US 20070187434A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2007/0187434 A1**

Schrafel (43) **Pub. Date: Aug. 16, 2007**

(54) **APPLICATOR SYSTEM**

(75) Inventor: **Tracy L. Schrafel**, West Concord, MN (US)

Correspondence Address:
James A. Wilke
FOLEY & LARDNER LLP
777 E Wisconsin Avenue
Milwaukee, WI 53202-5306 (US)

(73) Assignee: **McNeilus Truck and Manufacturing, Inc.**, Dodge Center, MN

(21) Appl. No.: **11/352,512**

(22) Filed: **Feb. 10, 2006**

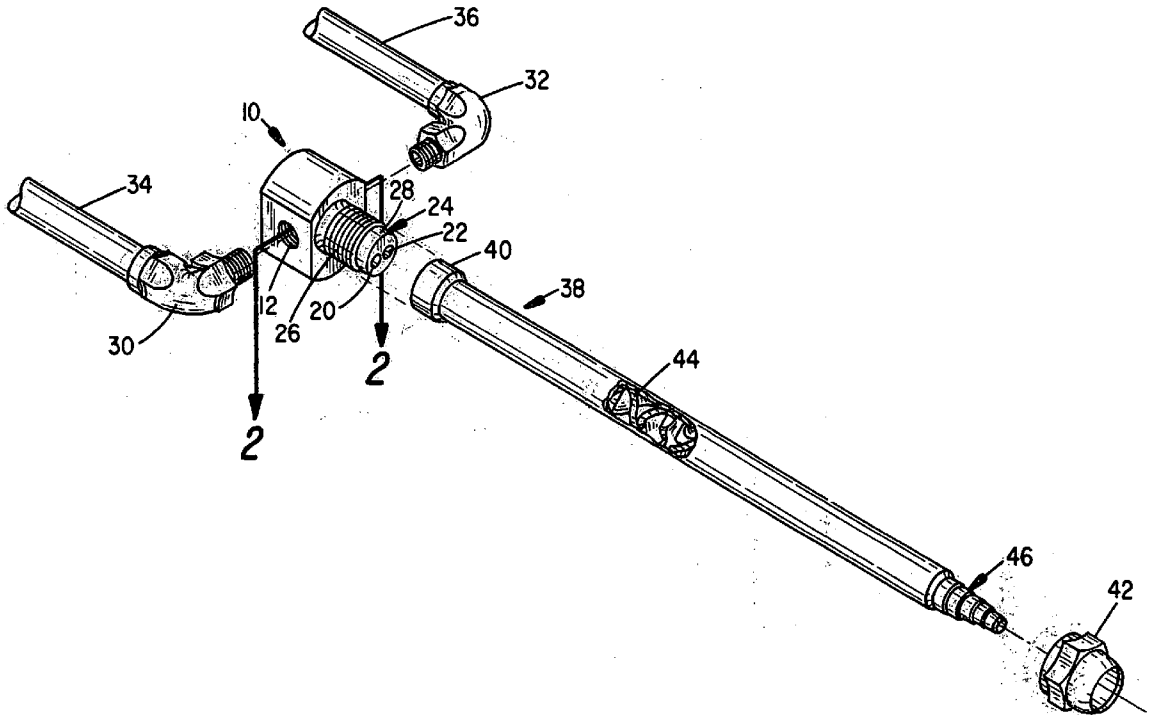
Publication Classification

(51) **Int. Cl.**
B65D 88/64 (2006.01)

(52) **U.S. Cl.** **222/459**; 239/432; 222/129; 222/145.6

(57) **ABSTRACT**

An applicator for combining and applying components of a multi-part curable system includes a proportioning valve having a body with a plurality of separate internal passageways, each communicating with a separate inlet recess and a separate outlet opening maintaining each component in separate condition in the valve. Each inlet recess is adapted to be connected to a source of one component of a multi-part curable system and the discharge openings discharge the two components separately from a common nose into an attached static mixing applicator nozzle.



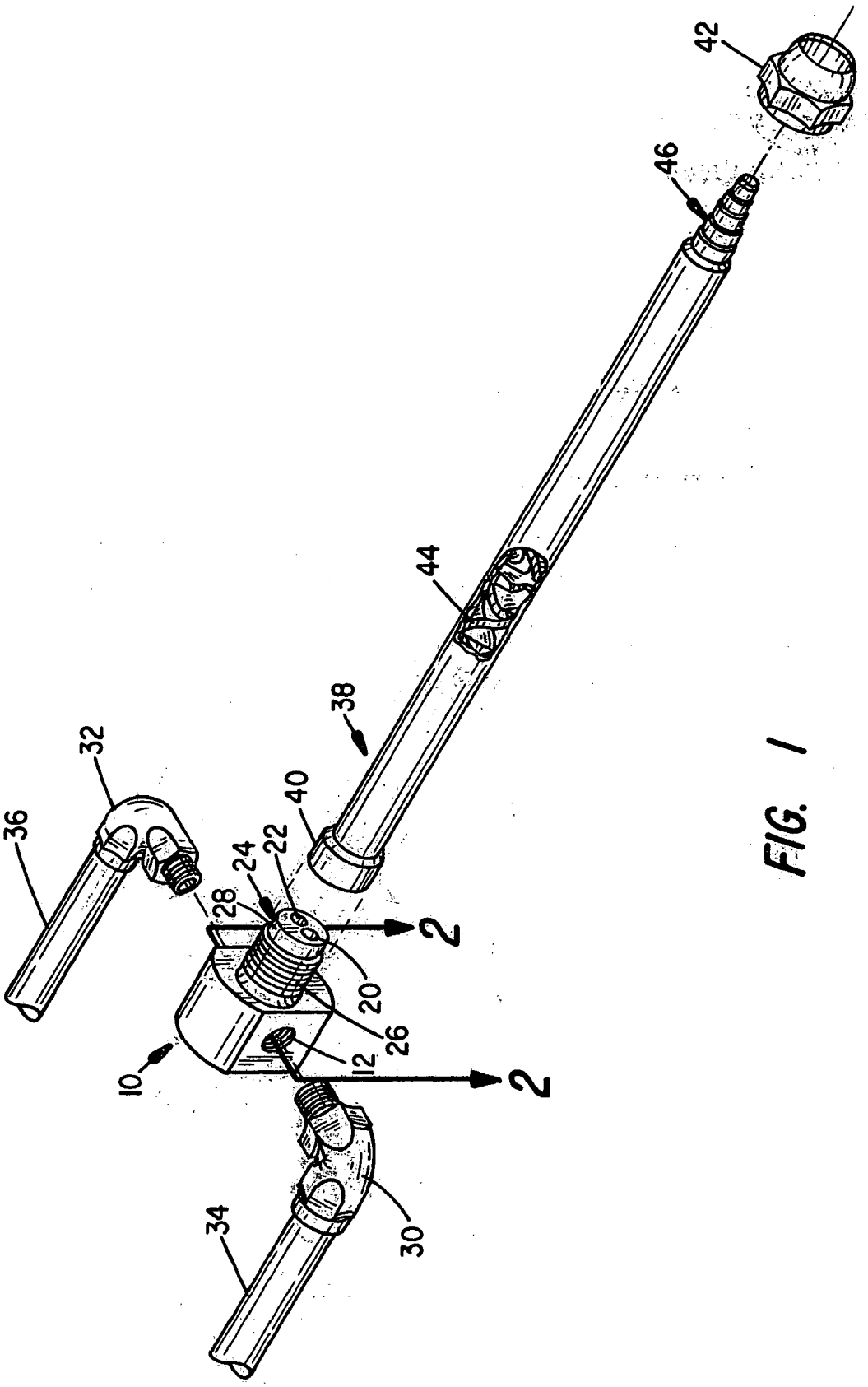


FIG. 1

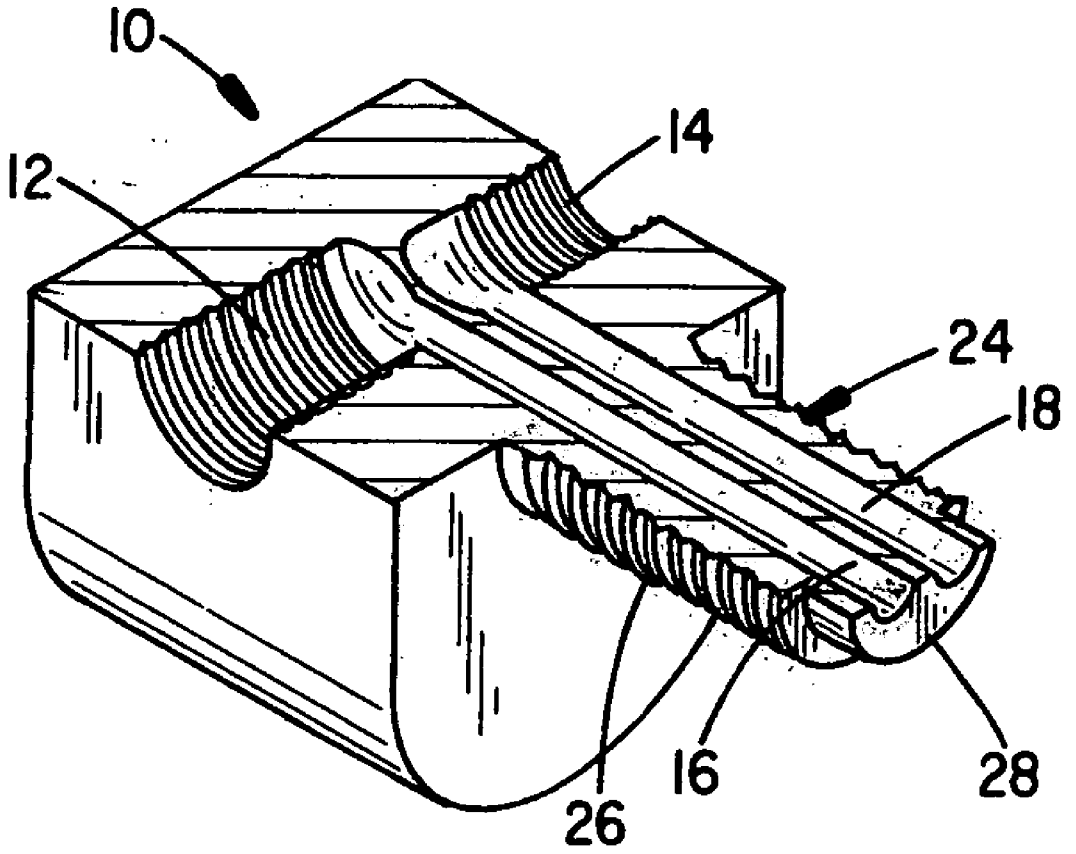


FIG. 2

APPLICATOR SYSTEM

BACKGROUND OF THE INVENTION

[0001] I. Field of the Invention

[0002] The present invention relates generally to an applicator system which combines a proportioning cartridge or valve with a static mixer nozzle to produce a dispensing applicator for the mixture which generally consists of a combination of viscous liquids which cure upon mixing such as found in epoxy or polyurethane materials. More particularly, the invention relates to such a system in which the components of the two-part mixture are maintained in a separate condition in a proportioning valve prior to mixing thereof in a disposable static mixing nozzle. The disposable mixing nozzle is attached as part of an applicator system.

[0003] II. Related Art

[0004] It is known to provide mixing nozzles for use with dispenser systems to mix components and dispense two-part reactive adhesive or coating materials using a proportioning valve system in conjunction with a static mixing nozzle which also may serve as a dispensing nozzle. In prior systems, a combination of both components is fed into a static mixing nozzle by the proportioning cartridge or valve which combines the components in the valve. Thereafter, the material is more thoroughly mixed as it progresses through the static mixing nozzle and applied as desired from the nozzle.

[0005] The components are generally viscous fluids which begin to react upon contact with each other and set up permanently a short time after contact or mixing. One serious drawback to such prior systems is that during and after use both the static mixing nozzle and the proportioning cartridge or valve contain residual amounts of combinations of the two-part reactants so that, depending on available open time, they must be immediately cleaned or they will become permanently clogged with reacted, hardened material. The proportioning devices themselves are typically machined from metal blanks and are relatively expensive to replace and difficult to clean, but they must be thoroughly cleaned immediately after use to be used again.

[0006] Thus, there remains a definite need to provide a relatively simple, re-usable proportioning cartridge or valve that does not become clogged with hardened or reacted material after use and does not require immediate cleaning after each use.

SUMMARY OF THE INVENTION

[0007] By means of the present invention, there is provided an applicator system which includes a proportioning cartridge or valve for separately receiving components of a multi-part reactive mixture and transmitting them in desired proportions in a separate condition into an attached static mixing nozzle. The mixing nozzle includes an internal structure that produces component intermixing as the material progresses along in the nozzle. That structure generally includes a baffle arrangement that causes side-to-side deflection and produces a thorough mixing of the components as they are forced along the length of the nozzle. The proportioning cartridge or valve includes a body having separate inlet openings and recesses designed to connect to separate sources of the components to be combined and applied. The inlet recesses also connect with separate, generally parallel, internal passages which lead to separate, spaced, side-by-side discharge outlets which are received in (and discharge into) the receiving end of the connected static mixing nozzle. The mixed material may be applied from the discharge end of the static mixing nozzle as a continuous bead or another desired form.

[0008] The illustrated embodiment includes a proportioning cartridge or valve that is machined from a metal blank which may be made from steel or brass, for example, but should be a material that does not react with or affect any component. The inlet openings and recesses and/or internal passages and outlet openings may be the same or of different sizes to accommodate various input lines from separate sources and having different flow rates, if desired, of component materials. The relative amounts of the components to be mixed can be controlled by line size and/or line pressure so that any desired ratio of components may be fed into the static mixing nozzle. Suitable flow control and metering devices are provided for the component sources in a well known manner.

[0009] In an illustrative embodiment, the proportioning valve is attached to the plurality of supply lines using threaded fittings which attach flexible supply lines connected to sources of supply of each component to the valves. Oppositely disposed inlet openings lead into recesses which lead to separate parallel internal passages that terminate in separate side-by-side output openings contained in a common reduced diameter nose section. The nose section is provided with external threads and a stepped-down design to be received in a corresponding input end of a static mixing nozzle. The static mixing nozzle is provided with a step-down shoulder at its receiving end and is retained against the nose of the mixing valve by a threaded nut which slips over the nozzle, and abuts the shoulder.

[0010] The static mixing nozzle is preferably of an inexpensive construction made of a polymeric material such that after each use the static mixing nozzle part of the system may be simply discarded rather than subjected to a cleaning process. The material of each component contained in the portioning cartridge or valve remains in a separated condition and so no reaction or setting up takes place. Thus, use of the valve itself may be stopped and started as necessary and the inexpensive mixing nozzle replaced as needed or the unreacted components cleaned out of the proportioning valve as desired between uses. Cleaning, of course, is necessary when switching components.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] In the drawings wherein like reference numerals designate like parts throughout the same:

[0012] FIG. **1** is an exploded perspective view partially fragmented and with parts broken away to expose internal structure of the mixing nozzle of an applicator for a two-part curable system in accordance with the present invention; and

[0013] FIG. **2** is an enlarged perspective sectional view through the body of the proportioning valve of FIG. **1** at **2-2** for supplying components of a two-part curable system for the applicator of FIG. **1**.

DETAILED DESCRIPTION

[0014] The detailed description found herein is directed to an example embodiment which discloses the principles of

the present invention but is not intended to limit the scope of the inventive concept. Thus, an important aspect of the present invention resides in a proportioning cartridge or valve which can be used to continuously feed separate components for a multi-part curable system. Well known examples include a system for dispensing continuous beads of epoxy resins produced from epichlorohydrin and bisphenol A; and polyurethanes, usually produced by the reaction of a polyfunctional isocyanate combined with a hydroxyl-containing component. The mixing cartridge or valve is combined with and feeds a static mixing applicator nozzle in a manner such that combining of the components and mixing takes place only in the static mixing nozzle and not in the proportioning cartridge or valve. The combination of the mixing valve and a static mixing nozzle provides an applicator for dispensing mixed material as a continuous bead of a desired size.

[0015] In the exploded perspective view of FIG. **1** and the perspective sectional view of FIG. **2**, there is shown at **10** a proportioning valve having opposed, generally aligned, threaded inlet recesses **12** and **14** which connect to separate generally parallel internal component feed passages **16** and **18**, respectively, which, in turn, terminate at spaced outlet openings **20** and **22**. The valve **10** contains a mixer nozzle-connecting or nose portion **24** which is partially threaded at **26** and is provided with a reduced diameter blunt nose end at **28** which includes side-by-side outlet openings **20** and **22**. A pair of street elbows **30** and **32** are provided to connect representative respective input supply lines which are preferable of a flexible construction shown as fragments at **34** and **36** to inlet passages **12** and **14**.

[0016] The proportioning valve of the illustrative embodiment is designed to receive feed or component material from two sources (not shown) and supply them in separated, parallel relation to connected static mixing and dispensing nozzle **38** which includes an enlarged attachment shoulder **40** designed to accommodate nose **28** of proportioning valve **10**. Mixing nozzle **38** is designed to be retained by an externally threaded retaining nut **42** which fits against the shoulder **40** and threads onto section **24** at **26**. Internal mixing baffles shown in the cutaway at **44** mix the components as they are forced along inside the nozzle **38**. The baffles are arranged in the passage in a manner that blocks a direct line of flow through the mixing nozzle and are preferably connected to cause flow to alternating sides of the nozzle **38** to produce thorough mixing. A stepped-down cut-off outlet is shown at **46** which enables the user to select the output bead size to use for the mixed material.

[0017] It should be noted that the relative sizes of the supply lines **34** and **36**, the inlet passages and the internal component feed passages **16** and **18** may be tailored to accommodate any ingredient viscosity and proportion ratio desired in a final mix. In addition, the discharge pressure in the lines **34** and **36** may be modulated in a well-known manner to adjust proportional feed rates to the mixing nozzle. In the illustrative example of the detailed description, the inlet opening and recess **12** is shown larger than the passage **14**, for example. The internal passages and outlets also may be sized to control the output flow of the valve **10**.

[0018] The proportioning valve **10** is preferably machined from steel, brass or other metallic material which does not react with the materials of the curable system. The valve is designed to be reused many times to supply components to various mixes without fear of reaction and hardening taking place within the valve.

[0019] The static mixing nozzle **38** of the combination is preferably an inexpensive plastic part which can be discarded and replaced after each use rather than requiring a user to clean and remove reacted or reacting materials. Such types of static baffled mixing nozzles are known and available commercially from several sources. Any suitable material may be used for the mixing nozzle that does not react or affect the materials being mixed or combined.

[0020] As indicated, an important aspect of the present invention relates to maintaining separation of the components prior to final mixing in the static mixing nozzle **38**. In this manner, as indicated, only unreacted fluid ingredients are present in the valve **10** at any time making the valve **10** easy to clean after use or even allowing it to be stored in the presence of components between uses given the continued use of the same materials. Thus, reacted or combined materials are confined to the inexpensive, "throw-away" component of the system while the machine proportioning valve remains to be used many times.

[0021] The proportioning, mixing and dispensing system of the present invention may be manifested as part of a continuously fed system for applying or layering down a continuous bead of polyurethane epoxy or other plastic material to a structure or delivering other materials as part of a manual or mechanized coating or seaming operation in which the applicator is used in conjunction with a multi-step manufacturing process.

[0022] This invention has been described herein in considerable detail in order to comply with the patent statutes and to provide those skilled in the art with the information needed to apply the novel principles and to construct and use such specialized components as are required. However, it is to be understood that the invention can be carried out by specifically different equipment and devices, and that various modifications, both as to the equipment and operating procedures, can be accomplished without departing from the scope of the invention itself.

What is claimed is:

1. A proportioning valve for supplying components of a multi-part curable system comprising a proportioning valve having a body including a plurality of separate internal passageways, each communicating with a separate inlet recess and a separate outlet opening thereby maintaining each component in separate condition therein, wherein each said inlet opening is adapted to be connected to a source of one component of a multi-part curable system and wherein said discharge openings are adapted to discharge said components separately from spaced openings in a common nose into a common chamber for mixing.

2. A proportioning valve as in claim 1 configured to supply components of a two-part curable system.

3. An applicator for combining and applying components of a multi-part curable system, said applicator comprising:

(a) a proportioning valve having a body including a plurality of separate internal passageways, each communicating with a separate inlet recess and a separate outlet opening thereby maintaining each component in separate condition therein, wherein each said inlet

opening is adapted to be connected to a source of one component of a multi-part curable system and wherein said discharge openings are adapted to discharge said components separately from spaced opening in a common nose into a common chamber for mixing; and

(b) a disposable static mixing applicator nozzle removably attached and adapted to accommodate said nose.

4. A proportioning valve as in claim 3 configured to supply components of a two-part curable system.

5. A proportioning valve as in claim 1 wherein a number of components supplied is 2 and wherein said mixing valve includes oppositely disposed threaded inlet passages designed to accommodate inlet elbow fittings connected to component sources.

6. A proportioning valve as in claim 5 wherein said inlet recesses are of different diameters.

7. The proportioning valve of claim 1, wherein the internal passageways are configured to obtain a predetermined mixing proportion of components of the multi-part curable system.

8. The proportioning valve of claim 1, wherein the input flow of components to the valve body is modulated, wherein the output flow of components from the valve body is controlled.

9. The proportioning valve of claim 1, wherein one of the inlet opening and outlet opening of at least one internal passageway is configured different from one of the inlet opening and outlet opening of another internal passageway.

10. The proportioning valve of claim 1, wherein the common chamber for mixing is removably attached to the valve body and disposable.

11. The applicator of claim 3, wherein the internal passageways are configured to obtain a predetermined mixing proportion of components of the multi-part curable system.

12. The applicator of claim 3, wherein the input flow of components to the valve body is modulated, wherein the output flow of components from the valve body is controlled.

13. A method for dispensing mixed materials as a continuous bead, comprising:

providing a valve body having a plurality of separate internal passageways, with each passageway extending from a separate inlet opening to a separate outlet opening;

coupling each inlet opening to a source of material to be mixed;

coupling a static mixing applicator nozzle to the valve body, wherein the separate outlets openings are in fluid communication with the applicator nozzle; and

mixing all the materials separately discharged from the valve body through the applicator nozzle forming a continuous bead of mixed materials.

14. The method of claim 13, including the step of configuring the relative size of each passageway to obtain a predetermined mixing proportion of materials to be mixed in the applicator nozzle.

15. The method of claim 14, wherein one of the inlet opening and outlet opening of at least one passageway is configured different from one of the inlet opening and outlet opening of another passageway.

16. The method of claim 13, including the step of modulating the input flow of material to the valve body wherein the output flow from the valve body is controlled.

17. The method of claim 13, wherein the applicator nozzle is removably attached to the valve body.

18. The method of claim 17, wherein the applicator nozzle is disposable.

19. The method of claim 13, wherein a number of materials to be mixed is two.

20. The method of claim 13, wherein the valve body includes oppositely disposed threaded inlet passages in communication with the inlet openings and configured to receive inlet elbow fittings coupled to the material sources.

21. A device for dispensing at least first and second materials which form a curable material when combined, the device comprising:

a housing having a first conduit separate from a second conduit, the first and second conduits having respective units being configured for connection to sources of the first and second materials respectively; and

a removable disposable mixing device, the conduits further including outlets, wherein the mixing device is removable coupled to housing so that material from the outlets is flowable into and mixed within the mixing device.

22. The device of claim 21, wherein the mixing device is formed from plastic.

23. For use with the housing of claim 21, a removable, disposable mixing applicator nozzle.

24. The device of claim 21, wherein the inlets are of different diameter.

25. The device of claim 21, wherein the conduits are configured to obtain a predetermined mixing proportion of the first and second materials.

* * * * *