

[54] **MIXING AND DISPENSING DEVICE**

3,010,705 11/1961 Brown.....259/98

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**FOREIGN PATENTS OR APPLICATIONS**

594,106 3/1959 Italy.....259/98

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[57] **ABSTRACT**

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[58] Field of Search.....259/98, 71, DIG. 30; 222/190, 222/564

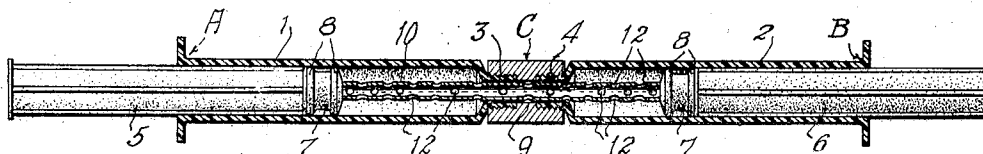
Each of two syringes comprises a barrel having a plunger therein and an outlet nozzle separably connected to the outlet nozzle of the other barrel in axial alignment therewith, and there is a perforated mixing tube slidable through said nozzles with each of its ends in abutting relation to one of said plungers so that fluent substances may be placed in either or both of said barrels, for example, one component of a two part reactive resin system can be placed in each of said barrels, and pumped repeatedly from each barrel into the other barrel through said perforated tube to thoroughly and rapidly mix said substances.

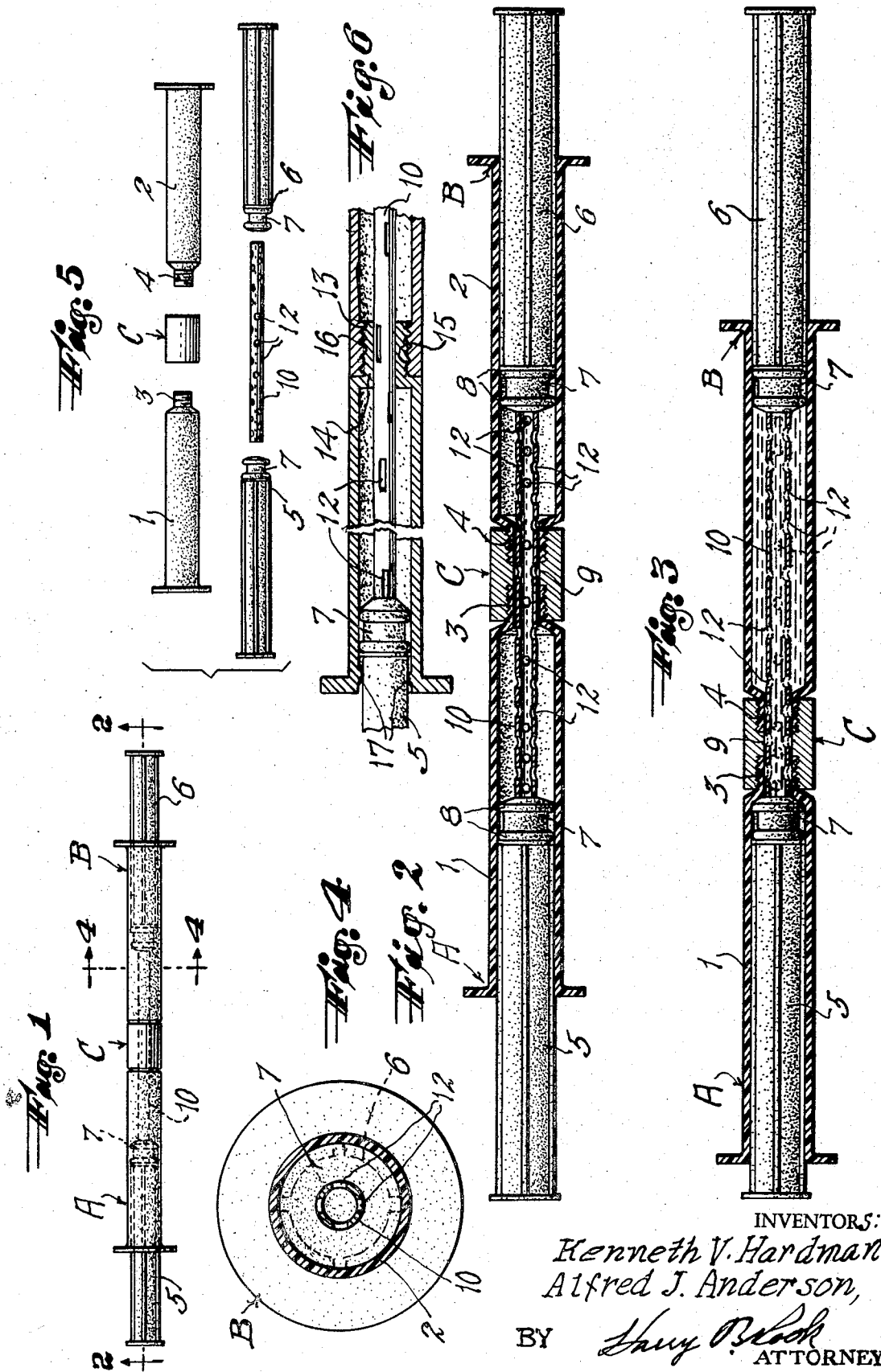
[56] **References Cited**

**UNITED STATES PATENTS**

2,726,656	12/1955	Lockhart.....	259/95 X
2,477,598	8/1949	Hain.....	259/4
3,188,057	6/1965	Trumbull.....	259/98 X
1,771,219	7/1930	Hein.....	128/218 P

**2 Claims, 6 Drawing Figures**





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**MIXING AND DISPENSING DEVICE****BACKGROUND OF THE INVENTION****1. Field of the Invention**

This invention relates to a device for mixing fluent substances and dispensing the mixture.

**2. The Prior Art**

The prior art shows the connection of the outlets of two fluent substance containers, for example, syringe barrels or collapsible tubes, and the pumping or pressing of the fluent substances repeatedly from one container into the other container to mix the substances.

However, these prior art devices leave much to be desired in that either they do not thoroughly mix the substances, especially substances of high viscosity, or the mixing operation is too slow, or the devices are too costly, or excessive care or special skill is required for operation.

Another deficiency of known prior art devices is that they do not mix fast setting materials quickly enough to get them properly mixed and out of the syringes.

**SUMMARY OF THE INVENTION**

A primary object of the present invention is to provide a simple and inexpensive mixing and dispensing device which will overcome the difficulties and disadvantages incident to the construction and use of the prior art devices and which at the same time will provide for rapid and thorough mixing of fluent substances, particularly liquid or semi-liquid materials, in dissimilar quantities and of different viscosities.

The invention also contemplates such a device which will also serve as a package or storage unit for the substances until mixture thereof is required for use.

More particularly, the invention provides two syringes each of which comprises a barrel, a plunger therein and an outlet nozzle separably connected to the outlet nozzle of the other barrel and in axial alinement therewith, and a perforated tube slidable through said connected nozzles and interposed between said plungers as to agitate and mix the substances as they are pumped through said tube repeatedly from one barrel into the other barrel upon reciprocation of said plungers in the respective barrels to thereby produce rapidly a thorough mixture which upon separation of the nozzles can be dispensed from one or the other or both of the barrels.

**A BRIEF DESCRIPTION OF THE DRAWINGS**

For a complete understanding of the invention, reference should be had to the following description in conjunction with the accompanying drawings in which:

FIG. 1 is a side elevation of a mixing and dispensing device embodying the invention;

FIG. 2 is an enlarged central longitudinal sectional view through the syringe barrels and the perforated tube, showing the plungers in side elevation and in positions assumed when there is a fluent substance in each barrel preliminary the mixing operation, the substances being omitted for clearness in illustration;

FIG. 3 is a similar view showing the substances pumped into one barrel during the mixing operation;

FIG. 4 is a greatly enlarged transverse sectional view on the plane of the line 4-4 of FIG. 1;

FIG. 5 is a composite side elevation of the several parts of the device in disassembled relation, and

FIG. 6 is a fragmentary sectional view showing another form of separable connection of the nozzles.

**DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Specifically describing the invention, the reference characters A and B designate two syringes of generally known type which comprise the respective barrels 1 and 2 having the respective outlet nozzles 3 and 4 at their outlet ends and having openings at their other ends through which the respective plungers 5 and 6 are slidably inserted into the barrels. The nozzles have outlet passages of the same diameter and are adapted to be separably connected together with said passages in axial alinement with each other and with the barrels. While the nozzles are shown as exteriorly screw-threaded and as connected together by a coupling sleeve C which has internal screw threads to mate with the threads on the nozzles, other types of connections can be used; for example, as shown in FIG. 6, the nozzles 13 and 14 could be formed with internal and external screw threads 15 and 16 respectively, for direct connection of the nozzles.

The barrels and the plungers may be formed of suitable material, for example, metal or glass but are shown as constructed of polymeric plastic material, and the inner ends of the plungers comprise pistons 7 formed of resilient material and having circumferential rings 8 to provide a sliding press-fit with the interior of the barrels so that upon reciprocation of the plungers fluent substances, particularly liquid or semi-liquid materials can be sucked into and pushed out of the barrels upon reciprocation of the plungers. Suitable stops, such as beads 17, may be provided on the inner sides of the barrel walls for abutment by the pistons to limit the outward movement of the plungers, but to permit the resilient pistons to be forced over the stops into the barrels.

When the barrels are connected together by the coupling sleeve a passage 9 is provided between the barrels through the nozzles and the sleeve, and upon alternate reciprocation of the plungers, fluent substances in the barrels will be pumped repeatedly from one barrel into the other barrel so that said substances become mixed together.

It is desirable that the mixing operation shall be rapid especially, for example, when the substances are the components of fast setting resin systems; and thorough mixing is not only desirable but is absolutely essential in many cases. To be entirely satisfactory, the mixing device must be capable of mixing different fluent substances in dissimilar quantities or proportions and of different viscosities, even substances of a soft pasty nature.

The invention achieves all of these desirable results by the provision of a mixing tube 10 which has a slide fit in the passage 9 through the nozzle with one end in communication with each barrel and adapted to be abutted and pushed by the corresponding plunger upon movement of the plunger in one direction and to simultaneously push the other plunger, or the second-mentioned plunger may be pulled if desired. The tube is constructed so that alternately the substance from one

barrel is forced into the tube and through the tube into the other barrel with a turbulent action which produces a rapid and thorough mixing operation.

Preferably the tube has a plurality of perforations or holes 12 in its wall spaced apart both longitudinally and circumferentially of the tube. The size of the barrels and tube 10 may be varied for different quantities of substances, and the size, shape and spacing of the perforations may be varied, depending upon the size of the barrels, the size of the tube and the nature of the substances to be mixed. For example, substances of high viscosity generally require larger holes than do liquids of low viscosity. The changes in direction of flow of the substances from the barrels into the tube and out of the tube into the barrels provide a turbulent action and the tube provides for distribution of the contents of each syringe throughout the length of the other syringe, so as to ensure a thorough mixing of the substances simply, easily and rapidly.

The syringes may be loaded easily and quickly. For example one substance can be sucked by the plunger into one syringe barrel, and the barrel may be held with the nozzle upright while the tube is inserted, whereupon the coupling sleeve may be screwed on the nozzle. Then if it is desirable to store the substances for subsequent mixing, a separating agent, such as glycerine may be dropped into the tube, after which the other syringe barrel loaded with the other substance may have its nozzle slipped over the tube and screwed into the coupling sleeve.

After the mixing operation the barrels may be

separated and the substance may be dispensed from whichever barrel contains it.

I claim:

1. A mixing and dispensing device comprising two syringes each including a barrel having a plunger therein and an outlet nozzle separably connected to the outlet nozzle of the other barrel in axial alinement therewith, and a mixing member having a slide fit in said nozzles with one end associated with each plunger and providing for sliding of the mixing member and pumping of fluent substances in said barrels from one barrel into the other barrel simultaneously at a plurality of points along the lengths of the barrels repeatedly upon alternate reciprocation of said plungers, thereby to rapidly and thoroughly mix said substances, said mixing member being a tube having perforations in its wall through which said substances are forced as the substances are pumped from one barrel into the other barrel.

2. A mixing and dispensing device as defined in claim 1 wherein said perforations are spaced apart longitudinally and circumferentially of the tube and the ends of the tube are occluded by the respective plungers during the reciprocation of the plungers so that said fluent substances are forced from one barrel into the perforations in the corresponding portions of the tube and then out of the perforations in the portions of the tube in the other barrel during the reciprocation of the plungers.

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