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[54] **ANTI-DRIP MIXING HEAD FOR VISCOUS
 MATERIAL**
6 Claims, 2 Drawing Figs.

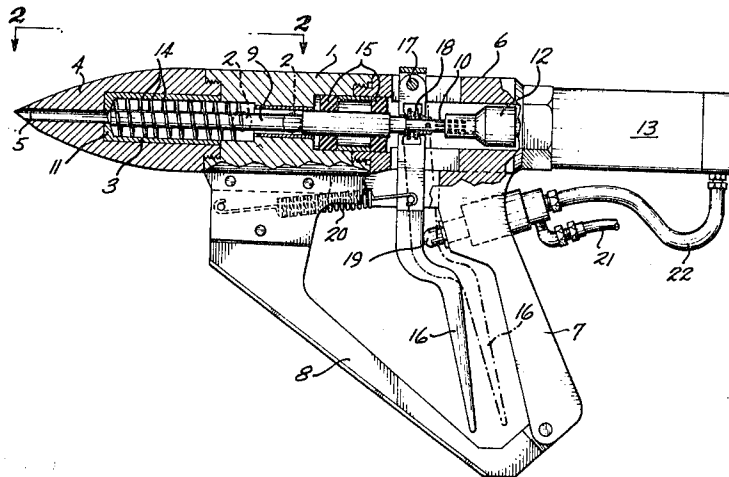
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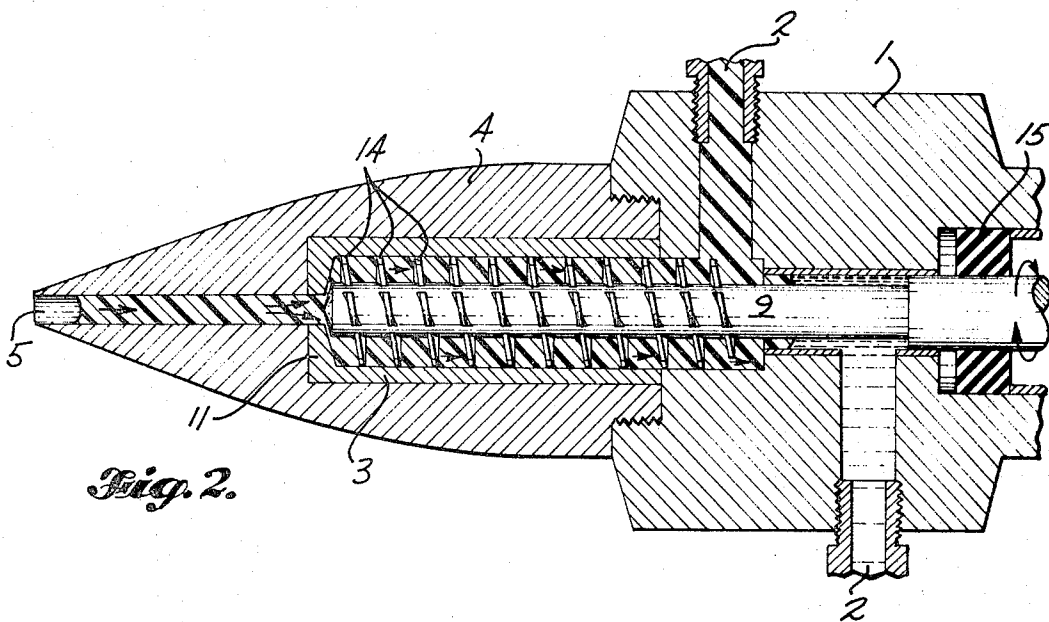
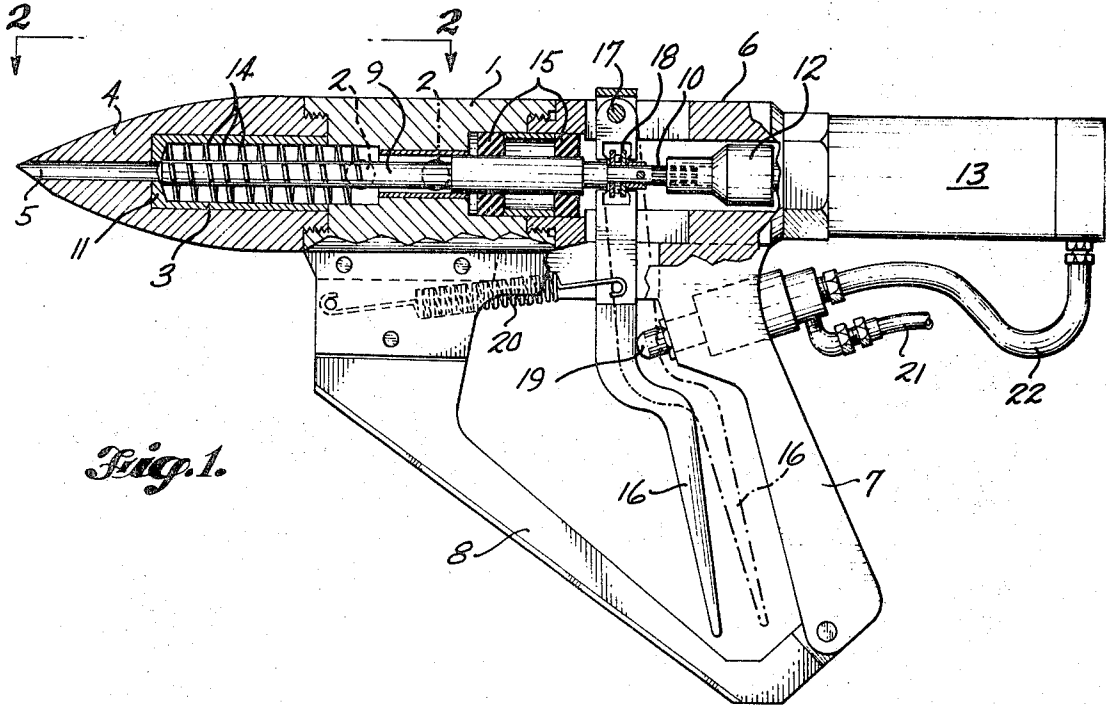
[56] **References Cited**
UNITED STATES PATENTS

1,726,412 8/1929 Rose 239/332
 3,377,139 4/1968 MacGregor et al. 239/142

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ABSTRACT: An antidrip apparatus for delivering a fluid, particularly a viscous fluid such as a synthetic resin, comprising a stationary housing having an annular passageway therethrough into which is placed an elongated rotor valve slidable along its axis. A dispensing nozzle is attached to one end of the housing and communicates with the annular passage. The rotor valve is unique in several respects: (1) It functions as a valve to control exit of the fluid or fluids from the passageway. (2) Vanes or flutes closely fitting the interior of the passageway are mounted on the shaft of the rotor valve and mix the fluids entering the passageway. (3) These same vanes are pitched so as to oppose the flow of fluid through the passageway on rotation of the rotor and tend to cause a reverse flow of fluid in the dispensing nozzle when the supply pressure on the fluid in the passageway is reduced, thereby preventing dripping. Inlet openings are provided in the housing for entry of resin components or other fluids which are supplied under pressure. An air motor or other suitable driving means is connected to the rotor valve.





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ANTI-DRIP MIXING HEAD FOR VISCOUS MATERIAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a dripless apparatus for mixing and dispensing viscous fluids.

2. Prior Art Relating to the Invention

In the metering and mixing of multicomponent systems, it is desirable many times to use the mixing head as the applicator to precisely deliver fluid to its proposed resting place. This is especially true when mixing and dispensing a mixture of a thermosetting resin and its curing agent with or without other additives. Mixing and dispensing devices of this type are known.

It is further desirable that the fluid be delivered only to the desired location on the workpiece, that is, the mixing head applicator should not drip. Fluid dripping from the applicator invariably falls in an undesired location on the workpiece creating production problems and resulting in unacceptable material. It is also wasteful of the fluid being delivered. Previous attempts to devise a dripless mixing head which shuts off fluid flow sharply have been unnecessarily complex. Although dispensing devices which prevent dripping of the material dispensed are known, as evidenced by U.S. Pat. Nos. 2,779,506; 2,978,149; and 3,097,671; no device of the type described herein in combination with a mixing device is known.

SUMMARY OF THE INVENTION

It is one object of this invention to provide an improved apparatus for mixing high and low viscosity materials and dispensing them and providing a means for sharp cutoff of the dispensed material at the exit end of the apparatus preventing any dripping.

The apparatus comprises:

1. a stationary housing having an annular passageway therethrough for a fluid;
2. a dispensing nozzle attached to one end of the housing;
3. inlet means for entry of the fluid into the passageway;
4. an elongated, slidable rotor valve mounted in the passageway movable from a passageway closing position to an open position;
5. means engaging the rotor valve operative to move the valve from the normally closed position to the open position; and
6. means to drive the rotor valve. The rotor valve has mounted thereon vanes or flutes closely fitting the inside of the annular passageway of the mixing chamber pitched so as to oppose the flow of fluid through the passageway on rotation of the rotor. This tends to cause a reverse flow of fluid in the dispensing nozzle when the supply pressure on the fluid or fluids is reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation view partially in section of the apparatus of this invention.

FIG. 2 is a partial sectional view of FIG. 1 taken along the line 2-2 of FIG. 1 showing the action of the rotor valve in preventing drip on the dispensed material.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to FIG. 1, the apparatus of this invention comprises a housing 1 having an annular passageway therethrough. The housing 1 has at least one inlet opening 2 communicating with the annular passageway for entry of the fluid or fluids to be dispensed. For dispensing most adhesives one inlet provides an entry for the resin component and the other inlet an entry for the catalyst or curing agent. Additional inlets can be provided for supplying a gas such as air to the annular passage if a foamed adhesive is desired. Also inlets can be provided for introducing a solvent to clean the passageway

of resin so that it does not harden or cure in the apparatus. To the forward end of the housing 1 is secured a dispensing nozzle 4 having an annular mixing chamber or passageway 3 communicating with the passageway of the housing 1. The forward end of the dispensing nozzle has an exit port 5 through which the mixed materials are dispensed. The exit end of the dispensing nozzle can be beveled as shown in the drawing for easy application of the dispensed material to a workpiece. To the rear end of housing 1 is threaded member 6 which also has an annular passageway communicating with the annular passageway of housing 1. A handle 7 and handle member 8 are secured to housing 1 and member 6.

Within the annular passageway of housing 1, member 6 and dispensing nozzle 4, is located a rotor valve having a shaft 9. The rear of the shaft 10 is splined for engagement with spline coupling 12. Spline coupling 12 is connected with air motor 13 which functions to drive or rotate shaft 9. On the forward or outlet end 11 of shaft 9 is an area which functions as a needle valve in that it seats against the outlet of mixing chamber 3 preventing the passage of fluid components therethrough. Also to the forward end of shaft 9 are attached vanes or flutes 14 which serve two functions. The vanes on rotation of shaft 9 intimately mix the fluid components of the resin mixture together before they are dispensed through exit port 5. In addition, the vanes 14 are pitched so as to oppose the flow of fluid through the passageway on rotation thereof and tend to cause a reverse flow of fluid in the dispensing nozzle when the supply pressure or the fluid in the passageway is reduced. The degree of pitch can be, for example, 0.004 inch, but this can be varied to control the degree of mixing and reverse flow of fluid. Shaft seals 15 isolate the mixing chamber 3 of the gun from air motor 13 and the rear portion of the gun.

A trigger handle 16 is pivoted from member 6 at 17 and engages thrust bearing 18 surrounding shaft 9. Pilot valve 19 is attached to handle 7 in a position such that it can be triggered by movement of trigger handle 16. A spring 20 hooked at one end to the trigger handle 16 and at the other end to handle 8 retains the trigger in an inoperative position when no pressure is being exerted on it. Air inlet hose 21 supplies air to the air motor 13 through hose 22.

The gun of this invention is simple to operate and simple to maintain. The sliding rotor valve 9 serves as a valving means to control exit of the mixed material from the gun, as a means of mixing the resin and catalyst components, and as a means of preventing dripping. No other moving parts are necessary.

In operation, when the trigger handle 16 is depressed rotor valve shaft 9 slides back along the splined drive shaft opening the outlet to the exit port 5 of the gun. At the same time trigger handle 16 depresses pilot valve 19 allowing air to enter the air motor and drive the motor to rotate the rotor valve. This same pilot valve also triggers the fluid feed system which feeds the fluid, usually resin and catalyst components under pressure to the inlet openings 2 located in housing 1. As the fluids enter mixing chamber 3 they are intimately mixed by the vanes on rotor valve shaft 9 and dispensed through exit port 5. Release of trigger handle 16 accomplishes two things: (1) stops the air flow by closing of pilot valve 19, terminating rotor valve spin and fluid flow to the mixing chamber, and (2) closes instantly thereafter the outlet to the exit port 5, by the rotor valve sliding forward. The pitch of the vanes on rotor valve shaft 9 creates a negative pressure sufficient to cause a reverse flow of fluid in the dispensing nozzle which tends to pull fluid within the exit portion of the dispensing nozzle 5 back into mixing chamber 3, preventing dripping.

As previously mentioned this gun is primarily useful for mixing and dispensing multicomponent resin systems such as epoxy resins, urethane resins, phenolic resins, urea resins, etc. If a foamed resin is desired blowing agents can be injected into the resin mixture through a separate inlet into the mixing chamber. It is obvious that extenders, fillers, etc. can be included in the resin composition prior to dispensation from the apparatus.

The gun of this invention is capable of functioning for long periods of time without problem. The maintenance of the gun is economical and its cost is minimal.

I claim:

1. An internal mixing and dispensing apparatus for uniformly mixing and dispensing viscous materials comprising:
 - a. a stationary housing having a mixing chamber therein;
 - b. a dispensing nozzle attached to the forward end of the housing and in communication with the mixing chamber;
 - c. an elongated rotor valve mounted in the mixing chamber movable from a chamber closing position to an open position, the rotor valve having mounted thereon members closely fitting the inside of the passageway and pitched so as to oppose the flow of material through the passageway on rotation of the rotor valve, thereby tending to cause a reverse flow of fluid in the dispensing nozzle, preventing dripping;
 - d. power means having a shaft means extending into the rear end of the mixing chamber coupled to the rotor valve for driving thereof;
 - e. seal means surrounding the shaft means and isolating the mixing chamber from the power means;
 - f. at least one inlet opening in the housing communicating with the mixing chamber;
 - g. means engaging the rotor valve operative to move the valve from a normally closed position to an open position; and
 - h. control means to actuate the power means.
2. Apparatus according to claim 1 wherein one of the inlet openings is connected to an inlet which supplies a plastic resin

to the mixing chamber and another inlet opening is connected to an inlet which supplies a curing agent.

3. Apparatus according to claim 1 wherein the end of the rotor valve adjacent the outlet end of the mixing chamber and dispensing nozzle is shaped so as to seat against the outlet end preventing passage of material.

4. Apparatus according to claim 1 including means for supplying a fluid under positive pressure to the inlet opening.

5. An apparatus providing delivery of a fluid and cutoff of the fluid without dripping which comprises:

- a. a stationary housing having a passageway therethrough for a fluid;
 - b. a dispensing nozzle attached to one end of the housing;
 - c. inlet means for entry of the fluid into the passageway;
 - d. an elongated rotor valve mounted in the passageway movable from a passageway closing position to an open position;
 - e. means engaging the rotor valve operative to move the rotor valve from a normally closed position to an open position; and
 - f. means to drive the rotor valve, the rotor valve having mounted thereon members closely fitting the inside of the passageway and pitched so as to oppose the flow of fluid through the passageway on rotation thereof.
6. Apparatus according to claim 5 wherein the end of the rotor valve adjacent the outlet end of the dispensing nozzle is shaped so as to seat against the outlet end preventing passage of material therethrough.

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