

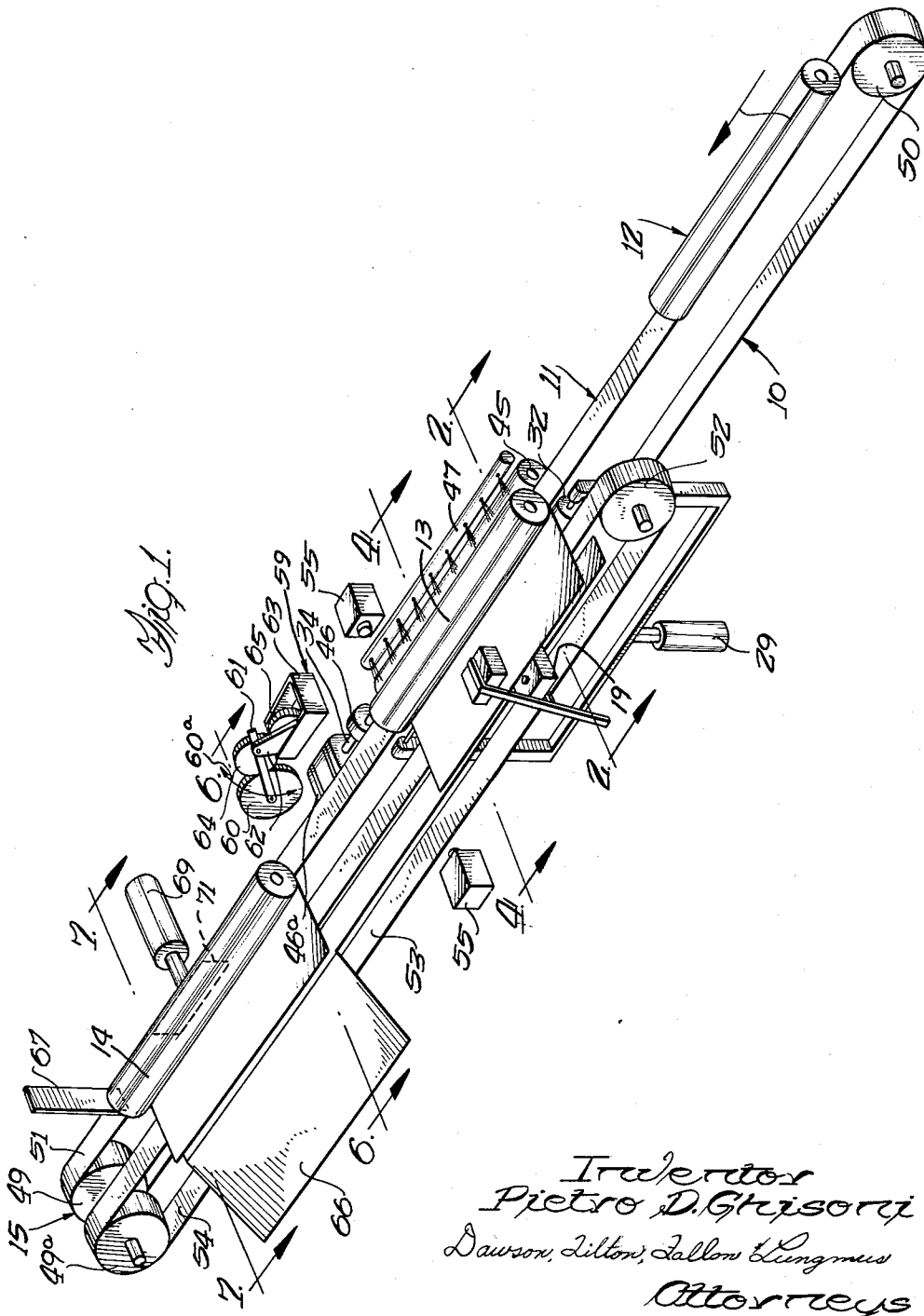
July 17, 1962

P. D. GHISONI
TAIL SEALING MACHINE

3,044,532

Filed March 30, 1960

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July 17, 1962

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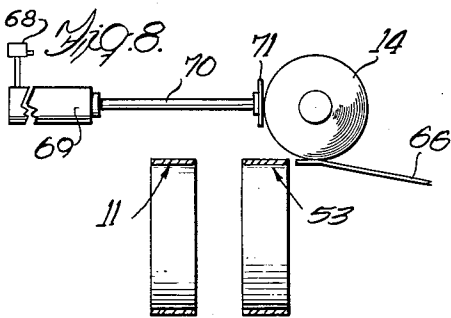
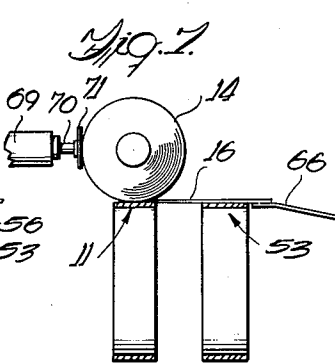
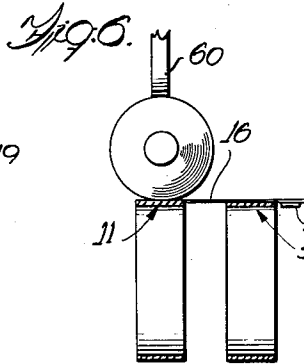
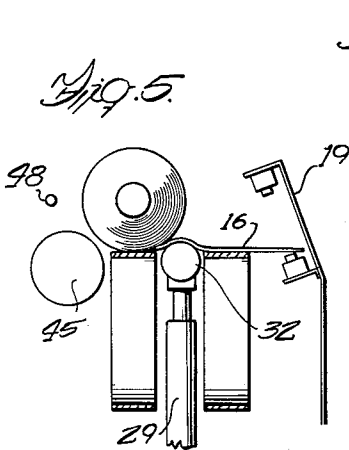
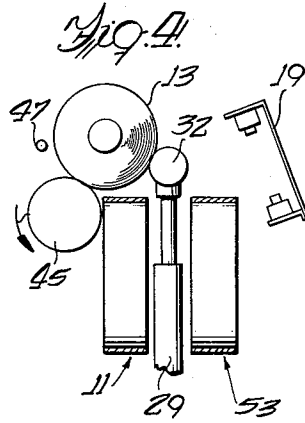
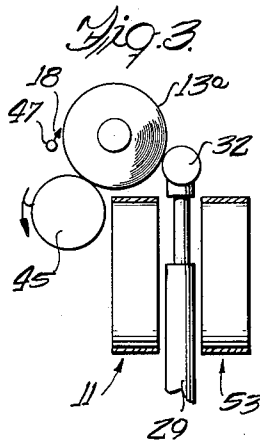
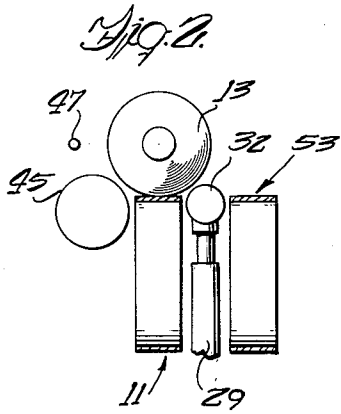
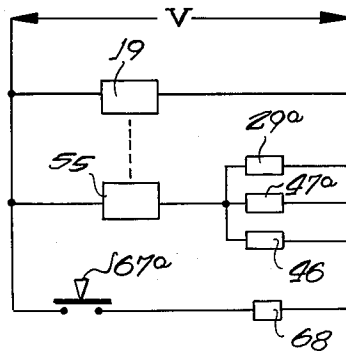


Fig. 9.



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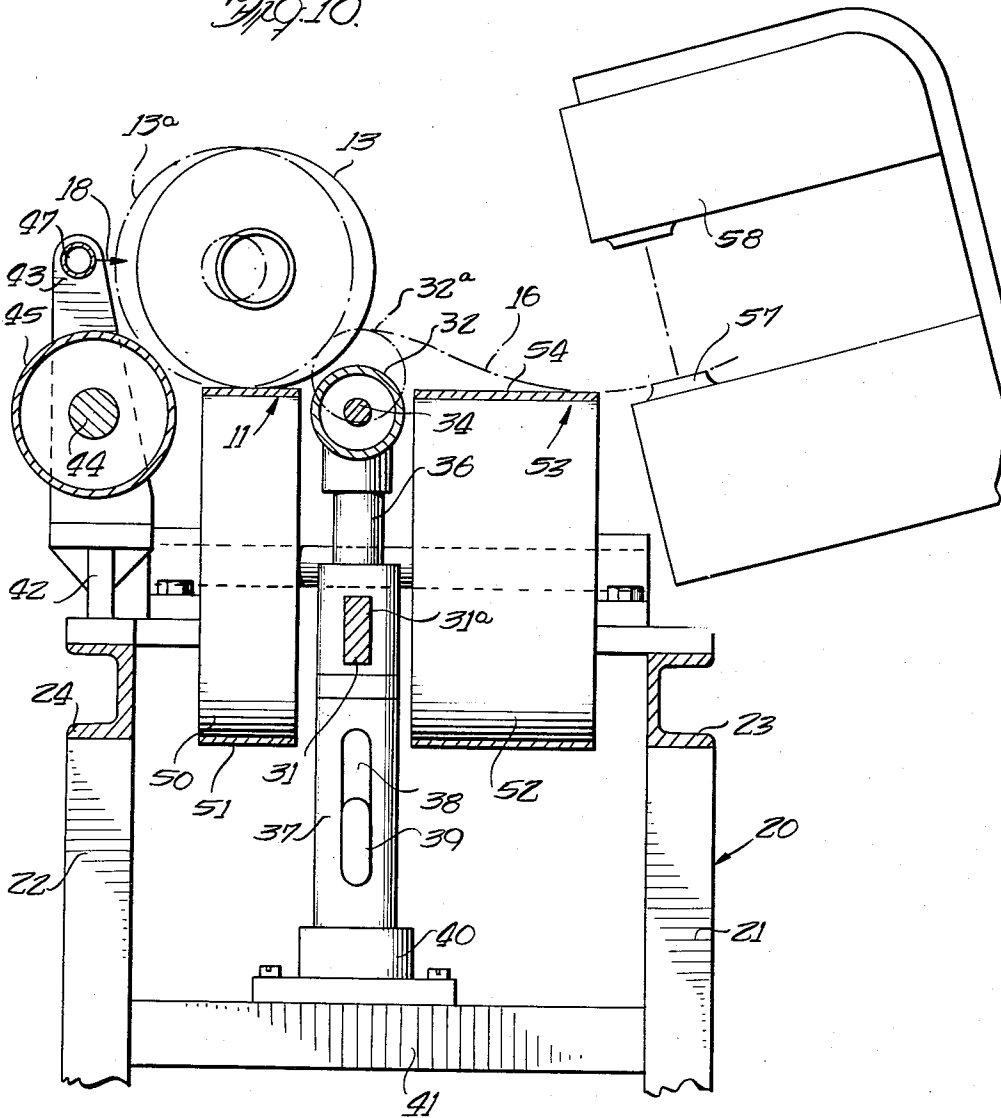
3,044,532

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4 Sheets-Sheet 3

Fig. 10.



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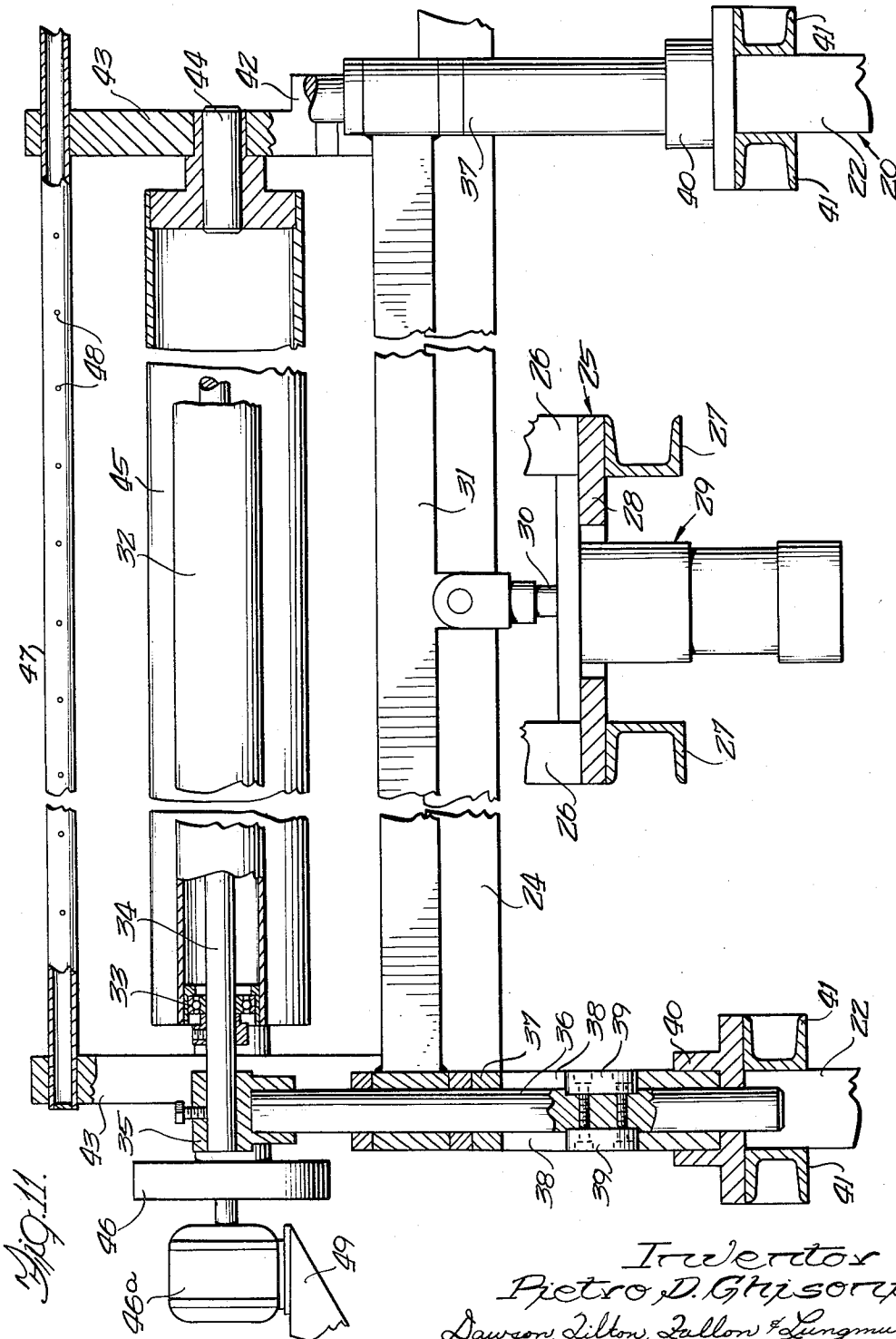
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4 Sheets-Sheet 4



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1

3,044,532

TAIL SEALING MACHINE

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14 Claims. (Cl. 156—361)

This invention relates to a tail sealing machine, and, more particularly, to a machine capable of being employed for sealing the tail portion of web rolls.

This application is a continuation-in-part of my copending application, Serial No. 669,034, filed July 1, 1957, now abandoned.

It is a general object of this invention to provide a machine for sealing the tail of a web roll to the body of the roll. Another object is to provide a machine for the purpose set forth immediately above wherein the machine is adapted to operate separately from a web-winding mechanism. Still another object is to provide a machine adapted to seal the tail portion of a rolled web having transverse perforations to the web roll. Yet another object is to provide a machine adapted to operate on a rolled web having transverse perforations so as to seal the last or tail section of the perforated web to the main body of the web roll.

Still another object is to provide a machine to seal the tail portion of a rolled web to the main body of the rolled web wherein the machine is adapted to unwind a predetermined tail portion and apply adhesive at a predetermined point on the main body of the web roll. Other objects and advantages of the invention will appear as this specification proceeds.

My invention will be described in an illustrative embodiment in conjunction with the accompanying drawing, in which—

FIG. 1 is a perspective schematic representation of a machine embodying teachings of this invention;

FIG. 2 is a fragmentary sectional view such as would be seen along the reference line 2—2 of FIG. 1 when the machine is in a different operative condition;

FIG. 3 is a view similar to FIG. 2 but in which the machine elements are seen in a different operative condition;

FIG. 4 is a fragmentary cross-sectional view such as would be seen from the reference line 4—4 of FIG. 1 but showing the machine parts in a different operative condition;

FIG. 5 is a view similar to FIG. 4 but having the operative elements differently disposed;

FIG. 6 is a fragmentary sectional view such as would be seen from the reference line 6—6 of FIG. 1;

FIG. 7 is a fragmentary sectional view such as would be seen from the reference line 7—7 of FIG. 1;

FIG. 8 is a view similar to FIG. 7 but showing the machine parts in a different operative condition;

FIG. 9 is a schematic wiring diagram of parts used in connection with the machine of FIG. 1;

FIG. 10 is a transverse sectional view of the machine similar to FIG. 5 but showing the machine parts in greater detail; and

FIG. 11 is an elevational view, partially in section, of the machine of FIG. 1 and showing mechanical features in greater detail.

2

It is believed that the invention herein can be more readily understood from a brief description of the operation thereof, and such a description follows.

In the illustration given, the machine seen in FIG. 1 is designated generally by the numeral 10 and includes a horizontally-disposed conveyor generally designated 11. A rolled web 12 is seen mounted on the conveyor 11 at the extreme right-hand end thereof. The rolled web proceeds with the conveyor 11 to the position designated 13, which is midway of the length of conveyor 11, and ultimately to the position designated 14, which is adjacent the turn-around 15 of the conveyor 11.

During the progress of the roll 12 through positions 13 and 14, it is partially unwound to provide a tail 16 (see also FIG. 5), after which adhesive is applied by means of an adhesive-applying mechanism generally designated 59. This effectively secures the tail or loose end of the roll to the roll proper, so that in any subsequent severing operation there is no loose end to interfere.

In the operation of the machine as applied to the roll in position 13, the tail 16 is advanced more rapidly than the roll is rotated by means of a series of air jets 18 (see FIGS. 1 and 4). The more rapidly advancing tail 16, as seen in FIG. 5, interrupts the beam of a photo-electric cell unit 19 which is effective to stop the operation, whereby the roll in position 13 is rotated and which will be described in greater detail hereinafter.

Referring now to FIGS. 10 and 11 of the drawing, the numeral 20 generally designates a machine frame, seen in these two figures in fragmentary form. It is to be noted that in both figures the base portions of the frame are not shown, since this is considered unnecessary for an understanding of the invention. Suitable pedestals or support means can be readily provided by those skilled in the art to complete the frame 20 shown herein.

The frame 20 includes a pair of rear vertical members 21 and a pair of front vertical members 22, only the front vertical members being seen in FIG. 11. The rear vertical members 11 are tied together and rigidified by a rear longitudinal stringer 23, while the front vertical members 22 are tied together by a front longitudinal frame member or stringer 24. Suitable transverse framing members may be provided, but again the showing of these is not believed essential for the understanding of the invention.

Referring now to FIG. 11, the numeral 25 designates generally a cylinder-supporting subframe which is provided as a part of frame 20. Subframe 25 includes vertical members 26 which may be secured to frame 20 and tied together by transverse members 27. Interposed between the lower ends of vertical cylinder frame members 26 and the top of transverse cylinder frame members 27 is a cylinder support plate 28. The various elements making up cylinder subframe 25 can be conveniently united by bolting, welding, or the like. Mounted, as by bolting, on cylinder support plate 28 is a cylinder generally designated 29. Cylinder 29 can be conveniently provided as an air cylinder, in which case suitable air inlet and exhaust means are provided. Cylinder 29 is internally equipped with a piston (not shown), and extending from one end of the cylinder 29 is a piston rod 30. Secured to the piston rod 30 and disposed at right angles to the axis of piston rod 30, is a connecting rod 31.

Connecting rod 31 extends lengthwise of the machine

and is employed to raise an elevating roll 32. This can be best appreciated from a consideration of the central portion of FIG. 10, where the elevating roll 32 is shown in broken line form corresponding to its elevated position and designated 32a. Means by which cylinder 29, operating through connecting rod 31, brings about the elevation of roll 32 will now be explained.

The numeral 33 designates a roller bearing (see FIG. 11) mounted at one end of roll 22 (a second similar roller bearing being provided, but not shown in the drawing). The roller bearings 33 permit the roll 32 to rotate freely about the shaft 34. Shaft 34, as seen in the left-hand portion of FIG. 11, is carried in a bushing 35. A corresponding bushing is provided at the right-hand side of the machine of FIG. 11, but this element has been cut away to show other portions of the apparatus. Bushing 35 is mounted on elevating roll support shaft 36, shaft 36 being seen in both FIGS. 10 and 11.

Shaft 36 is carried by a sleeve 37, while the sleeve 37 is provided with a pair of slots 38 extending longitudinally thereof, into which guides 39 (provided by shaft 36) move when shaft 36 is raised or lowered by the operation of cylinder 29. As best seen in FIG. 10, a second opening or slot 31a is provided in shaft 36 which carries connecting rod 31. It is to be appreciated that corresponding shaft and sleeve structures are provided at the other end of the machine. Pedestals 40 for carrying the sleeves 37 at each end of the machine are carried on transverse members 41 which are integrated into the frame 20, as can be best appreciated from a consideration of FIG. 10.

The numeral 42, as seen in FIG. 10, denotes a pedestal for a driven roll 45. The pedestal 42 is equipped with a bearing housing 43 in which shaft 44 of roll 45 is carried. This arrangement can be best appreciated by considering the extreme upper right-hand portion of FIG. 11. A corresponding structure is provided at the other end of the machine. The corresponding structure, in the upper left-hand portion, is slightly modified in that the stub shaft at this end of roll 45 is extended outwardly of its associated bearing to provide a mounting for a clutch 46. The clutch 46 in turn is coupled to a motor 46a (seen only in FIG. 1), which may be suitably supported on the frame 20. Thus, the motor 46a is effective to drive the roll 45 whenever the clutch 46 is energized. As will be seen hereinafter, an electric clutch may be employed, this being appreciated from a consideration of FIG. 9, wherein a schematic control circuit is illustrated.

Bearing housing 43 also provides a mounting for air pipe 47, the pipe 47 being equipped with a number of jets or openings 48. The pipe 47 is communicated to a source of compressed air (not shown), the compressed air being regulated by means of a valve 47a (see FIG. 9).

The frame 20, at opposite ends thereof, provides a suitable mounting for conveyor pulleys 49 and 50 (see FIG. 1), over which an endless belt 51 is entrained, which makes up the conveyor 11. A second conveyor is generally designated 53, provided by entraining a belt 54 over pulleys 52 and 49a, which are also suitably rotatably mounted on frame 20. The pulleys 49 and 49a may be mounted on a common shaft 49b, to which a motor (not shown) may be coupled for advancing the conveyors 11 and 53.

Referring now to FIG. 10, it is to be noted that the conveyors 11 and 53 are disposed in spaced, parallel relation, and that the elevating roll 32 is positioned therebetween. Outward of conveyor 11 is located the driven roll 45 and the air pipe 47.

It is believed that a further description of the operation of this machine in sealing the tail of a rolled web to the main body of the roll will facilitate the understanding of this invention. Therefore, such description follows.

Operation

Conveyor 11 is shown transporting a rolled web 12 at the right-hand or entering end of the machine as seen in FIG. 1. Exemplary of such rolled webs 12 is a roll of

toilet tissue. As the rolled web 12 advances with the conveyor 11 until it reaches the position 13, the roll interrupts the beam of a photoelectric cell unit 55 (seen only in FIG. 1, but designated schematically in FIG. 9). The interruption of the beam of the photoelectric cell unit 55 causes the engagement of clutch 46, thus putting roll 45 into rotation. Simultaneously, the photoelectric cell unit 55 actuates valve 47a (see FIG. 9) to supply compressed air to the pipe 47 from which the air issues as jets 18. Still further, the interruption of the beam of photoelectric cell unit 55 actuates a valve 29a (see FIG. 9), which supplies compressed air to the air cylinder 29—this being effective to elevate roll 32 to the position designated 32a.

The condition of the machine just prior to interruption of the beam of unit 55 is seen in FIG. 2, while the machine condition immediately thereafter is seen in FIG. 3. In FIG. 3, the rolled web is seen to be raised off of the conveyor 11, the position of the roll being designated 13a. The driven roll 45 is seen to be rotating, which induces rotational movement in the rolled web 13a and the idler roll 32. An air jet 18 is seen issuing from the pipe 47.

As mentioned previously, the elevation of the idler roll 32 is brought about by the operation of cylinder 29, which causes piston rod 30 to be extended out of the cylinder 29—the piston rod 30 in turn operating through the connecting rod 31 to translate the shaft 36 upwardly. The shaft 36 is effective to elevate the shaft 34 and thereby the roll 32. The rolls 45 and 32, prior to the time the beam of unit 55 is interrupted, serve to stabilize the rolled web 13 against any substantial lateral displacement.

When the rolled web assumes the position 13a, it is engaged by the periphery of the driven roll 45, whose rotation is geared through a clutch-brake device 46, electrically operated, as can be appreciated from a consideration of FIG. 9, wherein a voltage V is applied to the elements there designated. At this time, the roll 13a is cradled between the rolls 45 and 32. The driven roll 45 is rotating at a rather slow speed, and causes rotation of the paper roll 13a. Rotation of the paper roll 13a is expedited by the free rotatability of the idler roll 32—the idler roll 32 being journaled in roller bearing 33. During the rotation of the paper roll 13a under the influence of the driven roll 45, the air blast or jet 18 issuing from pipe 47 causes the tail portion 16 to move to the broken line position seen in FIG. 10. This also can be appreciated from a comparison of FIGS. 4 and 5, FIG. 4 being essentially the same showing as is seen in FIG. 3 but with the addition of a second photoelectric cell unit 19. In FIG. 5, the tail 16 of the paper roll is seen in a position of interrupting the beam of the unit 19. Additionally, in FIG. 5, it is to be noted that there is no longer any air jet issuing from the pipe 47, the idler roll 32 being retracted and the rotation of driven roll 45 stopped.

The more rapid advancement of the tail 16 is stopped when the tail 16 engages the conveyor 53, and the side apron 56 (see FIGS. 1 and 5). At this time, the tail 16 interrupts the beam in the photoelectric cell unit 19. The unit 19 comprises spaced jaw portions 57 and 58 to interrupt the beam extending therebetween. The interruption of the beam of the unit 19 is employed to reactivate the unit 55 and for a time sufficient to permit the unit 55 to reestablish its own beam. The reactivation of the unit 55 results in a closing of the valves 29a and 47a and a disengagement of the clutch 46, bringing the mechanism to the condition seen in FIG. 5.

Thus the roll 13 is provided in a partially unwound condition suitable for the application of adhesive thereto for bonding of the tail 16. Because of the cooperation of the driven roll 45, air jet 18 and the photoelectric cell unit 19, the tail portions 16 of successive paper rolls 12 assume the same disposition so that the adhesive is applied to corresponding portions of each paper roll. In the case of toilet tissue, the mechanism is arranged so that the adhesive is applied to that square or segment

5

of the main body of the roll so that upon rewinding, the last perforated segment of the paper roll is caused to be sealed to the adhesive-equipped portion.

When considering the operation with a roll of toilet tissue, the gluing operation may be performed by an adhesive-applying device generally designated 59 (see FIG. 1). The device 59 includes a pivotally mounted wheel 60 (see also FIG. 6), which is mounted on an arm 61. The arm 61 is pivotally mounted on a bracket 62 provided as part of the adhesive-containing trough 63. The arm 61 also rotatably carries a second wheel 64 which is effective to transfer adhesive from a pick-up wheel 65 suitably rotatably mounted within the trough 63. By virtue of the rotatable mounting of the roll or wheel 60, it is possible to apply adhesive to paper rolls of different diameters without having to check the position of the glue wheel 61 when the diameter varies—the pivotal movement of which wheel 60 is possible being indicated by an arrow to which is affixed the numeral 60a in FIG. 1. It is thus also possible to completely forego the adhesive-applying operation, if the same is desired. Through the operation of the adhesive-applying device 59, a continuous strip of adhesive is applied on the paper roll leaving the station 13 and entering the station 14.

Thereafter, rewinding of the tail 16 upon the paper roll 14 can be achieved by employing gravity, as by having the roll 14 roll upon itself down a chute 66 (this being seen in FIGS. 1, 7 and 8). When the continuous strip of adhesive has been applied on the whole length of the paper roll 14, the roll 14 arrives against a switch arm 67 which is effective to close a switch 67a (see FIG. 9). The closing of switch 67a energizes a valve 68 which supplies compressed air to a cylinder 69. The cylinder 69 is equipped with a piston rod 70 having a ram element 71 at the end thereof. Extension of the piston rod 70 by the actuation of valve 68 translates the paper roll 14 laterally off of conveyor 11, over conveyor 53, and down the chute 66. From the time the paper roll reaches the chute 66, it falls under the action of gravity and rotates around its center line, causing the tail 16, previously unwound, to be rewound around the periphery of the paper roll 14 and to be put in contact with a strip of adhesive applied by the device 59.

The air cylinder 69 may be equipped with a limit switch or servomechanism which causes the piston rod 70 to be retracted after the same has reached the end of its stroke. Upon return of the piston rod 70, the ram-like element 71 at the end thereof is in a position to again serve as the stabilizing guide for a roll leaving position 13 and entering the position designated 14.

While in the foregoing specification I have set forth a specific structure in considerable detail for the purpose of illustrating an embodiment of the invention, it will be understood that such details of structure may be varied widely by those skilled in the art without departing from the spirit of the invention.

I claim:

1. In a web roll tail sealing mechanism, a frame, means on said frame for supporting a web roll for rotation about its own axis, means for rotating said web roll about its own axis, means on said frame for angularly advancing the tail portion of said web roll faster than the rotation of said roll, and means sensitive to the faster angular advance of said tail portion for halting the rotation of said roll, whereby said roll is provided in a partially unwound condition suitable for application of an adhesive thereto for sealing said tail portion.

2. In a web roll tail sealing machine, a frame, means on said frame for cradling a web roll and rotating the same about its axis, air blast means on said frame arranged to impinge upon said web roll to cause a tail portion thereof to be unwound from said web roll when the same is rotating, and means on said frame responsive

6

to the unwinding of said tail portion for stopping the means for rotating said web roll.

3. The structure of claim 2 in which means are provided on said frame for applying adhesive to the partially unwound web roll.

4. The structure of claim 3 in which means are provided on said frame for causing the partially unwound web roll to rotate upon itself, whereby the unwound tail portion of said roll engages an adhesive-provided portion of said web roll.

5. A web roll tail sealing machine, comprising a frame, a pair of conveyors mounted on said frame, elevating roll means mounted on said frame for upward movement between said conveyors, driven roll means mounted on said frame outboard of one of said conveyors, means on said frame for rotating said driven roll, air jet means on said frame adjacent said driven roll, and means on said frame outboard of the other of said conveyors responsive to the unwinding of a tail portion of a web roll for stopping the rotation of said driven roll.

6. In a machine for sealing the tail of a roll of paper to the roll, a frame, a conveyor mounted on said frame, a roll rotatably mounted on said frame adjacent one longitudinal side of said conveyor and having its axis parallel to the direction of travel of said conveyor, means on said frame for elevating said roll, a second roll rotatably mounted on said frame and also having its axis parallel to the direction of travel of said roll, said second roll being positioned on said frame adjacent the other longitudinal side of said conveyor, means on said frame for driving said second roll, air jet means on said frame adjacent said second roll and operative to direct a stream of air across said conveyor, and signal means on said frame adjacent the first-mentioned roll adapted to deliver a signal for stopping said second roll, lowering the first-mentioned roll and stopping said air jet means when the tail of a rolled web is advanced by said stream of air faster than said rolled web is angularly rotated by said second roll.

7. In a web roll tail sealing mechanism, a frame, a conveyor mounted on said frame for horizontal travel thereon, a pair of spaced-apart rolls on said frame arranged with their axes parallel to the direction of travel of said conveyor and positioned on opposite sides of said conveyor, means on said frame for elevating one of said rolls relative to said conveyor, means on said frame for rotating one of said rolls, and air jet means on said frame adjacent one side of said conveyor and oriented to direct a stream of air across said rolls and conveyor.

8. The structure of claim 7 in which adhesive-applying means is mounted on said frame above said conveyor.

9. In a web roll tail sealing machine, a frame, means on said frame for rotating a roll, an air jet on said frame adjacent said means and directed at a roll on said means to cause a tail portion thereof to be unwound from said roll, signalling means on said frame responsive to the unwinding of said tail portion for stopping said rotating means, and means on said frame for applying adhesive to the partially unwound roll.

10. A web roll tail sealing machine, comprising a frame, a pair of conveyors mounted on said frame in side-by-side relation for horizontal movement, an elevating roll mounted on said frame and positioned between said conveyors, means on said frame for elevating said elevating roll, a driven roll mounted on said frame adjacent the outboard side of one of said conveyors, means for driving said driven roll, an air jet mounted on said frame adjacent said driven roll and operative to direct a stream of air across said rolls and conveyors, means responsive to movement of a web roll on said one conveyor for actuating said driving means, said air jet, and elevating said elevating roll, and signalling means mounted on said frame adjacent the other of said conveyors for delivering a signal for deactuating said driven roll and air jet and lowering said elevating roll when said air jet unwinds a tail portion of a web roll.

11. The structure of claim 10 in which adhesive-applying means is mounted on said frame over said conveyor.

12. The structure of claim 11 in which said frame is equipped with chute means for gravity discharge of a partially-unwound, adhesive-equipped web roll, whereby said web roll is adapted to rotate upon its own axis to rewind said tail portion. 5

13. The structure of claim 12 in which said frame is equipped with pusher means for initiating the movement of a partially unwound web roll toward said chute means. 10

14. The structure of claim 10 in which said signalling means is a photoelectric cell.

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