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(54) **METHOD TO CONTROL A FEEDING UNIT TO FEED COMPONENTS FOR SMOKING ARTICLES**

(57) A method to control a feeding unit (1) to feed components (2) for smoking articles and comprising the steps of: feeding, by means of a first feed (3), a first flow of components (2) having a first pitch (PI); and feeding, by means of a second feed (4), a second flow of components (2) having a second pitch (PI), which is the same as the first pitch (P1). In case of the regular operation of both feeds (3, 4), combining, at a first drum (5), the components (2) of the first and second flows so as to create a third flow of components (2), in which the components (2) of the first flow are alternated with the components (2) of the second flow and have a third pitch (P3) which is smaller then, in particular half, the first pitch (P1) and the second pitch (P1). In case of regular operation of both feeds (3, 4), transferring the components (2) of the third flow from the first drum (5) to a second drum (8) having the same speed as the first drum (5). In case the first feed (3) stops, the steps of: carrying out a pitch reduction of the components (2) of the second flow, in particular at the output of the first drum (5), so as to obtain a third flow of components (2) having a third pitch (P3) which is smaller than, in particular half, the first pitch (P1) and the second pitch (P1); and transferring the components (2) of the third flow from the first drum (5) to the second drum (8).

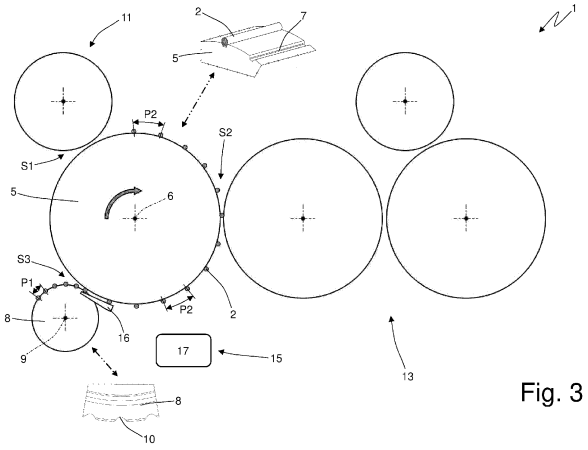

Fig. 3

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 102020000023935 filed on October 12, 2020.

TECHNICAL FIELD

[0002] The present invention relates to a method to control a feeding unit to feed components for smoking articles.

PRIOR ART

[0003] A feeding unit to feed components for smoking articles normally comprises a hopper which is arranged at the highest point and contains a mass of (cylindrical) components; a suction drum is arranged at the bottom of the hopper which is provided with peripheral suction seats and withdraws, from the mass of components, a succession of components which are transferred to the conveyor drums arranged downstream.

[0004] Modern packaging machines for smoking articles have very high nominal speeds (close to or even higher than 18,000-20,000 smoking articles produced per minute) and at these nominal speeds a single hopper may not be sufficient to guarantee the necessary flow rate of components (the descent of the mass of components into the hopper occurs by gravity and therefore there are physical limits that are not easily overcome); for this reason, the feeding units of modern packaging machines for smoking articles often have two twin hoppers operating in parallel (therefore each hopper has a nominal flow rate which is half the flow rate required by the combining machine). The two flows of components coming from the two twin hoppers that are initially separated are brought together in a joining drum provided with seats that alternatively receive a component coming from one hopper and a component coming from the other hopper; in this way, in the seats of the joining drum the components coming from one hopper are alternated with the components coming from the other hopper.

[0005] In a hopper the components which descend by gravity all have a same longitudinal orientation which is necessary to allow the components to enter the seats of the suction drum arranged on the bottom of the hopper; it may happen that during the descent by gravity along the hopper a component ends up *"crosswise",* that is, arranged transversely relative to the other components. A possible *"crosswise"* component is unable to enter a seat of the suction drum and represents an obstacle that also prevents the other correctly aligned components from entering the seats of the suction drum, namely, a possible *"crosswise"* component generates a jamming of the hopper. When a component is arranged sideways, it is normally necessary to interrupt the operation of the feeding unit (therefore of the packaging machine) and consequently the intervention of an operator is required who manually eliminates the *"crosswise"* component.

[0006] Traditionally, in a feeding unit provided with two twin hoppers and in case of blocking (jamming) of a hopper (normally due to a *"crosswise"* component) the entire feeding unit and therefore the entire combining machine is blocked. However, a complete stop of the combining machine even for a few minutes results in a significant loss of production and reduces the average productivity of the combining machine (generally measured as the number of pieces produced during an 8-hour work shift).

[0007] In order to increase the average productivity of a combining machine it has been proposed to keep the combining machine operative even in case of blockage (jamming) of only one of the two hoppers of a feeding unit; in other words, all the elements that operate with the blocked (jammed) hopper are stopped (also in order to allow an operator to intervene on the blocked hopper) and therefore the feeding unit uses only the other hopper still operative. However, by keeping only one hopper operative, only the components of a single hopper arrive in the joining drum (which should alternatively receive the components from both hoppers) and therefore a series of empty spaces (namely, the seats of the joining drum instead of being all full are alternately one full and one empty) are formed in the joining drum; consequently, downstream of the joining drum it is necessary to manage the feeding of the other components, of the wrapping materials and of the glues, taking into account the fact that the combining machine is (literally) *"half empty"* (or, from the other point of view, *"half full")* . Managing a *"half empty"* combining machine is rather complex as feeding of the wrapping materials operates continuously and therefore it is very difficult to cyclically interrupt feeding of the wrapping materials for each empty seat; furthermore, when many empty seats remain in the drums (namely, half of the seats are empty) there is a great waste of suction which, on the one hand, increases the energy consumption of the combining machine (consuming more energy even though operating at half-service) and, on the other, the noise generated by the combining machine also significantly increases (making more noise even though operating at half-service).

[0008] The patent application EP3542650A2 represents the closest state of the art and describes a transport system for smoking articles provided with a cutting device to cut each double-length smoking article into at least two single-length smoking articles; the cutting device has at least one cutting blade which protrudes inside a guide channel and is oriented perpendicular to the longitudinal axis of the smoking articles, and at least one rotation device to rotate the smoking articles relative to the cutting blade .

DESCRIPTION OF THE INVENTION

[0009] The object of the present invention is to provide

a method to control a feeding unit to feed components for smoking articles, which control method allows not to stop the feeding unit in case of a hopper being jammed and, at the same time, allows to manage in a simple and efficient manner the rest of the combining machine to which the feeding unit belongs.

[0010] According to the present invention, a method to control a feeding unit to feed components for smoking articles is provided according to what is claimed in the attached claims.

[0011] The claims describe embodiments of the present invention forming an integral part of the present description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The present invention will now be described with reference to the attached drawings, which illustrate some non-limiting embodiments thereof, wherein:

- Figure 1 is a schematic and front view of a feeding unit to feed components for smoking articles during normal operation;
- Figure 2 is a schematic view of part of the feeding unit of Figure 1 during normal operation;
- Figure 3 is a schematic view of part of the feeding unit of Figure 1 during a special operation due to jamming of a hopper;
- Figure 4 is a schematic view of part of the feeding unit of Figure 1 according to an alternative embodiment and during normal operation.

PREFERRED EMBODIMENTS OF THE INVENTION

[0013] In Figure 1, number 1 denotes, as a whole, a feeding unit to feed components 2 (for example, pieces of filtering material or pieces of tobacco) which is part of a combining machine for the production of smoking articles (for example, new generation smokeless cigarettes, namely, without combustion) or of components for smoking articles (for example, filters for traditional cigarettes or for new generation cigarettes).

[0014] The feeding unit 1 comprises a hopper 3 containing a mass of components 2 and a further hopper 4 which is the twin of the hopper 3 and also contains a mass of components 2. According to a different embodiment, not illustrated, the feeding unit 1 could comprise feeds of a flow of components 2 different from those of the hopper.

[0015] As illustrated in Figures 1, 2 and 3, the feeding unit 1 comprises a drum 5 which is mounted rotatable around a rotation axis 6 (which is horizontal and perpendicular to the plane of Figure 1) and is provided with a plurality of suction seats 7 which are formed on the side wall of the drum 5 and are arranged with a single pitch P1 (namely, the suction seats 7 of the drum 5 are equally spaced and a constant distance equal to the single pitch P1 is present between two consecutive suction seats 7 of the drum 5). The suction seats 7 of the drum 5 receive the components 2 coming from the hopper 3 at a feeding station S1 and receive the components 2 coming from the hopper 4 at a feeding station S2 arranged downstream of the feeding station S1 relative to the rotation direction of the drum 5. In the feeding station S1 the components 2 coming from the hopper 3 have a double pitch P2 (which is exactly double the single pitch P1 of the seats 7 of the drum 5) and therefore immediately downstream of the feeding station S1, the seats 7 of the drum 5 are alternately empty and full; also in the feeding station S2 the components 2, coming from the hopper 4, have a double pitch P2 (which is exactly double the single pitch P1 of the seats 7 of the drum 5) and therefore in the feeding station S2 the components 2, coming from the hopper 4, are inserted in the seats 7 of the drum 5 left empty downstream of the feeding station S1. In other words, the seats 7 of the drum 5 which have the single pitch P1 are half filled in the feeding station S1 by the components 2 coming from the hopper 3 and the remaining half are filled in the feeding station S2 by the components 2 coming from the hopper 4.

[0016] The feeding unit 1 comprises a drum 8, which is mounted rotatable around an rotation axis 9 (which is horizontal and parallel to the rotation axis 6), is arranged alongside the drum 5, and is provided with a plurality of suction seats 10, which are obtained on the side wall of the drum 8 and are arranged with the single pitch P1 (namely, the suction seats 10 of the drum 8 are equally spaced and a constant distance equal to the single pitch P1 is present between two consecutive suction seats 10 of the drum 8). The suction seats 10 of the drum 8 receive the components 2 from the drum 5 in a transfer station S3 that is arranged, relative to the drum 5, downstream of the feeding stations S1 and S2 relative to the rotation direction of the drum 5.

[0017] The feeding unit 1 comprises a transport system 11 (illustrated in Figure 1) which is formed by a cascade (succession) of drums, picks up the components 2 from the hopper 3 and releases the components 2 to the drum 5; in particular, the transport system 11 ends at the feeding station S1 in which the transport system 11 releases the components 2 coming from the hopper 3 to the seats 7 of the drum 5. The transport system 11 begins with a suction drum 12 that is directly coupled to a bottom of the hopper 3, namely, it is partially inserted in the bottom of the hopper 3, to cyclically pick up the components 2 which are inside the hopper 3. Obviously, the drums of the transport system 11 have suction seats which are arranged with the double pitch P2 (which is exactly double the single pitch P1 of the suction seats 7 of the drum 5). The intermediate drums of the transport system 11 (namely, the drums located between the suction drum 12 and the drum 5) can be simple transport drums (namely, they do not perform any type of operation or control on the components 2) or they can also be operating drums that perform an operation (for example, a transversal cut, an overturning, an optical check, a pneumatic

check ...) on the components 2.

[0018] Similarly, the feeding unit 1 comprises a transport system 13 (illustrated in Figure 1) which is formed by a cascade (succession) of drums, picks up the components 2 from the hopper 4 and releases the components 2 to the drum 5; in particular, the transport system 13 ends at the feeding station S2 in which the transport system 13 releases the components 2 coming from the hopper 4 to the seats 7 of the drum 5. The transport system 13 begins with a suction drum 14 which is directly coupled to a bottom of the hopper 4, namely, it is partially inserted in the bottom of the hopper 4, to cyclically pick up the components 2 that are inside the hopper 4. Obviously, the drums of the transport system 13 have suction seats, which are arranged with the double pitch P2 (which is exactly double the single pitch P1 of the suction seats 7 of the drum 5). The intermediate drums of the transport system 13 (namely, the drums located between the suction drum 14 and the drum 5) can be simple transport drums (namely, they do not perform any type of operation or control on the components 2) or they can also be operating drums that perform an operation (for example, a transversal cut, an overturning, an optical check, a pneumatic check ...) on the components 2.

[0019] According to what is illustrated in Figures 2 and 3, the feeding unit 1 comprises a rolling device 15, which is arranged in the transfer station S3 and can be switched inserted and removed (namely, it can be activated and deactivated): when the rolling device 15 is inserted (activated) it subjects the components 2 to rolling (namely, to a rotation around a longitudinal central axis thereof) at the transfer station S3 whereas when the rolling device 15 is removed (deactivated) it does not subject the components 2 to rolling. The rolling device 15 comprises a rolling tile 16 (rolling bed), which (when the rolling device 15 is inserted) is arranged alongside the drum 5 to define, together with the drum 5, a rolling channel inside which each component 2 is made to rotate on itself by rolling on the external surface of the drum 5; an example of a rolling device similar to the rolling device 15 is described in the patent application US5349968A1.

[0020] The rolling device 15 further comprises an actuator device 17 (for example, an electric motor) which moves the rolling tile 16 between an active position (illustrated in Figure 3), in which the rolling tile 16 engages the components 2 located in the transfer station S3 subjecting the components 2 to rolling and a deactivated position (illustrated in Figure 2), in which the rolling tile 16 does not engage the components 2 that are in the transfer station S3 and which therefore are not subjected to rolling.

[0021] With reference to Figures 2 and 3, the operation of the feeding unit illustrated in Figures 1-3 is described in the following, both in case of regular operation of both hoppers 3 and 4, and in case of blockage of a hopper 3 or 4 (in particular, blockage of hopper 4).

[0022] As illustrated in Figure 2, in case of regular operation of both hoppers 3 and 4, in the feeding station S1 in half of the seats 7 of the drum 5 the components 2, coming from the hopper 3, are transferred (therefore by means of the transport system 11); at the same time, in the feeding station S2 and, in the remaining half of the seats 7 of the drum 5 the components 2, coming from the hopper 4 (therefore by means of the transport system 13), are transferred so that in the seats 7 of the drum 5 the components 2 coming from the hopper 3 are alternated with the components 2 coming from the hopper 4. In this operating mode, the drum 5 and the drum 8 are made to rotate at the same rotation speed and the components 2 are transferred to the transfer station S3 from the drum 5 to the drum 8 keeping the pitch between the components 2 unchanged; namely, at the transfer station S3 (therefore downstream of the feeding station S2) in the drum 5 the components 2 have the single pitch P1, and at the transfer station S3 also in the drum 8 the components 2 have the single pitch P1. In other words, across the transfer station S3 in both drums 5 and 8 (rotating at the same rotation speed) the components 2 have the same single pitch P1.

[0023] As illustrated in Figure 3, in case of blockage of the hopper 4, in the feeding station S1 in half of the seats 7 of the drum 5 the components 2 coming from the hopper 3 (therefore through the transport system 11) are transferred, while in the feeding station S2 the components 2 coming from the hopper 4 (therefore through the transport system 13) are not transferred, since the hopper 4 is blocked; consequently, only half of the seats 7 of the drum 5 receive the components 2 coming only from the hopper 3 and therefore half of the seats 7 of the drum 5 remain empty and in the seats 7 of the drum 5 the components 2, coming from the hopper 3, are alternated with the empty seats 7. In this operating mode, the drum 5 is made to rotate at a rotation speed that is twice the rotation speed of the drum 8 (namely, the rotation speed of the drum 8 is half the rotation speed of the drum 5) and the components 2 are transferred to the transfer station S3 from the drum 5 to the drum 8, halving the pitch between the components 2; namely, at the transfer station S3 (therefore downstream of the feeding station S2), in the drum 5, the components 2 have the double pitch P2 (half of the seats 7 of the drum 5 being empty due to the blocking of the hopper 4), while at the transfer station S3, in the drum 8, the components 2 have the single pitch P1 (which is half the double pitch P2). In other words, across the transfer station S3 the pitch between the components 2 is reduced by half by passing from the double pitch P2 provided in the drum 5 to the single pitch P1 provided in the drum 8.

[0024] By operating in this way, starting from the drum 8 (namely, in the drum 8 and in everything downstream of the drum 8) the components 2 have the same pitch (namely, the single pitch P1) that they have when both hoppers 3 and 4 are operative and, therefore, the effects of blocking the hopper 4 are completely compensated; to obtain this result it is necessary to reduce by half the rotation speed of the drum 8 relative to the rotation speed

of the drum 5, namely, relative to the rotation speed that the drum 8 would have if both hoppers 3 and 4 were operative. In other words, starting from the drum 8 (namely, in the drum 8 and in everything downstream of the drum 8) it is chosen to reduce by half the rotation speed (namely, the productivity) to ensure that all the seats 10 of the drum 8 are full (namely, have respective components 2) and therefore to ensure that the feeding unit 1 and the combining machine can have a completely normal operation (but obviously slowed down relative to the nominal capacity). It is important to note that the limitation on the productivity of the combining machine (namely, the reduction by half of the productivity of the combining machine) is completely logical and expected: if half of the hoppers 3 and 4 are not available (namely, in case of blockage of one of the two hoppers 3 and 4), it is a natural consequence that the combining machine can only operate at half of the nominal capacity.

[0025] To summarize the above, in case of regular operation of both hoppers 3 and 4, all the elements of the feeding unit 1 operate with the same rotation speed while in case of blockage of a hopper 3 or 4, the drum 5 and all the elements of the feeding unit 1 upstream of the drum 5 operate with a double rotation speed and a double pitch relative to the drum 8 and to all the elements of the feeding unit 1 downstream of the drum 8.

[0026] What has been described above in case of blockage of the hopper 4 applies mutatis mutandis also in case of blockage of the hopper 3.

[0027] As is clear by observing Figures 2 and 3, the components 2 are rolled (namely, subjected to rolling) at the transfer station S3 to reduce by half the pitch between the components 2; namely, in case of regular operation of both hoppers 3 and 4, the rolling device 15 is kept deactivated (as illustrated in Figure 2), while in case of blockage of a hopper 3 or 4, the rolling device 15 is activated (as illustrated in Figure 3) to subject the components 2 to a rolling at the transfer station S3 so as to reduce by half the pitch between the components 2.

[0028] In the embodiment illustrated in Figures 1, 2 and 3, the reduction by half of the pitch between the components 2 (from the double pitch P2 to the single pitch P1) in the transfer of the components 2 from the drum 5 to the drum 8 is obtained (when necessary, namely, in case of blockage of a hopper 3 or 4) by activating the rolling device 15 and then by rolling the components 2 at the transfer station S3. In the alternative embodiment illustrated in Figure 4, the reduction by half of the pitch between the components 2 (from the double pitch P2 to the single pitch P1) in the transfer of the components 2 from the drum 5 to the drum 8 is obtained (when necessary, namely, in case of blockage of a hopper 3 or 4) by interposing, between the drum 5 and the drum 8, a further drum 18 which can be configured between a normal configuration, in which the pitch between the components 2 does not change between an input station S4 at the drum 5 and a output station S5 at the drum 8, and a special configuration, in which the pitch between components 2 is half between the input station S4 and the output station S5.

[0029] In other words, according to what is illustrated in Figure 4, the drum 18 is provided, which is mounted rotatable around a rotation axis 19 (that is horizontal and parallel to the rotation axes 6 and 9), is interposed between the drums 5 and 8, it receives the components 2 from the drum 5 in the input station S4 and releases the components 2 to the drum 8 in the output station S5. The drum 18 comprises a plurality of suction holding heads 20, each of which is designed to receive and hold a respective component 2 and is mounted movably on the drum 18 to move, in use, relative to the drum 18; in particular, each suction head 20 is mounted rotatable on the drum 18 to rotate relative to the drum 18 around a rotation axis 21 parallel to the rotation axis 19.

[0030] According to a possible embodiment, the drum 18 comprises a cam operator 22 which controls the movement (rotation) of the suction holding heads 20 relative to the drum 18 and an actuator device 23 which, between the normal configuration and the special configuration, changes the cam operator 22 to change the law of motion applied by the cam operator 22 on the suction holding heads 20. By way of example, the actuator device 23 could be an electric motor that rotates a cam of the cam operator 22.

[0031] When it is not necessary to change the pitch of the components 2 in the transfer from the drum 5 to the drum 8 (namely, when both hoppers 3 and 4 work regularly and therefore there are no empty seats 7 in the drum 5 downstream of the feeding station S2), the drum 18 is configured by the actuator device 23 so as not to perform any variation in the pitch of the components 2 between the input station S4 and the output station S5; namely, the components 2 arrive in the input station S4 with the single pitch P1 and leave the output station S5 with the same single pitch P1. This result is obtained thanks to the fact that the suction holding heads 20 in the output station S5 have the same reciprocal spacing as the suction holding heads 20 in the input station S4.

[0032] On the other hand, when it is necessary to change the pitch of the components 2 in the transfer from the drum 5 to the drum 8 (namely, when a hopper 3 or 4 is blocked and therefore there are half of the seats 7 empty in the drum 5 downstream of the feeding station S2), the drum 18 is configured by the actuator device 23 to change the pitch of the components 2 between the input station S4 and the output station S5; namely, the components 2 arrive in the input station S4 with the double pitch P2 and leave the output station S5 with the single pitch P1 which is half the double pitch P2. This result is obtained thanks to the fact that the suction holding heads 20 in the output station S5 have a reduced (half) mutual spacing compared to the suction holding heads 20 in the input station S4.

[0033] The embodiments described herein can be combined with each other without departing from the scope of the present invention.

[0034] The control method described above makes it possible not to stop the feeding unit 1 in case of jamming of a hopper 3 or 4 and, at the same time, allows to manage in a simple and efficient way the rest of the combining machine to which the feeding unit 1 belongs. This result is obtained thanks to the fact that the output of the feeding unit 1 does not have empty seats even in case of jamming of a feed 3 or 4 and therefore the rest of the combining machine can operate in a completely normal way even if obviously slowed down relative to nominal performance.

Claims

1. A method to control a feeding unit (1) to feed components (2) for smoking articles and comprising the steps of:

   feeding, by means of a first feed (3), a first flow of components (2) having a first pitch (PI); and
   feeding, by means of a second feed (4), a second flow of components (2) having a second pitch (P1), which is the same as the first pitch (PI);
   in case of regular operation of both feeds (3, 4), combining, in the area of a first drum (5), the components (2) of the first flow and of the second flow so as to create a third flow of components (2), in which the components (2) of the first flow are alternated with the components (2) of the second flow and
   have a third pitch (P3), which is smaller than, in particular half, the first pitch (PI) and the second pitch (PI);
   in case of regular operation of both feeds (3, 4) transferring the components (2) of the third flow from the first drum (5) to a second drum (8) having the same speed as the first drum (5); the control method is **characterized in that** it comprises, in case the first feed (3) stops, the steps of:

      reducing the pitch of the components (2) of the second flow, in particular at the output of the first drum (5), so as to obtain a third flow of components (2) having a third pitch (P3), which is smaller than, in particular half, the first pitch (PI) and the second pitch (PI); and
      transferring the components (2) of the third flow from the first drum (5) to the second drum (8).

2. The control method according to claim 1, wherein:

   in case of regular operation of both feeds (3, 4), the method comprises the steps of: transferring the components (2) coming from the first feed (3) into the seats (7) of the first drum (5), in particular into half the seats (7), and the components (2) coming from the second feed (4) into further seats (7) of the first drum (5), in particular into the remaining half of the seats (7), so that, in the seats (7) of the first drum (5), the components (2) coming from the first feed (3) are alternated with the components (2) coming from the second feed (4); and
   transferring the components (2) from the first drum (5) to the second drum (8) keeping the pitch between the components (2) unchanged; and
   in case the first feed (3) stops, the method comprises the alternative steps of: transferring the components (2) coming from the second feed (4) into part of, in particular half, the seats (7) of the first drum (5) so that a remaining part, in particular a remaining half, of the seats (7) of the first drum (5) remain empty and so that, in the seats (7) of the first drum (5), the components (2) coming from the second feed (4) are alternated with the empty seats (7); causing the first drum (5) to rotate with a speed that is greater than, in particular twice, a rotation speed of the second drum (8); and transferring the components (2) from the first drum (5) to the second drum (8) reducing, in particular halving, the pitch between the components (2).

3. The control method according to claim 1 or 2 and comprising the further step of rolling the components (2) in a transfer station (S3) between the first drum (5) and the second drum (8) so as to reduce, in particular half, the pitch between the components (2).

4. The control method according to claim 3, wherein:

   in a transfer station (S3) between the first drum (5) and the second drum (8) there is a rolling device (15), which can be activated or deactivated; and
   the pitch reduction, in particular halving, while transferring the components (2) from the first drum (5) to the second drum (8) is carried out by activating the rolling device (15).

5. The control method according to claim 4, wherein the rolling device (15) comprises:

   a rolling tile (16), which is movable between an active position, in which the rolling tile (16) engages the components (2) in the transfer station (S3), and a deactivated position, in which the rolling tile (16) does not engage the components (2) in the transfer station (S3); and
   a first actuator device (17), which moves the roll-

ing tile (16) between the active position and the deactivated position.

6. The control method according to claim 3, 4 or 5, wherein the components (2) are caused to roll against an outer surface of the first drum (5).

7. The control method according to claim 1 or 2, wherein between the first drum (5) and the second drum (8) there is interposed a third drum (18), which can be configured either in a normal configuration, in which it does not change the pitch between the components (2) between an input station (S4) in the area of the first drum (5) and an output station (S5) in the area of the second drum (8), or in a special configuration, in which it reduces, in particular halves, the pitch between the components (2) between the input station (S4) and the output station (S5).

8. The control drum according to claim 7, wherein the third drum (18) comprises a plurality of holding heads (20), each mounted on the third drum (18) in a movable manner so as to move, in use, relative to the third drum (18).

9. The control method according to claim 8, wherein the third drum (18) comprises:

a cam operator (22), which controls the movement of the holding heads (20) relative to the third drum (18); and
a second actuator device (23), which, between the normal configuration and the special configuration, changes the cam operator (22) so as to change the law of motion applied by the cam operator (22) to the holding heads (20).

10. The control method according to one of the claims from 1 to 9, wherein the feeding unit (1) comprises:

a first transport system (11), which receives the components (2) from the first feed (3) and releases the components (2) to the first drum (5); and
a second transport system (13), which receives the components (2) from the second feed (4) and releases the components (2) to the first drum (5) in a different position compared to the first transport system (11).

11. The control method according to one of the claims from 1 to 10, wherein:

in case of regular operation of both feeds (3, 4), all the elements of the feeding unit (1) operate with the same rotation speed; and
in case the first feed (3) stops, the first drum (5) and all the elements of the feeding unit (1) upstream of the first drum (5) operate with a greater, in particular double, rotation speed and a greater, in particular double, pitch compared to the second drum (8) and all the elements of the feeding unit (1) downstream of the second drum (8).

12. A control method to control a feeding unit (1) to feed components (2) for smoking articles; the feeding unit (1) comprises: a first feed (3), which feeds a first flow of components (2), a second feed (4), which feeds a second flow of components (2), a first drum (5), which is provided with seats (7) receiving the components (2) from the first feed (3) and from the second feed (4), and a second drum (8), which receives the components (2) from the first drum (5);
the control method, in case of regular operation of both feeds (3, 4), comprises the steps of:

transferring the components (2) coming from the first feed (3) into the seats (7) of the first drum (5), in particular into half the seats (7), and the components (2) coming from the second feed (4) into further seats (7) of the first drum (5), in particular into the remaining half of the seats (7), so that, in the seats (7) of the first drum (5), the components (2) coming from the first feed (3) are alternated with the components (2) coming from the second feed (4); and
transferring the components (2) from the first drum (5) to the second drum (8) keeping the pitch between the components (2) unchanged;
the control method is **characterized in that** it comprises, in case the first feed (3) stops, the alternative steps of:

transferring the components (2) coming from the second feed (4) into half the seats (7) of the first drum (5) so that half the seats (7) of the first drum (5) remain empty and so that, in the seats (7) of the first drum (5), the components (2) coming from the second feed (4) are alternated with the empty seats (7); causing the first drum (5) to rotate with a rotation speed which is greater than, in particular twice, a rotation speed of the second drum (8); and
transferring the components (2) from the first drum (5) to the second drum (8) reducing, in particular halving, the pitch between the components (2).

13. A combining machine for the production of smoking articles or of components of smoking articles; the combining machine comprising:

a feeding unit (1) having: a first feed (3) for a first flow of components (2), a second feed (4)

for a second flow of components (2), a first drum (5), which is provided with seats (7) receiving the components (2) from the first feed (3) and from the second feed (4), and a second drum (8), which receives the components (2) from the first drum (5); and

a control system implementing the control method according to one of the claims from 1 to 12.

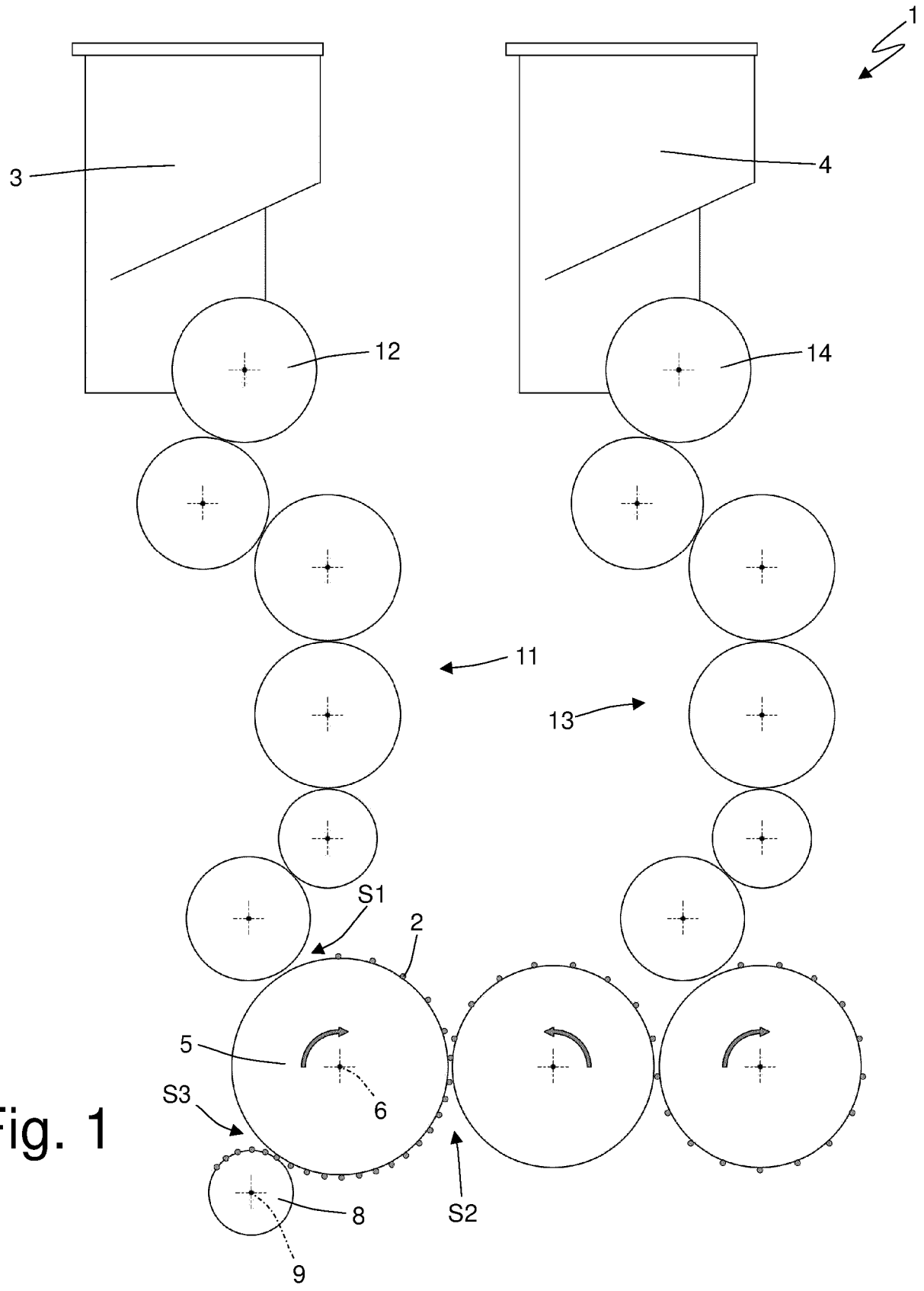

Fig. 1

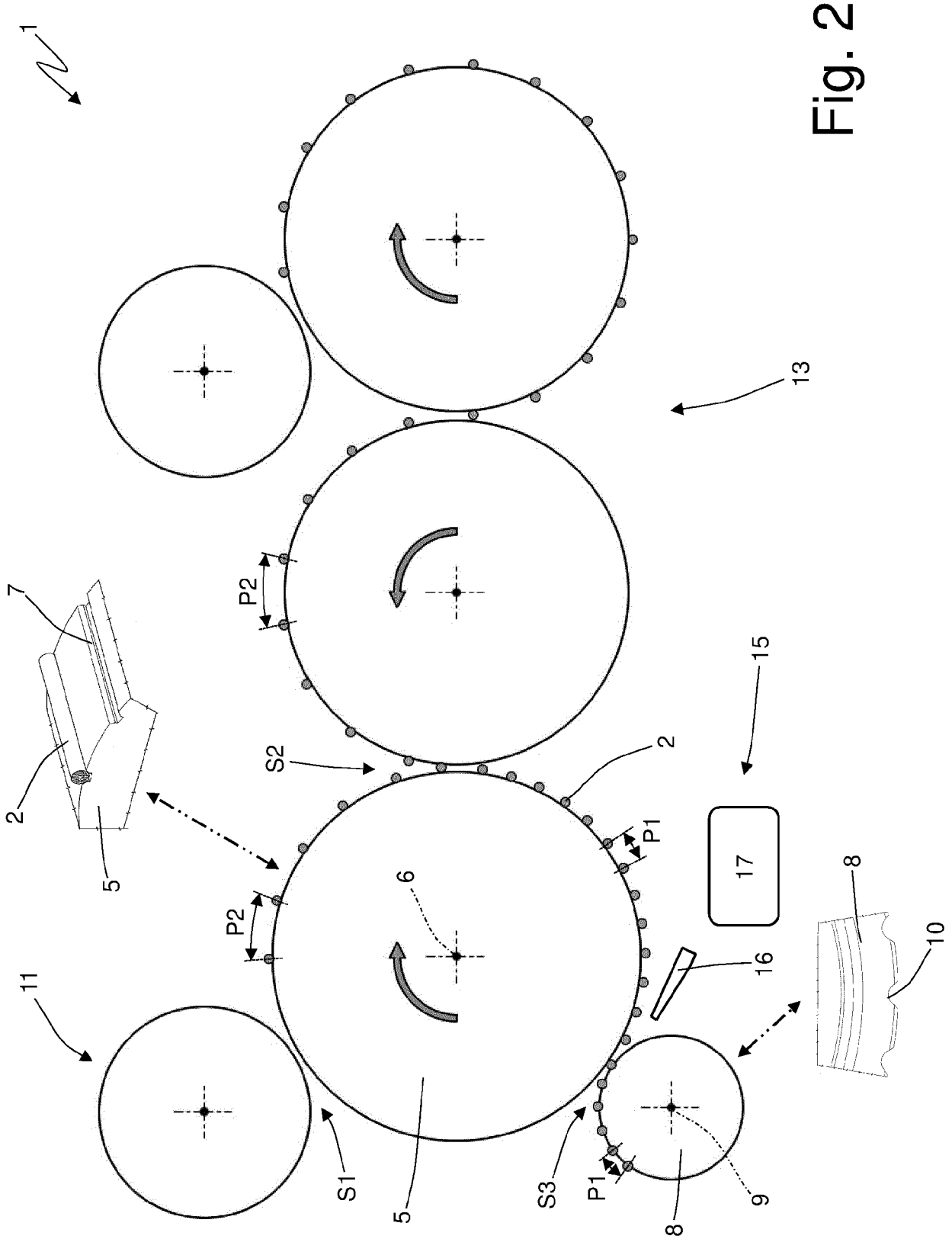

Fig. 2

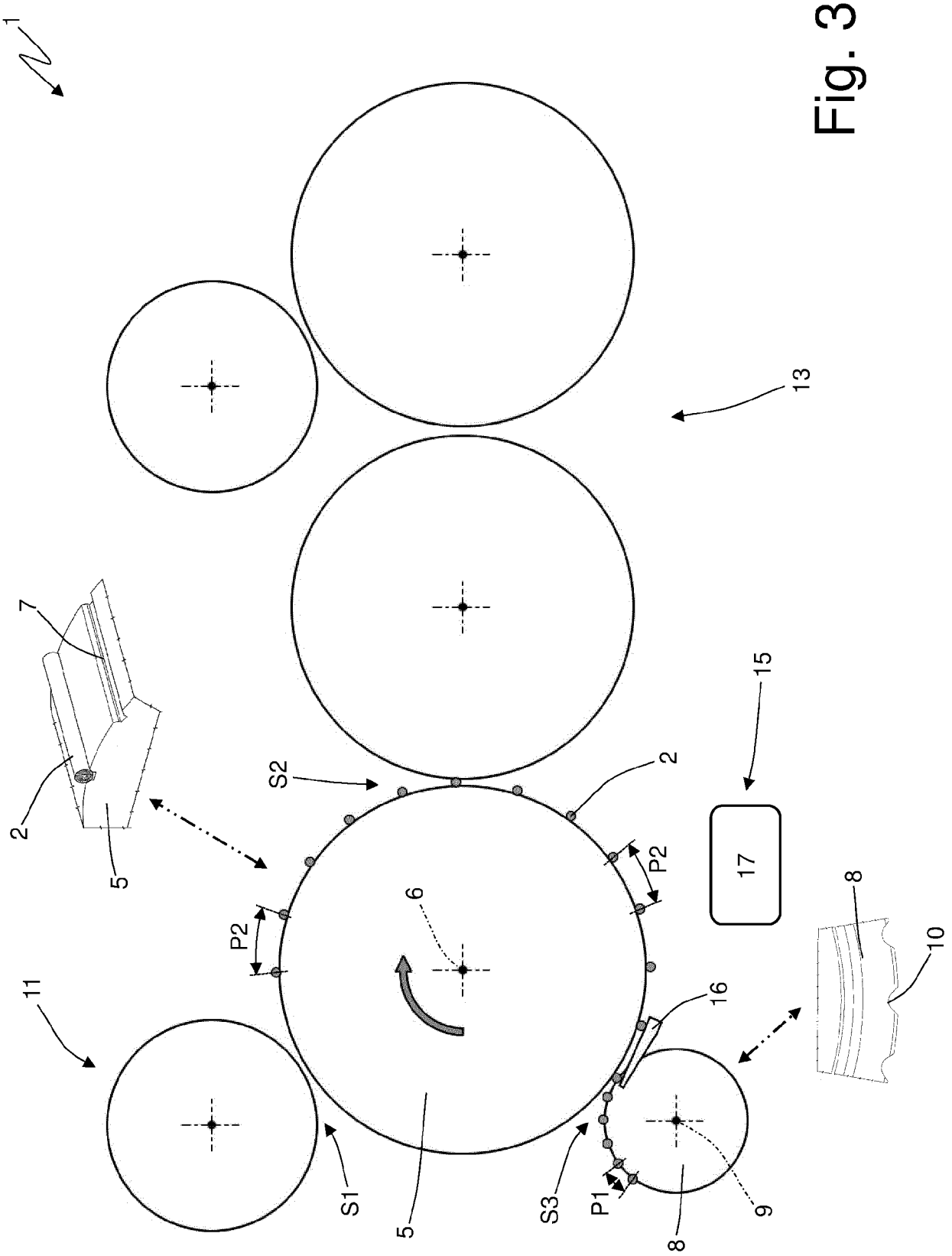

Fig. 3

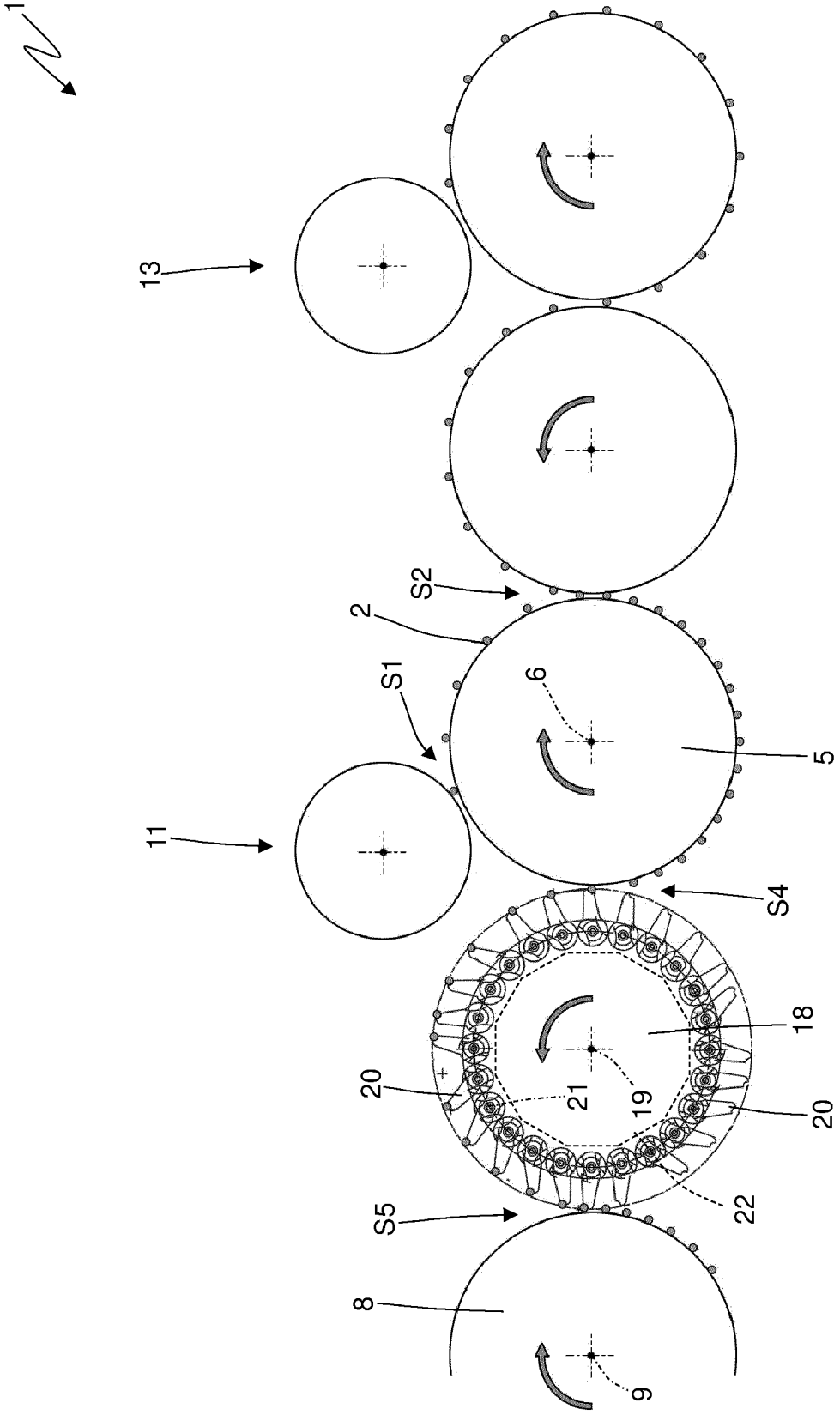

Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- IT 102020000023935 **[0001]**
- EP 3542650 A2 **[0008]**
- US 5349968 A1 **[0019]**