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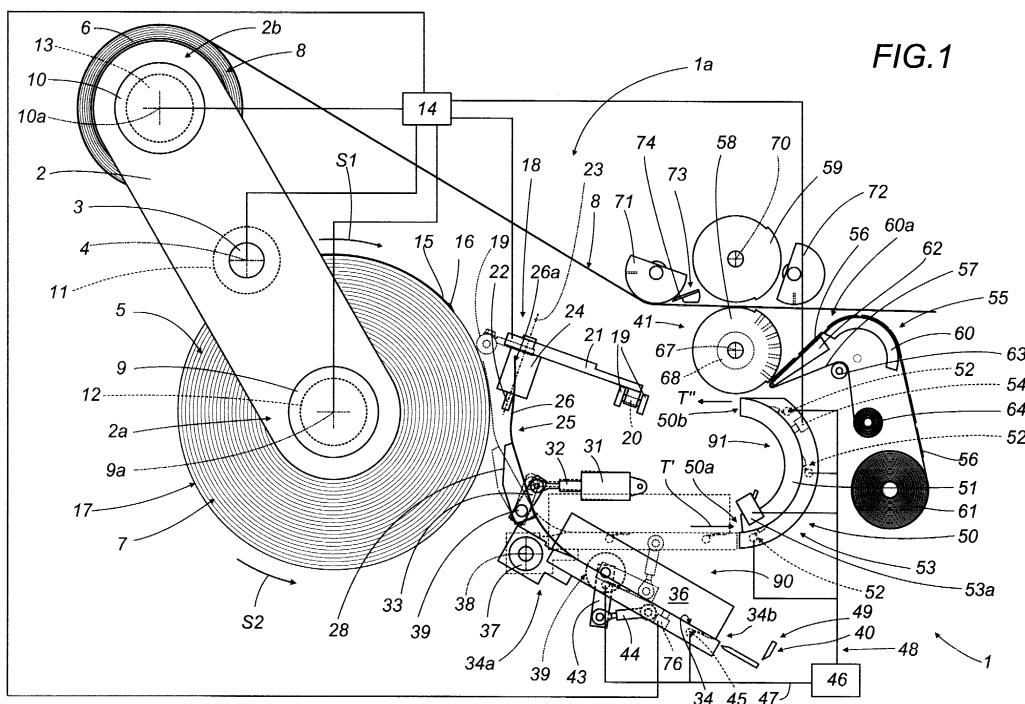
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(54) **A device for automatic splicing of strips decoiled from rolls**

(57) In a device (1) by which strips decoiled from rolls are spliced together automatically, a leading end (15) of a new strip (7) decoiling from a first roll (5) is gathered at a take-up station (25) and directed along a movable feed table (34) toward a cutting and preparing station (40); once the step of preparing the leading end

(15) of the new strip has been completed, the table (34) tilts on a relative axis of rotation (38) so as to direct the strip toward the entry end of a conveyor (50). The leading end (15) of the strip (7) passes along the conveyor (50) to a splicing station (41) where it is jointed with an end portion (42) of a depleting strip (8) decoiling from a second roll (6).



Description

[0001] The present invention relates to a device for the automatic splicing of strips decoiled from rolls.

[0002] In the art field of automatic manufacturing machines, for instance packaging machines in which use is made of paper or metal strip material wound onto rolls, the roll nearing depletion needs to be replaced with a new roll without causing any break in continuity of the supply of the strip material, unacceptable in such machines as correct operation would be jeopardized.

[0003] The prior art embraces machines comprising a set of devices arranged in succession and designed to perform the operations of replacing the roll, then of preparing the leading end of the strip decoiled from the new roll, and ultimately of splicing the prepared end with the trailing end of the strip of the depleting roll. Reasons of construction dictate that such devices are disposed normally in sequence and thus occupy considerable space, with the result that the route followed by the strip is long and elaborate.

[0004] The object of the present invention is to provide a device for splicing two strips automatically such as will be effective, economical and of compact dimensions.

[0005] The stated object is realized according to the present invention in a device for the automatic splicing of strips decoiled from rolls, comprising first means by which to guide a leading end of a new strip decoiled from a first roll, characterized in that the first guide means are capable of movement at least between a first position in which the new strip is directed toward a station where the leading end is cut and prepared, and a second position in which the new strip is directed toward a station where the leading end is spliced with a trailing end portion of a depleting strip decoiled from a second roll.

[0006] The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 shows a portion of a packaging machine, viewed schematically in a side elevation with certain parts omitted for clarity, equipped with a device according to the invention for the automatic splicing of strips decoiled from respective rolls, illustrated in a first embodiment;
- figure 2 shows a detail of the device illustrated in figure 1, viewed in perspective from above;
- figures 3 to 7 show the device of figure 1 viewed schematically in a side elevation and illustrated in a succession of operating steps;
- figure 8 is an enlarged detail of figure 7;
- figure 9 shows the same detail as in figure 2, illustrated schematically in a side elevation and in an alternative embodiment;
- figures 10 to 12 are schematic side elevations showing a detail of the device of figure 1 in an alternative embodiment, illustrated in a succession of operating steps.

[0007] With reference to figure 1 and figures 3 to 7 of the drawings, 1a denotes a portion of a packaging machine, in its entirety, and 1 denotes a device, in its entirety, by which strips decoiled from respective rolls are spliced automatically.

[0008] The device 1 comprises an arm 2 mounted rotatably to a central pivot 3 with a horizontally disposed axis 4, of which the two opposite ends 2a and 2b carry respective first and second rolls 5 and 6 of a strip material 7 and 8 mounted to corresponding pivots 9 and 10 lying with axes 9a and 10a parallel to the axis 4 of the central pivot 3.

[0009] The arm 2 is rotatable about the central axis 4 through the agency of conventional drive means denoted 11, whilst the rolls 5 and 6 are set in rotation about their respective axes 9a and 10a by respective drive means denoted 12 and 13, likewise conventional in embodiment, incorporated into the arm 2 and connected mechanically to the relative pivots 9 and 10.

[0010] The operation of the drive means 11, 12 and 13 is interlocked to a master control unit 14, and with reference to figures 1 and 9 and figures 3 to 7, in particular, the drive means denoted 12 are piloted in such a way that the first roll 5 can be rotated either in a clockwise direction S1 (figure 1) or in the opposite direction S2 (figure 4).

[0011] As illustrated in figure 1 and figures 3 to 6, and with reference to the position occupied by the arm 2, the first roll 5 is stationed in the lower position, and as viewed in figure 1, more exactly, in a standby position, whereas the second roll 6 is stationed in the upper position or position of use. Accordingly, the strip 7 of the first roll 5 is referred to in the following specification as the new strip and the strip 8 decoiling from the second roll 6 as the depleting strip.

[0012] The new strip 7 of the first roll 5 appears with one end 15 secured by a seal 16 against an outer surface of revolution 17 of the selfsame roll 5, in such a way that the coils of the strip 7 will not unreel or loosen when the roll 5 is being handled or in transit.

[0013] A metering element 18 positioned near the first roll 5 comprises two wheels 19 fashioned from a material having a high coefficient of friction, mounted rotatably to a pivot 20 carried by one end of an arm 21 hinged at the other end to a pivot 22 of which the axis 23 lies transverse to the axis 4 of the central pivot 3. The arm 21 is caused by an actuator 24 to rotate about the axis 23 between a first operating position, illustrated in figure 1 by phantom lines and in figures 3 to 6 by solid lines, in which the wheels 19 are in contact with the surface of revolution 17 of the first roll 5, and a second inactive position, illustrated in figures 1 and 7 by solid lines, in which the two wheels 19 are distanced from the first roll 5.

[0014] The metering element 18 likewise is interlocked to the master control unit 14 and comprises an electrical, electromagnetic or electronic component of conventional type (not illustrated) operating in conjunc-

tion with the wheels 19 in such a way as to count the revolutions completed by the wheels 19 when brought by the arm 21 into contact with the surface of revolution 17 of the roll 5 and set thus in contrarotation by the selfsame roll 5, as will be explained shortly.

[0015] In particular, referring to a clockwise rotation of the first roll 5 as indicated in figures 3, 5, 6 and 7 by the arrow denoted S1, which coincides with the direction in which the new strip 7 is decoiled, the device comprises a station 25 located beyond the point of contact between the wheels 19 and the roll 5, at which the roll 5 is broken open and the leading end 15 of the strip 7 taken up.

[0016] As illustrated in figure 2, in particular, the break-open station 25 comprises a flexible metal blade 26 of which a curved end portion 26a directed toward the first roll 5 extends substantially parallel to the surface of revolution 17 of the roll 5 and is furnished with a cutting edge 27 of Vee profile oriented oppositely to the decoiling direction S1 of the roll 5.

[0017] The flexible blade 26 is carried by a frame 28 mounted hingedly to a pivot 29 of which the axis 30 is disposed parallel to the axis 4 of the central pivot 3, and can be made thus to rotate about the axis 30 by a linear actuator 31 of which the rod 32 is connected to the pivot 29 by way of a relative crank arm 33, so that the end portion 26a of the blade 26 can be moved between a first position of separation from the roll 5, distanced from the surface of revolution 17 as illustrated in figure 1 by solid lines, and a second operating position of tangential contact with the selfsame surface 17, illustrated by phantom lines in figure 1 and in figures 3 to 7, in which the cutting edge 27 facing toward the leading end 15 of the strip 7 is able to cut through the seal 16 and thus free the leading end 15, breaking open the roll 5.

[0018] The end of the blade 26 remote from the cutting edge 27 rests on a table 34, over which the new strip 7 is caused to advance, affording a flat surface 35 occupied by the strip and two lateral restraints 36 one on each side of the strip 7, and mounted hingedly at one end 34a to a pivot 37 of which the axis 38 lies parallel to the axis 30 of the blade pivot 29.

[0019] As discernible from figure 1, the table 34 is capable of movement, generated by an actuator 39, between a first angled position indicated by solid lines, descending from left to right as viewed in the drawing, in which the strip 7 decoiling from the first roll 5 is directed toward a station 40 where the leading end 15 is cut and prepared, and a substantially horizontal second position indicated by phantom lines in which the strip 7 is directed toward a station 41 where the same leading end 15 is spliced with a trailing end portion 42 of the depleting strip 8 decoiled from the second roll 6.

[0020] In particular, the actuator 39 comprises a crank arm 43 connected mechanically to the table 34 by way of a rod 44.

[0021] The table 34 presents a plurality of blower nozzles 45 (see figure 2) distributed over its surface 35, con-

nected to a source 46 of pressurized gas by way of a system of ducts 47 and combining with the selfsame source to constitute a first pneumatic device 48 such as will generate an air cushion on the table 34 to support and convey the strip 7.

[0022] The table 34, the flexible blade 26 and the first pneumatic device 48 combine together to establish first means 90 of guiding the strip 7.

[0023] Observing figures 3 and 4, it will be seen that when the table 34 assumes the angled position, the end 34b opposite the end 34a mentioned previously is positioned facing and near to the cutting and preparing station 40, which comprises a knife type cutter device 49 of conventional embodiment shown schematically in figure 1 and figures 3 to 7.

[0024] Observing figures 5, 6 and 7 where the table 34 will be seen conversely to occupy the substantially horizontal position, the end 34b in question is position facing and near to a first entry end 50a of a conveyor 50 with lateral restraints 51 along which the strip 7 is caused to advance toward a second exit end 50b located near to the splicing station 41.

[0025] The conveyor 50 is embodied in such a way as to establish a curved path P substantially of reverse C shape, from which the strip 7 emerges following a trajectory denoted T" having been diverted through approximately 180° in relation to the trajectory T' followed during its movement along the table 34 and on reaching the entry end 50a of the conveyor 50.

[0026] The bed of the conveyor 50 presents a plurality of blower nozzles 52 connected each by way of the system of ducts 47 to the aforementioned source 46 of pressurized gas and combining with the source to constitute a second pneumatic device 53 by which an air cushion is created on the conveyor 50 (in the same way as on the table 34) to carry the advancing strip 7. The pneumatic device 53 also comprises two blower ports 53a mounted to the lateral restraints 51 near to the entry end 50a.

[0027] As discernible from figures 5, 6 and 7, the two blower ports 53a are directed so as to generate a forcing action on the face of the strip 7 opposite to that breast with the conveyor 50, at the exit end 50b, in a manner that will be described in due course.

[0028] The C-shaped conveyor 50 and the second pneumatic device 53 combine to constitute second means 91 by which to guide the strip 7.

[0029] The presence of the strip 7 at the exit end 50b of the conveyor 50 is detected by a photocell 54 connected to the master control unit 14.

[0030] With reference in particular to figures 5, 6 and 7, the splicing station 41 comprises a device 55 for feeding adhesive tabs 56 applied to a backing strip 57, also a first aspirating drum 58 by which the leading end 15 of the new strip 7 is taken up and advanced together with an adhesive tab 56, and a second drum 59 interacting with the first drum 59 in such a way as to connect the tab 56 with the end portion 42 of the depleting strip 8.

[0031] The backing strip 57 is decoiled from a roll 61 and directed around a curved element 60 forming part of the tab feeder device 55.

[0032] The curved element 60 presents an exit end 60a directed toward a finger 62 of which the function is to force a sharp diversion in the path followed by the backing strip 57 and thus cause an adhesive tab 56 to peel away from the backing strip 57. The strip 57 from which the tabs have been separated is directed around a guide roller 63 downstream of the finger 62 and re-coiled thereafter onto a take-up roll 64.

[0033] As illustrated to advantage in figure 8, a single tab 56 presents a first adhesive face 65 disposed initially in contact with the backing strip 57, and a second non-adhesive face 66 on the side opposite to the first face 65.

[0034] The finger 62 is positioned so as to bridge the gap between the exit end 50b of the conveyor 50 and the first drum 58.

[0035] Still referring in particular to figures 5, 6 and 7, the first drum 58 is rotatable about an axis 67 disposed parallel to the decoiling axes 9a and 10a of the respective rolls 5 and 6, and driven by a motor 68 connected to the master control unit 14.

[0036] The first drum 58 exhibits two sectors 58a and 58b of respectively greater and lesser radius. The sector 58a of greater radius is furnished with a plurality of suction holes 69 connected to a source of negative pressure (not illustrated, being of familiar embodiment) of which the function is to retain a tab 56, peeled from the backing strip 57 through the agency of the finger 62, as the drum rotates.

[0037] The second drum 59 rotates synchronously with the first drum 58 about an axis 70 disposed parallel to the axis 67 of rotation of the first drum 58.

[0038] Like the first drum 58, the second drum 59 also presents two sectors 59a and 59b respectively of greater and of lesser radius.

[0039] The splicing station 41 also comprises first and second semi-drums 71 and 72 over which the strip is routed on its passage toward the user machine, and a mechanism 73 by which the trailing end portion 42 of the depleting strip 8 is cut.

[0040] The semi-drums 71 and 72 are located respectively upstream and downstream of the second drum 59 in relation to the direction followed by the strip, indicated in figure 3 by the arrow denoted A, and exhibit respective surfaces of revolution 71a and 72a of which the straight line generators extend parallel to the decoiling axes 9a and 10a of the rolls 5 and 6.

[0041] The cutter mechanism 73 is interposed between the first semi-drum 71 engaged by the depleting strip 8 and the second drum 59, and comprises a knife type cutting device 74 of familiar embodiment indicated only schematically.

[0042] In operation, as the depleting strip 8 decoiled from the second roll 6 continues to supply the packaging machine, the first roll 5 is loaded onto the corresponding pivot 9 through the agency of conventional means which

require no description or illustration.

[0043] Referring to figure 1, the wheels 19 of the metering element 18, initially occupying the aforementioned inactive position so that the operation of loading the new roll can take place, are brought to bear against the first roll 5 by swinging the arm 21 on the pivot 23 and thus placed in contact with the surface of revolution 17 of the roll as illustrated clearly in figures 3, 4, 5 and 6.

[0044] Importantly, to the end of avoiding any possible interference between the wheels 19 and the flexible blade 26 when in the position of separation from the roll 5, the frame 28 is first rotated with the new roll still motionless in such a way as to rest the blade 26 against the surface of revolution 17, whereupon the arm 21 is rotated into the position of contact between the wheels 19 and the roll 5 and the frame 28 then rotated back again to distance the blade 26 from the roll 5.

[0045] As illustrated in figure 1, once the wheels 19 are in contact with the roll 5, the roll is caused to rotate first in the anticlockwise direction S2, that is, inversely to the direction S1 in which the strip 7 decoils, at a defined and constant angular velocity. The master control unit 14 acquires the number of revolutions made by the wheels 19 during a given number of revolutions of the roll 5 and, with the angular velocity of the roll 5 and the diameter of the wheels 19 both known, proceeds to determine the diameter and maximum circumference of the roll 5. Anticlockwise rotation of the roll 5 is then stopped.

[0046] Thereafter, as discernible from figure 3, the frame 28 supporting the blade 26 is caused by the relative actuator 31 to rotate in such a way as will move the end portion 26a into the operating position of tangential contact with the surface 17 of the roll 5 and bring the Vee cutting edge 27 into tangential engagement with the outermost coil of the roll 5. The flexibility of the blade 26 is such that the cutting edge 27 will remain stably in contact with the outermost coil even though there may be irregularities in the cylindrical geometry or variations in diameter of the roll 5.

[0047] The roll 5 is now set in rotation clockwise, the direction S1 which causes the strip 7 to decoil, and the cutting edge 27 slices through the seal 16.

[0048] The leading end 15 of the strip 7 separates from the roll 5 and drops by gravity along the blade 26 toward the table 34, currently occupying the angled position.

[0049] During the steps following the removal of the seal 16, the wheels 19 of the metering element 18 are maintained in contact with the roll 5 to ensure the strip 7 does not decoil in an irregular manner.

[0050] As the leading end 5 of the strip 7 reaches the table 34, the strip 7 is guided laterally by the restraints 36 and advanced by the nozzles 45, each of which emits a jet 75 of air, as illustrated in figure 2, directed at an angle relative to the flat surface 35 of the table 34 occupied by the strip 7.

[0051] The component of each jet 75 directed parallel

to the flat surface 35 serves to propel the strip 7 along the table 34, whereas the component of the jet 75 directed perpendicular to the surface 35 serves to create the aforementioned air cushion on which the strip 7 is carried.

[0052] Still observing figure 3, the leading end 15 of the strip 7 advances along the flat surface 35 of the table 34 and reaches the preparing station 40 where the cutter device 49 makes a series of cuts through the end of the strip 7. These cuts serve to remove a length of the strip 7 greater at least than the developable circumference of the roll 5, in order to discard both the leading end 15 and any part of the first coil of the strip 7 underneath which may still bear a trace of the seal 16 cut through previously by the Vee cutting edge 27.

[0053] The movement of the new strip 7 during the step described above is governed by the master control unit 14, which causes the roll 5 to rotate through a distance such as will decoil a predetermined quantity of strip 7 corresponding in length to a multiple of the circumference of the roll acquired previously by way of the metering element 18.

[0054] During this step the roll 5 is caused to rotate at least two full revolutions about the relative axis 9a in the decoiling direction S1, and more exactly one and a half revolutions, allowing the cutting edge 27 to slice through the seal 16 so that the leading end 15 can be freed and directed toward the preparing station 40, then another full revolution to complete the preparation; in this way, the timing of the preparing step is rendered independent of the position of the seal 16 securing the leading end 15 of the strip 7.

[0055] Once the strip 7 has been prepared, the roll 5 is caused to rotate in the direction S2 counter to the decoiling direction S1 so that the cut end of the strip 7 recedes to an intermediate position on the flat surface 35 of the table 34, as illustrated in figure 4. A photocell 76 embedded in the table 34 and connected to the master control unit 14 detects the absence of the recoiling strip 7 and causes the roll 5 to cease rotation.

[0056] With the full preparation cycle thus completed, the strip 7 will present a new leading end 15 free of defects and with no traces of the seal 16.

[0057] At this juncture the table 34 is caused by the relative actuator 39 to rotate anticlockwise about its axis 38 and assume the substantially horizontal position aforementioned, illustrated in figure 5, in which the free end 34b is aligned with the entry end 50a of the conveyor 50.

[0058] The roll 5 is set in rotation once again in the decoiling direction S1 and the leading end 15 of the strip 7 begins moving along the conveyor 50; the conveyor, as already intimated, incorporates a pneumatic device 53 by which the strip 7 is carried and propelled substantially in the same way as when passing along the table 34.

[0059] The leading end 15 of the strip 7 thus reaches the entry end 50a of the conveyor 50 following the first

trajectory T' and advances thence along the curved path P, guided by the lateral restraints 51 of the conveyor 50 and by the pneumatic device 53 in the bed of the conveyor 50.

5 **[0060]** In particular, each of the blower ports 53a lying externally of the path P followed by the strip 7 produces a respective angled jet 77 directed at the portion of the strip 7 occupying the exit end 50b of the conveyor 50, thereby ensuring the strip 7 does not deviate from the path P and separate from the bed of the conveyor 50, and ensuring also that the trajectory T" followed by the exiting strip 7 is not diverted by an angle more than 180° from the entry trajectory T'.

10 **[0061]** Referring now to figure 6, the adhesive tab 56 peeled from the backing strip 57 by the finger 62 is applied to the leading end 15 of the strip 7 at a point near the exit end 50b of the conveyor 50.

15 **[0062]** In particular, the photocell 54 installed at the exit end 50b of the conveyor 50 senses the presence of the leading end 15 of the strip 7 and relays a signal to the master control unit 14, which then proceeds to set the first drum 58 in rotation at a peripheral velocity matching the linear velocity of the leading end 15.

20 **[0063]** The tab 56 peeling from the backing strip 57 is picked up by the aspirating sector 58a of the first drum 58 from the side of the non-adhesive face, and fed forward along a path substantially tangential to the trajectory T" of the strip 7 exiting from the conveyor 50.

25 **[0064]** At the same time, still observing figure 6, the advancing strip 7 engages a rear portion 78 of the adhesive face 65 presented by the tab 65, leaving a front portion 79 of the face 65 exposed; the two portions 78 and 79 being defined rear and front in relation to the direction followed by the strip 7.

30 **[0065]** The attracted tab 56 thus continues to revolve on the drum 58 and with it the leading end 15 of the strip 7, which is attached to the adhesive face 65 of the self-same tab 56.

35 **[0066]** According to the output signal received from the photocell 54 on the conveyor 50, the master control unit 14 activates the cutter mechanism 73 to sever the depleting strip 8 from the relative roll 6 by cutting the trailing end portion 42 at an instant timed with the advance of the leading end 15 of the new strip 7, in such a way that the end portion 42 will be placed faultlessly on the front portion 79 of the adhesive face 65 offered by the tab 56 when at a minimum distance from the two drums 58 and 59.

40 **[0067]** As discernible clearly from the enlarged detail of figure 8, the positioning of the end portion 42 of the depleting strip 8 on the adhesive face 65 of the tab 56 coincides with an area 80 at which the trailing end 42 of the depleting strip 8 is spliced with the leading end 15 of the new strip 7.

45 **[0068]** Referring to figure 7, the second drum 59 is set in rotation synchronously with the first drum 58 in such a way that the respective sectors 59a and 58a of greater radius rotate in mutual opposition at the point of mini-

mum distance between the drums 58 and 59.

[0069] The restriction offered to the strips 7 and 8 between the sectors of greater radius presented by the drums 58 and 59 has the effect of rolling the splice 80 at the point where the two strips 7 and 8 are united, thereby compressing the adhesive tab 56 and the jointed ends 15 and 42 and maximizing their mutual adhesion. Thereafter, the new strip 7 is fed forward to the packaging machine (not illustrated) downstream of the device 1.

[0070] As indicated in figure 7, the new strip 7 changes trajectory gradually as it separates from the guide components 34 and 50, passing through a series of intermediate configurations P', P'' and P''' to the point of assuming a substantially taut profile V indicated by a phantom line in figure 7.

[0071] The metering element 18 will have been rotated previously on its arm 21 to the inactive position so as not to interfere with the strip 7 during the variation in trajectory.

[0072] Advantageously, the leading end 15 of the new strip 7 coiled onto the roll 5 might be weighted, so as to favour its descent gravitationally along the blade 26 and toward the table 34 at the moment when the seal 16 is cut through.

[0073] It will be evident from the foregoing that with the adoption of a table 34 capable of movement between two positions, the stations at which the strip is prepared and then spliced can be arranged substantially one above the other, thus clearly reducing the overall dimensions of the device and simplifying the route followed by the strip, and achieving the objects stated at the outset.

[0074] Figure 9 illustrates a further embodiment of the device according to the present invention, which can be adopted to advantage when decoiling rolls 5 of strip 7 of which the leading end 15 is not fixed to the adjacent coil, or in practice not secured by a seal 16 or other equivalent element.

[0075] In the example of figure 9, there is no longer a station 25 at which the new roll 5 is broken open by cutting the seal 16 before taking up the leading end 15 of the strip 7, as illustrated in figures 1 to 7, but instead a station 81 at which the leading end 15 of the strip 7 is taken up directly from the roll 5.

[0076] The station 81 in question is equipped with an aspirating roller 82 carried by an arm 83 pivotable about an axis 84 disposed parallel to the axis 9a of the roll 5. The roller 82 is connected to a source of negative pressure familiar in embodiment (not indicated), and set in rotation anticlockwise, as indicated by the arrow R, by a motor likewise of familiar embodiment (not indicated). The roller 82 incorporates an internal manifold 82a serving to confine the aspirating action within a limited area coinciding substantially with a sector to a circle denoted A in figure 9.

[0077] The arm 83 is rotatable about the axis 84 through the agency of an actuator 85 and can be made

thus to assume an operating position variable according to the possible differences in diametral dimensions of new rolls 5 being decoiled.

[0078] Still in figure 9, the station 81 also comprises a reaction roller 86 operating in conjunction with the aspirating roller 82 and rotatable about the axis 38 of the pivot 37 to which the table 34 is hinged. The reaction roller 86 is driven by way of a friction wheel 87 mounted to an arm 88 likewise pivotable about the hinge axis 38 and capable of movement between an operating position of contact between the friction wheel 87 and the surface 17 of the roll 5, indicated by solid lines, and an idle position, indicated by phantom lines, in which the friction wheel 87 is distanced from the roll 5. The arm 88 is caused to rotate about the hinge axis 38 by an actuator 89 of which the rod is connected to the end of the arm 88 opposite from the end hinged about the selfsame axis 38.

[0079] In operation, the aspirating roller 82 is made to move by the relative actuator 85 in the direction of the arrow R toward the roll 5, which rotates in the decoiling direction S1; at the same time, the second arm 88 mentioned is rotated by the relative actuator 89 so as to bring the friction wheel 87 into contact with the surface of revolution 17 of the roll 5. Once the free leading end 15 of the strip 7 appears alongside the aspirating roller 82, it is taken up and retained by this same roller and directed with the aid of the reaction roller 86 toward the table 34. The aspirating roller 82 is then caused to retract along its own axis 82b of rotation by actuator means not illustrated in the drawings, in such a manner as to avoid interfering with the strip 7 decoiling from the roll 5.

[0080] In a further embodiment not illustrated in the drawings, the reaction roller 86 might be driven by an independent device, thereby dispensing with the friction wheel 87.

[0081] Figures 9 to 12 show an alternative embodiment of the second means 91 of guiding the strip 7.

[0082] Such means 91 comprise a pickup mechanism 92 with a head 93 designed to engage the strip 7, which is provided with suction holes connected to a vacuum device of conventional type (not illustrated). The aspirating head 93 of the mechanism 92 is carried by one end 94a of an arm 94 hinged in its turn at the end 94b remote from the head 93 to a shaft 95 of which the axis 96 lies parallel to the axis 9a of the decoiling roll 5 of new strip 7.

[0083] The pickup mechanism 92 further comprises a first actuator 97 serving to set the shaft 95 in rotation about its axis 96 and a second actuator 98 by which the mechanism 92 is caused to shift along this same axis 96.

[0084] In operation, once the leading end 15 has been prepared, as described previously with reference to figure 4, the strip 7 recedes to an intermediate position on the flat surface 35 of the table 34,

[0085] At this point the table 34 will be caused by the relative actuator 39 to rotate anticlockwise about its hinge axis 38 and assume a position essentially angled

upwards, as indicated in figure 10, so as to facilitate the step in which the leading end 15 of the strip 7 is attracted by the aspirating head 93 of the pickup mechanism 92.

[0086] Observing figure 11, once the leading end 15 of the strip 7 has been taken up by the mechanism 92 the table 34 is again rotated by the actuator 39, this time clockwise, toward a lowered configuration that will ensure there can be no obstruction of the arm 94 when rotating anticlockwise about its hinge axis 96 to transfer the strip 7 to the splicing station 41.

[0087] Concurrently with the rotation of the arm 94 brought about by the first actuator 97, the roll 5 is again set in rotation in the clockwise decoiling direction S1 so as to feed the strip 7 smoothly to the splicing station 41.

[0088] Referring to figure 12, once the leading end 15 of the new strip 7 has been spliced with a trailing end portion 42 of the depleting strip 8, in the manner described above with reference to figures 6, 7 and 8, the mechanism 92 is made to retract along the axis 96 by the actuator 98, so as not to hinder normal decoiling of the strip 7, and so as not to impede the strip from assuming a taut configuration illustrated by phantom lines in figure 12.

[0089] Thereafter, and in the manner already described referring to figure 9, the aspirating roller 82 is also shifted in the axial direction to facilitate normal decoiling of the strip 7 from the roll.

Claims

1. A device for the automatic splicing of strips decoiled from rolls, comprising first means (90) by which to guide a leading end (15) of a new strip (7) decoiled from a first roll (5), **characterized in that** the first guide means (90) are capable of movement at least between a first position in which the new strip (7) is directed toward a station (40) where the leading end (15) is cut and prepared, and a second position in which the new strip (7) is directed toward a station (41) where the leading end (15) is spliced with a trailing end portion (42) of a depleting strip (8) decoiled from a second roll (6).
2. A device as in claim 1, comprising a station (25) at which the first roll (5) is broken open and the leading end (15) of the new strip (7) taken up, comprising means (26, 27), associated with the first guide means (90), by which to cut through an element (16) sealing the leading end (15) of the new strip (7) to the relative roll (5), capable of movement between a first position of separation distanced from the roll (5) and a second operating position of tangential contact with a surface of revolution (17) of the roll (5) in which the seal element (16) is sliced through and the leading end (15) of the strip (7) freed and directed onto the first guide means (90) in continuous fashion.
3. A device as in claim 1 or 2, wherein first guide means (90) comprise a table (34) over which the strip (7) is caused to slide, pivotable on an axis (38) substantially parallel to an axis (9a) about which the first roll (5) is caused to decoil and rotatable thus about the selfsame axis (38) between the first position and the second position.
4. A device as in claim 3, wherein the table (34) over which the strip (7) is caused to slide comprises first pneumatic means (48) such as will carry and propel the strip (7) during its passage along the table (34).
5. A device as in claim 4, wherein first pneumatic means (48) comprise a plurality of blower nozzles (45) connected to a source (46) of pressurized gas.
6. A device as in claims 3 to 5, wherein first guide means (90) comprise a first sensing element (76) positioned in close proximity to the movable table (34) and serving to detect the presence of the strip (7) on the selfsame table (34).
7. A device as in claim 6, wherein the first sensing element (76) is connected to a master control unit (14) connected in its turn to means (12) of driving the first roll (5) in such a way as to govern the movement of the first roll (5).
8. A device as in claims 3 to 7, comprising second means (91) by which to guide the strip (7), interposed between the movable table (34) and the splicing station (41).
9. A device as in claim 8, wherein the leading end (15) of the strip (7) leaves the table (34) by way of a relative exit end (34b) capable of assuming a position, coinciding with the first position of the table (34), aligned with and in close proximity to the cutting and preparing station (40), and a position, coinciding with the second position of the table (34), aligned with and in close proximity to an entry end (50a) of second guide means (91) comprising a conveyor (50) along which the strip (7) is carried toward the splicing station (41).
10. A device as in claim 9, wherein the strip (7) decoiled from the first roll (5) is caused by the conveyor (50) to follow a substantially curved path (P).
11. A device as in claim 10, wherein the curved path (P) is such that on exiting the conveyor (50) the strip (7) describes a trajectory (T'') diverted approximately 180° from a trajectory (T') described by the strip (7) on entering the conveyor (50).
12. A device as in claims 8 to 11, wherein second guide means (91) comprise second pneumatic means

(53) such as will carry and propel the strip (7) when passing along the conveyor (50).

13. A device as in claim 12, wherein second pneumatic means (53) comprise a plurality of blower nozzles (52, 53a) connected to the source (46) of pressurized gas and acting on both faces of the strip (7). 5
14. A device as in claims 8 to 11, wherein second guide means (91) comprise a respective second sensing element (54) positioned in close proximity to the conveyor (50) and serving to detect the presence of the strip (7) on the selfsame conveyor (50). 10
15. A device as in claim 7 or 14, wherein the master control unit (14) is connected to the second sensing element (54) and to the means (12) of driving the first roll (5) in such a way as to govern the movement of the first roll (5). 15
16. A device as in claims 2 to 15, wherein means (26, 27) by which to cut through the element (16) sealing the leading end (15) of the new strip (7) comprise a flexible blade (26) associated with the movable table (34) in such a way as will afford a continuous path to the strip (7) decoiling from the first roll (5) in each of the positions assumed by the selfsame movable table (34). 20 25
17. A device as in claim 1 for splicing strips of which the new strip (7) wound onto the first roll (5) presents a free leading end (15), wherein the leading end (15) of the strip (7) is taken up from the roll (5) at a station (81) comprising an aspirating roller (82) by which the selfsame leading end (15) is attracted and directed to the first guide means (90). 30 35
18. A device as in claim 17, wherein the aspirating roller (82) is capable of movement between a first non-operating position of separation from the surface of revolution (17) of the roll (5) and an operating position of contact with the surface of revolution (17), in which the leading end (15) of the strip (7) is taken up, and operates in conjunction with a reaction roller (86) so as to direct the leading end (15) of the strip (7) onto the first guide means (90) in continuous fashion. 40 45
19. A device as in claims 1 to 18, comprising an element (18) by means of which to measure the circumference of the first roll (5). 50
20. A device as in claim 19, wherein the master control unit (14) is connected to the element (18) which measures the circumference and to the means (12) of driving the first roll (5) in such a way as to govern the movement of the first roll (5). 55

21. A device as in claim 8, wherein second means (91) by which to guide the strip (7) comprise an aspirating element (93) such as will attract the strip (7), capable of movement through the agency of an actuator (97) between a first position in which the leading end (15) of the strip (7) is taken up from the table (34) and a second position in which the strip (7) is released at the splicing station (41).

22. A device as in claim 21, wherein the aspirating element (93) is mounted to an arm (94) pivotable on a shaft (95) of which the axis (96) lies parallel to the decoiling axis (9a) of the first roll (5), and of which the movement is brought about by the actuator (97).

23. A device as in claim 22, wherein second means (91) by which to guide the strip (7) comprise an actuator (98) such as will move the aspirating element (93) along the pivot axis (96) to the end of retracting the aspirating element (93) and allowing the strip (7) to decoil from the roll (5) unhindered.

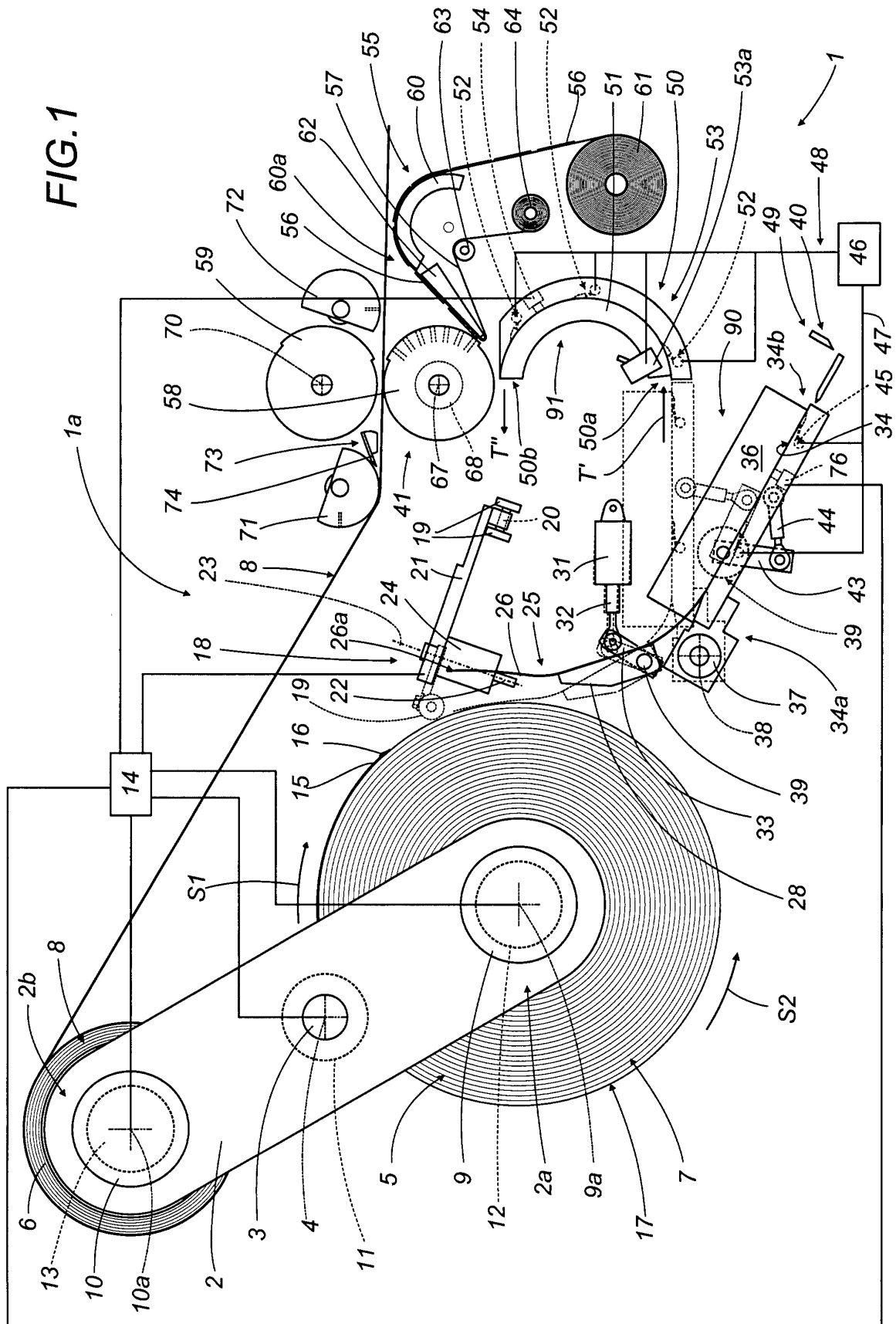


FIG.2

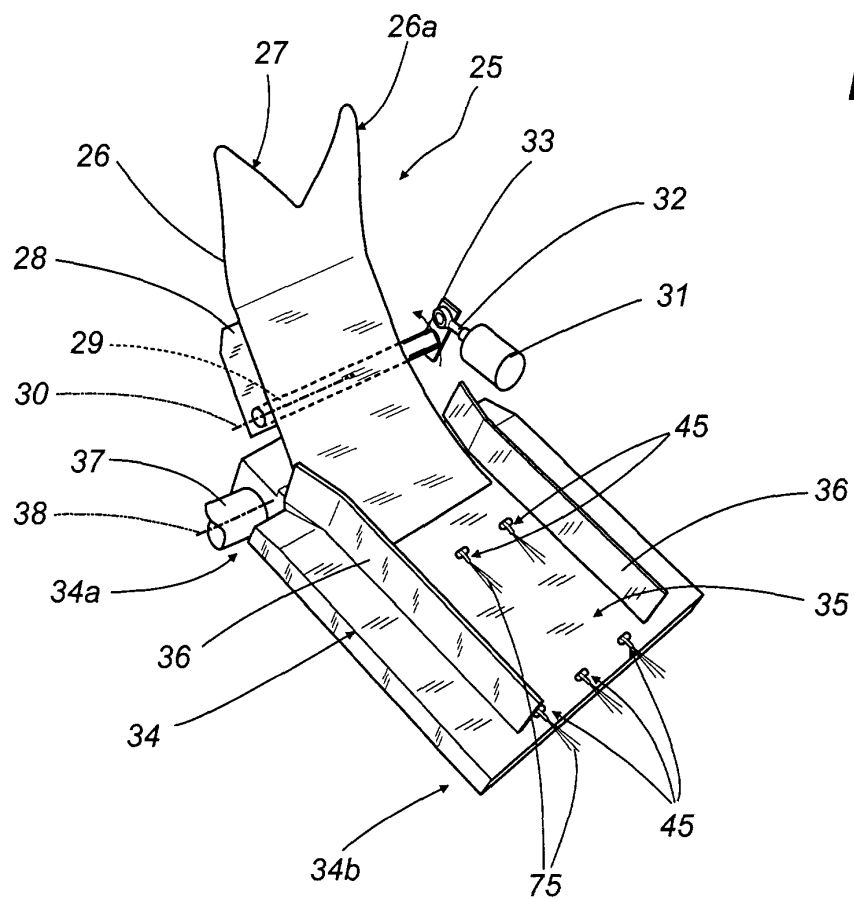


FIG.8

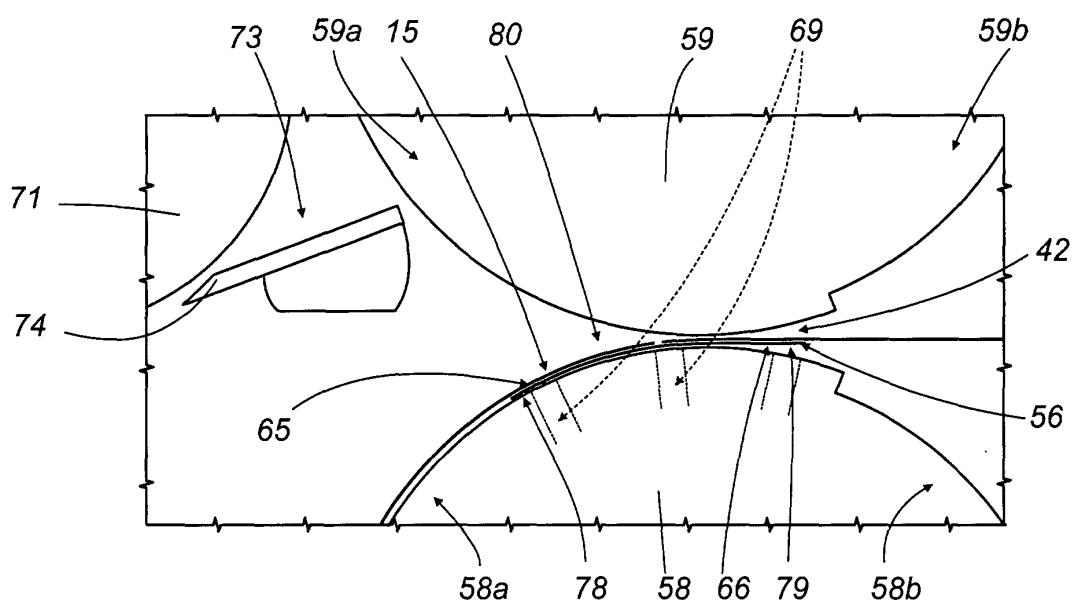
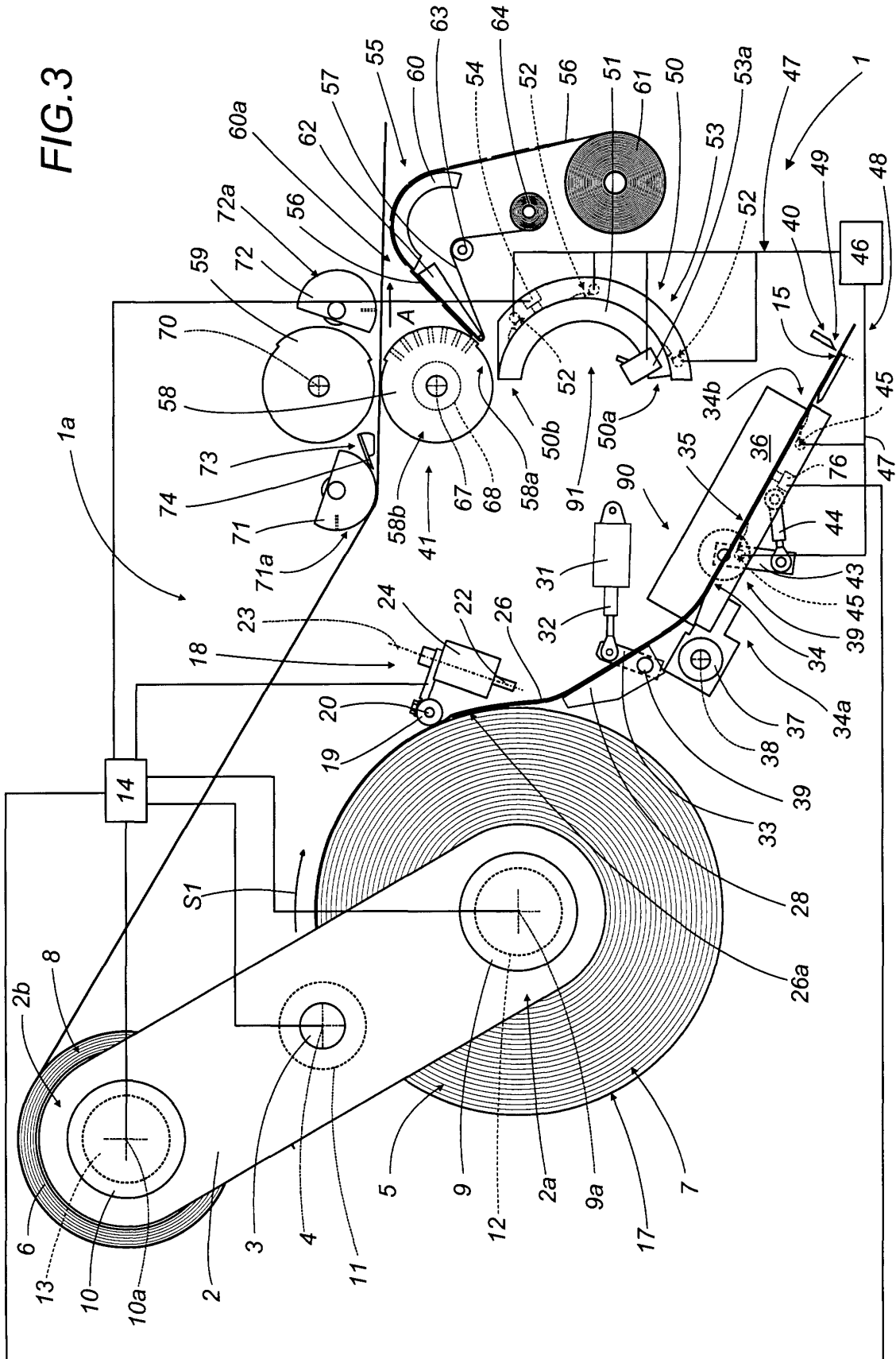
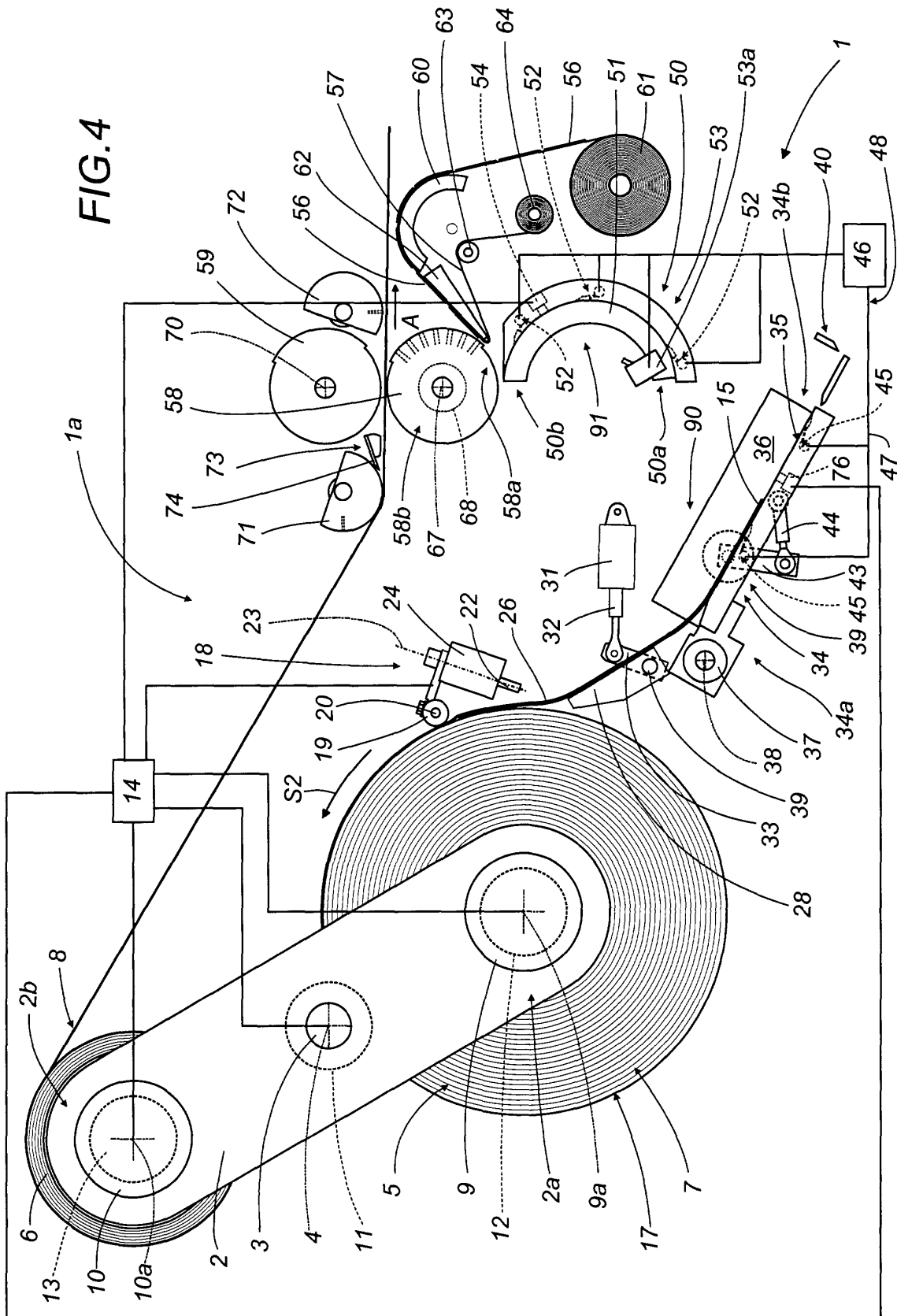
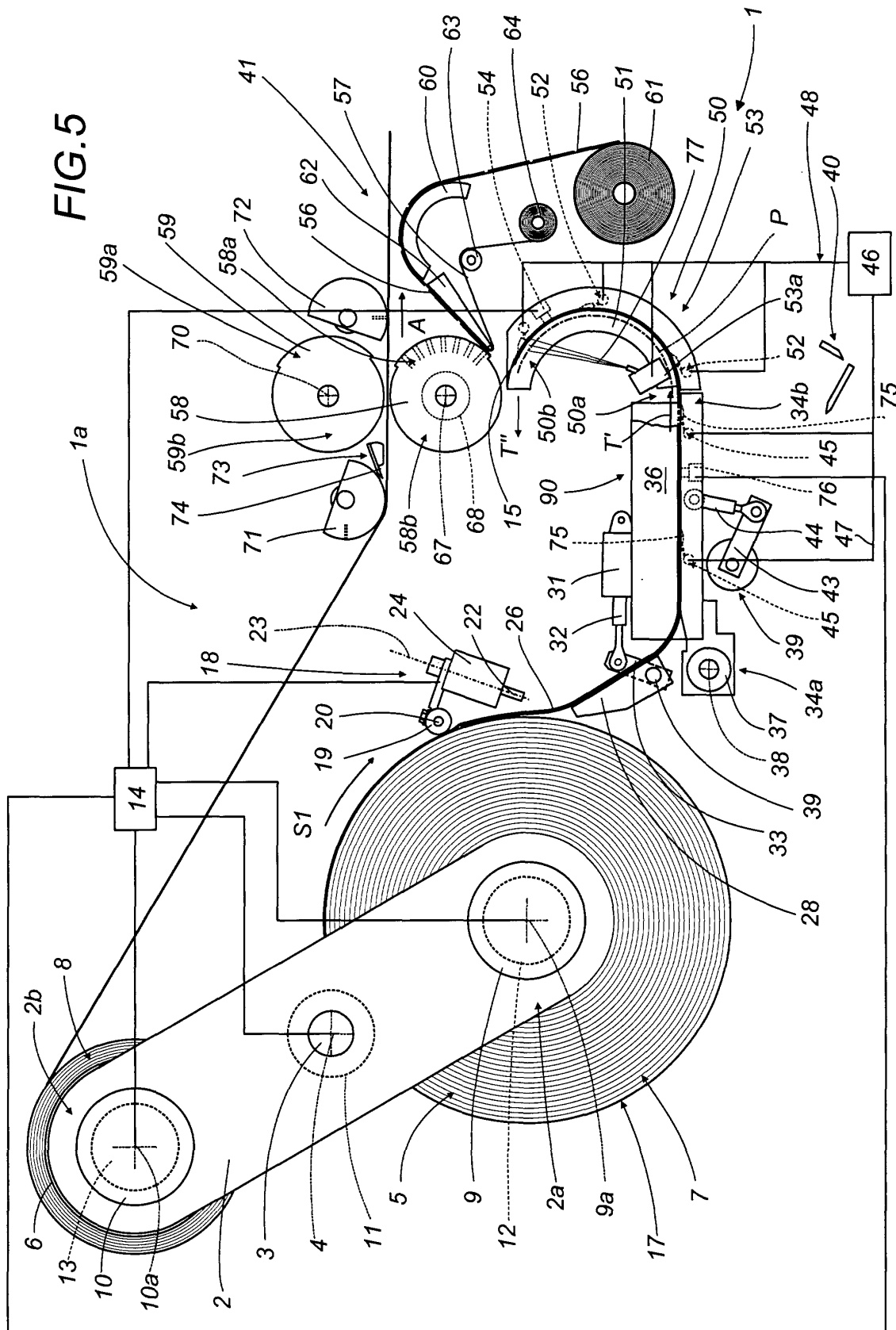
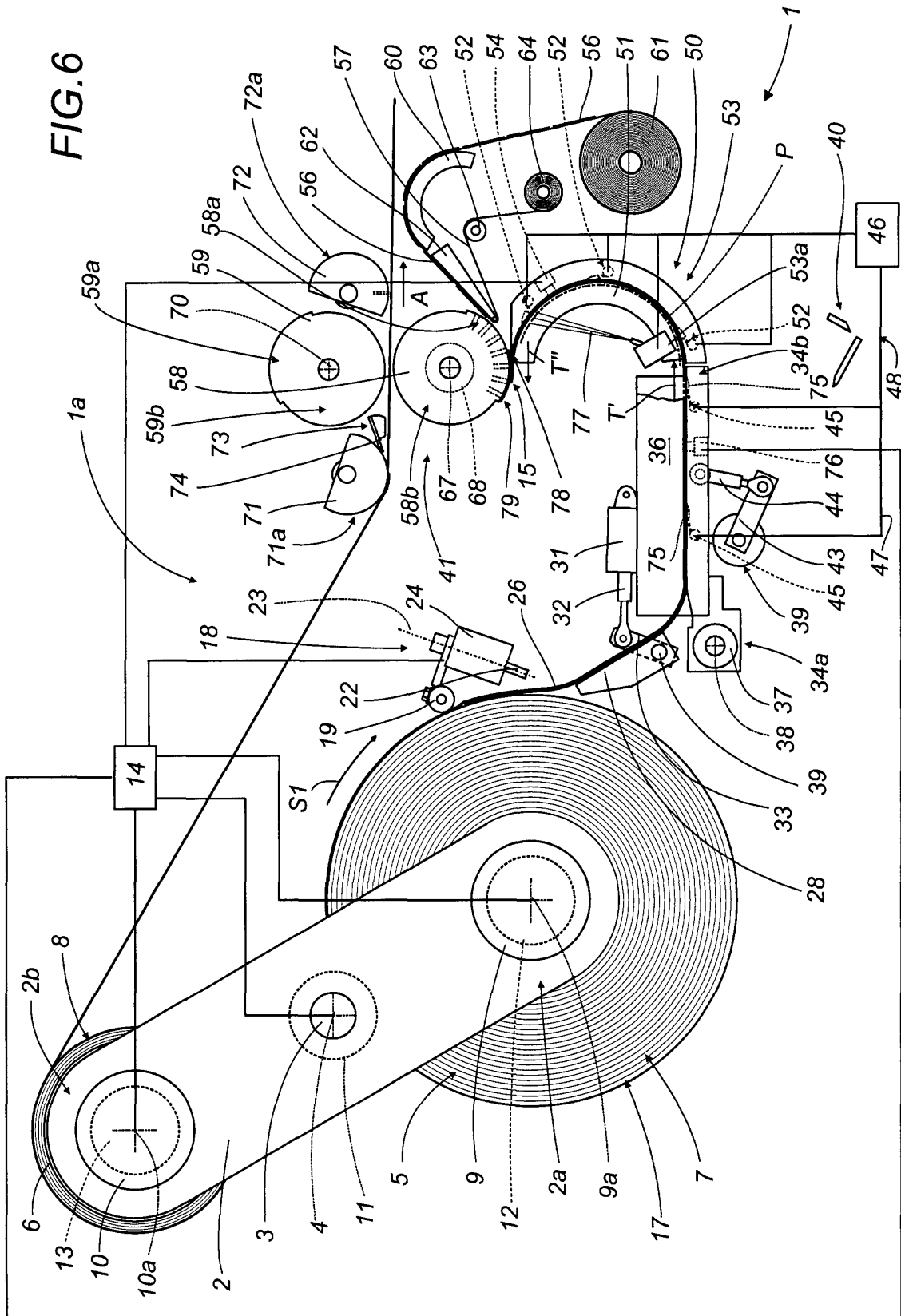


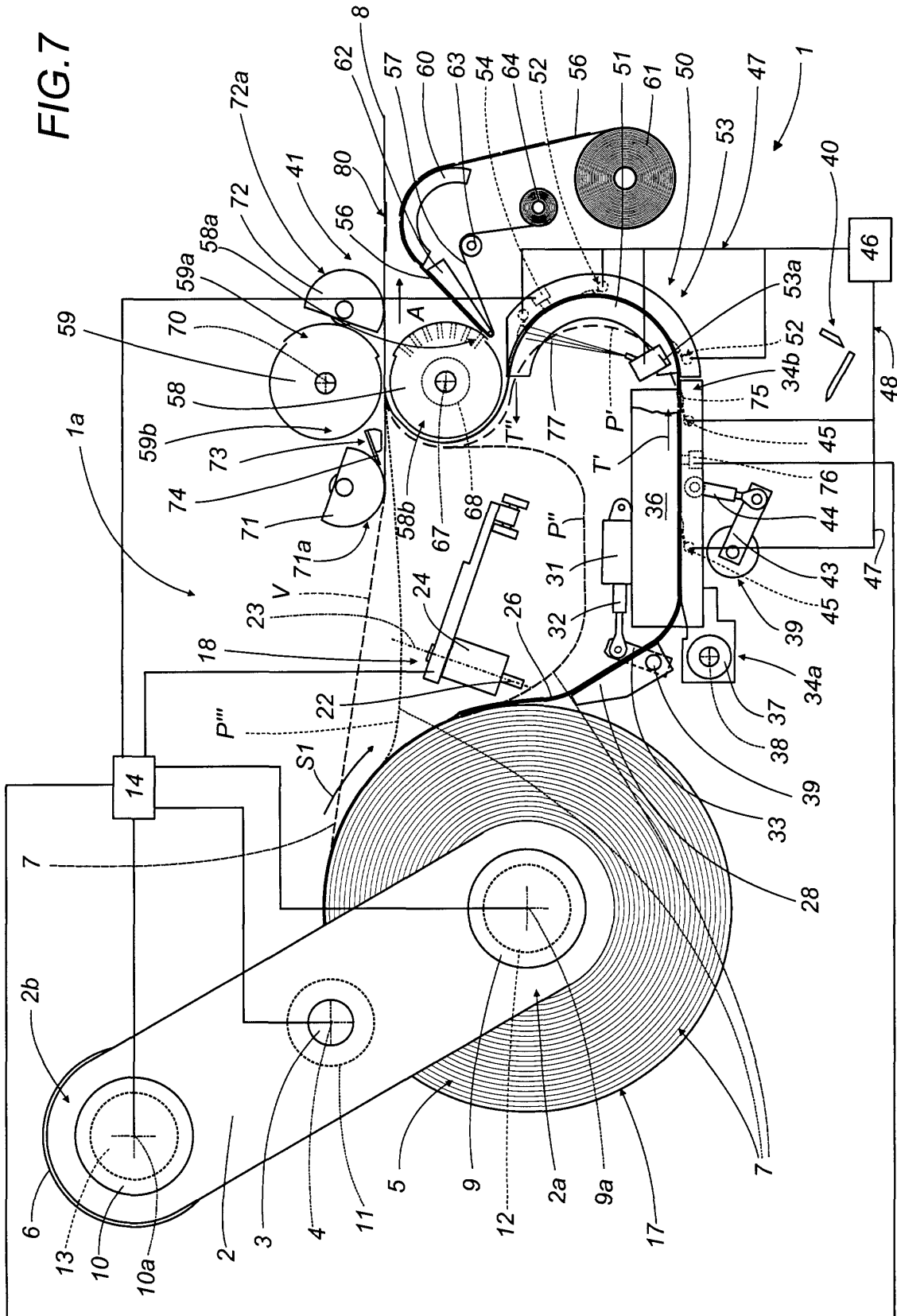
FIG.3











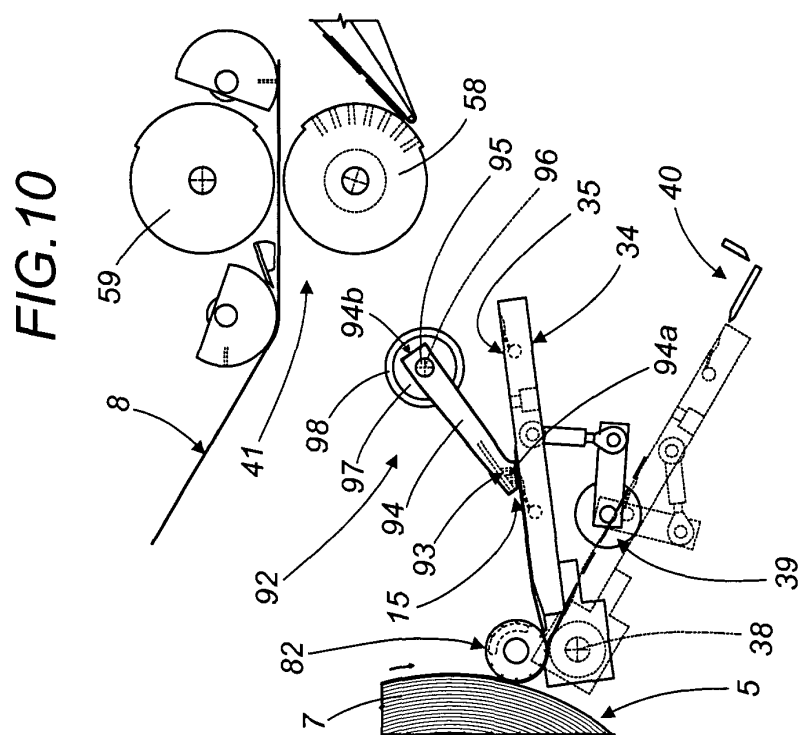
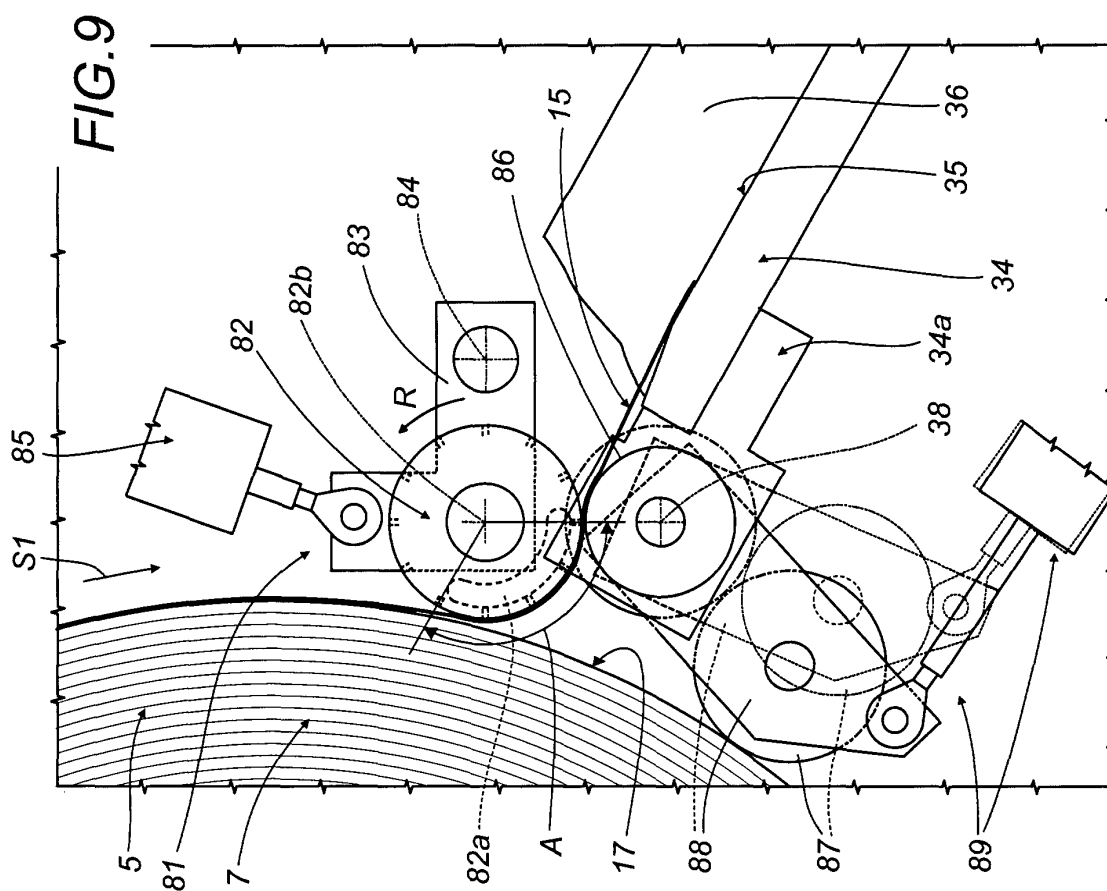


FIG. 11

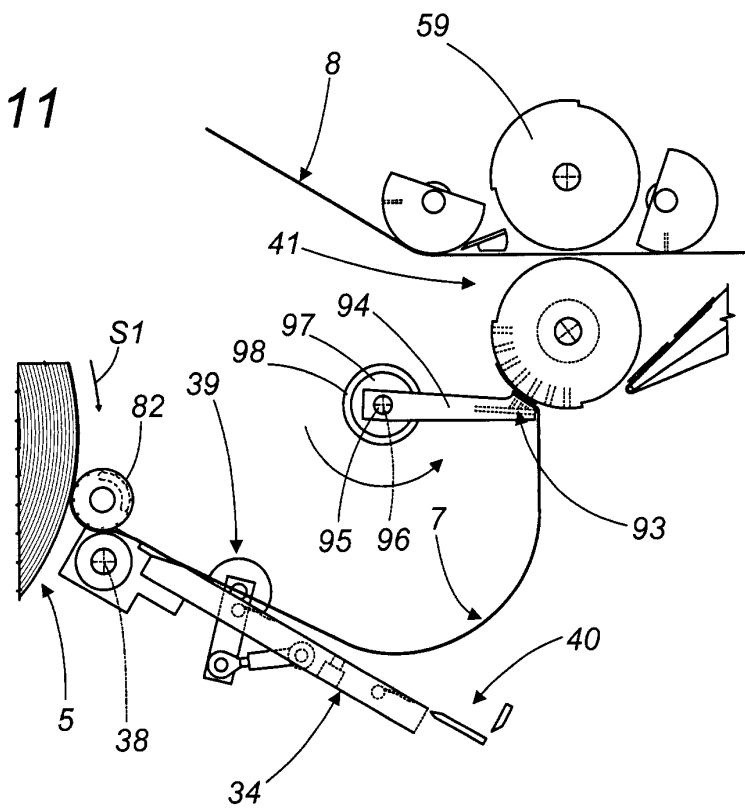
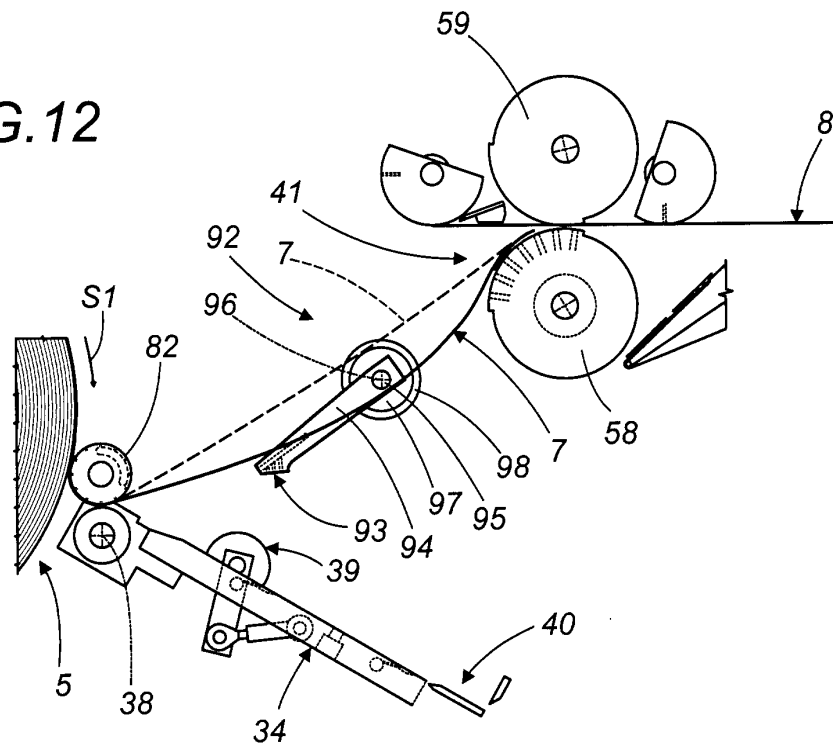


FIG.12





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0353

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 2 October 2001	Examiner Haaken, W
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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