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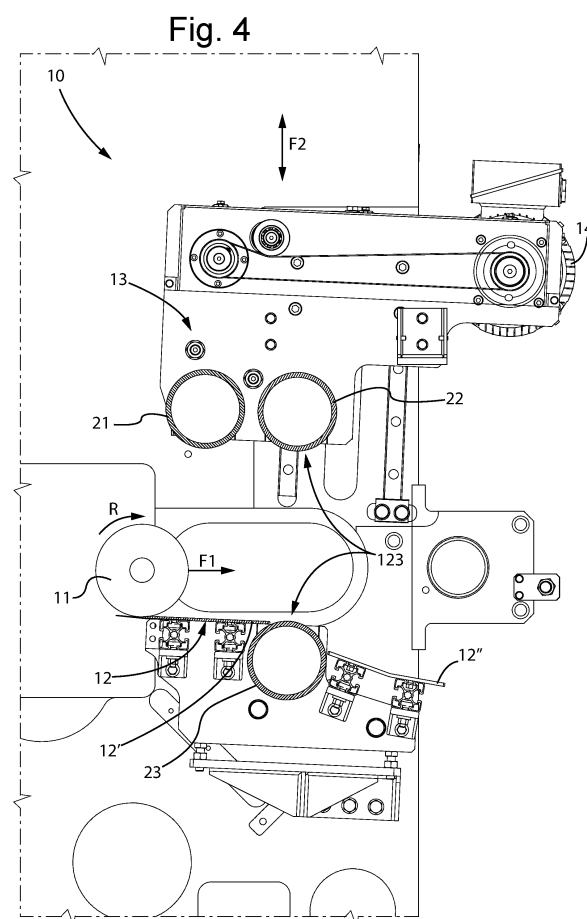
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(54) **LOG EJECTION GROUP AND RELATIVE EJECTION METHOD**

(57) A log ejection group in a rewinding machine comprises an unloading plane (12) of wound logs (11) and means for slowing down the logs associated with the unloading plane (12), as well as a first upper inlet roller (21), motorized, to intercept the logs (11) arriving on the unloading plane (12), a pair of motorized handling rollers (123), located downstream of the upper inlet roller (21) and comprising an upper handling roller (22) and a lower handling roller (23), wherein the lower handling roller (23) is integrated into the unloading plane (12) and in which the first upper inlet roller (21) and the upper handling roller (22) are arranged on an upper structure (13), adjustable in height, the angular speed of the first upper inlet roller (21) being greater than the angular speed of the upper handling roller (22) located downstream.

A method for ejecting a log also forms part of the invention.



Description

[0001] The present invention relates to a log ejection group and to a relative ejection method.

[0002] At the end of the log winding step in a rewinding machine, the log is ejected at a certain speed from the winding rollers, which is higher, the greater the winding speed of the rewinder.

[0003] The log must then be stopped to be fed to the next stations, in particular to the end tail gluing device.

[0004] A known system employed to slow down the log comprises an inclined plane surmounted by an upper movable structure, rounded in shape in the direction of log reception, placed directly in a position to intercept the log in order to stop the log itself. The surface that comes into contact with the log is made of soft material to reduce the impact of the log against it and reduce the risk of damages. When the log has stopped, the structure is raised by means of a piston to allow the log to descend towards the gluing device, which takes place by rolling along the final section of the inclined plane using only the force of gravity.

[0005] This system, which stops the log as it rolls on the inclined plane and then releases it to allow the start of a new rolling, is simple and inexpensive, but it does not guarantee a proper operation when the rewinder is producing a high number of logs per minute. In fact, after having been stopped by the soft part of the upper structure, the log takes a certain amount of time, of the order of tenths of a second, to resume its rolling motion. This is a significant time in the cases where 50-60 logs/min are produced and therefore the log arrival rate is close to one second.

[0006] Other slowing down means associated with the inclined unloading plane and placed in phase with the exit of the log from the winding zone have been proposed, such as for example a rotating butterfly in WO 03/002439 A1, or a rotating sector in WO 2015/040644 A1, which take charge of the individual outgoing logs, stop them and transfer them by rotation of the butterfly or of the rotating sector to the end tail gluing device placed downstream.

[0007] WO 2017/145185 A1 proposes to slow down the log by means of a series of rollers arranged above the slightly inclined plane placed at the exit from the rewinder, in which the rollers rotate at progressively lower speeds. The distance between the rollers and the plane is slightly less than the diameter of the log in order to intercept each log passing on the plane. The interaction of the log with a rotating roller above and a fixed plane below constitutes an important limit to the rotation speed of the rollers and therefore to the possibility of slowing down the log and in any case entails a high risk of damaging the logs.

[0008] The object of the present invention is to provide a log ejection group and a relative ejection method suitable for operation with high performance rewinders, which solves the drawbacks of the known systems.

[0009] Another object of the present invention is to provide a log ejection group and a relative ejection method that does not damage the logs despite the high rotation speeds.

5 **[0010]** Another object of the present invention is to provide a log ejection group and a relative ejection method capable of progressively accompanying the log towards the exit from the rewinder.

10 **[0011]** Another object of the present invention is to provide a log ejection group and a relative ejection method which is particularly simple and functional with low costs.

[0012] These objects according to the present invention are achieved by providing a log ejection group and a relative ejection method as set forth in the independent claims.

15 **[0013]** Further features are comprised in the dependent claims.

[0014] The characteristics and advantages of a log ejection group and of a relative ejection method according to the present invention will become more apparent from the following description, by way of example and not limitation, referring to the accompanying schematic drawings in which:

25 figure 1 is a plan view of a log ejection group according to the present invention;

figure 2 is a schematic section along the trace plane II-II of the log ejection group of figure 1;

figure 3 is a schematic section along the trace plane III-III of the log ejection group of figure 1;

30 figure 4 shows by means of an enlarged detail the means for slowing down the log ejection group of figure 1;

35 figure 5 shows by means of an enlarged detail the means for slowing down the log ejection group according to a further embodiment of the invention.

[0015] With reference to the figures, there is shown an ejection group, indicated with 10, 10', which handles the ejection of a log 11 from a rewinding machine, not shown.

40 **[0016]** The logs 11 wound in the rewinder are ejected in succession, rotating according to the arrow R with a linear exit speed, schematized with the arrow F_1 , which is the greater, the greater the winding speed of the rewinder is, according to what is schematized in figures 4 and 5.

[0017] The ejection group 10 subject-matter of the present invention comprises an unloading plane 12 of wound logs 11 and means for slowing down the logs, associated both above and below with the unloading plane 12.

50 **[0018]** According to a first embodiment of the ejection group 10 of the invention, the means for slowing down the logs comprise a first upper inlet roller 21, motorized, cooperating directly with the unloading plane 12 to intercept the logs 11 arriving on the unloading plane 12, and at least a first pair of handling rollers 123, motorized, located downstream of the upper inlet roller 21 and com-

prising an upper handling roller 22 and a lower handling roller 23 to slow down the logs advancing on the unloading plane 12.

[0019] According to a further embodiment of the log ejection group 10' of the invention, shown in figure 5, there is a further lower inlet roller 24 located upstream of the pair of handling rollers 123 and integrated into the unloading plane 12 to provide with the first upper inlet roller 21 a pair of inlet rollers 114.

[0020] In the ejection group 10' of the invention, in the presence of both the pair of handling rollers 123 and the pair of entering rollers 114, the further lower inlet roller 24 is preferably realised idle.

[0021] However, it could also be made frictioned so as to slow down the rolling of the log 11 being grasped between the roller 21 and itself. The log 11 would then proceed to the pair of handling rollers 123, which would further slow it down.

[0022] According to a further configuration of the invention, the further lower inlet roller 24 could be motorized.

[0023] An ejection group, not shown, comprising a further pair of motorized rollers located downstream of the pair of handling rollers 123 is also part of the invention.

[0024] The lower rollers 23, 24 are integrated in a fixed position in the unloading plane 12 and placed with their upper generatrix grazing first inclined portions 12' of the unloading plane 12, i.e. tangential to them.

[0025] The unloading plane 12 is an inclined plane that receives the logs 11 at the exit of the rewinder and conveys them to the next stations.

[0026] The unloading plane 12 may consist of successive portions also having different inclinations to each other and discontinuous in the transverse direction.

[0027] In the example shown, the first portion 12' of the unloading plane 12, which receives the log 11 exiting the rewinder at high speed, has a slight inclination, while the second portion 12" of the unloading plane 12, located downstream of the pair of rollers 123, has a greater inclination to facilitate the exit of the slowed down logs 11 from the group 10. The second portion 12" is constituted in the example by a succession of sections spaced apart from each other in a transverse direction (figure 1).

[0028] The upper rollers 21, 22 are arranged on an upper structure 13 adjustable in height along guides, as shown schematically by the double arrow F_2 in figures 2 to 5, to adapt the ejection group 10 to the dimensions of the log 11, which must be intercepted on the unloading plane 12 by the upper rollers 21, 22.

[0029] In the ejection group 10 according to the invention the angular speed of the first upper inlet roller 21 is greater than the angular speed of the upper handling roller 22 located downstream.

[0030] This ensures a progressive reduction in the speed of the log 11 passing on the unloading plane 12.

[0031] According to a preferred embodiment of the invention in the first pair of handling rollers 123 the angular speed of the upper handling roller 22 is greater than the

angular speed of the lower handling roller 23.

[0032] A similar arrangement is adopted in the pair of inlet rollers 114, if any, in which the angular speed of the first upper inlet roller 21 is greater than the angular speed of the further lower inlet roller 24.

[0033] In the ejection group 10, 10' according to the invention the upper rollers and the lower rollers have motorizations independent of each other.

[0034] Preferably, there is only one upper motor 14 connected to the upper rollers and only one lower motor 17 connected to the lower rollers.

[0035] The ratio among pulleys results in the speed difference among the upper rollers, which is in this case a fixed value.

[0036] Alternatively, according to an embodiment not shown, if both motors are controlled by inverters, the speed differences among the rollers are controllable at will.

[0037] If each roller is controlled by its own motor in turn managed by an inverter, maximum flexibility would be obtained in setting the reciprocal speeds.

[0038] During the operation of the ejection group 10, according to the invention, the log 11 exiting the winding zone of the rewinder proceed rolling on the first portion 12' of the unloading plane 12 until it is intercepted by the first upper roller 21, which rotates at a speed substantially equal to or slightly lower than that of the entering log 11 and slows it down by a first amount.

[0039] The log 11 then proceeds towards the first pair of handling rollers 123, and when intercepted by it, it continues rotating for a predetermined number of revolutions between the upper roller 22 and the lower roller 23.

[0040] When also the further lower inlet roller 24 is present in the ejection group 10', the log 11 is first intercepted by the pair of inlet rollers 114, it continues rotating for a predetermined number of revolutions between the upper inlet roller 21 and the lower inlet roller 24 and then proceeds towards the pair of handling rollers 123 and subsequently downstream along the portion 12" of the unloading plane 12.

[0041] The number of rotations that the log 11 makes on the single pair of rollers 123, and possibly on the previous pair 114 if present, depends on the difference of speed between the relative upper 21, 22 and lower 23, 24 rollers.

[0042] The greater the difference between the speeds of the upper roller 21, 22 compared to the lower roller 23, 24 of each pair of rollers 114, 123, the smaller the revolutions that the log 11 makes between them will be.

[0043] The difference of speed between the upper roller 21, 22 compared to the lower roller 23, 24 of each pair of rollers 114, 123, ensures that the log 11 rotates and translates at the same time, proceeding downstream with respect to the pair of rollers 114, 123 with reduced linear speed with respect to the linear speed it had upstream of the same pair of rollers 114, 123.

[0044] Preferably, the first upper inlet roller has an angular speed that can be set to a value equal to 10%-80%

of the speed of the upstream rewinder.

[0045] The angular speed of the upper handling roller 22 of the pair of handling rollers 123 can be set to a value equal to 30%-80% of the speed of the first upper inlet roller 21

[0046] The ratio of the angular speed between the first upper inlet roller 21 and the upper handling roller 22 of the pair of rollers 123 is about 1.6, i.e., the upper handling roller 22 of the pair of handling rollers 123 has an angular speed equal to 63% of that of the first upper inlet roller 21.

[0047] Furthermore, by having two independent motors 14, 17 for moving the upper rollers and the lower rollers, it is possible to set an angular speed difference respectively between the upper handling roller 22 and the relative lower handling roller 23, wherein the lower handling roller 23 has an angular speed equal to 5%-50% of the speed of the upper handling roller 22.

[0048] When the pair of inlet rollers 114 is also present, the further lower inlet roller 24, if motorized, has an angular speed comprised between the same speed of the upper inlet roller 21 and 50% thereof.

[0049] Thus, for example, according to a preferred embodiment, a possible approximate, non-limiting speed profile could be as follows:

Rewinder	= 700 m/min
First upper inlet roller 21	= 500 m/min
Upper handling roller 22	= 325 m/min
Lower handling roller 23	= 150 m/min
Further lower inlet roller 24	= 300 m/min.

[0050] The indicated speeds, which are to be considered indicative only, may vary depending on the type of product.

[0051] A method for ejecting a log from a rewinding machine includes the steps of:

- receiving a log 11 rolling on an unloading plane 12 towards a first upper inlet roller 21, put into rotation,
- transferring the log 11 downstream of the first upper inlet roller 21,
- receiving the log 11 between the upper handling 22 and lower handling rollers 23 of a pair of motorized handling rollers 123, in which the upper handling roller 22 has an angular speed lower than the first upper inlet roller 21,

-- transferring the log 11 rolling on the unloading plane 12 towards the exit.

[0052] According to a preferred embodiment of the invention the relative ratio of the angular speeds of the rollers of the pair of handling rollers 123 is set so that the angular speed of the upper handling roller 22 is greater than the angular speed of the lower handling roller 23.

[0053] According to a particular embodiment of the method, in the presence of a pair of inlet rollers 114,

located upstream of the pair of handling rollers 123 and comprising an upper inlet roller 21 and a further lower inlet roller 24, the log 11 exiting the pair of inlet rollers 114 is received between the upper 22 and lower 23 rollers of the pair of handling rollers 123.

[0054] The upper inlet roller 21 of the pair of inlet rollers 114 has angular speed greater than the upper handling roller 22 of the pair of handling rollers 123.

[0055] The log ejection group and the relative ejection method subject-matter of the present invention have the advantage of not damaging the entering logs coming from the rewinding machine at high speed. Advantageously, the first contact with the log entering at high speed is made by causing a first partial slowdown to avoid the formation of wrinkles.

[0056] The pair of handling rollers advantageously exerts an increased pressure on the log exiting the ejecting group, which can be particularly advantageous if the tail is glued inside the rewinder.

[0057] In addition, the pair of handling rollers advantageously straightens the logs passing on the unloading plane 12.

[0058] The log ejection group in a rewinding machine and the relative ejection method thus conceived is susceptible to numerous modifications and variations, all falling within the invention; furthermore, all the details are replaceable by technically equivalent elements. In practice, the materials used, as well as their dimensions, can be of any type according to the technical requirements.

Claims

1. Log ejection group in a rewinding machine comprising an unloading plane (12) of wound logs (11) and means for slowing down the logs associated with the unloading plane (12), said unit comprising a first motorized upper inlet roller (21), to intercept the logs (11) arriving on the unloading plane (12), **characterized in that** it comprises a pair of motorized handling rollers (123), located downstream of the upper inlet roller (21) and comprising an upper handling roller (22) and a lower handling roller (23), wherein the lower handling roller (23) is integrated into the unloading plane (12) and in which the first upper inlet roller (21) and the upper handling roller (22) are arranged on an upper structure (13), adjustable in height, the angular speed of the first upper inlet roller (21) being greater than the angular speed of the upper handling roller (22) located downstream.
2. Ejection group according to claim 1, **characterized in that** in the pair of handling rollers (123) the angular speed of the upper handling roller (22) is greater than the angular speed of the lower handling roller (23).
3. Ejection group according to claim 1 or 2, **characterized in that** the first upper inlet roller (21) cooperates

with the unloading plane (12) to intercept the logs (11) arriving on the unloading plane (12).

4. Ejection group according to claim 1 or 2, **characterized in that** it comprises a further lower inlet roller (24), placed upstream of the pair of handling rollers (123) and integrated in the unloading plane (12) forming with the first upper inlet roller (21) a pair of inlet rollers (114), in which the angular speed of the first upper inlet roller (21) is higher than the angular speed of the further lower inlet roller (24). 5
5. Ejection group according to claim 4, **characterized in that** said further lower inlet roller (24) is idle or frictioned. 10
6. Ejection group according to claim 4, **characterized in that** said further lower inlet roller (24) is motorized and forms with the first motorized upper inlet roller (21) a first pair of motorized inlet rollers (114). 15
7. Ejection group according to claim 6, **characterized in that** it comprises only two pairs of motorized rollers (123, 114). 20
8. Ejection group according to any one of the preceding claims, **characterized in that** it comprises a single upper motor (14) and a single lower motor (17). 25
9. Ejection group according to any one of the preceding claims, **characterized in that** the upper rollers (21, 22) are placed on an upper structure (13) adjustable in height and **in that** the lower rollers (23, 24) have a fixed position under the unloading plane (12) and are placed with their upper generatrix tangential to the first inclined portions (12') of the unloading plane (12). 30
10. Method for ejecting a log including the steps of: 35
 - receiving a log (11) rolling on an unloading plane (12) towards a first motorized upper inlet roller (21), 40
 - transferring the log (11) downstream of the first upper inlet roller (21), 45
 - receiving the log (11) between the upper handling roller (22) and lower handling roller (23) of a pair of motorized handling rollers (123), in which the upper handling roller (22) has an angular speed lower than first upper inlet roller (21), 50
 - - transferring the log (11) rolling on the unloading plane (12) towards the exit. 55
11. Ejection method according to claim 10, **characterized in that** the relative ratio of the angular speeds of the rollers is set so that in the pair of handling

rollers (123) the angular speed of the upper handling roller (22) is greater than the angular speed of the lower handling roller (23).

12. Ejection method according to claims 10 or 11, **characterized in that** the log (11) is received at the inlet on the unloading plane (12) by a pair of inlet rollers (114) formed by the first upper inlet roller (21), motorized, and by a further lower inlet roller (24), in which the first upper inlet roller (21) has a greater angular speed than the further lower inlet roller (22) .

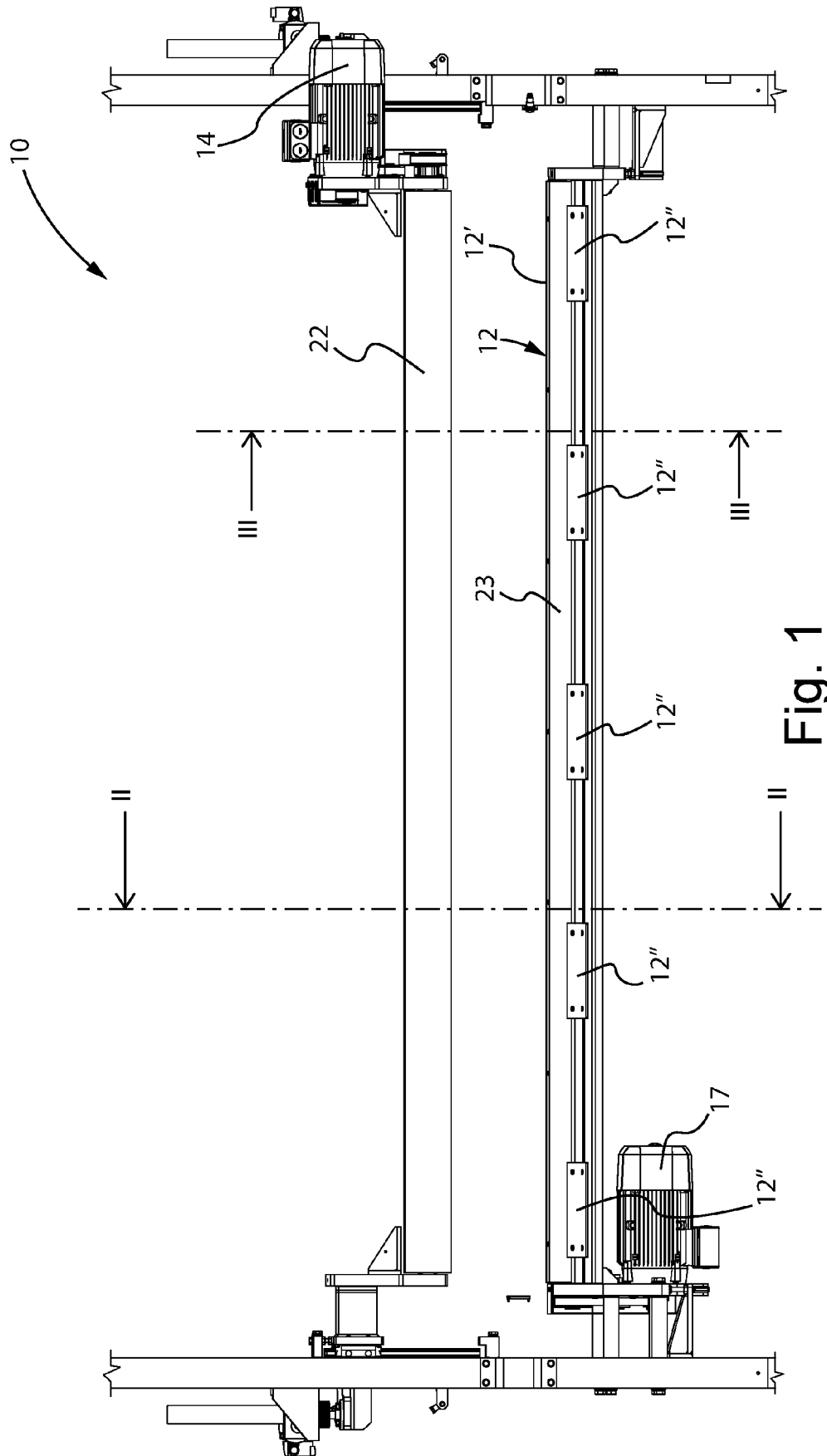


Fig. 1

Fig. 2

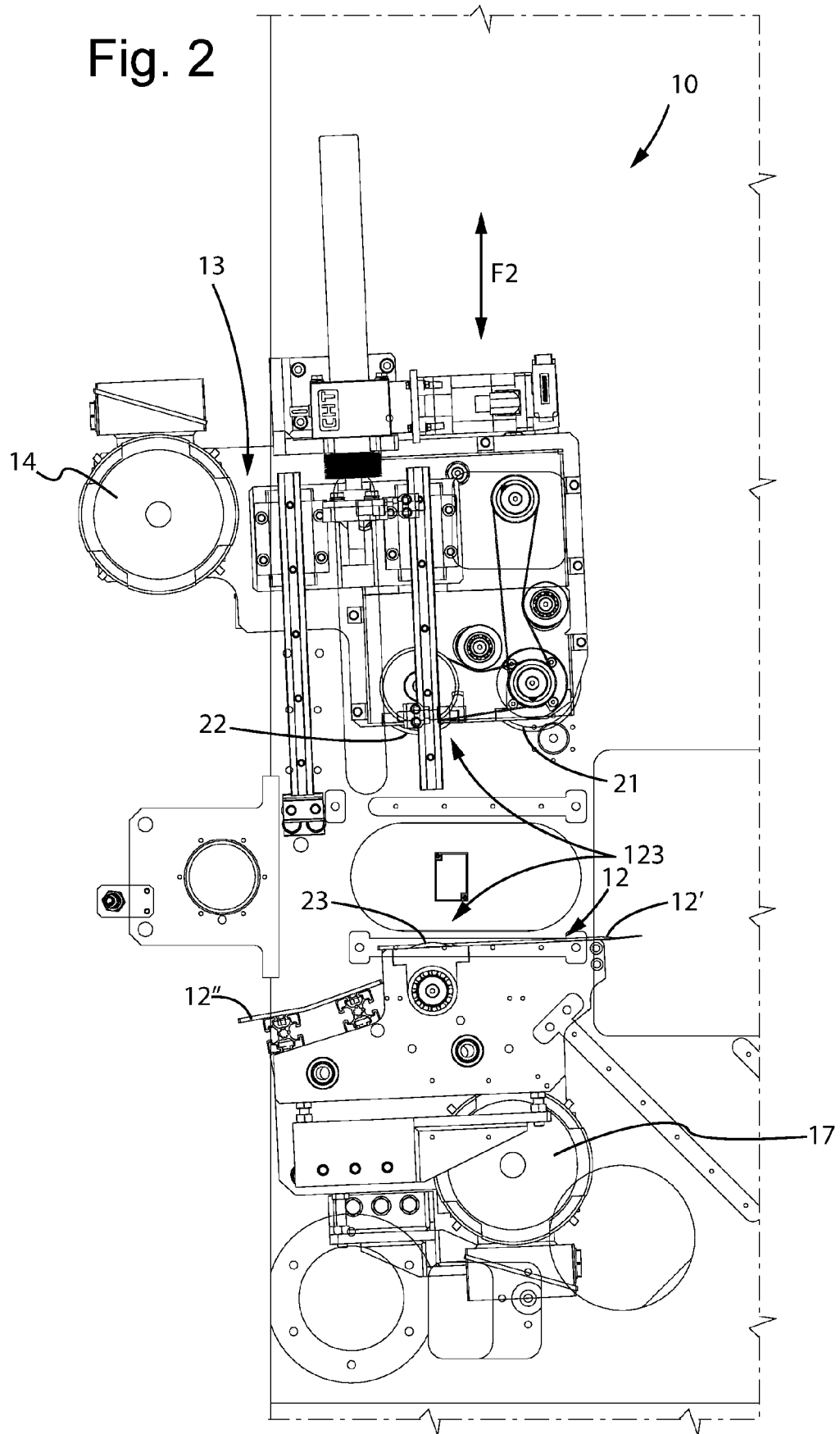


Fig. 3

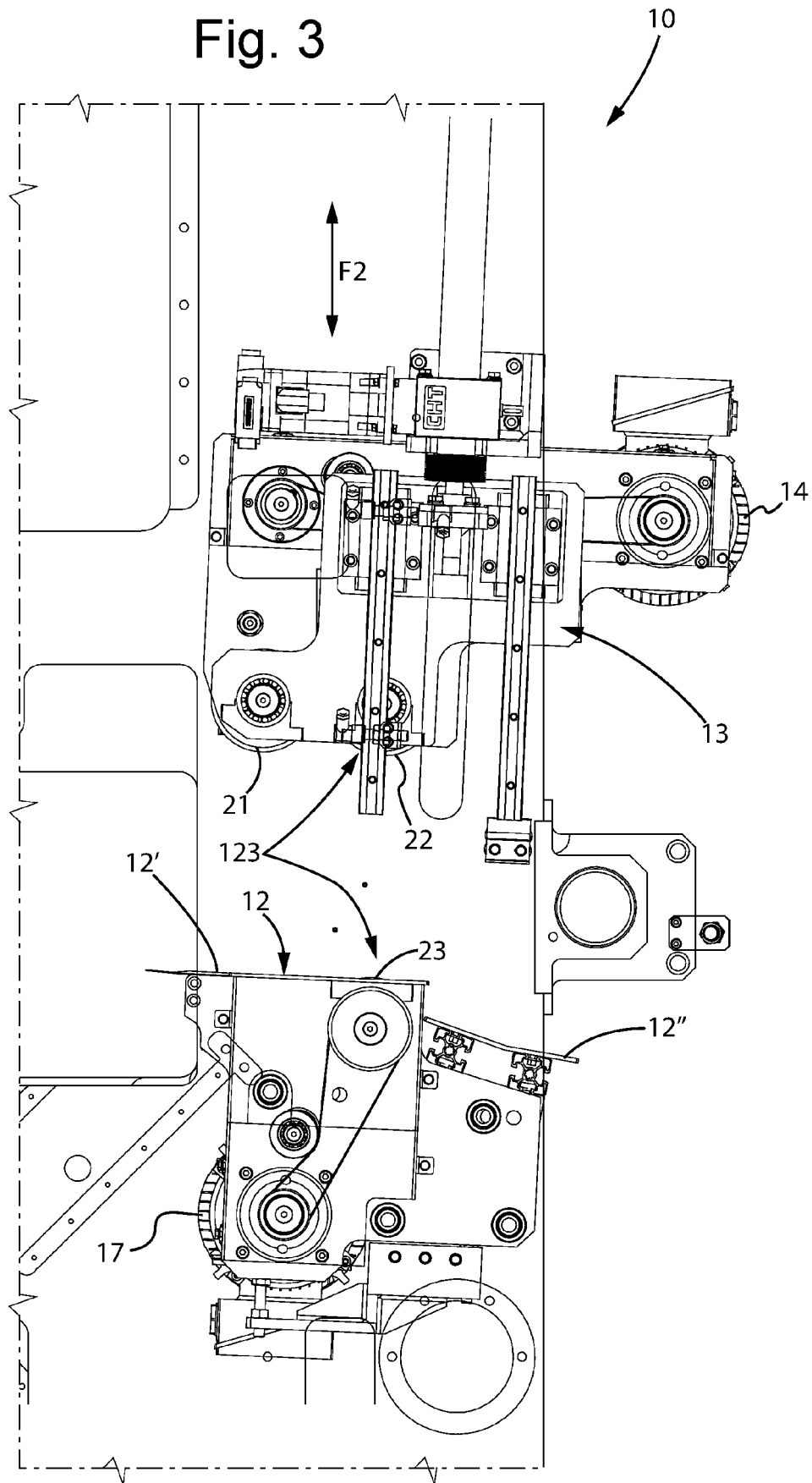


Fig. 4

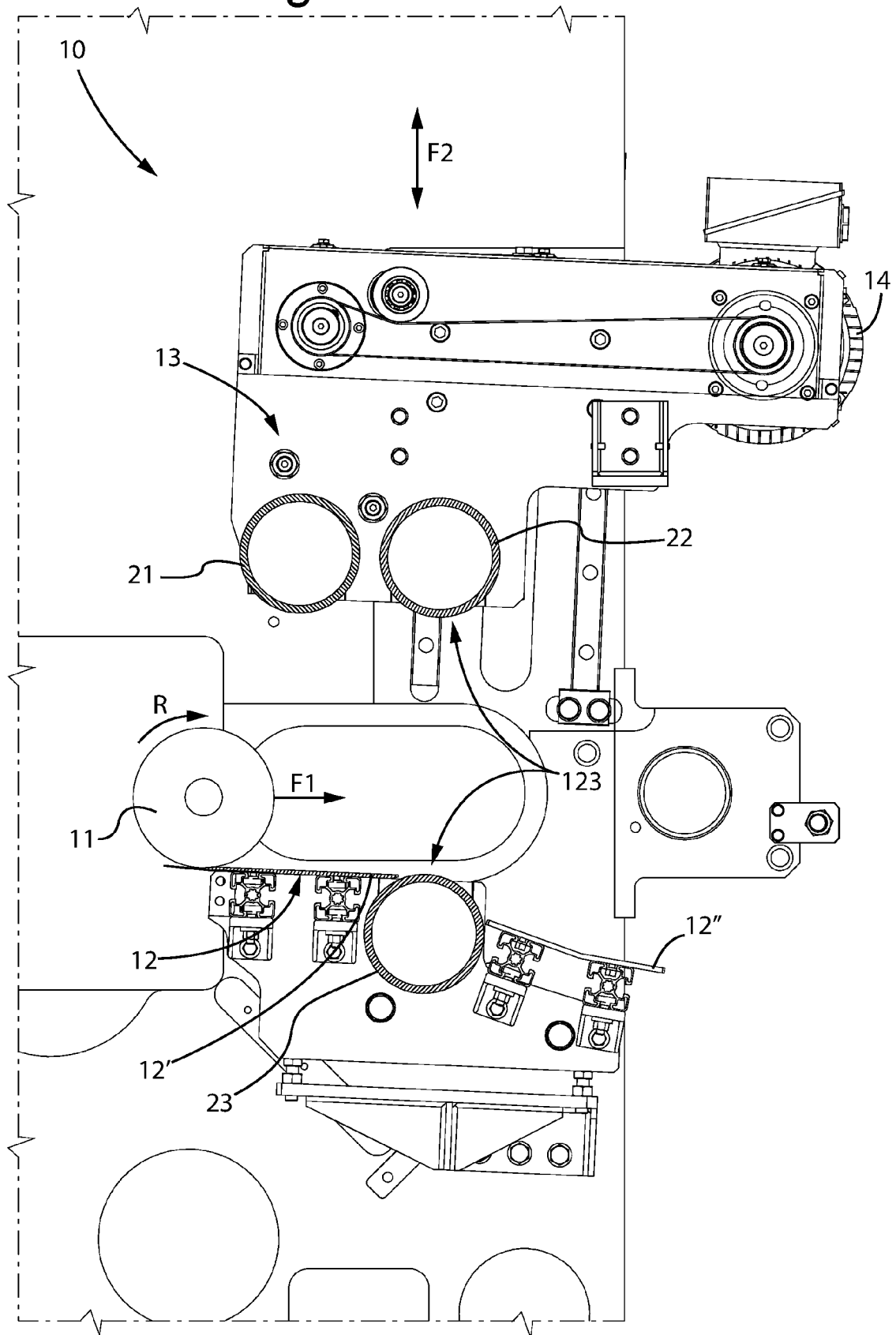
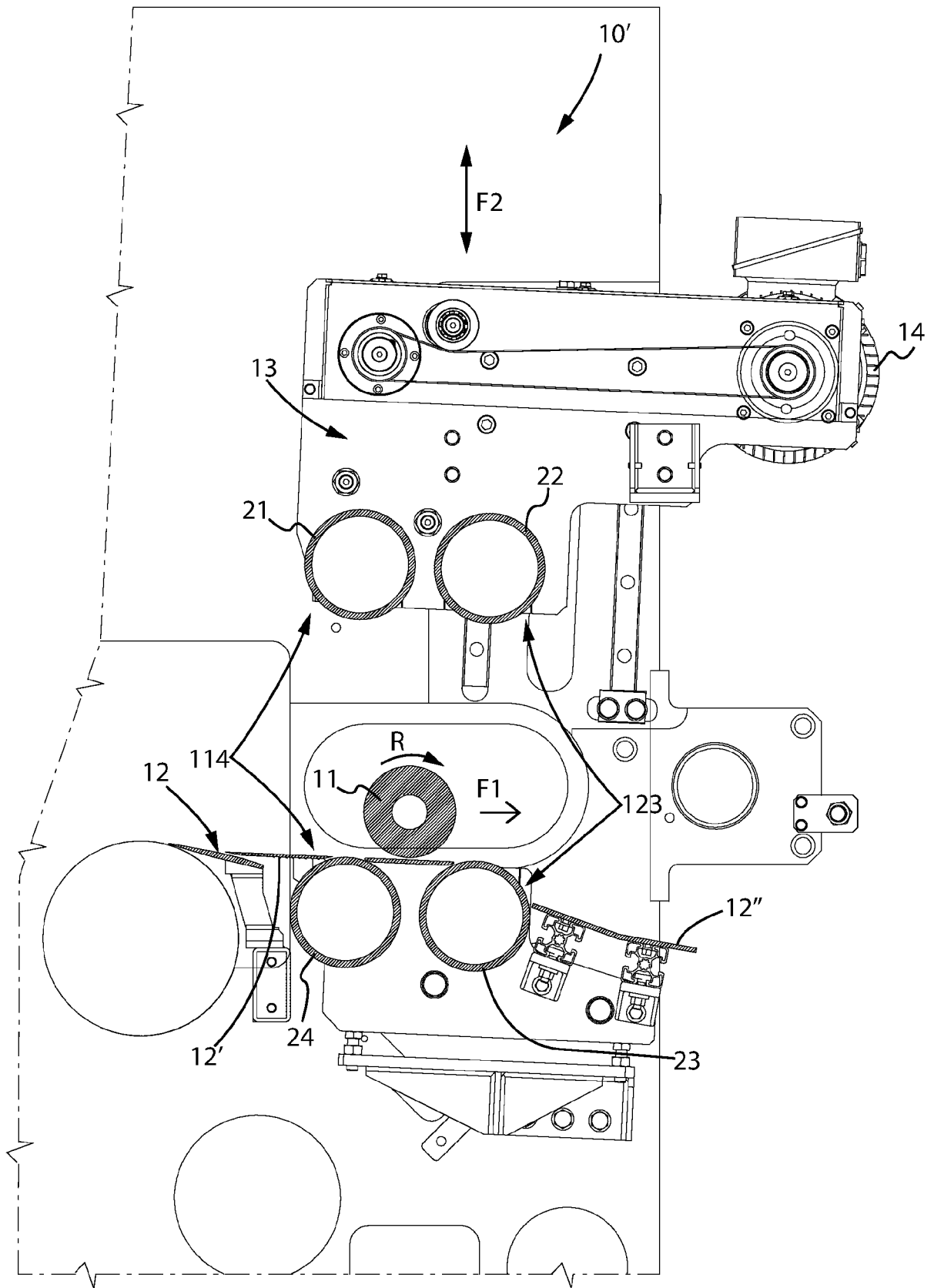


Fig. 5





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Application Number

EP 22 21 0640

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EPO FORM 1503 03:82 (P04C01)

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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