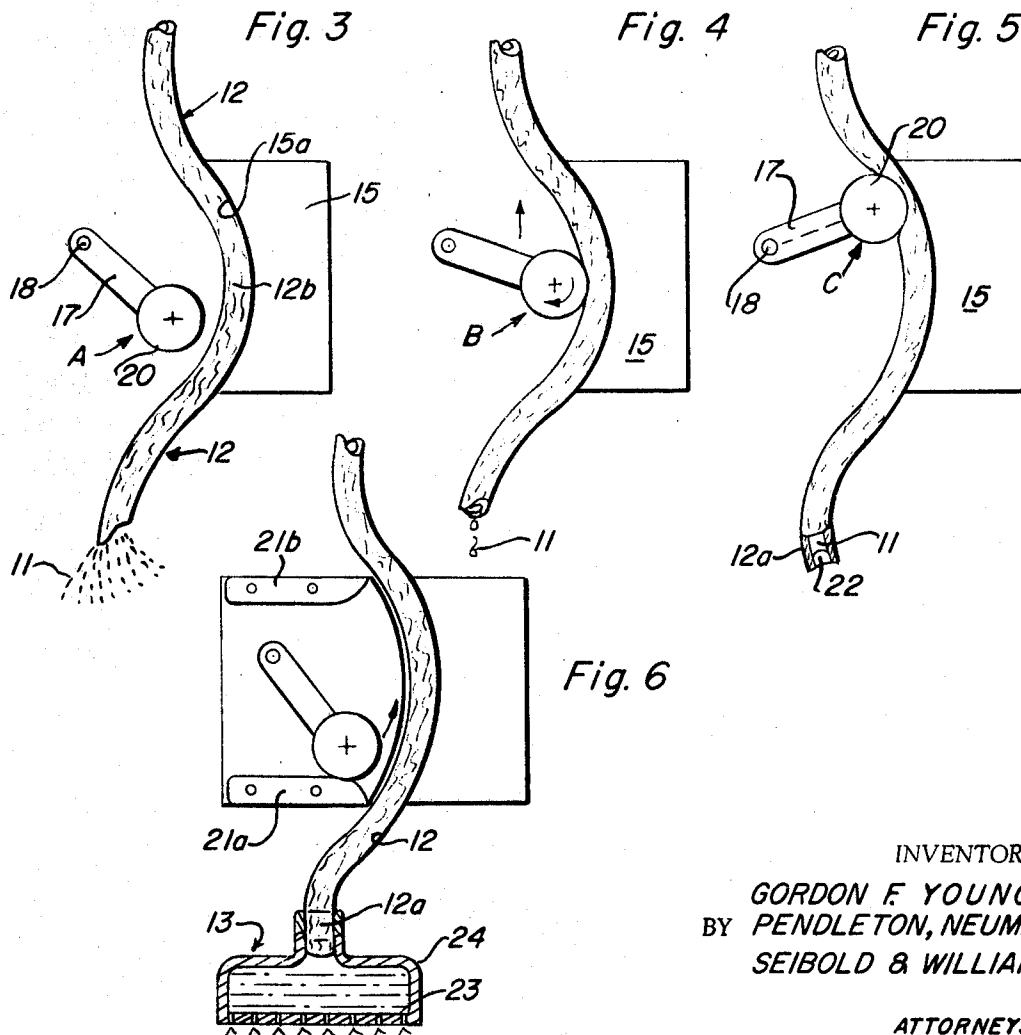
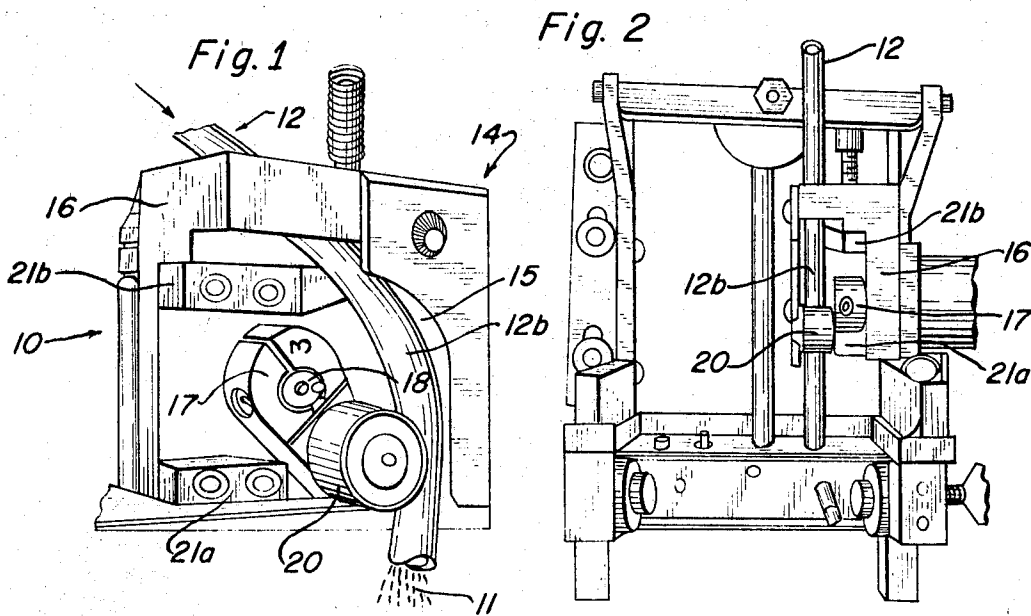


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APPARATUS FOR CONTROLLING THE DISCHARGE OF A LIQUID
MEDIUM THROUGH A CONDUIT
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3,511,468

APPARATUS FOR CONTROLLING THE DISCHARGE OF A LIQUID MEDIUM THROUGH A CONDUIT

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1 Claim 10

ABSTRACT OF THE DISCLOSURE

An apparatus is provided for controlled dispensing of an adhesive through a header and onto a predetermined surface area moving in a given direction beneath the header. The header is connected to a source of adhesive by a conduit having a collapsible section. The collapsible section is disposed adjacent a concave backup surface. Through controlled movement of a pivotal member in one direction gradual collapsing of the conduit section results causing adhesive flow therethrough to be interrupted and producing a suction effect upon the adhesive entrapped between the header and the collapsed conduit section.

BACKGROUND OF THE INVENTION

In high speed gluing operations, for example, it has heretofore been extremely difficult, if not impossible, to effectively control the application of the adhesive to predetermined non-contiguous area on a moving surface or substrate. The complexity of the control problem is dependent upon numerous factors such as, for example, the viscosity and drying characteristics of the adhesive being used, the configuration of the areas to which the adhesive is applied, and the speed of movement of the substrate past the applicator.

Various efforts heretofore made in solving the aforementioned problems have resulted in the development and utilization of costly, complex and/or highly sensitive devices and apparatus which seriously curtail the economic advantages to be normally expected from such high speed operations. The maintenance and servicing of such devices and apparatus have proved difficult, frustrating, and necessitated frequent shut-down of the glue line operation.

SUMMARY

Thus, it is an object of this invention to provide an apparatus which overcomes the shortcomings aforementioned associated with the prior art approaches and yet permits effective controlled application of an adhesive or some other liquid medium to a predetermined area on a moving substrate.

It is a further object of this invention to provide a liquid medium applying apparatus which utilizes a minimum of simple mechanical components wherein the adjustment and maintenance thereof is simple and expedient and does not require the talents of one skilled in or adept to the solution of mechanical problems.

Further and additional objects will appear from the description, accompanying drawings, and appended claim.

In accordance with one embodiment of this invention an apparatus is provided for controlling the application of a liquid medium to a predetermined area on a moving surface. The apparatus in question comprises a conduit through which a liquid medium under a predetermined pressure is caused to flow. Upstream from the discharge end of the conduit is a collapsible segment of the conduit. One side of the segment is engaged by a backup

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surface. Spaced from the backup surface and movable toward and away from said surface and the collapsible segment is a means which is adapted to contact and collapse said segment against the backup surface and thus interrupt medium flow therethrough. The collapse of the conduit segment and subsequent movement of the means after initial collapse has occurred is produced upon movement of the means towards the backup surface and in opposition to the medium flow wherein a suction effect on the medium is caused at the discharge end of the conduit. Connected to the discharge end of the conduit is a header which is adapted to distribute the discharge medium in a given pattern.

For a more complete understanding of this invention reference should be made to the drawing wherein:

FIG. 1 is a fragmentary perspective side view of one form of the improved apparatus with the various components thereof in a position to permit unrestricted medium flow through the conduit.

FIG. 2 is a fragmentary perspective left end view of the apparatus shown in FIG. 1.

FIGS. 3-5 are fragmentary, diagrammatic views of the improved apparatus showing, respectively, unrestricted, partially restricted, and interrupted medium flow positions.

FIG. 6 is similar to FIG. 3 showing a header, in section, connected to the discharge end of the medium conduit.

DESCRIPTION

Referring now to the drawing and more particularly to FIGS. 1 and 2, one form of an improved apparatus 10 is shown for use in applying a liquid adhesive or medium 11 to a surface area of a sheet, a blank, a web, or similar substrate, not shown, moving horizontally in a given direction. The apparatus 10 includes in this instance a tubular member or conduit 12 having one end thereof connected to a source or supply of liquid adhesive, not shown, and the other end 12a thereof connected to a header or distributing member 13, see FIG. 6.

A segment or length 12b of the conduit near discharge ends 12a is of collapsible material and is adapted to be engaged by and extend through a housing assembly 14. The assembly includes a block piece 15 provided with a concave surface 15a against which the conduit segment 12b engages. Surface 15a functions as a backup for the conduit segment 12b as will be explained more fully hereinafter. Piece 15 is fixedly secured to a frame 16.

Pivotaly mounted on frame 16 and spaced from concave surface 15 is an elongated arm 17. One end of arm 17 is keyed to a shaft 18, the latter being supported by frame 16 and being free to oscillate about its longitudinal horizontal axis. Oscillating movement of shaft 18 is controlled by suitable drive means, not shown.

To the free or distal end of arm 17 is a roller 20, the periphery of which is adapted to engage and collapse conduit segment 12b, when arm 17 is in certain positions of pivotal adjustment. Stop bars 21a and 21b are mounted in vertically spaced relation on frame 16 and serve to limit the amplitude of the arm's oscillatory movement. The actuation of arm 17 may be readily effected and controlled by various well known timing devices, not shown, which have been set to actuate arm 17 so that the proper amount of adhesive will be applied in a predetermined pattern.

FIGS. 3-5 show in a diagrammatic way, the arm 17 in various positions of adjustment. In describing each position it is important to note that the pivotal axis of arm 17 is offset upwardly relative to the center of curvature of surface 15a. In FIG. 3, arm 17 is in full down position A wherein it is in contact with lower stop bar 21a. When arm 17 is in its full down position, roller 20 is out of contact with or does not cause flexing of conduit seg-

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ment 12b and thus there is unrestricted flow of the liquid adhesive through the conduit.

In FIG. 4, the arm 17 has moved approximately 15° in a counter-clockwise direction from its full down position A to an intermediate position B wherein the roller 20 has contacted conduit segment 12b and partially collapsed same whereby restricted flow through the conduit results. The roller 20 is free to rotate about a transverse axis at the end of arm 17 and thus will rotate in a clockwise direction when it engages the conduit segment as arm 17 is moving towards position B.

In FIG. 5, arm 17 is shown in a full up position C wherein it is in engagement with upper stop bar 21b. While arm 17 is in position C and prior to its reaching said position, roller 20 will have collapsed a portion of the conduit segment 12b against concave surface 15a a sufficient amount to cut off flow of the adhesive or liquid medium 11 through the conduit. Once the flow is cut off and as roller 20 continues to move upwardly toward position C, a suction effect on the adhesive, trapped in the conduit between the roller 20 and the discharge end 12a is created which in turn reverses slightly the direction of flow of the trapped adhesive. The extent of the suction effect produced by the movement of roller 20 along the collapsed conduit segment 12b may be varied depending upon the shape of the header or the consistency of the liquid medium by varying the amount of pivotal movement of arm 17. Such variance can be accomplished, for example, either by a threaded stop carried by arm 17 engaging the upper stop bar 21b or by the threaded stop being carried by the upper stop bar.

The result of such reverse flow is to produce a slight recess 22 at the discharge end 12a of the conduit, see FIG. 5. When the apparatus is in operation the movement of arm 17 is smooth and uninterrupted while moving from position A to C. In actual practice, however, the discharge end 12a of the conduit is connected to a header 13, as indicated in FIG. 6, and thus, in place of the suction effect occurring at the discharge end, it will occur at the discharge surface 23 of the header.

The header 13 may be of conventional or special design depending upon the configuration of the area to which the adhesive is to be applied. In the illustrated embodiment, the header 13 is of a conventional design and comprises a hollow member 24 having a connector fitting or nipple 25 disposed on the upper side thereof. The fitting 25 is sized to receive the discharge end 12a of the conduit. Suitable clamping means, not shown, may be utilized to retain the conduit end and fitting in assembled relation. The discharge surface 23, which forms the lower face of the member 24 is provided with a plurality of perforations which cause the adhesive to be discharged in small streamlets or the like. Because the member 24 accumulates therein continuously a small portion of adhesive, any small fluctuation occurring in the adhesive flow pressure within the conduit 12 is readily dampened within member 24, thus effecting even flow or adhesive past surface 23 except when roller 20 has collapsed conduit segment 12a.

In instances where a hollow header 13, as shown, is replaced by one having a single opening therein, not shown, a restrictor may be placed at the discharge end 12a. The purpose of the restrictor is to prevent any sudden excessive amount of adhesive being accidentally dis-

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charged in the event of a sudden pressure surge in the conduit.

The apparatus 10 as illustrated is representative of one form of accomplishing the novel method of creating a suction effect at the discharge end of the conduit. The conduit segment, as well as the whole conduit, may be formed of a flexible plastic tubing which is inexpensive and is readily available on the commercial market. The shape of the backup surface may also be changed from that shown and the block piece itself, if desired, may be movable relative to the axis of arm 17.

Thus, it will be seen that a simple, inexpensive apparatus has been provided to overcome the common and frustrating problem in high speed, interrupted gluing operations of the adhesive dripping or trailing after shut-off and thereby cause numerous rejects to occur or complicate storing of the glued sheets, blanks, or the like.

I claim:

1. An apparatus for controlling the application of a liquid adhesive onto a predetermined surface area moving in a given direction past said apparatus, said apparatus comprising a conduit through which the adhesive under a predetermined pressure is caused to flow in one direction, said conduit having intermediate the ends thereof a resilient section which is collapsible upon a predetermined external force being exerted thereon; a stationary backup surface of concave configuration in contact with said conduit section, said conduit section being flexed so as to conform substantially to the shape of said concave surface; a header connected to the discharge end of said conduit and positionable adjacent the moving surface area; pivotally mounted means having a pivot arm of fixed dimension which is pivotal about a fixed axis spaced from said backup surface and said conduit section and offset with respect to the center of curvature of said concave surface, said pivot arm, when pivoting in one direction, having an end thereof moving in a direction substantially opposed to the normal flow of the adhesive through said conduit section and into rolling engagement with said conduit section whereby said arm end moves progressively closer to said backup surface gradually collapsing the conduit section against said backup surface and interrupting adhesive flow therethrough, upon collapsing of the conduit section as said arm pivots in said one direction a suction effect is caused on the adhesive entrapped between the collapsed conduit section and said header; and a pair of arcuately spaced stops between which said pivot arm is movable.

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R. GERARD, Assistant Examiner

U.S. Cl. X.R.

141—116; 222—571; 239—568

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,511,468 Dated May 12, 1970

Inventor(s) Gordon F. Young

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

- Column 1, line 33 - "area" should be --areas--
- Column 1, line 64 - "drawings" should be --drawing--
- Column 2, line 26 - after "3" insert --but--
- Column 2, line 42 - "ends" should be --end--
- Column 3, line 6 - "collopsed" should be --collapsed--
- Column 3, line 58 - "or" should be --of--

SIGNED AND
SEALED
SEP 15 1970

(SEAL)

Attest:

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