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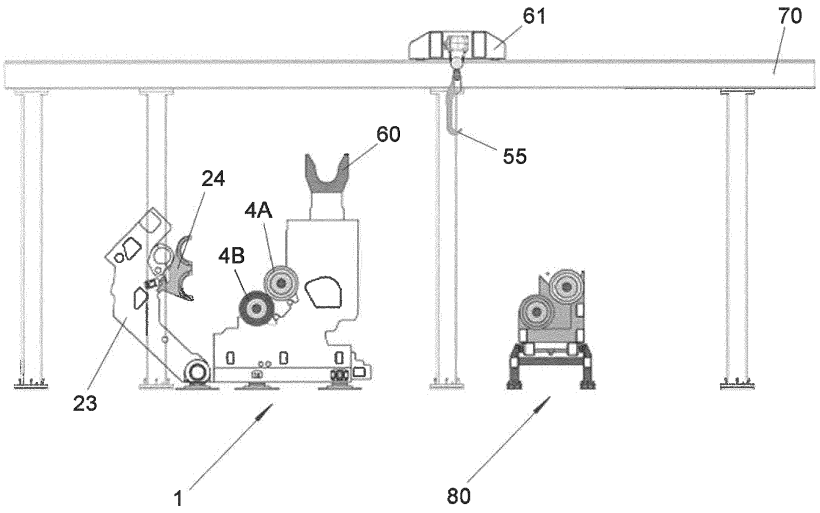
(54) **IMPROVED EMBOSSING ASSEMBLY FOR SHEET MATERIAL AND RELATIVE AUTOMATIC EMBOSSING ROLLERS CHANGE SYSTEM**

(57) A description is given of an automatic change system of embossing rollers (4A, 4B) comprising an embossing machine (1) provided with an exchange station external thereto and a movable side panel with upper blocking means for said rollers attached integrally to said movable side panel, a rollers storage magazine and/or shuttle (80), an automatic bridge crane (61) provided with hooking means, where said bridge crane is apt to extract automatically at least one of said embossing rollers (4A, 4B) from said embossing machine (1) when in open configuration, to transfer said extracted roller into said exchange station (60) on said embossing machine (1), to take a first exchange roller from said roller storage magazine (80) to house it in said embossing machine in the position of said extracted roller, to transfer rollers onto a shuttle for the possible external use on other lines or for maintenance or for an external check without having to interrupt production.

FIG. 7



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Description

[0001] The present invention relates to an improved embossing assembly for sheet material, in particular paper, such as tissue paper, toilet paper and the like.

[0002] Embossing machines are known on the market provided with embossing cylinders or rollers supported rotatably at their ends by means of bearings in the side panels of the frame of the embossing machine.

[0003] These embossing rollers are provided with a sleeve, generally in steel, engraved with the embossing patterns, so as to be able to perform the embossing of the respective plies of paper. This takes place by making the paper pass through an indentation between the steel embossing roller and the rubber roller which co-operates with it (pressure roller). The paper plies are subsequently coupled one to the other by means of nested or tip-to-tip coupling, so as to obtain an embossed web of several layers.

[0004] The embossing machines are also provided with embossing cylinders or rollers in rubber supported rotatably at their ends, which act as contrast for the embossing rollers in steel with which they co-operate.

[0005] The rubber roller can be different in order to adapt to the different steel rollers: it is well known in fact that a correct embossing process also depends on the features of the rubber roller, whose required hardness can vary from 50, 60 70 Shore A to 90 Shore A or more.

[0006] The embossing steel rollers and the rubber rollers have to be accessible and/or removable both for maintenance (for example the replacement of the bearings) and for the type of process, due to the need to change the embossing patterns on the web (sheet) and therefore the engraving on the sleeve of the embossing roller, and consequently to change also the rubber rollers.

[0007] As well as the abovementioned need to adapt to different embossing rollers in steel having different features, it is also clear that it can be necessary to change the rubber roller due to its consumption caused by wear.

[0008] The removal of the embossing rollers in steel and of those in rubber has always involved considerable down times of the machine, due to the need to dismantle and reassemble manually some parts of the embossing machine in order to offer greater accessibility to these embossing rollers in steel and in rubber, in addition to the time necessary for the change of said embossing rollers.

[0009] Patent EP 1652661 B1 describes an embossing machine for sheet material which comprises at least two embossing rollers, the ends of which are mounted rotatably in the side panels of the frame of the embossing machine, where each of the side panels is divided into a fixed portion and into a translatable movable portion, or rotatable with respect to a fixed point, so as to free an adequate space to allow an easy replacement of the embossing rollers in steel by means of raising and lowering of the same with a hoist, after having been detached from the supports placed in the side panels.

[0010] The system described in EP 1652661 B1 allows an easy replacement of the embossing rollers in steel and in rubber but the limitation of this system is that it is still necessary to operate manually to engage/disengage the supports of the embossing rollers which are mounted on the fixed part of the side panel.

[0011] Two other systems are described in WO2015/150452 and in EP 1 765 584 which allow an easy replacement of the steel embossing rollers, by means of appropriate rotating manipulators contained in the machine and housing the steel replacement rollers, generally two, but do not provide an equally easy and automatic extraction/replacement of the rubber rollers in that they have to be detached manually from the arms which support them.

[0012] Moreover these machines have limited working changes since the steel rollers are stored inside the machine, in appropriate seats, involving therefore a considerable overall machine dimension which increases as the number of interchangeable rollers to be stored increases.

[0013] Moreover the rollers cannot be shared with other similar units or moved in case of need onto other embossing machines except in a very complicated manner.

[0014] Moreover these machines, having the rollers stored in proximity of the work zone, end up by soiling the same rollers which are not therefore ready for subsequent changes.

[0015] Moreover these rollers, as well as soiled, cannot be cleaned during production in that housed inside safety guards or close to moving mechanical members as occurs in the cases in WO2015/150452 and in EP 1 765 584.

SUMMARY OF THE INVENTION

[0016] The object of the present invention is to eliminate the disadvantages of the prior art by providing an embossing assembly for sheet material which is apt to simplify and speed up the operations of replacement of the embossing rollers in steel and in rubber and the operations of regulation of the machine.

[0017] Another object of the present invention is to provide such an embossing assembly which is reliable and at the same time apt to be installed in a compact embossing machine which occupies little space, without sacrificing the possibility of storing many replacement rollers.

[0018] A further object of the present invention is to provide a system of replacement/storage of the rollers for said embossing assembly which allows moving in a simple manner, in case of need, the rollers of an embossing machine on other embossing machines present in the production unit, and managing the storage and maintenance of the rollers also with the machine in operation.

[0019] Another object of the present invention is to provide such an embossing assembly wherein the rollers can be engaged/disengaged automatically, so as to

avoid manual disengaging/engaging of the block support of conventional embossing rollers.

[0020] These objects are achieved in accordance with the invention and with the features listed in the appended independent claims.

[0021] Further advantageous embodiments of the invention are disclosed in the dependent claims.

[0022] The embossing machine according to the present invention provides an embossing assembly for sheet material comprising

at least two embossing rollers in steel whose ends are mounted rotatably in the side panels of an embossing machine, and

at least two embossing rollers in rubber whose ends are mounted rotatably in the side panels of an embossing machine.

[0023] Each of the side panels is divided into a fixed side panel portion and into a movable side panel portion.

[0024] The ends of the embossing rollers are not mounted in blocking supports attached to the fixed side panel portion because said blocking supports are not in fact provided on said fixed side panel portion: in actual fact the lower part of the block supports is attached to the fixed side panel portion while the upper part of the block supports is integral, or in one single part, with the movable side panel portion as will be explained in detail here below.

[0025] When the movable side panel portion moves with respect to the fixed portion away therefrom, a sufficient space is defined for removing automatically said embossing rollers in that the moving away of the movable side panel takes with it the upper part of the block supports which are integral or in one part with the movable side panel portion, favouring an immediate disengaging of the rollers with respect to the lower part of the block supports.

[0026] On the contrary, when the movable side panel portion moves towards the fixed portion, the space between the two portions is closed: in fact a part of said movable portion has an appropriate shape in order to adapt to the overall profile formed by each upper portion of the embossing rollers, therefore also acting as abutment of the fixed portion of the frame, when the machine is closed.

[0027] The rollers can therefore rotate, being restrained at their ends by the movable and fixed portions of the side panels.

[0028] In practice the side panels of the movable portions contain special parts formed thereon and capable of avoiding the use of supports for the rollers since it is the same parts formed on the side panels which contain the rollers.

[0029] After the opening of the movable portion of the side panel it is possible to replace easily the steel embossing rollers and those in rubber, since they can be lowered and raised by means of a hoist or hook, preferably automated, without having to resort to the usual and necessary manual disengaging of the block supports of the rollers from the side panels of the panel as in the known machine of EP 1652661 B1.

[0030] The present embossing machine provides moreover a roller exchange station which rests on the upper cover of the frame of the machine in which the roller just extracted from the embossing assembly can stay, while awaiting to be returned in the magazine by a hoist or winch mounted on a bridge crane (automatic winch) since the rollers can be extracted and positioned outside of the frame of the machine yet close thereto, avoiding the need to increase the dimensions of the machine for the storage of the rollers and the space of access to all the rollers.

[0031] The use of an automatic winch in combination with the exchange station provided on the embossing machine and the storage in situ of a high number of rollers in proximity of the machine means that an easy replacement of the embossing rollers is possible, both of those in steel and of those in rubber, without any limitation.

[0032] An automatic improved winch can be used since the movable portion of the side panel allows access immediately to the rollers without having to disengage manually the upper part of the block supports of the rollers.

[0033] The use of the winch can therefore be completely automatic.

[0034] The present system allows an easy change of production between tip-to-tip production and nested production and moreover it is advantageous also in the case wherein the marrying roller mounted in the movable roller has to be replaced.

DESCRIPTION OF THE DRAWINGS

[0035] Further features of the invention will be made clearer by the following detailed description referred to one of its embodiments purely by way of a non-limiting example, illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of an embossing machine where the movable part can be opened in translation and the upper cover has been omitted;

Figure 2 is a schematic view in cross section of the embossing machine of Figure 1, taken along a vertical plane between the two side panels of the machine and parallel thereto, wherein the gluing assembly has also been schematised;

Figure 3 is a perspective and partially exploded view, illustrating two embossing rollers supported at their ends, where their lower part is supported by the fixed side panel, while the upper parts are supported by elements illustrated in a raised position and integral with the movable side panel (not illustrated for the sake of simplicity);

Figure 4 is a perspective view, partially interrupted, of the ends of the embossing rollers of a machine

with the movable side panel openable by pivoting, where the movable side panel includes the upper part of the block supports of the rollers;

Figure 5 is a perspective and complete view of the machine of Figure 4, with the movable side panels completely opened by pivoting and with an embossing roller raised at the ends;

Figure 6 is a side view of the machine of Figures 1-2 with the movable side panel completely open in translation and with one of the two embossing rollers removed;

Figures 7-10 are four schematic views in side elevation, illustrating the various phases for the automatic removal of the embossing cylinders of the automatic system according to the invention; and

Figure 11 is a view in side elevation illustrating the system of Figs. 7-10 complete also with the vertical roller magazine;

Figures 12a and 12b are perspective views of a roller magazine on shuttle where the roller is respectively in withdrawn position ready for the replacement and in extracted position ready for cleaning.

DESCRIPTION OF A PARTICULAR EMBODIMENT

[0036] With the aid of the drawings, a description is given of an embossing machine containing an embossing assembly according to the invention and a system of automatic change of the embossing rollers associated with said machine.

[0037] Figure 1 illustrates a first embodiment of an embossing machine, denoted overall by reference numeral 1.

[0038] The embossing machine 1 comprises two side panels or shoulders, each of which comprises at least one fixed portion 2, 2', placed in a fixed manner on a base 3. Two embossing cylinders or rollers 4A, 4B are mounted rotatably in the fixed portions 2, 2' of the side panels. Each embossing roller 4A, 4B comprises a sleeve in engraved steel 5A, 5B and two end portions 6A, 6B. The ends 6A, 6B of the embossing rollers are rotating between the fixed portions (2, 2') of the side panels and the movable portions 23 of the side panels.

[0039] Referring to Figure 2, a schematic description is given of the functioning of the embossing machine 1. The embossing machine 1 works two plies W1, W2 of material (for example paper) and provides for performing the embossing of each of the two plies between a pair of rollers coupled one to the other, comprising an engraved steel roller and a contrast (counter-pressure) rubber-covered roller. The upper ply W1 passes through the upper pair of rollers constituted by a first embossing roller 4A and by a rubber-covered roller 8A. The two rollers 4A, 8A are brought into contact with a working pressure. The upper ply W1 passes through the two rollers 4A, 8A so as to be marked with the engraving of the steel roller 4A.

[0040] On leaving the point of contact between the two rollers 4A and 8A, the upper ply W1 remains in contact with the steel roller 4A for an angle of approximately 270°. In this way the upper ply W1 can come into contact with a glue distribution assembly 9 which, by means of a distributing roller 10, deposits a layer of glue on the ply W1. It should be noted that the distributing roller 10 and the upper embossing roller 4A are not in contact, but are adjusted so that the glue comes into contact only with the paper ply W1.

[0041] The glue distribution assembly 9 functions as follows. The glue is contained in a tank 11. A first roller 12 rotates partially immersed in the tank 11 and distributes the glue which is deposited on its surface on the glue dispenser roller 10. The glue dispenser roller 10, thanks to its particular surface finish, takes a uniform quantity of glue on its surface and distributes a uniform layer of glue on the paper ply W1.

[0042] The lower ply of paper W2 passes through the lower pair of rollers constituted by the second embossing roller 4B in steel and by a rubber-covered roller 8B so as to be marked with the engraving of the steel roller 4B. The ply W2 remains wound on the steel roller 4B for an angle greater than 90°. Then the lower ply W2 detaches from the steel roller 4B to couple with the upper ply W1. In this coupling the surface of the lower ply W2 comes into contact with the glued surface of the upper ply W1.

[0043] The two embossing rollers 4A and 4B are near to but are not in contact one with the other. A gap 14, which is just sufficient for the passage of the two plies W1, W2 without them touching each other, is left therebetween. Moreover the embossing rollers 4A and 4B have to be placed at a centre distance defined to facilitate the system of phasing of the rollers, that is to ensure that the engravings of the two plies W1, W2 are superimposed one in relation to the other during the coupling, in the case of nested coupling.

[0044] Above the lower embossing roller 4B a coupling roller 13 is placed, commonly known as marrying roller, mounted on arms hinged to the side panels of the machine. In this way the marrying roller 13 comes into contact with the upper embossing roller 4A and presses the two plies W1, W2 together so as to make the gluing take place and to obtain in output an embossed two-ply web W. The embossed two-ply web W is guided outside of the embossing machine 1 by means of idle rollers 15 suitable disposed in order to regulate the pull thereof.

[0045] It should be noted that this embossing machine 1 is very compact and that, without the present invention, the access to the steel rollers 4A and 4B would be difficult because the access to the rollers is prevented by the gluing assembly 9 and by the upper rubber-covered roller 8A on one side and by the marrying roller and by the lower rubber-covered roller 8B on the other side. Moreover, for the operating reasons described above, the embossing rollers 4A and 4B have to be placed close one to the other and at a well-defined centre distance in order to regulate their phasing and the breadth of the gap 14 for the passage of the plies W1, W2.

[0046] It should be noted that this embossing machine

1, when it is in function in the mode without glue, can optionally have the side panel opened.

[0047] Moreover this embossing machine 1 can be immediately accessible by an automatic hook or crane without any further operation with the exception of the opening of the movable side panel portion also in the case of non-glued products.

[0048] Here below a description is given of the embossing assembly according to the present invention.

[0049] Referring to Figures 1-6, in the fixed portions 2, 2' of the side panels of the machine 1 a lower oblique support 30 is placed whereon two housings 40 are formed, upwardly open, for housing the embossing rollers.

[0050] A movable portion 23 of the side panel is placed along a vertical plane coinciding with the plane of the fixed portion 2, 2' of the side panel.

[0051] The movable portion 23 of the side panel has, at the position of the embossing rollers, a lower edge with a profile (Figures 6, 8) matching the profile of the upper portion of the two embossing steel rollers 4A and 4B.

[0052] More particularly said lower edge of the movable portion 23 has a plate 24 (Fig. 4) whereon two bushings 31A and 31B are attached, after careful adjustment (Figs. 3-4) with a semicircle shape forming an upper part 31 of the block supports of the rollers.

[0053] The ends 6A, 6B of the rollers 4A, 4B are rotatable and contained between the lower part 30 on the fixed side panel and said upper part 31 integral with said movable side panel 23, so as not to require supports for the embossing rollers.

[0054] Each bushing 31A, 31B and each of said housings 40 on said lower oblique support is shaped so as to define a seat with concave arch with an arc angle of 180°.

[0055] If the movable side panel 23 opens in translation, the movable portion 23 of the side panel is apt to translate on the guide track 21 (Figs. 1-2, 6): in this way it can move from a position of closure wherein the two bushings 31A and 31B of the plate 24 attached to the lower edge of the movable portion 23 are located above the ends of the embossing rollers, pressing on them, to a position of opening (illustrated in Figure 6) wherein an open space is left above the ends of the embossing cylinders.

[0056] As shown in Figure 2, in the movable portion 23 of the side panel the marrying roller 13 and the various idle rollers 15 are mounted. Therefore a translation of the movable portion 23 of the side panel into the opening position opens a space above the embossing rollers 4A and 4B to allow easy replacement thereof, for example by means of raising and lowering by means of a bridge crane or an automated hoist.

[0057] During the functioning of the embossing machine 1 the movable portion 23 of the side panel has to be closed or opened effectively if the marrying roller 13 has to be used. In the tip-to-tip configuration or non-laminated embossed product this portion of the movable side panel 23 can be left open.

[0058] The two movable side panels 23 placed on the fixed portions 2, 2' of the side panels can be moved manually or in an automated manner by means of actuators or a motorised system. Clearly a movement of the two movable portions of the side panels is synchronised. Blocking systems are provided for blocking the movable portions 23 of the side panels in the positions of closure and of opening. The slides 22 of the movable portions 23 of the side panels are connected to the guide tracks 21 of the bracket 20 by means of precise position references (for example pins) so as to ensure that the relative positions of the marrying roller 13 with respect to the first embossing roller 4A are observed.

[0059] In the above description and in the drawings a single movable portion of the side panel on each fixed portion of the side panel has been illustrated. However each side panel can be provided with a plurality of movable portions of the side panel sliding on the fixed portions of the side panel or a plurality of movable portions sliding reciprocally one in relation to the other.

[0060] When it is necessary to change the embossing rollers 4A, 4B as shown in Figures 6-7, the movable portions 23 of the side panels are moved, for example they are made to translate on the guides 21 of the fixed portions 2, 2' of the side panels (or made to rotate with respect to a pin placed on the lower part of the machine as in Fig. 5) to bring them into the position of opening, so as to leave an empty space above the embossing rollers 4A, 4B.

[0061] In this way the rotation or the translation of the movable portions of the movable side panels 23 will open or close the bushings 31A, 31B above the embossing cylinders.

[0062] It should be noted that providing the two bushings 31A, 31B integral with the respective movable portion 23 of the corresponding side panel of the machine by means of a simple plate 24 means that the opening or closure of the bushings 31A, 31B above the embossing cylinders takes place simultaneously to the opening/closure of the movable side panels 23, simplifying to a great extent the operations of removal of said cylinders: the rotation or translation of the movable portions 23 of the side panels is therefore sufficient for opening or closing the bushings 31A, 31B above the embossing cylinders.

[0063] Subsequently, as shown in Figure 5, the first embossing roller 4A is grasped with a hoist or winch with bridge crane provided with appropriate gripping means 55 and raised.

[0064] It should be noted that in the present improved machine 1, the second embossing roller 4B can be removed both after having removed the first embossing roller in steel 4A and also before removing said first embossing roller 4A, thanks to the fact that the two bushings 31A, 31B placed above the embossing cylinders move away from them on moving away from the movable side panel 23, without having to operate any manual disengaging.

[0065] At this point, the two housings 40 of each lower

support 30 are free to receive new embossing rollers.

[0066] It should be noted that with the present invention it is possible advantageously, once the movable side panel 23 is opened, to remove only the rubber roller 4B without acting on the steel embossing roller, which is not possible in the system described in EP 1652661 in which the two rollers, embossing and rubber-covered ones, must be detached from the supports adjacent one to the other.

[0067] At this point, the two housings 40 of each lower support 30 are free to receive new embossing rollers.

[0068] The present embossing machine 1 according to the present invention is extremely advantageous when the whole line of loading/unloading of the steel rollers and of the rubber-covered ones is automated and associated with further components as will be described here below with reference to Figures 7-11.

[0069] More particularly the present machine 1 provides, moreover, a housing 60 for housing at least one roller, with the function of exchange station.

[0070] Said exchange station 60 is placed above the covers of the frame at the fixed side panel portion 2, 2' (Fig. 7).

[0071] In this housing 60 the roller 4A or 4B newly extracted from the embossing assembly (Fig. 8) can stay while waiting to be returned, preferably using an automatic bridge crane 61, into a roller magazine 80 provided in proximity of the embossing machine 1 or distanced form said machine 1.

[0072] More particularly the magazine 80 can be a shuttle with casing (magazine on fixed or movable shuttle) containing one or two rollers, as illustrated in Figs. 7-10, or can be a vertical magazine for housing a greater number of rollers as illustrated in Fig. 11, or it can be a combination of shuttle and vertical magazine without thereby departing from the spirit of the present invention.

[0073] In this way the need is avoided of increasing the dimensions of the machine 1 in order to have automated change of the rollers, as instead occurs in known machines which provide storage of the rollers inside the machine or the guards of the line.

[0074] It should be noted that, as illustrated in Figures 12 and 12b, the abovementioned shuttle when it is movable can be provided with a slide on wheels so as to be able to perform a translation of the rollers in order to move them easily between one production line and the other one present inside the same production unit, allowing sharing of said rollers between similar units, thus reducing the total cost of the rollers and the number of the rollers stored of the production unit.

[0075] A further advantage of a shuttle 80 with movable slide is of allowing the rollers to be stored outside of the work zone of the machine, preventing them from being soiled as instead happens in known machines in which the rollers are stored in proximity of the work zone inside the safety guards: with the shuttle 80 movable it is instead possible to bring the rollers in proximity of the embossing machine only when necessary, ready for subsequent changes.

[0076] Yet another advantage of providing a shuttle 80 which is movable is being able to take the rollers from the storage zone, also when the machine is in production, which is not possible in known machines which provide the storage of the rollers inside the same machine or inside the safety guards.

[0077] The use of the bridge crane 61, movable on tracks appropriately formed on a beams structure 70 placed around the embossing machine 1 of the present invention, means that an easy and fast replacement of the embossing rollers is possible, both those in steel and those in rubber, without any type of limitation, moving them from the machine to the various rollers magazines 80 provided in the system.

[0078] The automatic change of the rollers of the present system takes place advantageously without the intervention of the operator with the exception of removal and restoring of the phasing belt where this is necessary, considerably reducing the times of rollers change.

[0079] The present system allows an easy change between tip-to-tip production and nested production and moreover it is advantageous also in the case wherein the marrying roller mounted in the movable frame has to be replaced.

[0080] Numerous detail modifications and changes, within the reach of a person skilled in the art, may be made to the present embodiment of the invention, in any case coming within the scope of the invention disclosed by the appended claims.

Claims

1. Embossing machine (1) for sheet material, in particular paper, such as tissue paper, toilet paper and the like, comprising:

a pair of side panels, each of the two side panels having a fixed portion (2, 2') and a movable portion (23),

a pair of steel embossing rollers and of rubber rollers (4A, 4B, 4C, 4D), each of the embossing rollers having a pair of ends (6A, 6B) which are contained between the side panels

the fixed portions (2, 2') of the side panels providing two oblique, upwardly open seats (40), apt to receive said ends (6A, 6B) of the embossing rollers

characterised in that

each of said movable portions (23) of the side panels has, at the position of the embossing rollers, a lower edge with a profile matching the profile of the upper portion of the two steel embossing rollers (4A, 4B) so that:

upon the closure movement of the movable portions (23) of the side panels with respect

to the fixed portions (2, 2') of the side panels, said profile of said lower edge of the movable portions (23) presses on the ends of the embossing rollers to block said rollers, and

upon the opening movement of the movable portions (23) of the side panels with respect to said fixed portions (2, 2') of the side panels, a space is defined for access to the ends of the rollers for removal thereof directly without any manual operation,

said lower edge of said movable portions (23) of said side panels having, integral with the respective side panel, a plate (24) whereon two due bushings (31A, 31B) with half-ring shape are attached, suitable for pressing above said embossing rollers when said movable portions (23) are in position of closure.

2. Machine according to claim 1, wherein the ends (6A, 6B) of the embossing rollers contained between the side panels are arranged on a lower oblique support (30) on which said two seats (40) are formed, upwardly open, for housing the embossing rollers.

3. Machine according to any one of the preceding claims, wherein the ends (6A, 6B) of the rollers (4A, 4B) are rotatable between the lower part (30) attached to the fixed side panel (2, 2') and an upper part (31) formed by said bushings (31 A, 31B), said upper part (31) being integral to the corresponding mobile portion (23), so as not to require supports for the embossing rollers.

4. Machine according to any one of the preceding claims further comprising a marrying roller (13) and a tensioning roller (15) rotatably mounted on said movable portions (23) of said side panels.

5. Machine according to any one of the preceding claims, further comprising an exchange station (60), placed over the cover of the frame of said machine, at the fixed portions (2, 2'), said exchange station (60) comprising at least one housing for housing at least one roller extracted from the embossing assembly of said machine.

6. Automatic system for replacing automatically at least one embossing roller (4A, 4B) of an embossing machine (1) as defined in any one of claims 1 to 5, said system comprising

said embossing machine (1),

a roller storage magazine (80) placed outside said embossing machine (1),

an automatic bridge crane (61) provided with hooking means,

said bridge crane being apt to automatically extract at least one of said embossing rollers (4A, 4B) from said embossing machine (1) when said machine is in the open configuration,

said automatic bridge crane being also apt to position said extracted roller in said exchange station (60) and to withdraw a first exchange roller from said roller storage magazine (80) in order to house said exchange roller in the position of said extracted roller inside said embossing machine.

7. System according to claim 6, wherein said magazine (80) can be a shuttle containing one or more rollers, preferably two, or a vertical magazine for housing, vertically aligned, a greater number of rollers, or combinations thereof.

8. System according to claim 7, wherein said shuttle (80) is used to move the rollers between a production line and the other, allowing them to be shared between similar units, and reducing the total cost and the number of the rollers.

9. Method of replacing steel embossing rollers and rubber embossing rollers (4A, 4B, 4C, 4D) of an embossing machine (1) as defined in any one of claims 1 to 5, comprising the steps of:

providing a pair of side panels, each of the side panels having a fixed portion (2, 2') and a movable portion (23) as defined in any one of claims 1 to 5;

rotatably mounting a pair of embossing rollers on said side panels;

moving the movable portions of the side panels with respect to the fixed portions of the side panels so as to leave a space for removing said embossing rollers;

accessing the steel rollers and rubber rollers and extracting them by means of automatic hooking means placed on a bridge crane (61);

positioning the steel and rubber rollers, which have been extracted, in an exchange station (60) placed on the embossing machine (1), outside of it;

withdrawing at least one exchange roller from a roller storage magazine (80) to house it in the position of said extracted rollers inside said embossing machine.

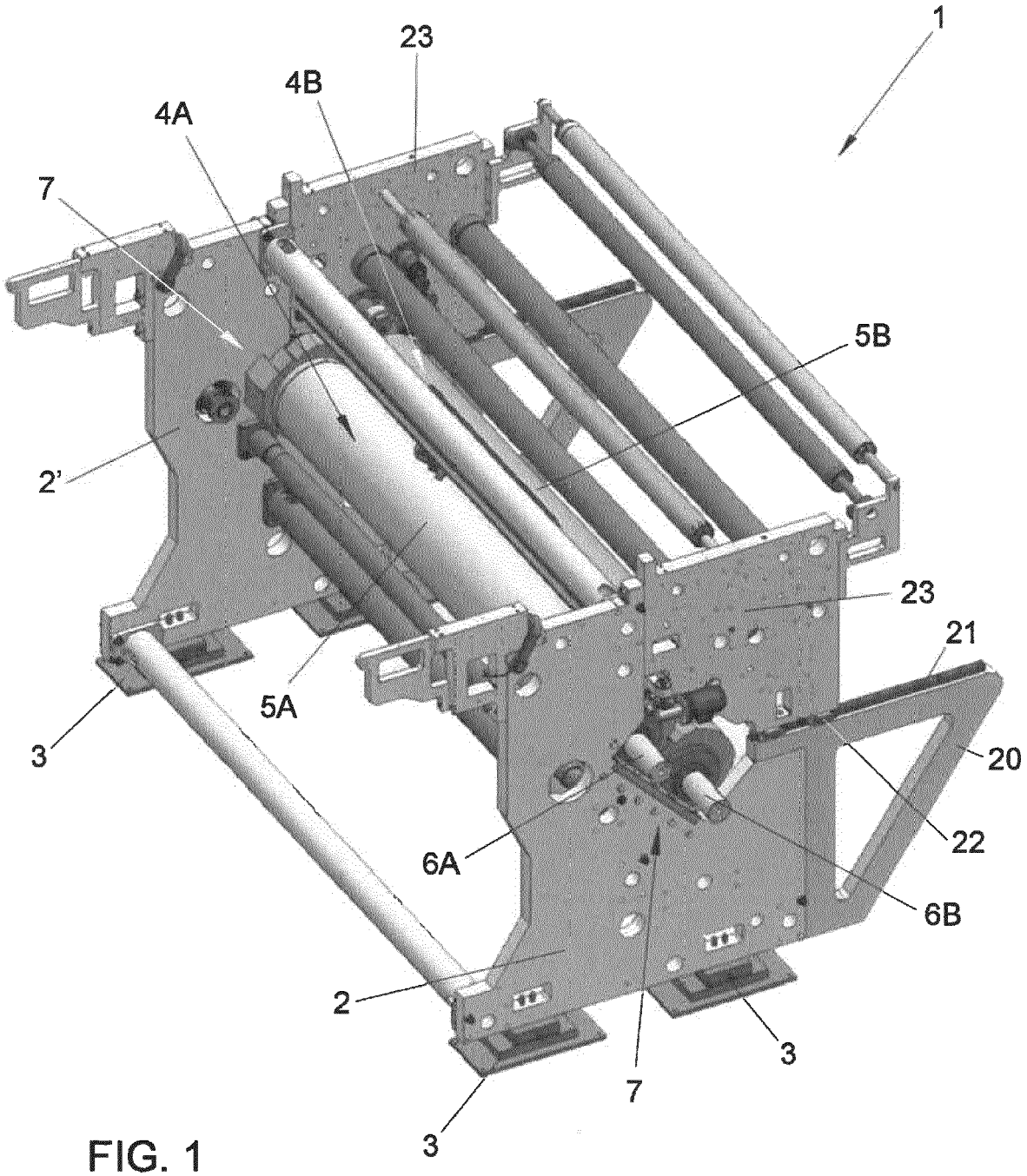


FIG. 1

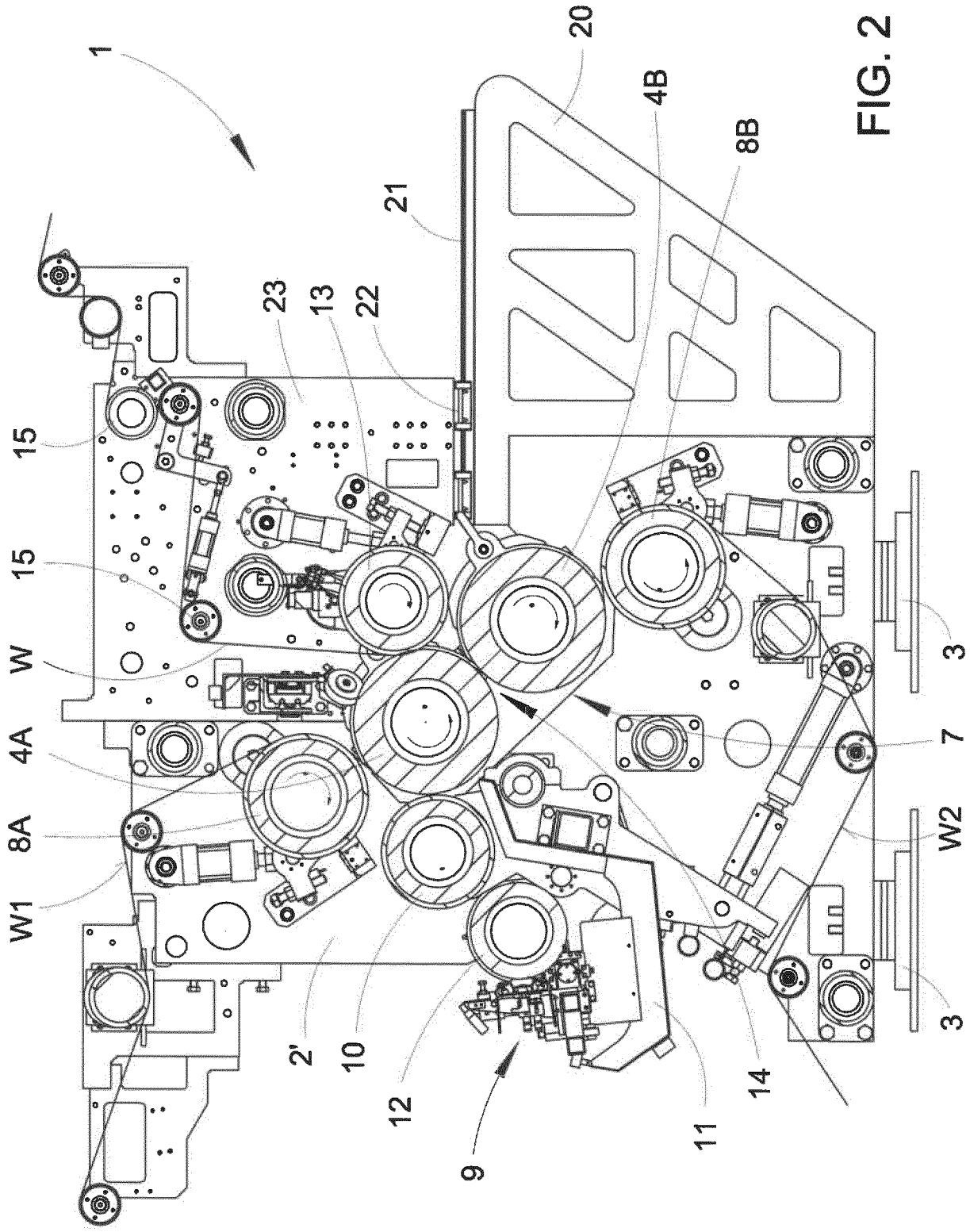


FIG. 2

FIG. 3

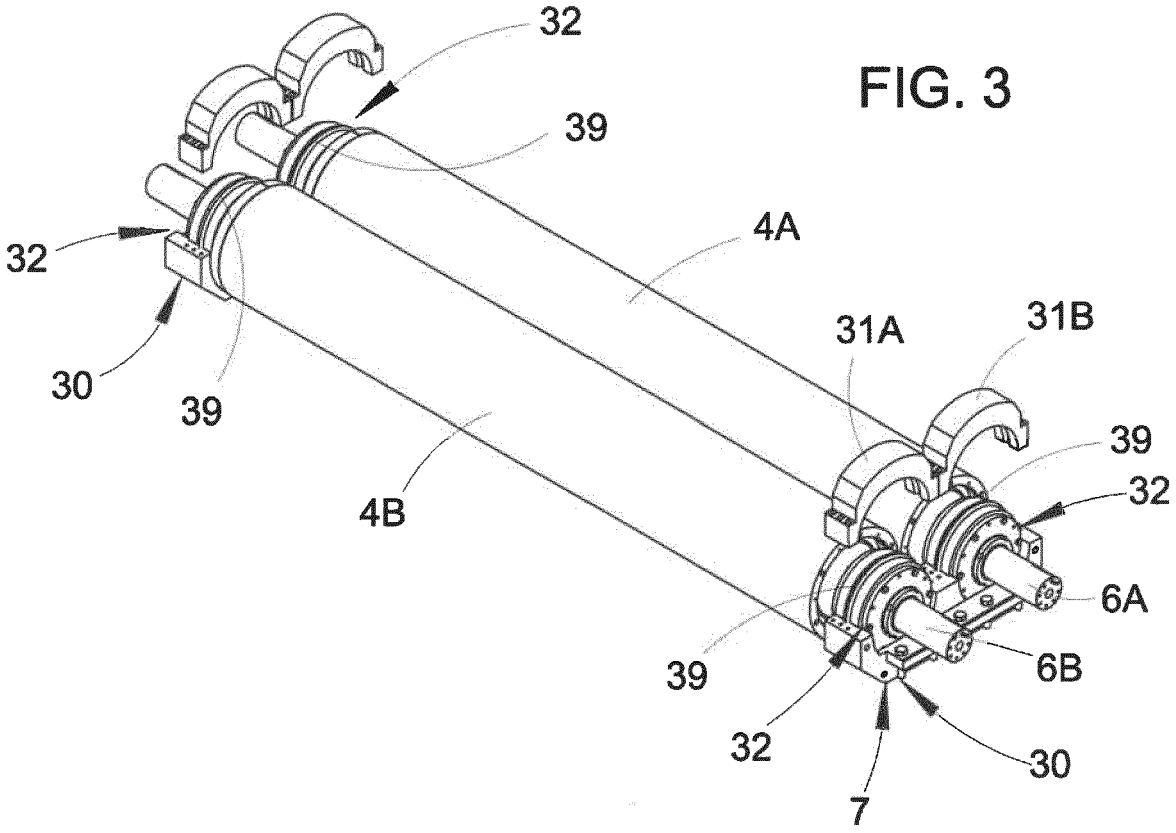
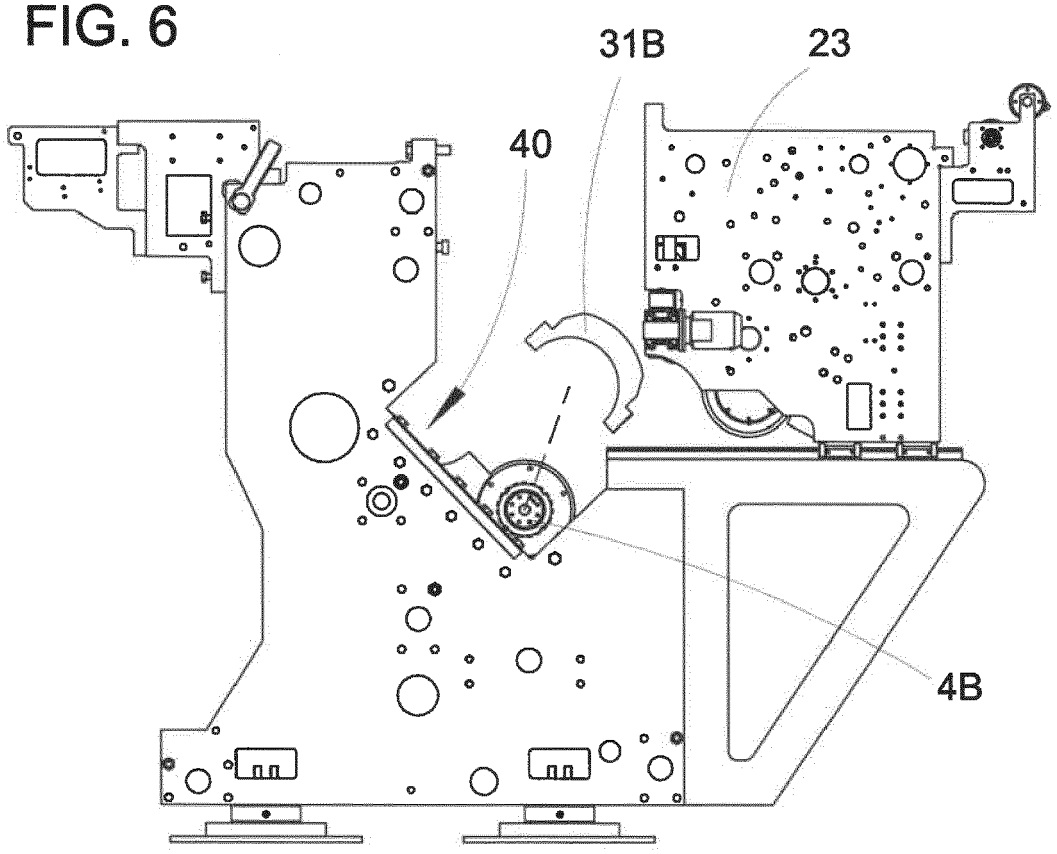


FIG. 6



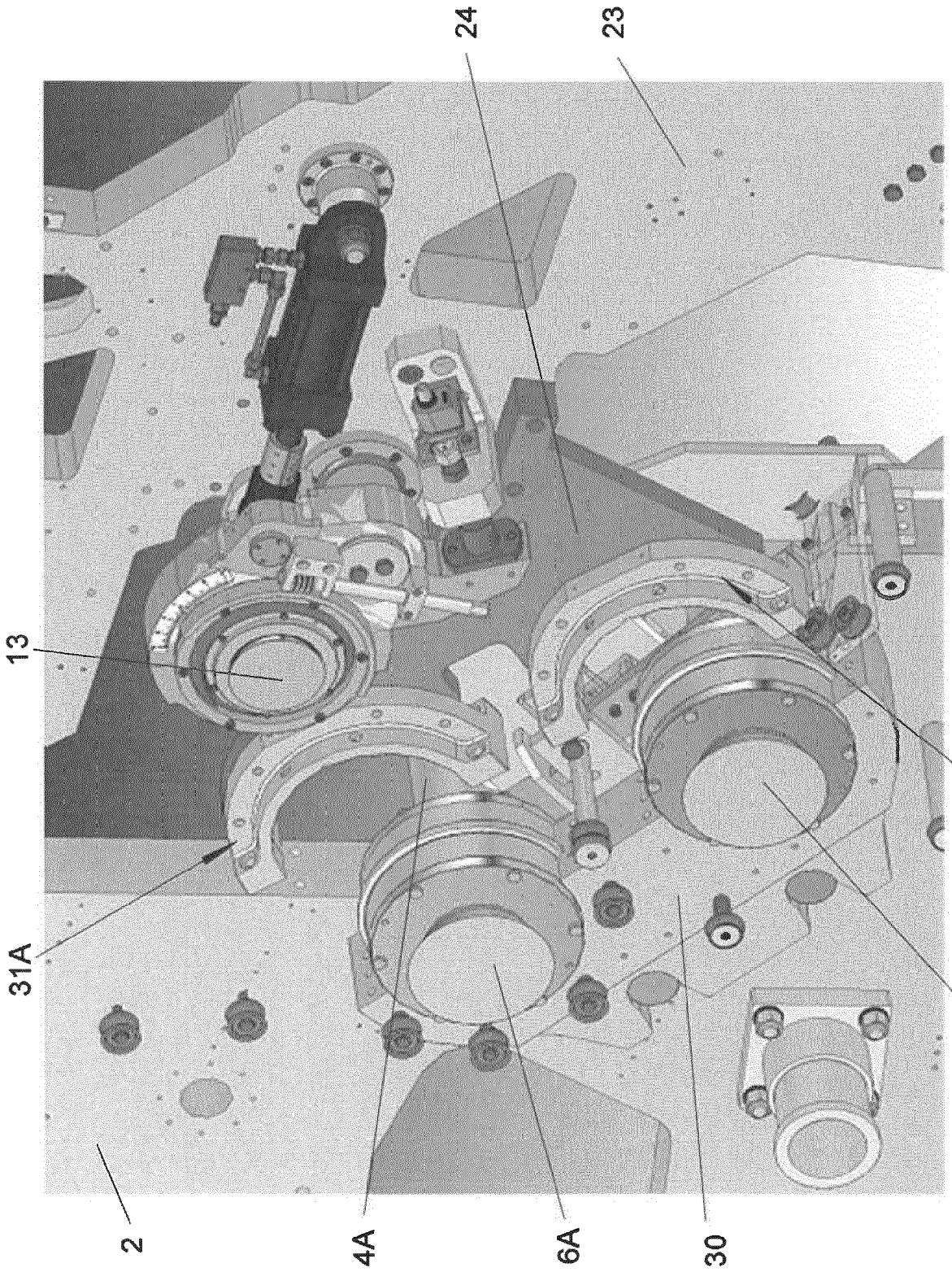


FIG. 4

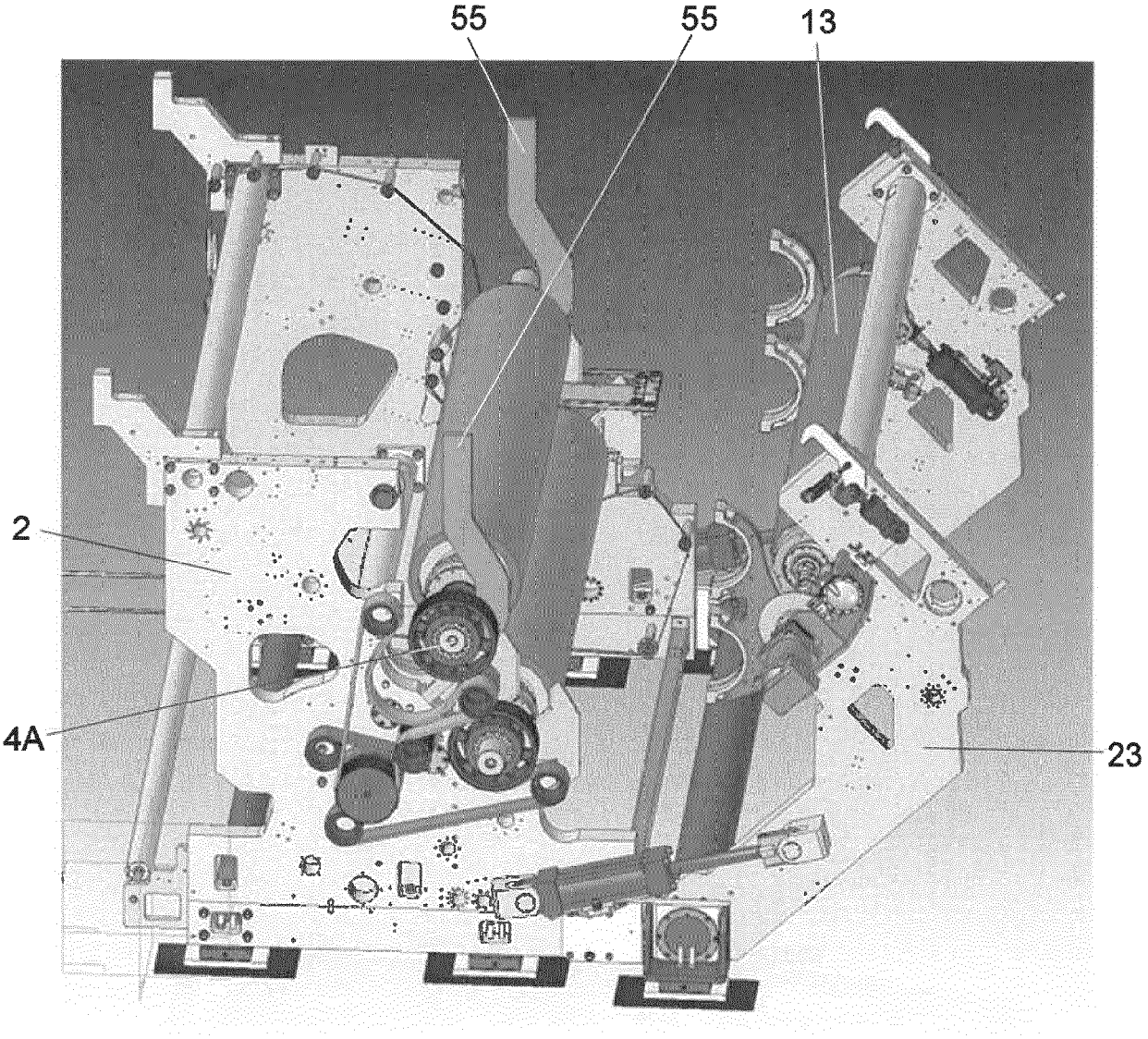


FIG. 5

FIG. 7

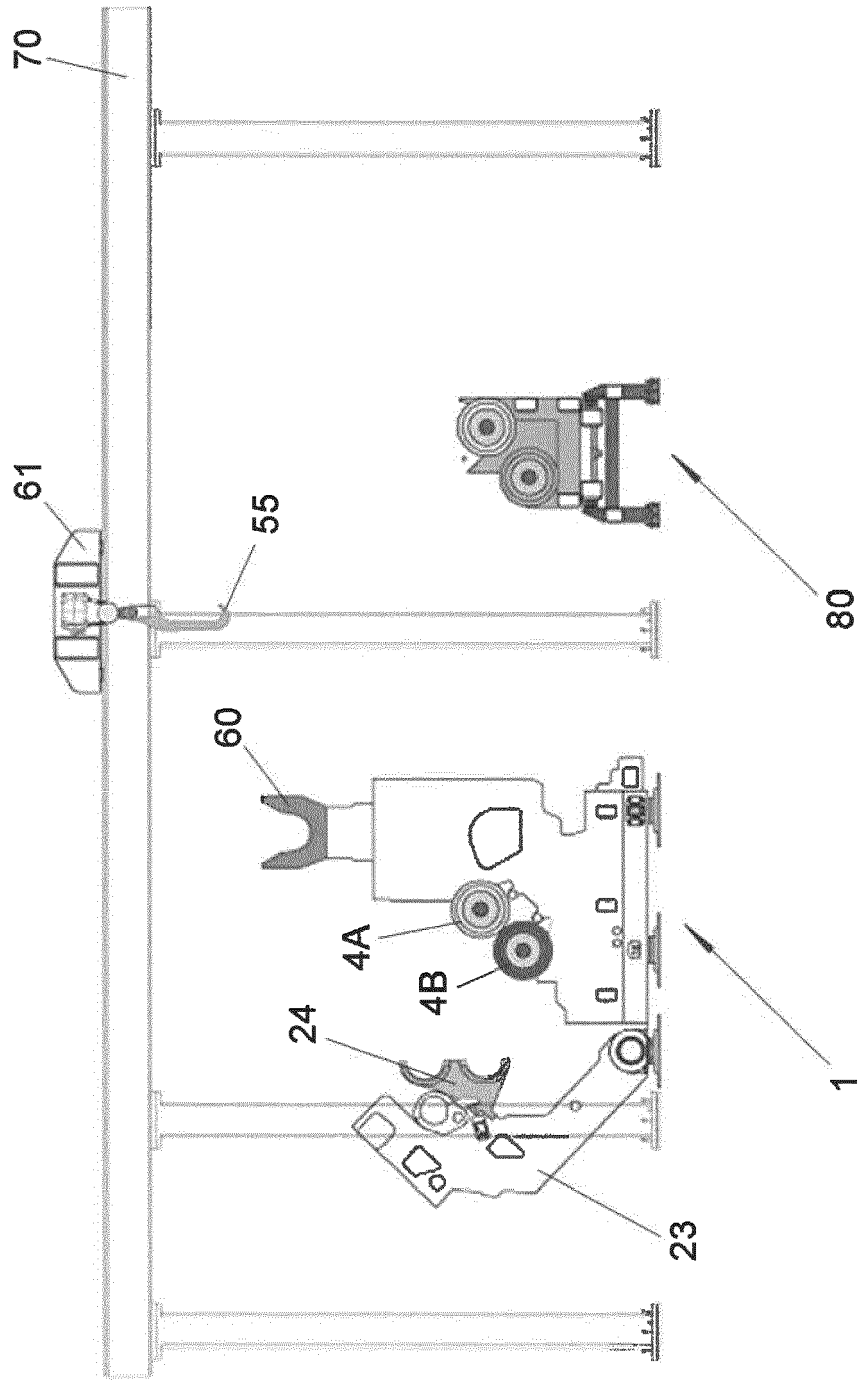


FIG. 8

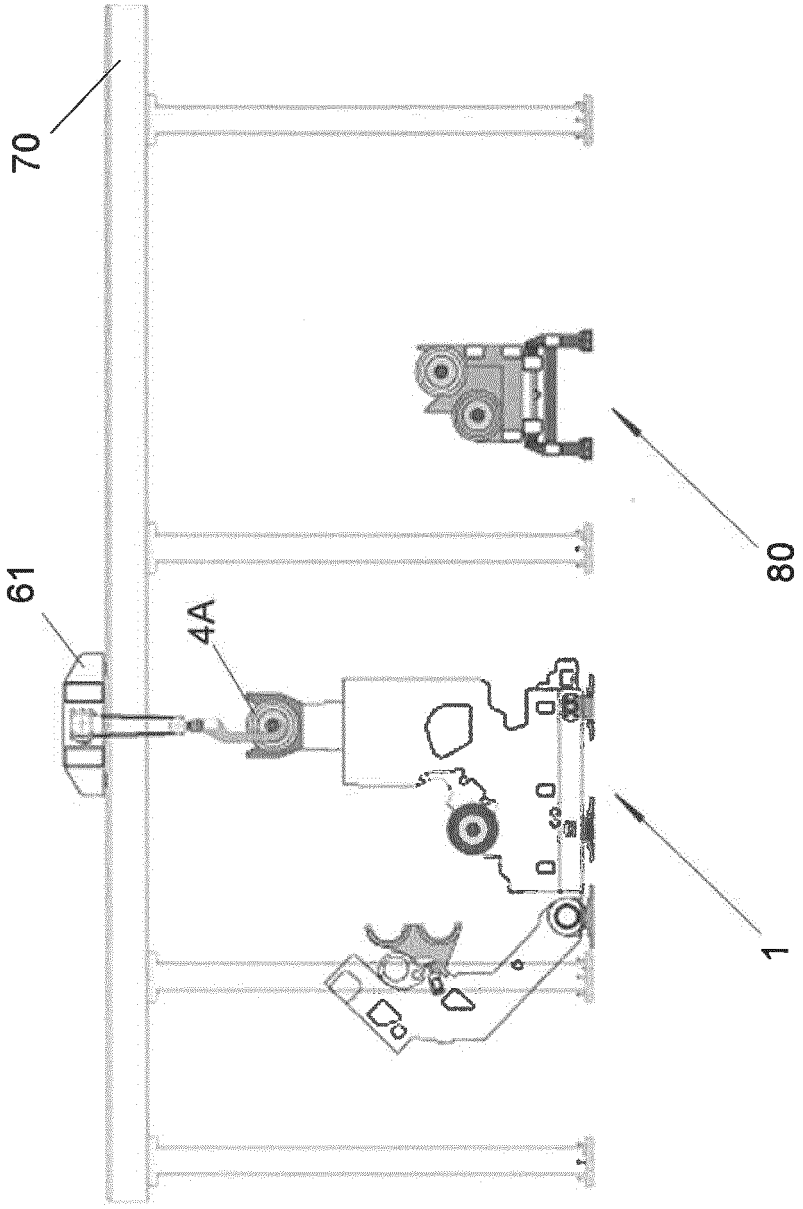


FIG. 9

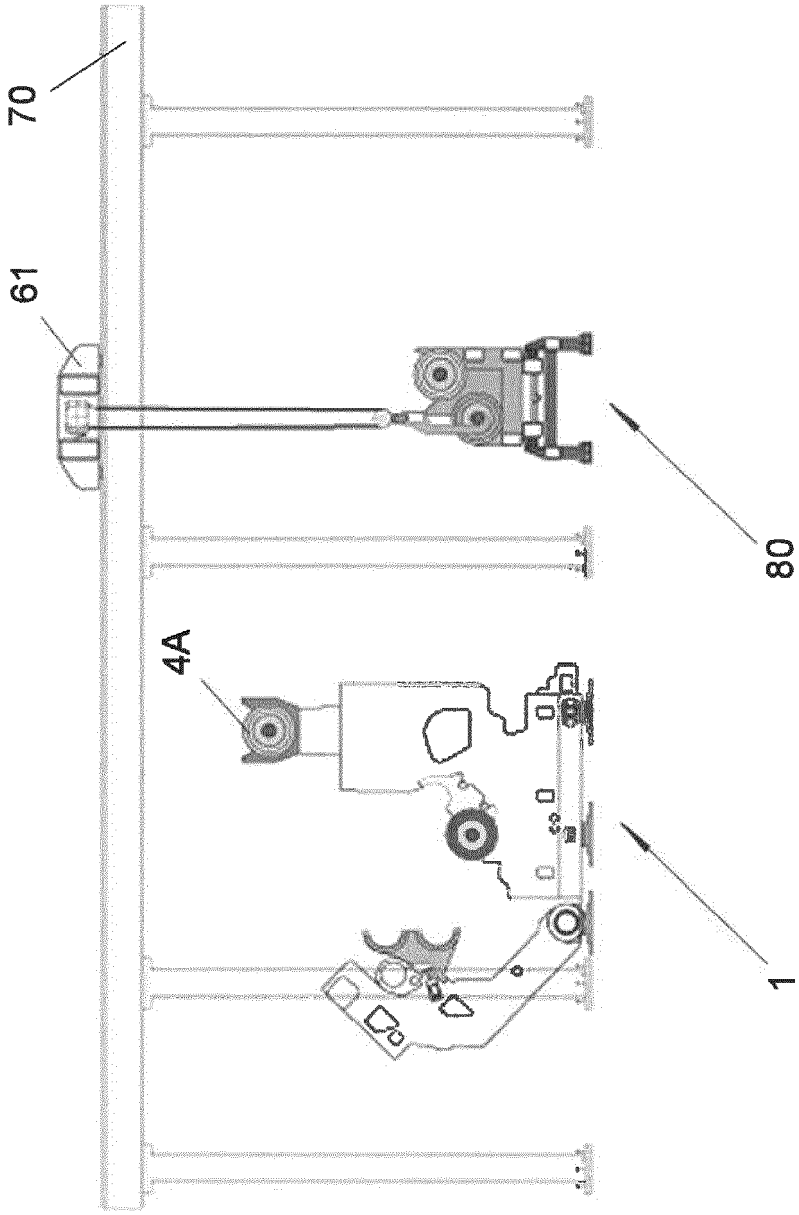
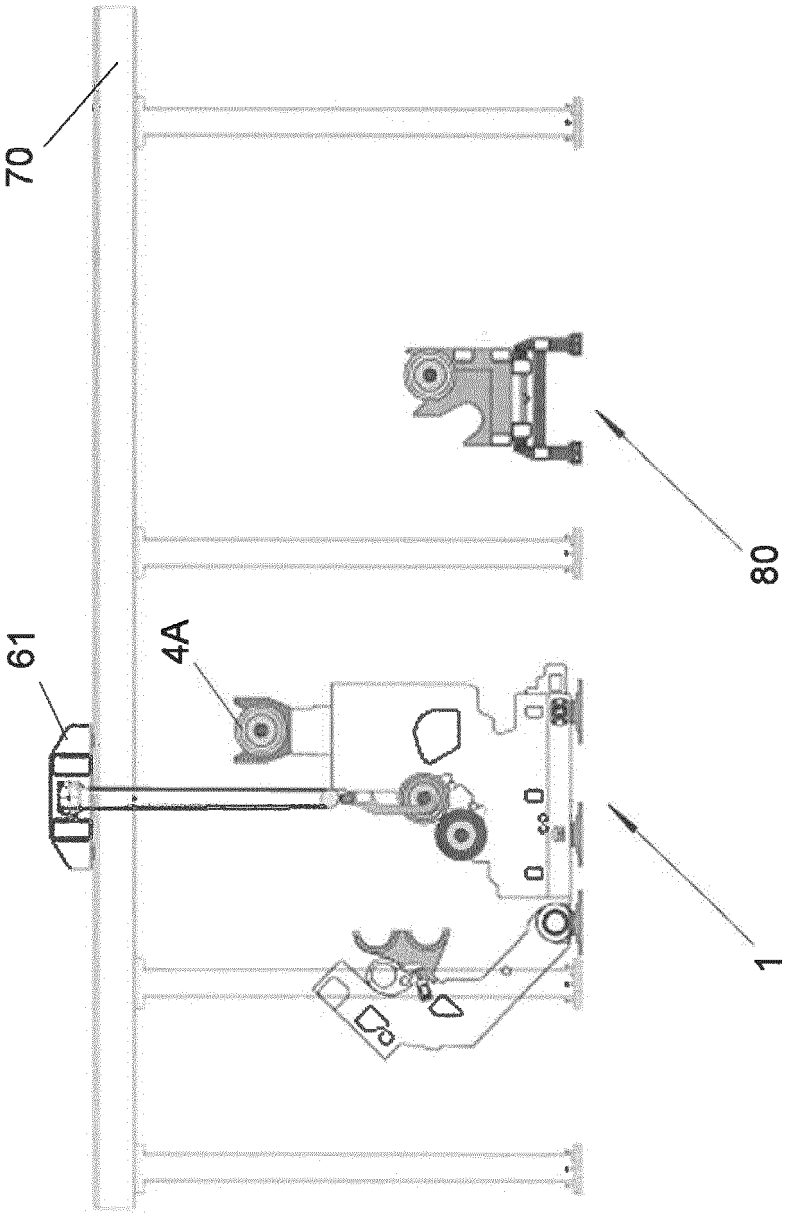


FIG. 10



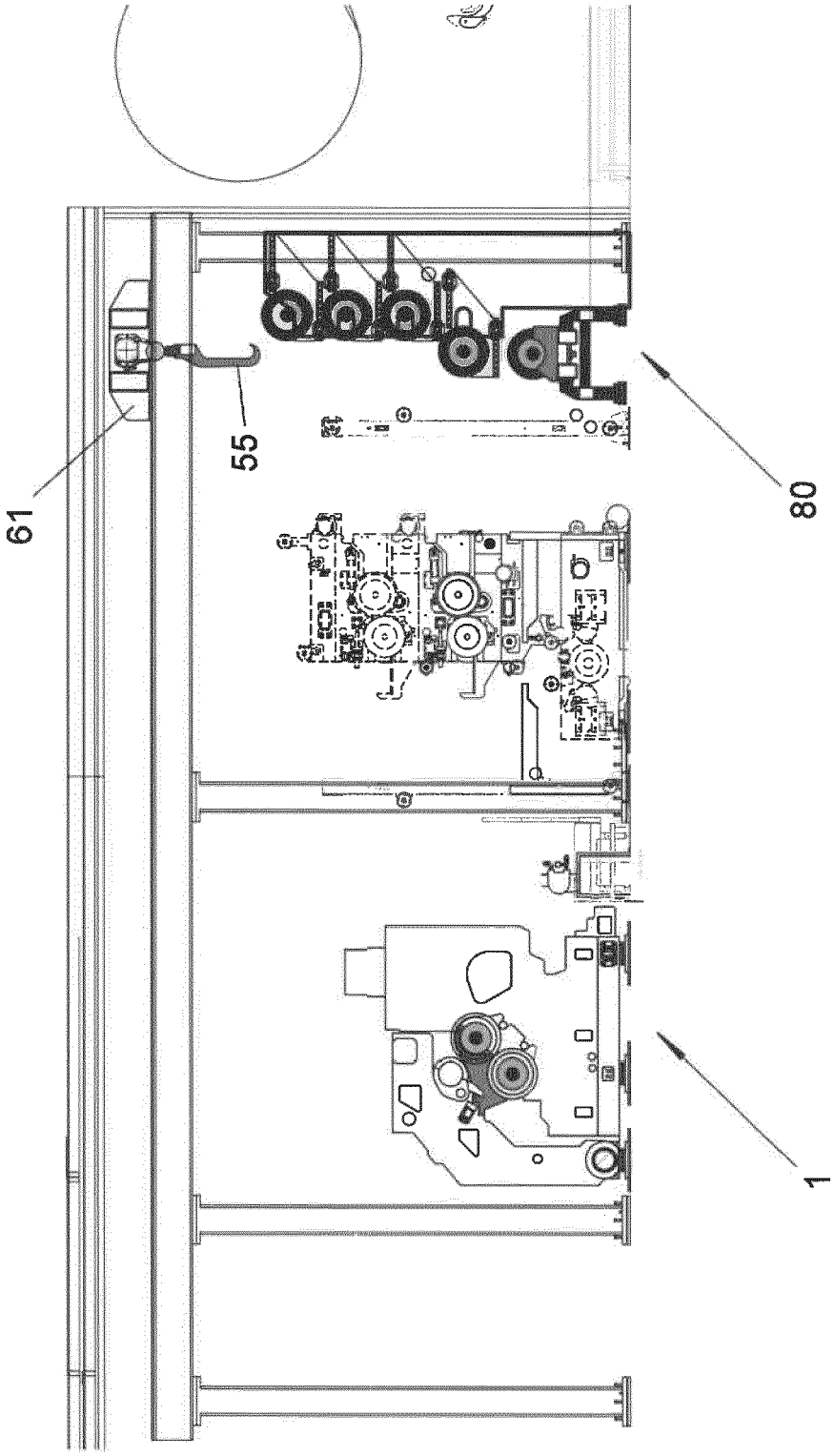


FIG. 11

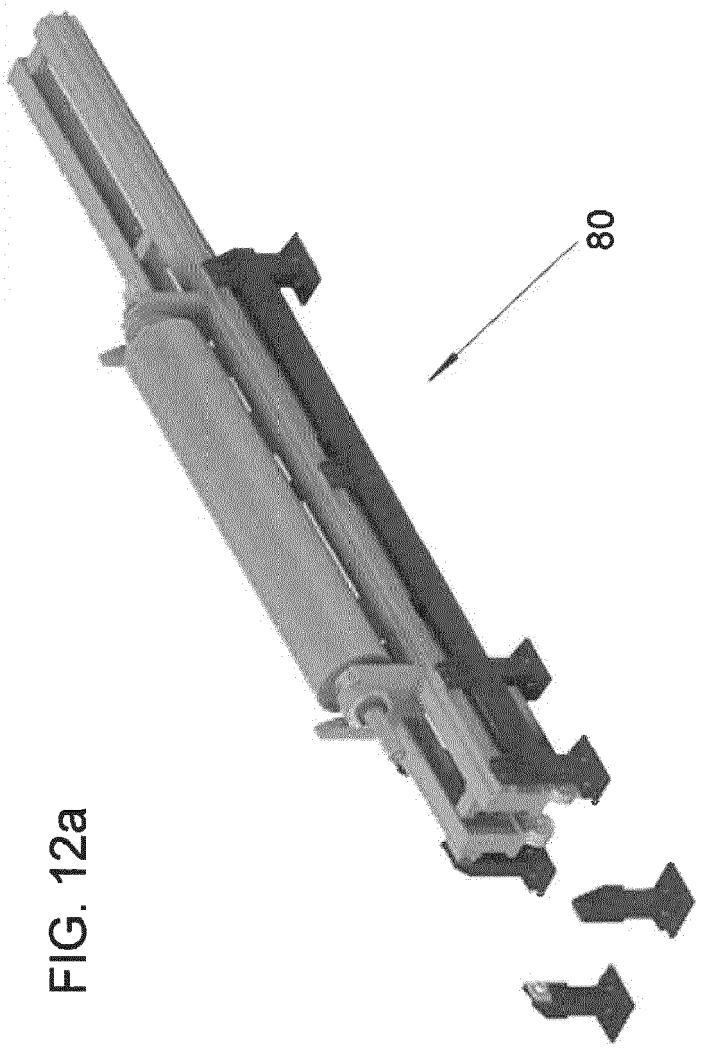


FIG. 12a

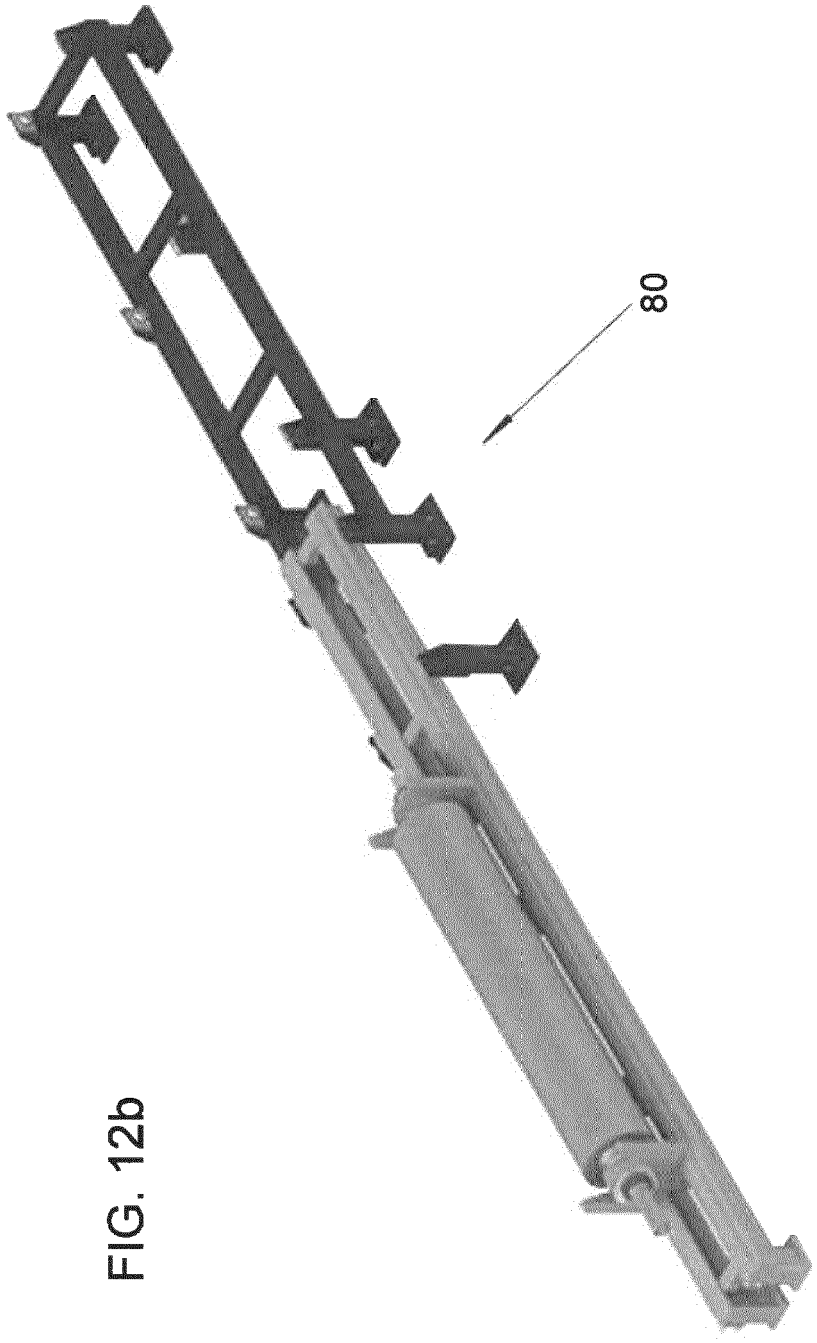


FIG. 12b

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EUROPEAN SEARCH REPORT

Application Number
EP 17 18 1678

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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B31F
B21B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 November 2017	Lawder, M

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