting frame.

[0020] The system of the present invention consists of the combination of two distinct components:

- a. a roll-supporting trolley, removable from the machine supplied by the roll, for supporting and conveying the roll itself;
- b. a pivoting assembly electrically/pneumatically supplied, mobile with respect to the machine supplied by the roll.

[0021] In the preferred embodiment, the assembly is not removable from the machine supplied by the roll.

[0022] Figure 1 shows the conveying system 1 of a painting machine of known type, typically comprising: a continuous conveying belt 2 for the (not shown) parts to be painted; a frame 3 with a vacuum box keeping paper adherent to the conveying belt 2. The conveyance of the parts to be painted occurs in the sense indicated by the bold arrow. A supplying roll 4 and a recovery roll 5 are placed under said frame 3, each on its trolley 6. When rolls have to be replaced, the rolls must be extracted perpendicularly from the machine, as shown in Figure 2. The trolley 6 are laterally extracted from the machine, and then the roll 4 or 5 is freed from its locking device, and is usually extracted together with a shaft 7 supporting it. As shown in Figure 2, a wide space is necessary on the machine side, as the roll 4 or 5 must be demounted with its shaft 7. Given the weights involved, a specific device is needed in order to mount and demount the assembly consisting of shaft 7 and roll 4 or 5 from its respective trolley 6.

[0023] Once the assembly consisting of shaft 7 and roll 4 or 5 was removed from the machine, shaft 7 must be extracted from the roll core and a new clean roll 4 (during loading phase), or an empty roll core (during unloading phase) must be inserted on shaft 7. Not necessarily the loading and unloading are performed at the same time.

[0024] Figure 3 shows a conveying system comprising a roll conveying system 11 according to the present invention. The conveying system 11 comprises a conveying belt 12 of the (not shown) parts to be painted; a frame 13 with a vacuum box keeping the paper adherent to the conveying belt 12. The conveyance of the parts to be painted occurs in the sense indicated by the bold arrow. A supplying roll 14 and a recovery roll 15 are placed under said frame 13, each on its trolley 16. When rolls 14 or 15 have to be replaced, they are extracted from the machine in an angulated way as shown in Figure 3. Already observing Figures 3 and 4 it is apparent that, thanks to the system of the present invention, a smaller space is needed on the side of the machine with respect to the prior art system, as the extraction of rolls occurs not perpendicularly to conveying system 11, but according to an angle. Figure 4 allows to appreciate that a pivoting assembly 30 helps the extraction of the trolley 16, initially keeping it in a direction parallel to the main axis of the pivoting assembly 30 itself, while beyond a certain travel, the trolley is free of inclining of a even greater angle with respect to the machine itself.

[0025] Figure 5 shows the roll-supporting trolley 16 in a lateral view. The trolley 16 is built in only one version, capable of hosting the supplying roll 14 or the recovery roll 15. In its preferred embodiment, the trolley 16 comprises a shaft 17, a tubular frame 18, two lateral sides 19, supporting cushions 20, a top hook 21, two tightening cones 22, 23, a handle 24, a pair of fixed wheels 25, a pair of pivoting wheels 26, linear rails 27, a device 28 for attaching trolley 16 to the pivoting assembly 30.

[0026] The trolley 16, thanks to the presence of the two pairs of wheels 25 and 26 and of the handle 24, allows to convey roll 14 or 15 from and towards a storehouse, which can also be placed in a position remote with respect to the machine itself, making the presence of a specific roll conveying device near the machine itself superfluous, which is on the other hand necessary in the prior art plants.

[0027] The pivoting wheels 26 allow the movement of the trolley 16 in any direction, making its use easier when used for conveying the rolls. The fixed wheels 25, on the other hand, simplify the insertion of trolley 16 with respect to pivoting assembly 30

[0028] On the trolley 16 on purpose no electric or pneumatic sources are present, which would limit the movements

of the trolley itself. The low cost of the trolley allows the plant manager to easily buy a number of trolleys greater than two, which accelerates the roll replacement on the machine, as waiting for the removal of a roll 15 or an empty roll core is not anymore necessary to proceed to the loading of a roll 14 or an empty roll core on another free trolley 16.

[0029] The shaft 17 is inserted on a connection flange 29, allowing the connection to the pneumatic and electric supplies, which remain fixed on the machine.

[0030] The roll 14 or 15 (or the empty roll core) is fastened to the shaft 17 through two tightening cones 22 and 23.

[0031] To simplify the insertion of the trolley 16 on the machine, a pivoting assembly 30 is present, which is integral to the conveying system 11 itself.

[0032] In Figure 7 the pivoting frame is shown, which comprises a C-frame 31 open on one side, comprising, in its preferred embodiment, a connection flange 29, two supporting wheels 32, resting on the ground, a supporting base 33 fastened to the machine, a rotating hub 34, and a connecting platform 35. Said C-frame 31 is the element guiding the trolley 16 during the insertion on the conveying system 11. The pivoting 30 assembly simplifies the insertion of the trolley 16 and allows the rotation of the trolley 16 with respect to the machine, with an angle with respect to the conveying system 11 smaller or equal to 60°. The rotation of the frame 31 is limited by end-of-stroke stops 36, which are adjustable according to the needs of the specific machine.

[0033] The C-frame 31 is the element leading the trolley 16 during its insertion on the conveying system 11. The pivoting assembly 30 facilitates the insertion of the trolley 16 and allows the rotation of the trolley 16 with respect to the machine, with an angle smaller or equal to 60°, with respect to the conveying system 11. The rotation of pivoting assembly 30 is limited by the end-of-stroke stops 36, which are adjustable according to the needs of the specific machine.

[0034] The connecting platform 35 determines the stops and the correct positioning of the trolley 16 with respect to the machine, both in height, and on the plane. The other element ensuring the perfect connection between the shaft 17 of trolley 16 and the conveying system 11 is the connection flange 29 present on the conveying system 11. The connection flange 29 is a purely mechanical connection element, and allows to disconnect the shaft 17 between its motive or braking part, which remains on the conveying system 11, and the part having the only aim of supporting the roll 14 or 15, which remains on the trolley 16.

[0035] Therefore, the trolley 16 performs a function of transport and support of rolls 14 or 15, when it is detached from the machine supplied by rolls 14 or 15, and becomes active through the connection to electric and/or pneumatic supplies only when the trolley 16 is connected to the conveying system 11 through the pivoting assembly 30.

[0036] In practice, the replacement of a roll 14, 15 supplying a machine for industrial processing comprises the following steps:

a. the supply to the machine supplied by the roll of the flexible, basically flat material is interrupted; said supply occurs keeping the shaft 17 of trolley 16 in a given direction, generally perpendicular to the direction of moving forward of the flexible, basically flat material;

b. the trolley 16 is extracted from the machine, sliding it in the pivoting assembly 30; the extraction occurs forming an angle smaller or equal to 60° between the shaft 17 of the trolley 16 and the direction of the shaft 17 during step a); the first extraction step occurs with the same angle of the pivoting assembly 30, while the second extraction step can occur with an even bigger angle of the trolley 16 with respect to the machine, therefore requesting an even smaller space in the proximity of the machine;

c. the trolley 16 is replaced with an identical trolley 16 bearing a new roll 14 or an empty roll core; said new roll or said empty roll core had been previously mounted on the trolley 16 in an area remote from the machine supplied by rolls 14 or 15.

1	conveying system	31	C-frame
2	conveying belt	32	wheels
3	frame with vacuum box	33	supporting base
4	supplying roll	34	rotating hub
5	recovery roll	35	connecting platform
6	trolley	36	stop
7	trolley shaft		
11	conveying system		
12	conveying belt		
13	frame with vacuum box		
14	supplying roll		
15	recovery roll		

(continued)

	16	trolley
	17	trolley shaft
5	18	trolley frame
	19	lateral side
	20	supporting cushions
	21	top hook
10	22	mobile tightening cone
	23	fixed tightening cone
	24	handle
	25	fixed wheels
	26	pivoting wheels
15	27	linear rails
	28	attaching device
	29	flange
	30	pivoting assembly

20

Claims

1. System for supporting rolls of flexible basically flat material for supplying machines for industrial processing, comprising:

25 a trolley (16), removable from the machine supplied by the roll itself, for the support of rolls, comprising: a shaft (17) to support said roll (14, 15), a frame (18), an active pivoting assembly (30), allowing the hooking of trolley (16) to the machine supplied by the trolley, said assembly comprising a frame (31), a connecting flange (29), a rotating hub (34) and a connecting platform (35),

30 **characterized in that**
said trolley (16) becomes active through to the connection to electric and/or pneumatic supply, realized fastening said trolley (16) to said pivoting assembly (30) and to said connecting flange (29).
2. System comprising a removable trolley (16) and a pivoting assembly (30) connected to electric/pneumatic supply according to claim 1, wherein said trolley (16) perform also the conveyance of rolls, and further comprises a handle (24) and wheels (25, 26).
3. System comprising a removable trolley (16) and a pivoting assembly (30) connected to electric/pneumatic supply according to claim 1 or 2, wherein said pivoting assembly (30) during roll loading and unloading forms an angle smaller or equal to 60° with respect to the axis of the roll during its use in the machine supplied by the roll itself.
4. System comprising a removable trolley (16) and a pivoting assembly (30) connected to electric/pneumatic supply according to claim 1 or 2, wherein the width of the angle formed by shaft (17) during replacement of rolls (14, 15) with respect to the position of the same axis (17) when the roll is supplying the machine is adjustable thanks to end-of-stroke stops (36) present on pivoting assembly (30).
5. System comprising a removable trolley (16) and a pivoting assembly (30) connected to electric/pneumatic supply according to claim 1-6, wherein trolley (16) comprises a pair of fixed wheels (25) and a pair of pivoting wheels (26).
6. System comprising a removable trolley (16) and a pivoting assembly (30) connected to electric/pneumatic supply according to claim 1-4, wherein the number of available trolleys (16) is greater than the two strictly necessary for supplying the machine, and all trolleys (16) are equal.
7. Method for replacing rolls (14, 15) supplying machines for industrial processing, comprising a trolley (16) removable from the machine for the support of rolls, further comprising the following steps:

interrupting the supplying of the flexible basically flat material to the machine supplied by the roll itself; said supplying occurs keeping trolley (16) shaft (17) in a given direction, generally perpendicular to the moving

forward direction of the flexible basically flat material;

characterized in that

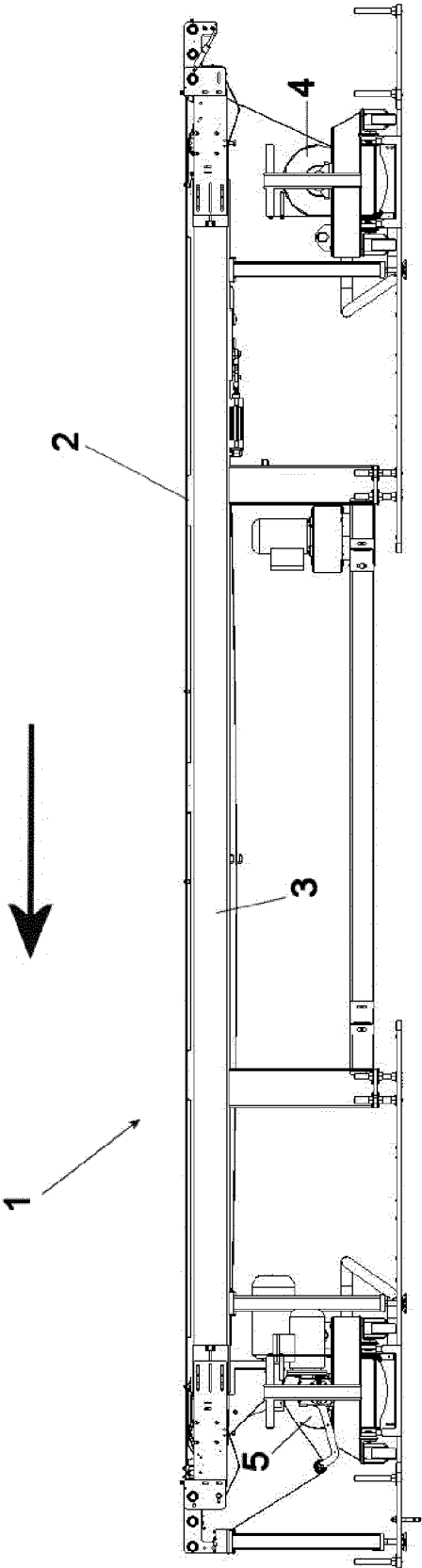
said trolley (16) is extracted from the machine firstly rotating it thanks to the rotating hub (34) and then sliding it within pivoting assembly (30); said extraction occurs forming an angle equal or smaller than 60° between said shaft (17) of trolley and shaft (17) direction during step a).

8. Method for replacing rolls (14, 15) supplying machines for industrial processing according to claim 7, wherein the first extraction step occurs with the same angle of the pivoting assembly (30), while the second extraction step occurs with an even wider angle of trolley (16) with respect to the machine.

9. Method for replacing rolls (14, 15) supplying machines for industrial processing according to claim 7 or 8, further comprising the following step:

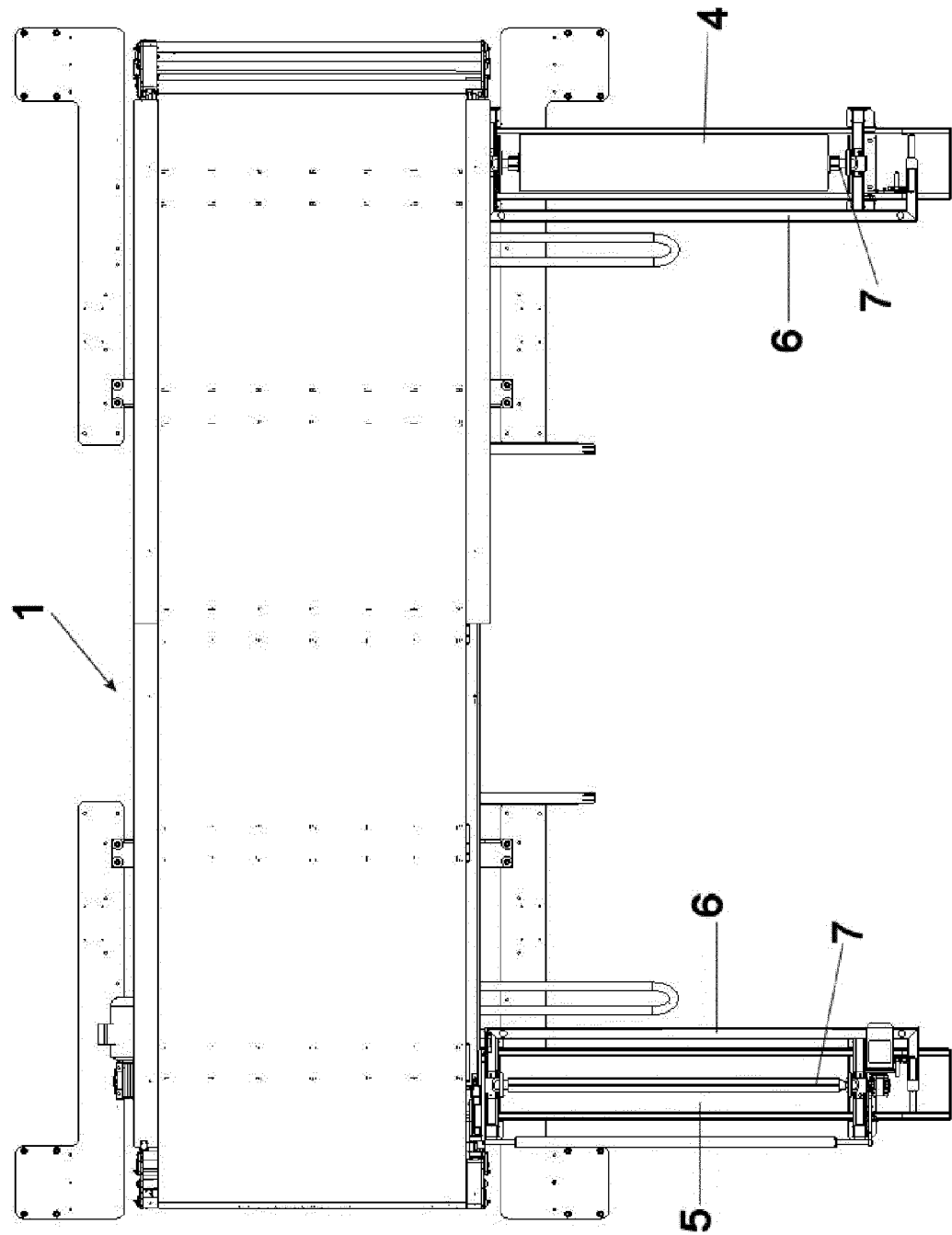
trolley (16) is replaced by another identical trolley (16) bearing a new roll (14) or an empty roll core; said new roll or said empty roll core was previously mounted on the other trolley (16) in an area which is remote from the machine supplied by roll (14 or 15).

10. Conveying system (11) in a painting machine for basically flat parts, making use of the system comprising a removable trolley (16) and a pivoting assembly (30) connected to electric or pneumatic supplies according to claims 1 - 9.



PRIOR ART

FIG. 1



PRIOR
ART

FIG. 2

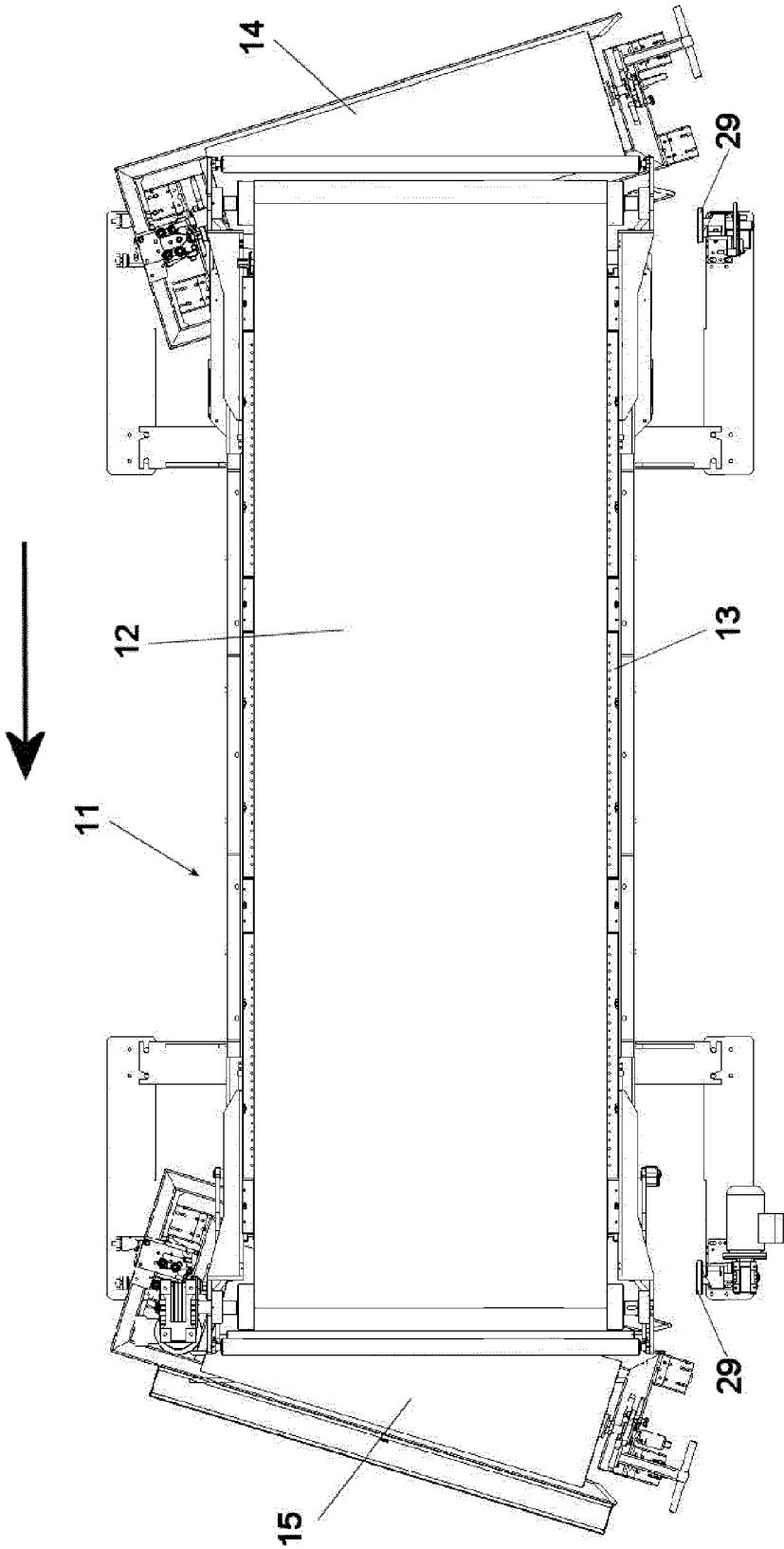


FIG. 3

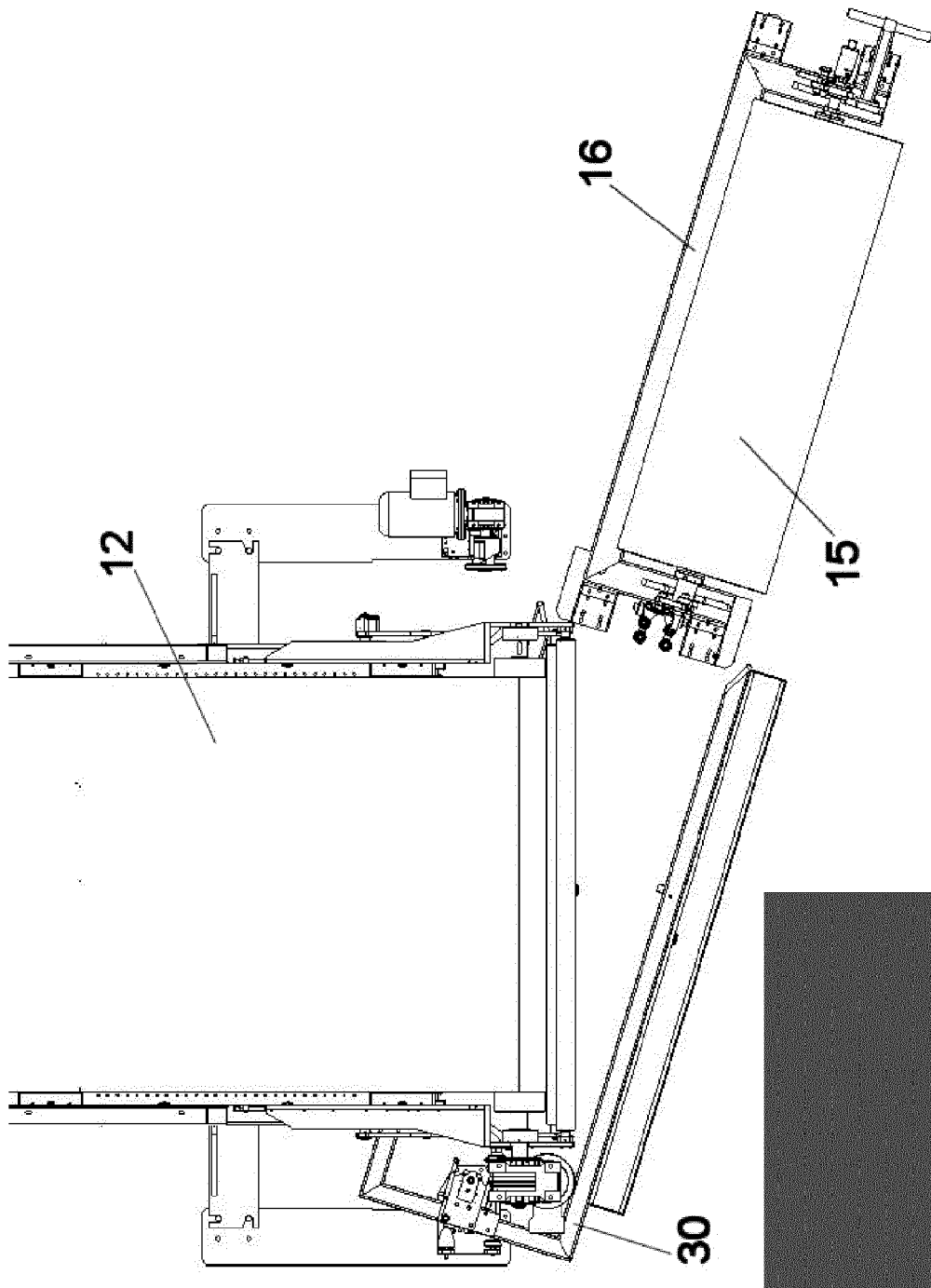


FIG. 4

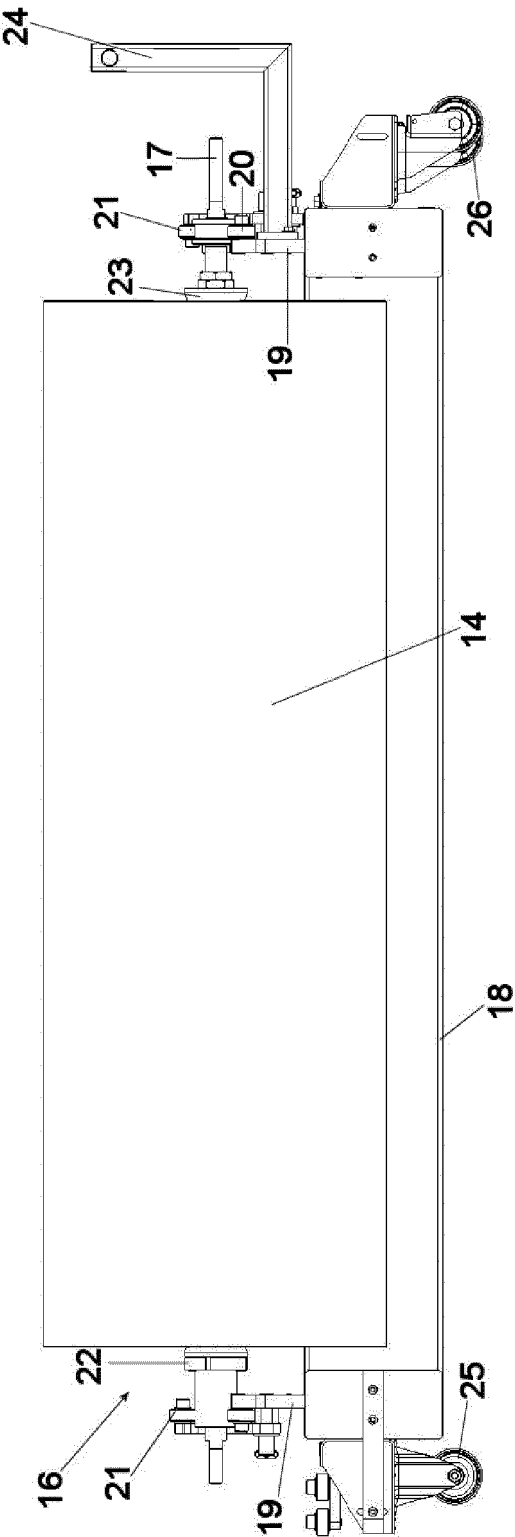


FIG. 5

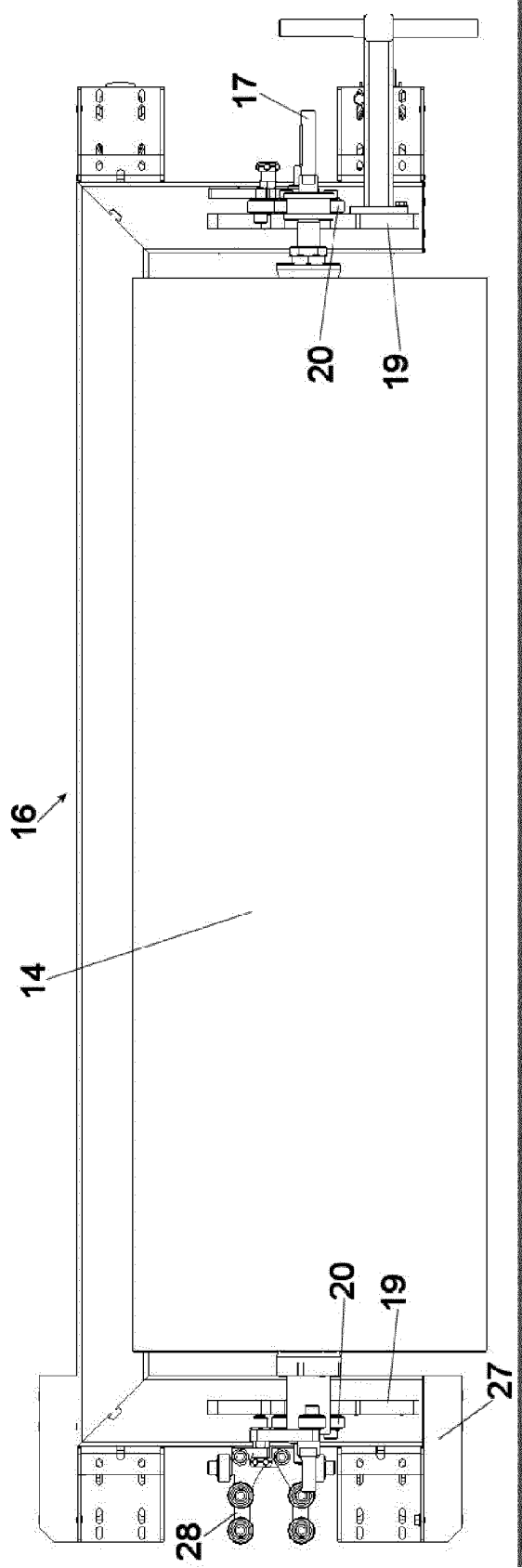


FIG. 6

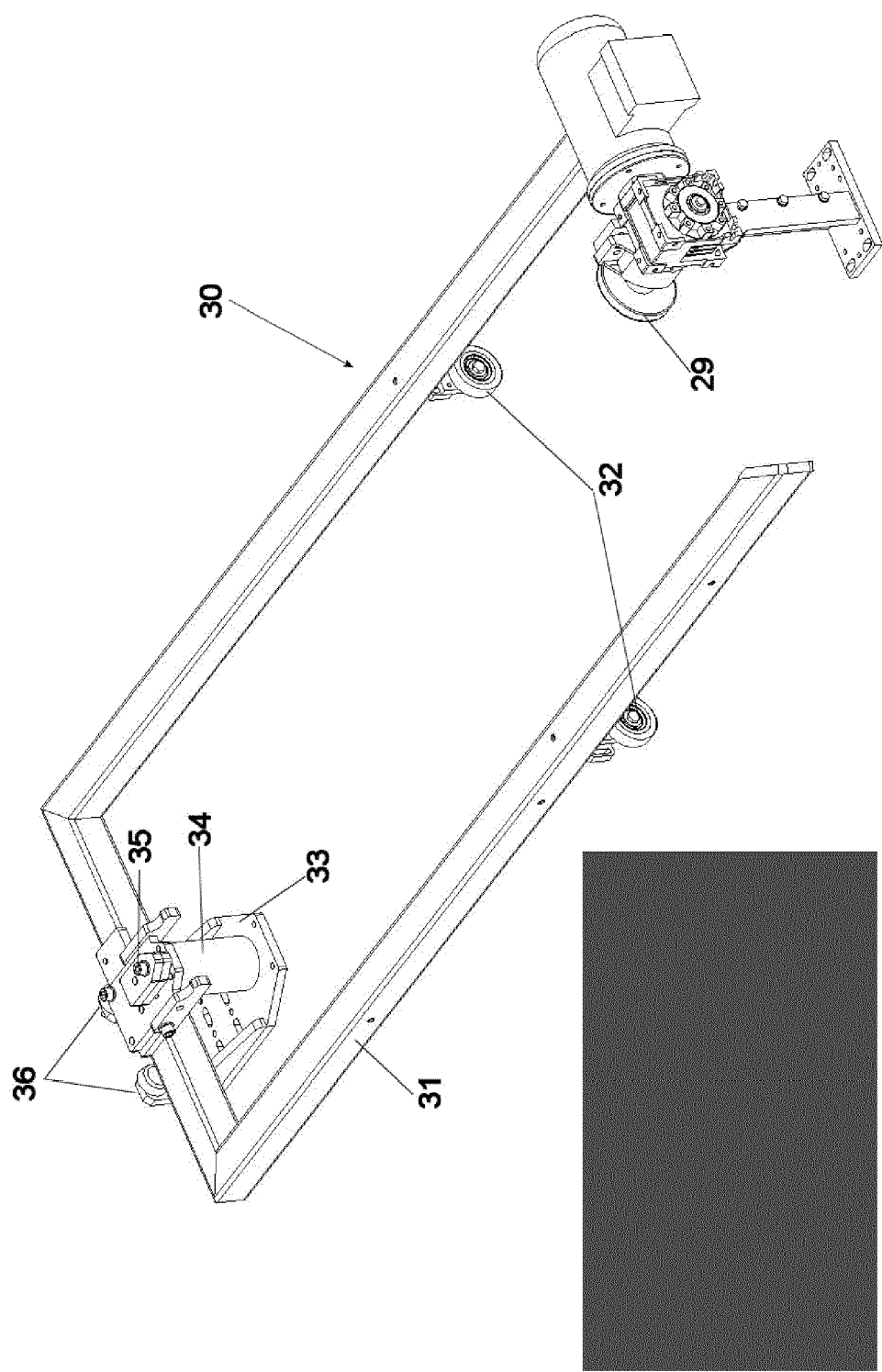


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- IT 211906 [0005] [0009]
- IT 1395165 [0005]
- DE 102005000081 A1 [0012]