Nov. 20, 1962 C. J. SANDERS 3,064,862

VALVE STRUCTURE

Filed Feb. 26, 1960 3 Sheets-Sheet 1

Fig. 1.

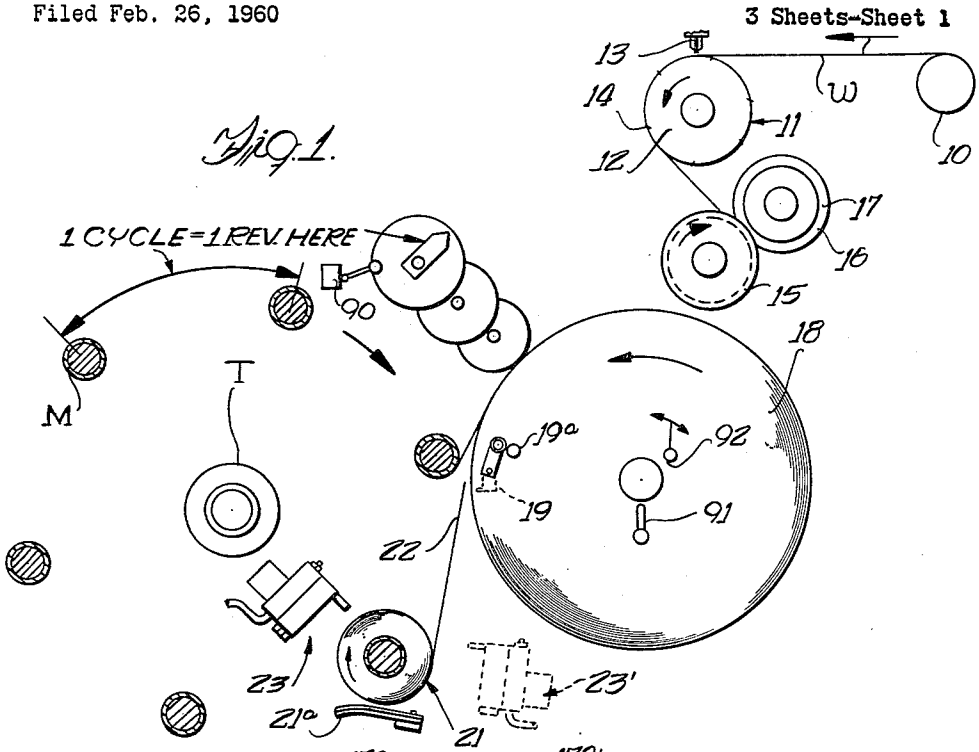
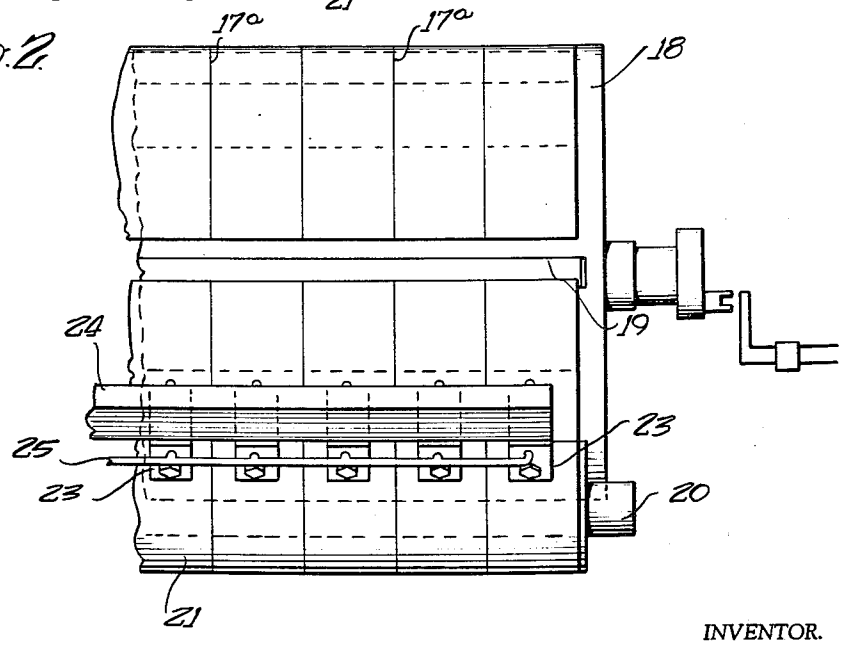


Fig. 2.



INVENTOR.

Charles J. Sanders

Dawson, Dilton, Fallon & Lungmus

Attorneys

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VALVE STRUCTURE

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Fig. 3.

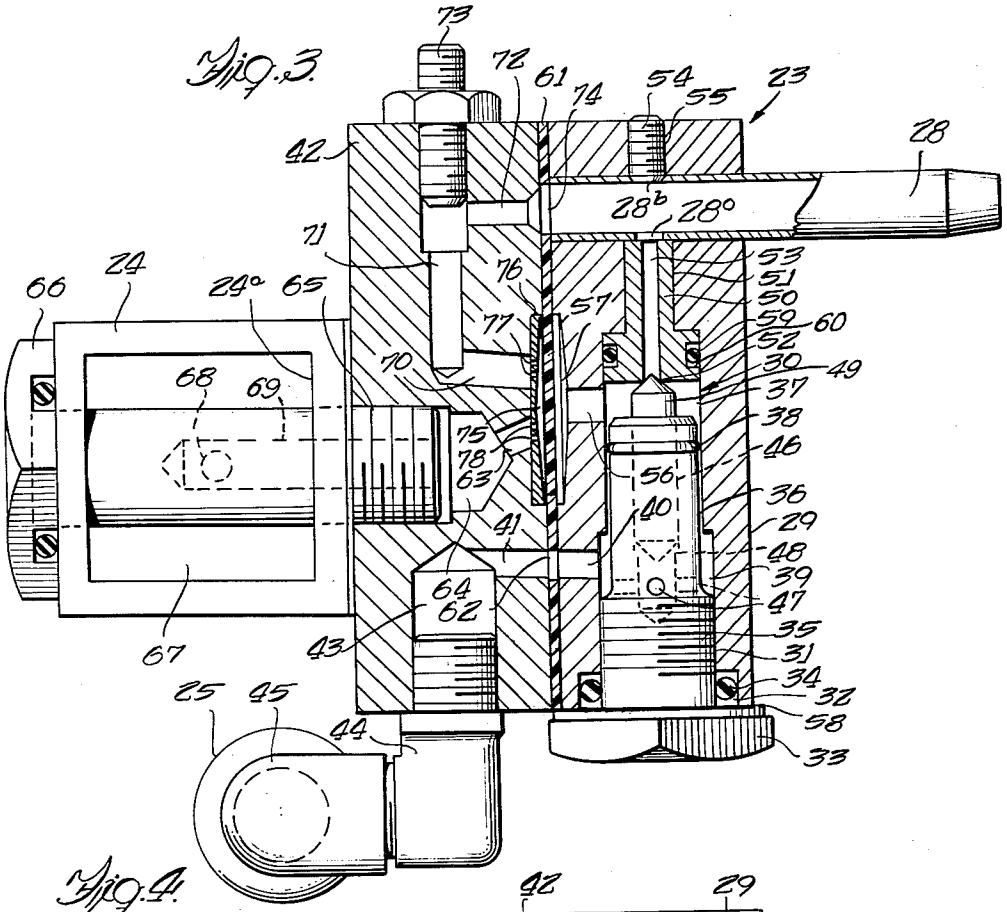
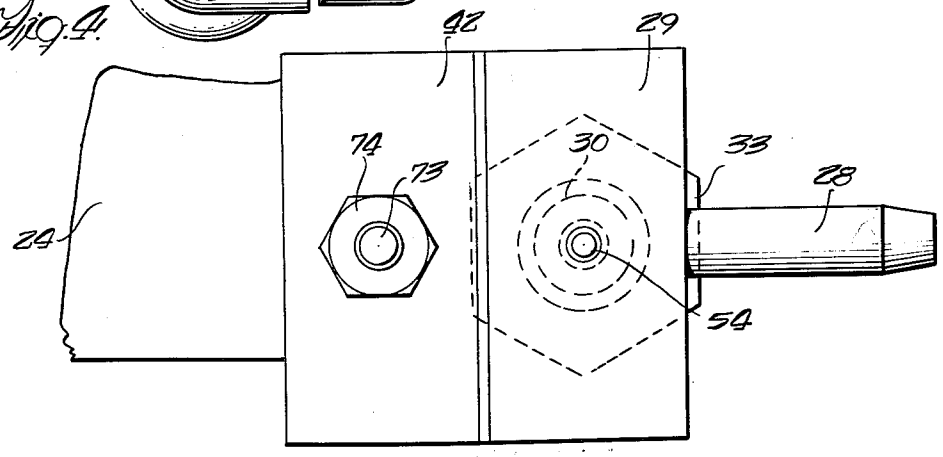


Fig. 4.



INVENTOR.

Charles J. Sanders

Dawson, Tilton, Fallon & Lungmus

Attorneys

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VALVE STRUCTURE

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Fig. 5.

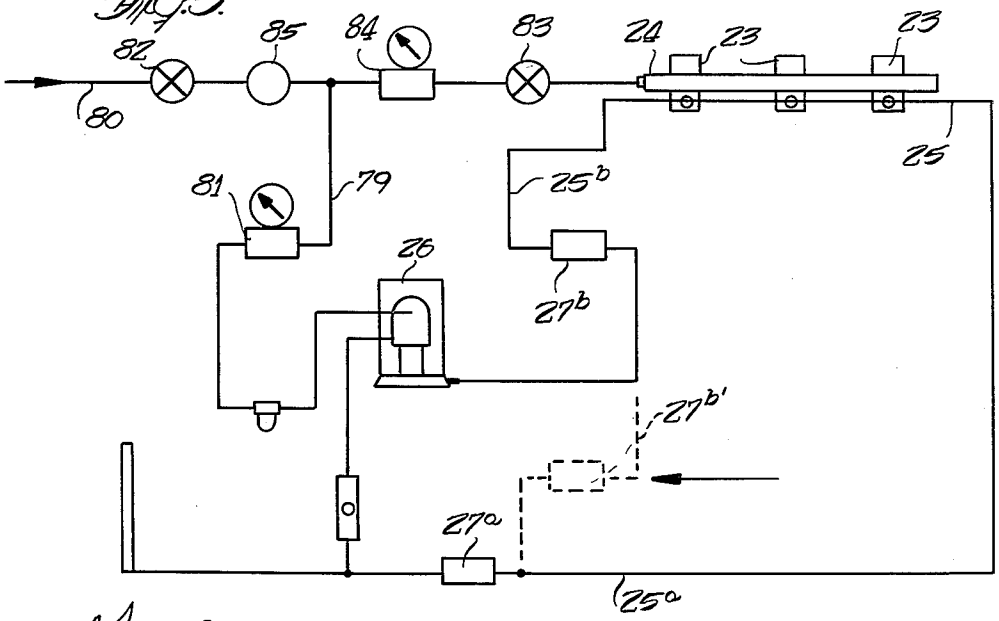
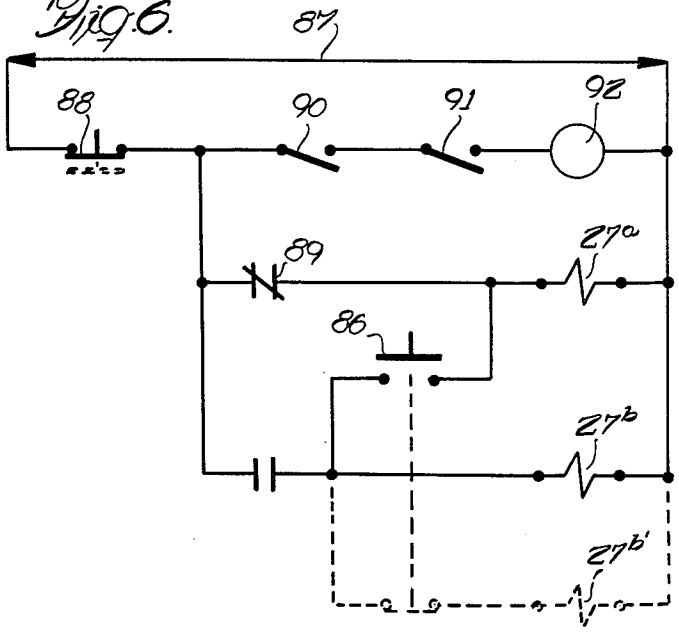


Fig. 6.



INVENTOR.

Charles J. Sanders

Dawson, Tilton, Fallon & Lungmus

Attorneys

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3,064,862
VALVE STRUCTURE

Charles J. Sanders, De Pere, Wis., assignor to Paper Converting Machine Co., Inc., Green Bay, Wis., a corporation of Wisconsin

Filed Feb. 26, 1960, Ser. No. 11,254
11 Claims. (Cl. 222—193)

This invention relates to a valve structure, and, more particularly, to a valve structure for delivering a metered quantity of pressurized fluid. Illustrative of the utility of this invention is its application to web winding machines where the tail end of a wound roll is to be secured to the roll itself—more specifically, rolls of toilet tissue, toweling, etc.

The web coming from a paper machine is conventionally delivered in a large sized roll which may be six feet in diameter and twenty feet long. When the paper is intended for individual use in a smaller sized roll, the paper must be rewound, and to make this operation economical, high speeds have to be employed, speeds of the order of 1000–1500 feet per minute. This rewinding operation is performed automatically and continuously on mandrel-equipped rewinders, see, for example, Kwitek and Nystrand Patent No. 2,769,600. On such a machine a conventional roll of toilet tissue is provided in a matter of a few seconds. With the advent of such high speed winders, there has arisen the problem of how to secure the tail of the small roll after the rewinding operation has been completed, especially where automatic wrapping is to follow.

The problem of sealing the tails to rolls is not only complicated by the time factor, but also by the need for rugged, simple equipment to perform the tail sealing operation. Relative to the time factor, it should be appreciated that in the United States, toilet tissue is conventionally provided in a web 4½" wide transversely perforated on 4½" centers. During the rewinding operation, this web may travel one inch in less than 1/200 of a second. For proper tail sealing, there is only a limited area where adhesive can be applied in order to prevent a flapping tail. The machinery for achieving such high speeds and maintaining them continuously is necessarily ponderous and, although dynamically well-balanced, the very nature of the machine has an effect on any associated apparatus, especially if the associated apparatus is of a delicate nature.

The problem of proper tail sealing in this environment is further complicated by the fact that the apparatus employed for applying adhesive must be substantially foolproof in operation. Any interruption in its proper operation may means the loss of thousands of feet of paper, which if it occurs with any frequency, can make uneconomical the entire high speed rewinding operation.

It is a principal object of this invention to provide a device which overcomes the complicated problems discussed above and reconciles the apparently irreconcilable objectives of properly placing adhesive for tail sealing in a foolproof operation and one that can be effectively employed with ponderous, high-speed winding apparatus.

Another object is to provide a novel valve structure which is effective to deliver a metered quantity of fluid such as would be applied for tail sealing, which can be accurately adjusted to provide a fast delivery of even fairly viscous liquids.

Still another object is to provide a valve system for applying adhesive in metered quantities to a wound web, or the like, which is responsive to released pressure in the adhesive supply line.

Other objects and advantages of this invention can be seen as this specification proceeds.

The invention will be described in conjunction with an illustartive embodiment in the accompanying drawing, in which—

FIG. 1 is a schematic representation of winder apparatus to which this invention has application;

FIG. 2 is a fragmentary end elevational view of a portion of the apparatus seen in FIG. 1;

FIG. 3 is an enlarged elevational view, partially in section, of a valve employed in conjunction with the invention;

FIG. 4 is a fragmentary top view of the valve seen in FIG. 3;

FIG. 5 is a piping diagram of the system associated with the apparatus seen in FIGS. 1 and 2; and

FIG. 6 is a wiring diagram also associated with the apparatus.

In the illustration given, with specific reference to FIG. 1, the letter W therein designates generally a traveling web which is to be wound upon itself to form a number of rolls, such as the toilet tissue or toweling mentioned hereinbefore. The web proceeds from a parent roll (not shown) past an idler roll **10** and then through perforating apparatus generally designated **11**. The perforating apparatus **11** includes a perforating bed roll **12** equipped with flexible knives **14** which cooperate with a stationary blade **13** in transversely perforating the web. The details of the perforator apparatus **11** can be seen by reference to Kwitek Patent No. 2,870,840.

The web W then passes between rolls **15** and **16** for longitudinal slitting thereof, the slitting rolls **16** being equipped with slitter wheels **17**. Thereafter, the web W is partially wrapped on and travels with a bed roll **18**.

For the winding operation, the web W is then handled by a multiple turret winder generally designated by the letter T, where the web is wound into a plurality of rolls. The apparatus thus far described can be seen in greater detail in the aforementioned Kwitek and Nystrand Patent No. 2,769,600, and reference is hereby made to that patent for details of construction of interest in connection with rewinding, but which are not herein given. Also seen in the above-mentioned Kwitek and Nystrand patent are the details of the web-severing knife **19** which is operative intermittently to transversely sever the web when a predetermined amount of the web has been wound upon a mandrel **20** to form a roll **21**. The severing action of the knife **19** necessarily results in the provision of a tail **22**, which must be adhesively secured to the roll **21**, and it is this phase of the winding operation with which this invention is particularly concerned.

For the purpose of applying adhesive to a wound roll **21** so as to secure its tail **22** thereto, adhesive-dispensing means in the nature of a valve-operated jet **23** is provided. Although only one such jet **23** is seen in FIG. 1, it is to be appreciated a plurality of aligned jets **23** will ordinarily be provided. This can be seen by reference to FIG. 2, where a portion of the width of bedroll **18** is seen. The web W is slit along a number of longitudinally-extending lines **17***a*, and between each of the slits **17***a*, a jet **23** is provided. Each jet **23** is mounted on an air manifold **24** and is thus connected to the source of compressed air which may be approximately 60 p.s.i. Each valve-operated jet **23** is also connected to an adhesive manifold **25** provided as part of a conduit system which also includes delivery piping **25***a* and return piping **25***b*, which provides liquid adhesive from a source not seen in FIGS. 1 and 2 but which is illustrated schematically in FIG. 5. The source is designated **26** and includes a pump which is effective to circulate adhesive through the manifold **25** to the jets **23**. Interposed in the delivery piping **25***a* to the manifold **25** is a solenoid-operated valve **27***a*, and interposed in the return piping **25***b* from the manifold **25** to the source **26** is a solenoid-operated valve **27***b*. Pres-

sure is built up in the manifold 25 when valve 27*a* is open and valve 27*b* is closed, while pressure is released in manifold 25 when the reverse is true, i.e., valve 27*a* being closed and valve 27*b* being open. Multiple valves, as indicated by 27*b'*, may be employed to aid pressure release when the supply lines are long.

Reference is now made to FIGS. 3 and 4, which show the details of the valve-operated jet 23. The jet-forming portion or delivery tube portion of the valve is designated by the numeral 28 and is seen to be mounted in a valve body 29. The body 29 has a passage, generally designated 30, extending therethrough, a portion of which communicates the tubular jet-forming tube 28 with the liquid adhesive manifold 25. The passage 30 is threaded at one end as at 31, and threadedly receives a plug or cap 33 therein. The adhesive issues from tube 28 and impinges on the web tail 22. Best results are obtained when the outer end of tube 28 is spaced about 5" from the sheet. An alternate location of the unit 23 can be seen in dashed line in FIG. 1, wherein the unit is designated by the numeral 23'. In the position designated 23, the adhesive is applied to roll 21 in position ahead of tail 22, so that the tail 22 overlaps the adhesive and adheres to the roll 21 after the completion of one more revolution of roll 21. As turret T advances, roll 21 is still rotating as it passes over the wiper 21*a*, which may be constructed of fabric belting, brush material, etc. The wiper 21*a* insures positive contact between the tail 22 and the adhesive-equipped portion of the roll 21, in addition to serving as a brake for the roll 21.

The passage 30 is equipped with a series of stepped portions, the largest of which is designated by the numeral 32 and which is immediately adjacent the outer end of the plug fitting 33. An O-ring 34 is mounted in the portion 32. The shank portion 35 of the plug 33 is threadedly received in the threaded portion 31 of passage 30. Portion 31 is seen to be slightly smaller in bore than portion 32. The O-ring 34 effects a seal between the walls of the passage 30 in portion 32 and the shank 35 of plug 33.

The extreme inner end of the plug 33 is designated by the numeral 36 and this is seen to be unthreaded and in a sliding fit relation with the portion 37 of passage 30. The slip fit here is of the order of .0005–.001". An O-ring 38 is provided to seal this slip fit. The unthreaded end portion 36 is seen to abut both portions 37 and 31, the portion 31 having a bore greater than the external diameter of plug portion 36 to provide an annular chamber 39. The annular chamber 39 communicates with the manifold 25 by means of a laterally-extending passage 40 in body 29, aligned, laterally-extending passage 41 in cooperating body 42, bore 43, and fittings 44 and 45. Through the elements just enumerated, adhesive from manifold 25 is adapted to flow into the annular chamber 39.

The inner end portion 36 of cap 33 is equipped with a longitudinally-extending recess 46. The inner end of the recess 46 communicates with the annular chamber 39 by means of transverse bores 47—thus, adhesive from manifold 25, having flowed into chamber 39, is enabled to reach the inner end of portion 37 of passage 30 by flowing through the transverse bores 47 and the longitudinally-extending recess 46.

Intermediate its ends, the recess 46 is equipped with an annular shoulder 48 which provides a valve seat. Floatingly mounted in the recess 46 and adapted to seat against the seat 48, is a tapered-ended, cylindrical valve element 49. In the illustration given, the element 49 is constructed of nylon with a 1/64" clearance relative to the walls of the recess 46.

The portion 37 of passage 30 is equipped with an internal fitting 50, the fitting 50 also extending into and filling a more constricted portion 51 of passage 30. The inner end of the fitting 50 provides a valve seat for the element 49 as at 52. The fitting 50 is equipped with a longitudinal bore as at 53 which communicates with the interior of delivery tube 28 through an opening 28*a* provided in the wall of the tube 28. The tube 28 is maintained in the position shown by means of a dog point setscrew 54 which is threadedly received in the extreme upper end portion 55 of passage 30 and which engages an opening 28*b* drilled on the same axis as opening 28*a*.

From the foregoing, it can be appreciated that adhesive may flow through passage 30 and into tube 28, depending upon the position of the valve element 49. When the valve element 49 is seated against the seat 52, adhesive may flow into the passage 30 up to that point and more specifically into laterally-extending passage 56 and diaphragm chamber 57.

The movement range of valve 49 can be readily varied by the degree to which the plug 33 is inserted within the passage 30. In the illustration given, the plug 33 is restricted from being fully inserted into the passage 30 by means of shims 58.

The flow of adhesive within the valve 23 is effectively confined to the passage 30 by the provision of suitable seals, one of which being the O-ring 34 previously mentioned, which is effective to prevent escape of adhesive downwardly as the valve is illustrated in the drawing. Escape of the adhesive upwardly is avoided by means of a companion O-ring 59 which is provided in an annular recess 60 in the fitting 50. Still referring to FIG. 3, it will be seen that a laterally-extending or branch passageway 56 is provided that communicates with the chamber 57 provided in the face of the body 29 adjacent the complementary body 42. Interposed between the adjacent faces of these two bodies 29 and 42 is a diaphragm element 61. The diaphragm element 61 is apertured as at 62 to permit the passages 40 and 41 to communicate for the flow of adhesive. However, the diaphragm 61 in the vicinity of branch passage 56 is imperforate, so that adhesive may not escape via that route. Communicating with the side of diaphragm 61 opposite the side closing branch passage 56 is a laterally-extending passage in body 42, this laterally-extending passage being designated by the numeral 63. The passage 63 communicates with the exterior of the body 42 by means of an enlarged passage designated 64. A portion of this passage is threaded as at 65, and this receives a bolt 66. The square tube air manifold 24 is grilled at 24*a* so that the bolt 66 secures the manifold 24 to a threaded opening 67 in the body 42. The body 42 is secured to the body 29 by bolts not shown.

The bolt 66 is equipped with a longtiudinally-extending recess 69 which at its inner end is equipped with a transverse bore 68. Thus, air entering the manifold 24 flows through the bore 69 into the recess 68 and thence to the left-hand side of the diaphragm 61—the left-hand side being that seen with reference to FIG. 3.

The diaphragm 61 is constructed of flexible material and should it be distended to the right in FIG. 3, would permit the air from manifold 24 to flow into passages 70, 71, and 72 which communicates with the inner end of the delivery tube 28. The passages 70—72 are all provided in the body 42, the passage 71 extending to the exterior of the body 42 and being partially restricted by adjustable setscrew 73. The bolt 73 is equipped with a lock-nut 74 to maintain the bolt within the passage 71 which is suitably threaded at its outer end. The position of the bolt 73 relative to the length of the passage 71 determines the rate of air flow from the manifold 24 to the delivery tube 28. The air, in flowing from the manifold 24 to the delivery tube 28, thus follows a generally S-shaped passage, with the portion of the S-shaped passage communicating the diaphragm 61 with the delivery tube 28 including passages 70—72 and which together form a generally U-shaped channel. The diaphragm 61 is suitably apertured as at 74 to permit air to flow from the passage 72 into the delivery tube 28.

In the operation of the jet-providing valve 23 just described, adhesive under relatively high pressure, i.e., about 750 p.s.i., enters the valve body 29 from the mani-

fold 25 by means of the fittings 45 and 44 and the passages 43 and 41 in body 42. Further flow of adhesive into the passage 30 is effective to move the valve element 49 upwardly and into seating relationship with the seat 52. The passage 30 is at atmospheric pressure, so that the back pressure on the element 49 forces it upwardly, as seen in FIG. 3—this is the position shown. The continued flow of adhesive into the portion 37 serves to distend the diaphragm 61 into the dished portion 75 of valve body 42—thus closing off communication between the passages 63 and 70 in the valve body 42. Because of this, no air can flow from manifold 24 to the delivery tube 28. The air pressure is considerably less than the adhesive pressure, the air pressure being about 60 p.s.i. When, however, the adhesive pressure is relieved, the air pressure takes over and forces the diaphragm 61 into a complementary dished portion 57 in valve body 29, thereby placing passages 67 and 70 in communication. This dished portion 75 may be conveniently provided by a plug insert 76. The insert 76 is equipped with two groups of smaller openings 77 and 78 communicating the dished portion or chamber 75 with the bores 70 and 63, respectively. In the illustration given, there are twelve smaller openings in each group, each group being arranged to be circumscribed by one of the bores 70 or 63.

Simultaneously with the movement of the diaphragm 61 (occasioned by the opening of valve 27*b*—see FIG. 5 to reduce the pressure in adhesive line 25*a*), the valve element 49 moves into seating relationship wtih the seat 48 and thus open the orifice within seat 52 provided by passage 53. The pressure imposed upon the adhesive in the dished portion or chamber 57 by the movement to the right of the diaphragm 61 causes the adhesive fluid to flow through the passage 53 and fitting 50 into the delivery tube 28. At that point, the liquid adhesive is mixed wih air entering the delivery tube from the left-hand side of the diaphragm 61 and is forced out of the delivery tube 28 in a fine spray. Through the operation of the valve just described, I find that a desirable dispersion of the adhesive is achieved and also the delivery tube is, in effect, self-cleaned because of the rush of air therethrough. Each time the valve 23 operates, a predetermined amount of adhesive is ejected into the delivery tube 28 so that a fine control of the amount of adhesive applied to the tail of a wound roll is obtained.

The setscrew 73 can be turned in to partially restrict the flow of air into nozzle 28, and simultaneously this member also serves to keep the air pressure high enough at the diaphragm to properly eject the adhesive from the nozzle 28. The nozzle 28 can be made with various shapes at the outlet and to form various patterns of adhesive on the web. The washers or shims 58 are made from plastic shim stock of various thicknesses and can be used to preset the travel of the plastic valve pin or element 49. Further, these shims allow for correction of dimensional errors in manufacturing the parts. Experience has shown that restricting the end-to-end travel of the valve element 49 to about 1/32" gives good results.

Referring now to FIG. 5 of the drawing, a schematic representation of the adhesive-applying apparatus can be seen. Previously, the interconnection between the source 26 and the manifold 25 was described. The source or pump may be a Model 4052 pump made by the Alemite Division of the Stewart-Warner Corporation. This pump will yield a liquid outlet pressure of around 750 p.s.i. when air pressure of 40 p.s.i. is delivered thereto, the air to pump 26 being supplied by means of conduit 79 which is connected to the main air supply 80. The conduit 79 is equipped with a regulator 81 which may be used to reduce the air pressure to the desired 40 p.s.i. The main conduit 80 is equipped with shut-off valves 82 and 83 and a regulator 84, which may be adjusted to supply 60 p.s.i. air to the air manifold 24. Additionally, a filter 85 is provided in conduit 80.

The valves 27*a* and 27*b* conveniently may be solenold valves, and the operation of this portion of the system to provide the pressure variation within chamber comprising passage portion 37 and branch passage 56 takes the following sequence.

When the system is at rest, awaiting a signal, the solenoid valve 27*a* is energized and opened, and the solenoid valve 27*b* is deenergized and closed. The maintains a high pressure on the adhesive line 25*a* and the manifold 25 to the valve 23. This pressure seats the nylon valve elements 49 in the escape orifices in seats 52 and prevents adhesive from entering the various discharge tubes 28. The pressure of the adhesive also forces the disphragm 61 against the air inlet passage 63, sealing off the flow of air through the U-shaped channel to the nozzle 28. Thus, adhesive is stored essentially in the dished portion 57.

When the circuit seen in FIG. 6 and to be described later is operated, the pressure in the adhesive line is instantaneously released by closing solenoid valve 27*a* and opening solenoid valve 27*b* and 27*b'* if the same is employed. With the pressure released on the adhesive side of the diaphragm 61, the lower air pressure on the opposite side becomes effective and tends to force the diaphragm 61 to the right in FIG. 3 and toward the cavity or dished portion 57. This action simultaneously accomplishes two things: it tends to force the adhesive in the chamber 57 back into the line 25, and in so doing shifts the valve element 49 and prevents adhesive escape in this direction. This leaves the orifice and valve seat 52 open to the nozzle 28, where the metered amount of adhesive is then deposited. As soon as the diaphragm 61 moves away from the air inlet, the adjacent air passage to the inner end of the nozzle 28 is exposed and the resulting blast of air through the nozzle 28 picks up the adhesive and carries it out of the nozzle tip.

The additional valve 27*b'* referred to above can be seen in FIG. 6 to be wired in parallel with the valve 27*b*. Further reference to FIG. 6 shows that a pushbutton 86 is provided that is effective to leave valve 27*b'* closed when the pushbutton 86 is depressed to actuate valve 27*b* while valve 27*a* is open, and thereby circulate adhesive in the system. In FIG. 6, the electrical circuit is seen to be provided with a voltage 87 which may be conventional 110-volt 60-cycle current. This current flows through an On-Off switch 88 and thence through a normally closed time delay relay 89 to the solenoid valve 27*a*. Current is also adapted to flow through a normally opened time delay relay to the valve 27 and also the valve 27*b'*, if such is provided. Current also flows through a cam-operated microswitch 90, a post magnetic switch 91 and a time delay relay 92, which are effective to energize the valve 27*b*. The switch 90 may be cam-operated from the counterdrive mechanism associated with turret T which meters the proper amount of web to be wound on roll 21, FIG. 1, and may be set to make contact for a period equal to one revolution of the bedroll 18. The switch 90 is timed in relation to the chop-off cycle provided by knife 19 and is mounted on the same shaft with a conventional chop-off signal cam not shown.

In order to accurately place the spot of adhesive on the web, the second switch 91 is placed in series with the switch 90 and is operated by a small permanent magnet 92 mounted directly on the bedroll journal. This is a mercury switch designed for high speed operation and is magnetically operated in order to eliminate mechanical linkage. A suitable switch is a Post Decitron Magnetic Switch No. MH–2. The magnet is adjustable about the axis of the bedroll so the adhesive application can be timed in relation to the position of chop-off knife 19. In practice, the elements can be readily geared together since the bedroll 18 generally has a circumference which is a multiple of the length between such perforations. For example, a common size of tissue is 4½" x 4½", and rolls of this tissue will be provided with 500 or 650 sheets,

designated "count." The bedroll circumference may then be 45", so it will rotate 50 times for a 500 count or 65 times for the 650 count. On the fiftieth revolution, both the knife **19** and the switch **90** are actuated. Thus, the switch **90** can be roughly set for a whole cycle of the turret, i.e., the time it takes a mandrel M to move one position (60° as shown), and the second switch **91** can be set to a given point in that revolution. Because of a time lag, amounting to about 0.05 seconds, between closing of the switch **91** (which closes every bedroll revolution) and the actual depositing of the adhesive on the web, the magnet may require adjusting when the running speed of the machine is increased or decreased. Once determined, however, this running speed is fairly constant. Where machine speeds are too high to maintain an electrical signal of the proper duration, a time delay relay may be used to operate the solenoid valve in the adhesive system. The solenoids preferably should remain energized for about 0.4 second to keep the nozzles clean.

While in the foregoing specification I have set forth a detailed description of an embodiment of the invention for the purpose of illustration, many variations in the details herein given may be made by those skilled in the art without departing from the scope of the invention.

I claim:

1. In a fluid-dispensing system for delivering a metered quantity of liquid, a valve body having a flow passage extending therethrough and providing an inlet and outlet, means for coupling a source of pressurized liquid to said inlet, a floating valve element in said passage, said passage being equipped with spaced-apart seats for said element, the first of said seats being adjacent said outlet and the second of said seats being adjacent said inlet, a diaphragm-equipped passage about said first seat and communicating with said flow passage adjacent said outlet and also communicating with said flow passage adjacent said second seat, and means for coupling a source of pressurized fluid to said diaphragm-equipped passage, said diaphragm being interposed between the means for coupling the pressurized fluid source and the communication of said diaphragm-equipped passage with said flow passage adjacent said second seat, whereby seating of said valve element on said second seat upon reduction of liquid pressure at said inlet is effective to expel combined liquid and fluid from said outlet.

2. In a fluid-dispensing system for delivering a metered quantity of liquid, a valve body having a flow passage extending therethrough and providing an inlet and an outlet, means for coupling a source of pressurized liquid to said inlet, a floating valve element in said passage, said passage being equipped with spaced-apart seats for said element, the first of said seats being adjacent said outlet and the second of said seats being adjacent said inlet, a diaphragm-equipped passage about said first seat and communicating with said flow passage adjacent said outlet and also communicating with said flow passage adjacent said second seat, and means for coupling a source of pressurized fluid to said diaphragm-equipped passage, said diaphragm being interposed between the means for coupling the pressurized fluid source and the communication of said diaphragm-equipped passage with said flow passage adjacent said second seat, said body comprising a first part equipped with seats in said valve element, and a second body part secured to said first part equipped with a portion of said diaphragm-equipped passage, said diaphragm being interposed between said first and second body parts, seating of said valve element on said second seat upon reduction of liquid pressure being effective to expel combined liquid and fluid from said outlet.

3. An adhesive-applying system, comprising a body having a flow passage extending therethrough with the ends of the passage providing an inlet and an outlet, spaced-apart, oppositely-oriented seats in said flow passage, the first of said seats being adjacent said outlet and the second of said seats being adjacent said inlet, a double-acting floating valve element in said flow passage adapted to alternately engage said seats, a generally U-shaped branch passage in said body communicating with said flow passage on opposite sides of said first valve seat, the communication of said branch passage with said flow passage on one side of said first valve seat being between said valve seats, means for coupling a source of pressure fluid to said branch passage, and a flexible diaphragm in said branch passage positioned to isolate said coupling means from said flow passage on said one side of said first valve seat, seating of said valve element on said second seat being accompanied by flexing of said diaphragm to communicate said source with said outlet.

4. An adhesive-applying system, comprising a body having a flow passage extending therethrough with the ends of the passage providing an inlet and an outlet, spaced-apart, oppositely-oriented seats in said flow passage, the first of said seats being adjacent said outlet and the second of said seats being adjacent said inlet, a double-acting floating valve element in said flow passage adapted to alternately engage said seats, a generally U-shaped branch passage in said body communicating with said flow passage on opposite sides of said first valve seat, the communication of said branch passage with said flow passage on one side of said first valve seat being between said valve seats, means for coupling a source of pressure fluid to said branch passage, and a flexible diaphragm in said branch passage positioned to isolate said coupling means from said flow passage on said one side of said first valve seat, seating of said valve element on said second seat being accompanied by flexing of said diaphragm to communicate said source with said outlet, said flow passage being equipped with a movable plug at the inlet end thereof, said plug being recessed to provide said second seat, and flow port means in said plug adapted to communicate the recess thereof with a source of pressurized liquid.

5. A fluid-dispensing system, comprising a body having a flow passage extending therethrough providing an outlet, at one end thereof, the outlet end of said flow passage being equipped with an internal fitting providing a valve seat, means in said body for delivering high pressure liquid to said flow passage, a second valve seat in said flow passage spaced from the first-mentioned seat and oppositely oriented thereto, a double-acting floating valve element in said passage adapted to alternately engage said seats, a generally U-shaped branch passage in said body intersecting said flow passage between said valve seats and also communicating with said flow passage at said outlet, said branch passage being equipped with a diaphragm element for closing the same, fluid pressure introducing means communicating with said valve body and said branch passage, and upon reduction of liquid pressure, the valve element is seated on said second seat followed by an expelling of combined liquid and fluid from said outlet.

6. A fluid-dispensing system, comprising a body having a flow passage extending therethrough providing an outlet at one end thereof, the outlet end of said flow passage being equipped with an internal fitting providing a valve seat, means in said body for delivering high pressure liquid to said flow passage, a second valve seat in said flow passage spaced from the first-mentioned seat and oppositely oriented thereto, a double-acting floating valve element in said passage adapted to alternately engage said seats, a generally U-shaped branch passage in said body intersecting said flow passage between said valve seats and also communicating with said flow passage at said outlet, said branch passage being equipped with a diaphragm element for closing the same, fluid pressure introducing means communicating with said valve body and said branch passage, and upon reduction of liquid pressure, the valve element is seated on said second seat, followed by an expelling of combined liquid and fluid

from said outlet, said branch passage being equipped with bolt means positionably mounted therein for limiting the flow of pressure fluid therethrough.

7. A fluid-dispensing system, comprising a body having a flow passage extending therethrough providing an outlet at one end thereof, the outlet end of said flow passage being equipped with an internal fitting providing a valve seat, means in said body for delivering high pressure liquid to said flow passage, a second valve seat in said flow passage spaced from the first-mentioned seat and oppositely oriented thereto, a double-acting floating valve element in said passage adapted to alternately engage said seats, a generally U-shaped branch passage in said body intersecting said flow passage between said valve seats and also communicating with said flow passage at said outlet, said branch passage being equipped with a diaphragm element for closing the same, fluid pressure introducing means communicating with said valve body and said branch passage, and upon reduction of liquid pressure, the valve element is seated on said second seat, followed by an expelling of combined liquid and fluid from said outlet, the inner end of said closure passage defining an orifice positioned within said first-mentioned seat, said second valve seat defining a second orifice, said second orifice being smaller than said first orifice.

8. In an adhesive-applying system for winder apparatus,

(A) a manifold,

(B) a pump for introducing pressurized liquid adhesive into said manifold,

(C) a nozzle-equipped valve body communicating with said manifold,

(D) a valve coupled to said manifold and interposed between said nozzle-equipped valve body and said pump,

(E) said nozzle-equipped body comprising a chamber for storing a predetermined quantity of said adhesive, and

(F) fluid pressure means responsive to said manifold valve for isolating said quantity from the liquid in said manifold and expelling a portion of said quantity through said nozzle and while mixing pressurized fluid with the portion expelled from said quantity.

9. In an adhesive-applying system for winder apparatus,

(A) a manifold,

(B) a pump for introducing pressurized liquid adhesive into said manifold,

(C) a nozzle-equipped valve body communicating with said manifold,

(D) a valve coupled to said manifold and interposed between said nozzle-equipped valve body and said pump,

(E) said nozzle-equipped valve body comprising a chamber for storing a predetermined quantity of said adhesive, and

(F) fluid pressure means responsive to said manifold valve for isolating said quantity from the liquid in said manifold and expelling a portion of said quantity through said nozzle and while mixing pressurized fluid with the portion expelled from said quantity, said responsive means including a diaphragm mounted in said nozzle-equipped valve body, said diaphragm being operative to isolate the pressurized fluid from said quantity in one position of said manifold valve and to communicate the same in another position of said manifold valve.

10. An adhesive-applying system, comprising:

(A) a body having a flow passage extending therethrough and defining thereby an outlet and an inlet,

(B) said flow passage being equipped with spaced-apart first and second valve seats respectively adjacent said outlet and inlet,

(C) a valve inlet movably mounted in said passage between said seats for ultimate seating engagement with said seats,

(D) a branch passage in said body around said first seat,

(E) a first source of pressurized fluid communicating with said branch passage,

(F) a diaphragm in said branch passage between said valve element and said first source, and

(G) a second source of pressurized fluid communicating with said flow passage inlet, said valve element seating on said second seat upon reduction in pressure of the fluid from said second source upon movement of said diaphragm so as to communicate said first fluid source with the fluid from said second source in said outlet and expel the same therefrom.

11. An adhesive-applying system, comprising:

(A) a body having a flow passage extending therethrough and defining thereby an outlet and an inlet,

(B) said flow passage being equipped with spaced-apart first and second valve seats respectively adjacent said outlet and inlet,

(C) a valve element movably mounted in said passage between said seats for alternate seating engagement with said seats,

(D) a branch passage in said body around said first seat,

(E) a first source of pressurized fluid communicating with said branch passage,

(F) a diaphragm in said branch passage between said valve element and said first source, and

(G) a second source of pressurized fluid communicating with said flow passage inlet, said second source including a valve-equipped manifold, the pressurized fluid from said second source being effective to urge said valve element against said first seat when the manifold valve communicates said second source with said body, said valve element seating against said second source when pressure is relieved in said manifold, whereby said diaphragm is operative to move and simultaneously communicate said first source with said second source fluid in said passage outlet and expel the same therefrom.

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