

Nov. 22, 1966

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3,286,689

ADHESIVE APPLICATOR

Filed Oct. 14, 1963

2 Sheets-Sheet 1

Fig. 1

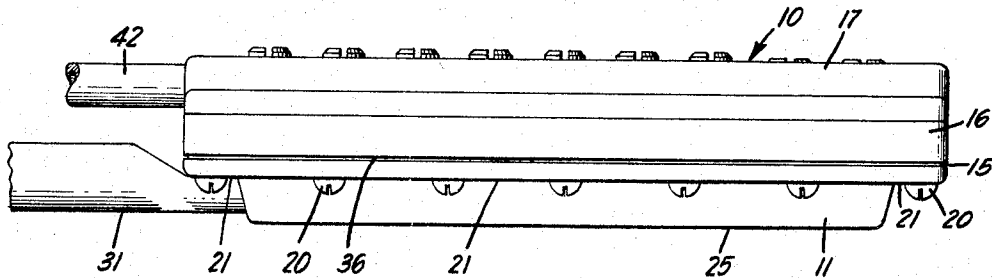


Fig. 2

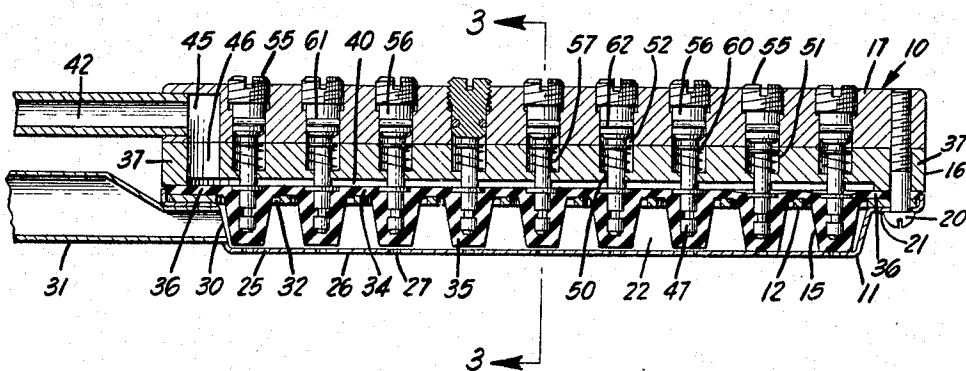
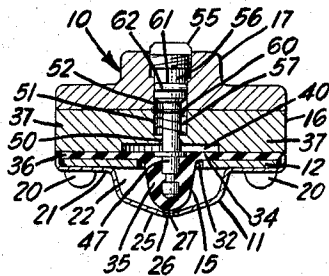


Fig. 3



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FIG. 4.

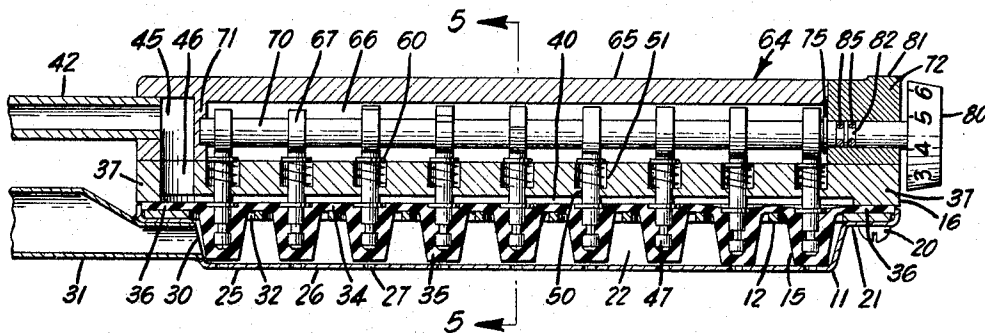
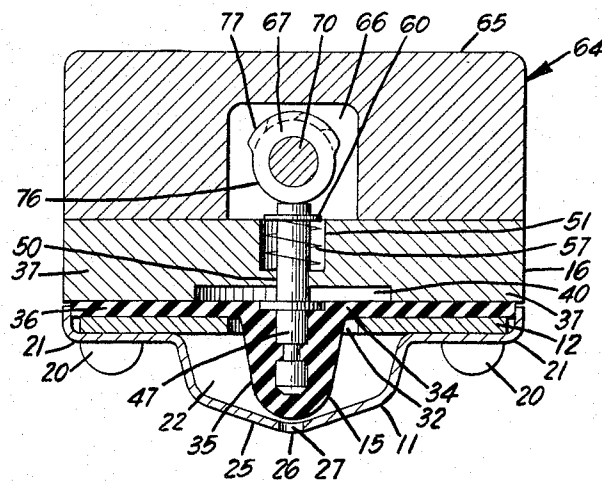


FIG. 9.



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ADHESIVE APPLICATOR

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9 Claims. (Cl. 118-411)

The instant invention relates to devices or applicators for applying adhesive, such as glue, to surfaces and is particularly adapted for incorporation in gluing systems employed in case sealing machines, such systems being of the type, for example, shown in the co-pending application of Craig et al., Serial No. 246,590, filed December 21, 1962, now Patent No. 3,190,259, issued June 22, 1965. It will be appreciated, however, that the device of the invention may be employed in other systems and for other uses.

Adhesive applicators of the type with which the present invention is concerned, and which are generally termed glue heads and will be so referred to hereinafter, include valved orifices through which the adhesive flows directly onto the carton flaps or other surfaces to which they are applied. The glue heads of said Patent No. 3,190,259 are of this type and comprise a forward wall having a line of orifices through which the adhesive, supplied under pressure to the glue head, exudes. Inasmuch as the flow of adhesive must be discontinued from time to time, as for example during the interval between the application of adhesive to the flaps of one carton and the positioning of the flaps of a second carton to receive adhesive, means are provided to close the several orifices and shut off the flow of adhesive therethrough when desired. In the devices of said Patent No. 3,190,259 the forward wall of the glue head forms the bottom of a reservoir like casing which, with a flexible diaphragm member, forms a pocket for receiving the adhesive. The diaphragm has a central body portion divided by transverse grooves into projecting portions equal in number to the number of orifices and positioned to overlie each orifice. In the unflexed or relaxed condition of the diaphragm the projecting members are spaced from the orifices whereby the adhesive may flow through the orifices and out to the case flap. To close the orifices against the further flow of the adhesive the diaphragm is flexed forwardly to bring the projecting portions simultaneously into contact with the forward wall of the glue head surrounding the orifices, such flexing being obtained by the application of fluid under pressure, such as compressed air to a chamber behind the diaphragm and for which the diaphragm forms a forward wall.

While the prior devices serve adequately to cut off the flow of adhesive from the entire line of orifices when desired, they have the disadvantage that they provide no way to close off selected individual orifices as is desired to accommodate flaps of narrower width than the full length of the line of orifices or for other purposes. Moreover, while the prior devices particularly that of Patent No. 3,190,259 discloses means for adjusting the maximum rearward movement of the diaphragm and hence of the spacing of the projections from the orifices, there is no provision for adjustment of such spacing of individual projecting portions. As will be understood due to rough handling or minor imperfections in manufacturing, the projecting portions may be or become spaced different distances from their respective orifices whereby, in the absence of means for such individual adjustment, the flow of adhesive through the orifices is unequal.

The principal object of the instant invention is the provision of an improved glue head for use in gluing systems of the type referred to, for example for use in the system of Patent No. 3,190,259, which incorporates the

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basic features of the above described glue heads in that a flexible fluid pressure diaphragm having projecting portions is employed to close off the orifices, but which includes means for individually adjusting the spacing of the projecting portions from the orifices which they overlie and for sealing individual orifices entirely when desired.

Another object of the invention is the provision of a glue head having orifice closing projecting portions of the diaphragm adapted for conjoint movement toward and away from their orifices but additionally having means whereby each projecting portion may be adjusted between zero spacing from its orifice and the maximum obtained by retraction of the diaphragm.

A further object of the invention is the provision of individual control means for adjustment of the projecting portions. A still further object of the invention in modified form thereof is the provision of a single control means for progressively adjusting the projecting portions to orifice closing position from the outer orifice toward the innermost orifice the number of orifices closed by the projecting portions depending upon the extent of operation of the control means.

Briefly described my invention resides in a glue head generally of the type of said Patent No. 3,190,259, but in which the diaphragm comprises a relatively thin base or membrane supporting the projecting portions whereby the projecting portions may be individually moved toward their orifices without affecting the adjacent projecting portions. In order to adjust the positions of the individual projecting members each is provided with a rearwardly extending stem forming a portion of an adjustment means and adapted to be moved forwardly or rearwardly by a control means. In one form of the invention such control means may be in the form of a set screw or the like individually rotatable to advance the stem or permit its retraction. In another form of the invention the control means is in the form of a camshaft having a cam thereon individual to each of the stems, the cams being so contoured and positioned that upon rotation of the camshaft the stems and hence the projecting portions will be successively moved forwardly to seal their respective orifices.

The invention will be more fully understood and further objects and advantages thereof will become apparent when reference is made to the more detailed description to follow and to the accompanying drawings in which:

FIG. 1 is a side elevational view of a glue head in accordance with the instant invention;

FIG. 2 is a cross-sectional view taken longitudinally and substantially through the center of the device of FIG. 1;

FIG. 3 is a cross-sectional view taken on the line 3-3 of FIG. 2 and looking in the direction indicated by the arrows;

FIG. 4 is a view similar to FIG. 2 but showing a modified version; and

FIG. 5 is a cross-sectional view taken on the line 5-5 of FIG. 4 and looking in the direction of the arrow but on a larger scale relative to FIG. 4.

The glue head of the instant invention is adaptable for incorporation in any suitable gluing system but finds a particular field of use in the systems of said Patent No. 3,190,259, where it may be employed in substitution for the glue heads disclosed therein and be similarly mounted for operation. Inasmuch as the mounting means and the supply and control of both the adhesive and the compressed air to the glue head forms no part of the present invention the following description will be limited to the glue head per se.

Referring now to the drawings and more particularly to FIGS. 1, 2 and 3, the glue head 10 comprises a face

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plate 11, a support plate 12 for a diaphragm 15, a guide or base plate 16 and a cover plate 17 all having substantially the same length and width and held in assembled relationship by screws 20. The face plate 11 has a continuous flange or marginal portion 21 surrounding a depressed center portion forming a troughlike portion 22 whose bottom wall 25 is sloped from each side toward an apex 26 lying along the longitudinal center of the glue head as can best be seen in FIG. 3. Suitably spaced at intervals along the apex 25 are openings or orifices 27 through which adhesive, such as glue, may be exuded and applied upon any desired surface. Where the glue head is to be employed in a case sealing machine its length will be at least equal to the widest area to which adhesive is to be applied, e.g., the widest case flap which the machine can accommodate.

Flange 21 of the face plate 11, the edges of the support plate 12 and of diaphragm 15 are held in close engagement by the screws 20 to define a fluid tight adhesive receiving pocket between the troughlike portion 22 and the plate 12 and diaphragm 15. Liquid adhesive under pressure is supplied to the pocket from some suitable supply (not shown) by means of a supply line 31 and an opening 30 formed at one end of the portion 22 into which the end of the supply line is fixed. Support plate 12 is provided with a line of enlarged openings or apertures 32 each overlying one of the orifices 27. Diaphragm 15 is composed of any suitable flexible and distortable material such as rubber and comprises a relatively thin flexible body portion 34 with integral orifice closing projecting portions 35 depending therefrom and penetrating the apertures 30 in spaced relationship to the walls thereof. The projecting portions, one for each orifice 27, terminate short of the orifices to permit the adhesive to exude therethrough when the diaphragm is in its relaxed condition and their forward ends are suitably shaped to fit against the bottom wall 25 when the projections are moved into contact therewith.

The flange 36 of the diaphragm is confined between the support plate 12 and marginal edges 37 of the base plate 16 by the screws 20, hereinbefore mentioned, to form an airtight seal. The base plate 16 is provided with a longitudinally extending recess 40 of a width greater than that of apertures 32 defining a chamber to which fluid pressure, such as compressed air, is supplied from any suitable source (not shown) through a conduit 42 secured in an airtight manner in a port 45 of the cover plate 17. An opening 46 in the base plate 16 connects port 45 to the recess 40 whereby the fluid pressure can be applied in the chamber behind the diaphragm to flex it and cause the projecting portions 35 to seal the orifices 27.

Heretofore the width of the area over which the adhesive was applied was determined by the effective length of the glue head. To vary the width, for example in adapting a case sealing machine to accommodate cases having narrower flaps it was necessary to change all the glue heads. The instant invention provides a solution to this problem through the provision of means whereby each of the projecting portions 35 of the diaphragm 15 may be individually operable to maintain its respective orifice 27 closed during the adhesive applying operation, the remaining open orifices defining the width of the adhesive area.

In more detail, each projecting portion 35 has an upstanding pin 47, molded or otherwise fixedly secured therein, the pin projecting through recess 40, a guide hole 50 and an enlarged cylindrical recess 51 in the base plate 16, into a cylindrical opening 52 in the cover plate 17. A set screw 55 is threadably mounted in an enlarged recess of the cover plate and has a reduced end portion 56 bearing against the top of the pin 47. A coil spring 57 surrounds pin 47 and has one end bearing against the bottom of recess 51 and the other end bearing against a collar 60 formed on pin 47. In order to

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maintain the airtightness of the chamber defined by recess 40 without leakage of pressure through the cover plate 17 because of the structure for pin 47, a reduced end portion 56 of the set screw 55 is provided with a groove 61 receiving a gasket or O-ring 62 made of rubber or some other suitable sealing material.

As will be understood by turning the set screws 55 to move them forwardly into their recesses the projections are advanced toward their orifices to adjust their spacing therefrom or to completely seal those orifices through which no flow of adhesive is desired. When the set screws are turned in the opposite direction the projections are retracted under the influence of the glue pressure and of springs 57 if the latter are employed. Thus the construction described permits the spacing of the projections from their orifices to be readily adjusted and permits any number of the orifices to be sealed off as when the glue head is employed in the application of adhesive to case flaps which are narrower than or otherwise do not require the full line of orifices.

FIGS. 4 and 5 show a modified version of the glue head, the general structure of which is the same as that previously described the difference residing in the means for controlling the adjusted positions of the pins 47. In the modified version, where identical parts are given the same reference characters as in the previously described embodiment, a glue head 64 is provided with a cover plate 65 having a longitudinally extending recess 66 housing a series of cams 67, each overlying one of the pins 47, and fixed on a shaft 70 journaled in a wall 71 at one end of the cover plate. The opposite end of the shaft 70 is journaled in a cap member 72 fixed to the cover plate 65 in any suitable manner. A flange 75 is formed on the shaft to provide a shoulder bearing against the cap member 72 whereby endwise movement of the shaft is prevented and each cam 67 is maintained in line with its respective pin 47. Each cam 67 has a low portion 76 and a high portion 77 for the purpose of moving its pin 47 from an adhesive releasing position to an adhesive restricting position respectively. As can best be seen in FIG. 5, the cams constitute a series whereby the high portion 77 becomes progressively larger on each cam (from the right to the left of FIG. 4) and conversely the low portion becomes progressively smaller. A dial 80, fixed on the shaft 70 outside the cap member 72, is adapted to be turned to rotate shaft 70 between a position where all of the low points and a position where all of the high points are opposite their respective pins 47 whereby any number of the orifices may be progressively opened or sealed off. The dial is suitably calibrated to indicate the number of open orifices when any of the calibrations thereon is aligned with an indicator 81 on the cap member. In order to insure against loss of fluid pressure from behind diaphragm 15 grooves 82 are formed in that portion of shaft 70 journaled in cap member 72, the grooves receiving gaskets or O-rings 85 made of rubber or some other suitable pressure sealing material.

In summary the glue head serves as a means for applying liquid adhesive such as glue to any surface such as flaps of cases traveling through a case sealing machine. The adhesive, under pressure, is conducted to the glue head through inlet 31 and opening 30, into the chamber 22 and caused, when the diaphragm is in a relaxed condition, to exude through any open orifices 27. When it is necessary to suspend the application of glue the previously open orifices are sealed by the application of fluid pressure, such as compressed air, to the recess 40 of plate 16 to apply pressure on and flex the diaphragm 15 to cause the projecting portions 35 to contact the forward wall of face plate 25 around the orifices 27. Upon release of the fluid pressure the diaphragm and hence the projecting portions, except those held in orifice sealing positions by forwardly advanced pins 47 and their advancing mechanism, retract to again open the orifices. In the embodiment of FIGS. 1 and 2 the number of open

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orifices may be varied to suit the flap width of the different size cases being sealed in the same machine by manually adjusting the set screws, by a screw driver or similar suitable instrument. In the embodiment of FIGS. 3 and 4 the number of open orifices may be controlled by simply rotating dial 80. The embodiment of FIGS. 1 and 2 has the further advantage that the spacing of individual projections from their orifices may be varied to secure a controlled or metered flow of the adhesive there-through when the orifices are opened. In both embodiments all of the orifices may be sealed by the projections under the pressure applied to their pins 47 when for example the machine is shut down and it is desirable to relieve the fluid pressure in line 42.

Having thus described my invention in rather complete detail it will be understood that these details need not be strictly adhered to and that various changes and modifications may be made all falling within the scope of the invention as defined by the following claims.

What is claimed is:

1. In a device for applying adhesive to surfaces said device including an elongated adhesive receiving chamber comprising a forward wall to overlie said surfaces, a series of orifices in said forward wall, a flexible diaphragm defining in part a rear wall of said chamber and having projecting portions in overlying relationship to said orifices but spaced therefrom in a relaxed condition of said diaphragm, means to supply fluid under pressure behind said diaphragm to flex said diaphragm and move said projecting portions into orifice closing positions against said forward wall, and means independent of said fluid pressure means to move selected ones of said projecting portions into said orifice closing positions, said last named means comprising cams located rearwardly of said diaphragm and individual to each of said projecting portions.

2. In a device for applying adhesive to surfaces said device including an elongated adhesive receiving chamber comprising a forward wall to overlie said surfaces, a series of orifices in said forward wall, a flexible diaphragm defining in part a rear wall of said chamber and having projecting portions in overlying relationship to said orifices but spaced therefrom in a relaxed condition of said diaphragm, means to supply fluid under pressure behind said diaphragm to flex said diaphragm and move said projecting portions into orifice closing positions against said forward wall, and means independent of said fluid pressure means to move selected ones of said projecting portions into said orifice closing positions, said means independent of said fluid pressure means comprising pins individual to each projecting portion and secured thereto and extending rearwardly therefrom, resilient means urging said pins rearwardly and means engaging

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said pins for adjusting said pins forwardly against the action of said resilient means.

3. A device as defined in claim 2 wherein said means engaging said pins comprises a set screw individual to each pin.

4. A device as claimed in claim 2 wherein said means engaging said pins comprises a cam individual to each pin.

5. A device as claimed in claim 4 wherein there is a camshaft supporting said cams and each cam is contoured to have a low portion permitting retraction of its associated pin and a high portion for advancing said pin and wherein said high portions decrease in length and said low portions progressively increase in length from the cam nearest one end of the shaft to the cam nearest the opposite end.

6. In a device for applying adhesive to surfaces said device including an elongated adhesive receiving chamber comprising a forward wall to overlie said surfaces, a series of orifices in said forward wall, an apertured member defining in part a rear wall of said chamber, a diaphragm having a flexible body portion overlying said member and having projecting portions extending through the apertures thereof in overlying relationship to said orifices but spaced therefrom in one condition of said diaphragm, said diaphragm in part defining the rear wall of said chamber, a base plate behind said diaphragm and openings in said base plate each in alignment with a projecting portion, a pin extending rearwardly from each projecting portion through the aligned opening in said base plate, and means for cooperation with each said pin for causing forward movement thereof and of its associated projecting portion.

7. A device as defined in claim 6 wherein there is spring means urging each projecting pin rearwardly.

8. A device as defined in claim 6 wherein said means for cooperation with each pin comprises an adjusting screw bearing against the rear end of said pin.

9. A device as defined in claim 6 wherein means for cooperation with each pin comprises a camshaft mounted behind said base plate extending longitudinally thereof, a cam carried by said camshaft individual to each of said pins, and means for rotating said camshaft.

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