United States Patent [19]

Nicholls

[11] **3,827,602**

[45] **Aug. 6, 1974**

[54] **DUAL TUBULAR DISPENSING DEVICE**

[76] Inventor: **Augustus H. Nicholls,** 1170 Longfellow Dr., Manhattan Beach, Calif. 90266

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[21] Appl. No.: **325,854**

Related U.S. Application Data

[63] Continuation of Ser. No. 84,059, Oct. 26, 1970, abandoned.

[52] **U.S. Cl.** **222/137**

[51] **Int. Cl.** **B67d 5/52**

[58] **Field of Search** .... 222/94, 137, 276, 288, 222/325–327, 305, 438, 526, 527, 440, 146 HE, 741; 206/57; 138/26, 30, 31; 141/140, 147; 128/218 P, 218 PA, 218 C, 234, 218

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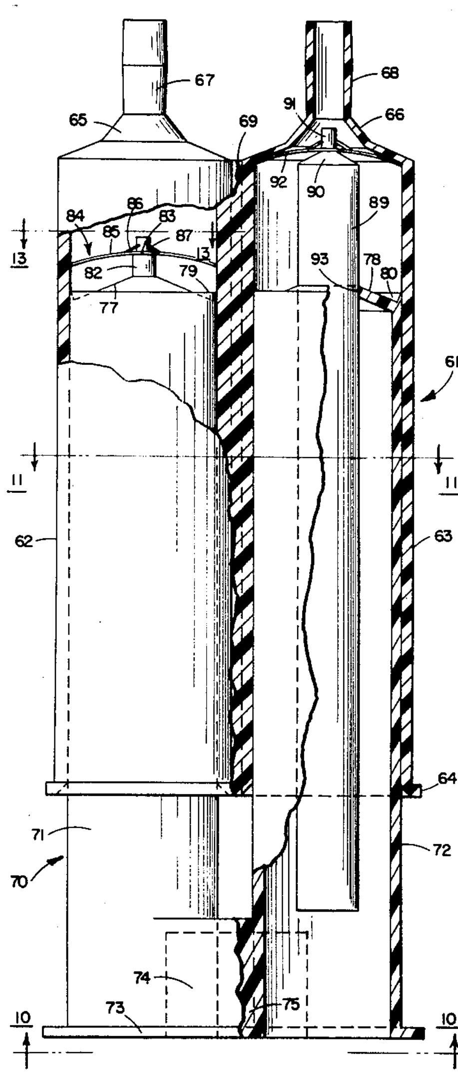
Primary Examiner—Stanley H. Tollberg
Assistant Examiner—Norman L. Stack, Jr.
Attorney, Agent, or Firm—Richard F. Carr

[57] **ABSTRACT**

A dispensing device including a duality of barrels attached together, each receiving a piston, the pistons being attached together exteriorly of the barrels for simultaneous and equal movement in ejecting material from nozzles at the ends of the barrels, each piston having a sealing means which may be a wedge-shaped forwardly projecting annular lip, the barrels including spaced grooves or ridges in their circumferential walls to interrupt the seals and allow air to bleed out when the barrels are filled. One piston may be provided with a stop to prevent reverse movement. An insert may be included in one of the barrels to fit through an opening in the piston and reduce the volume in the barrel to change the ratio of materials dispensed from the two barrels.

5 Claims, 19 Drawing Figures



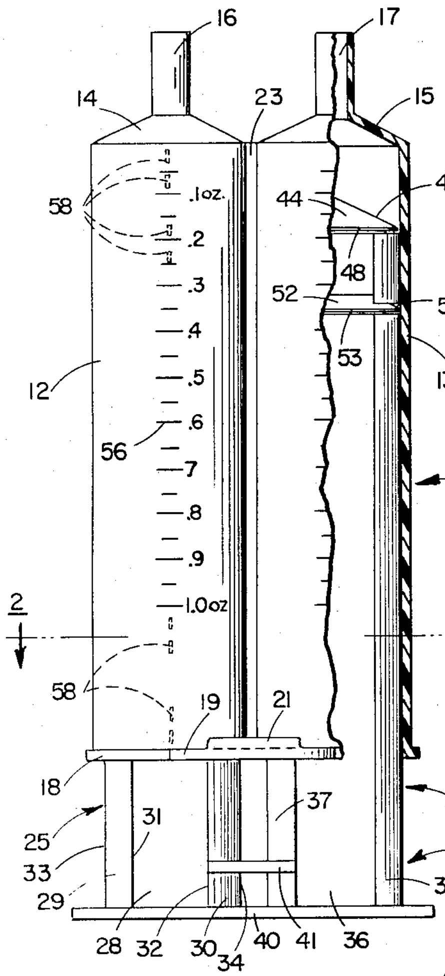


FIG. 1

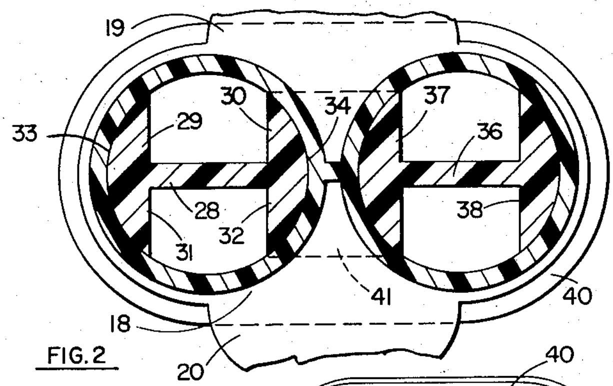


FIG. 2

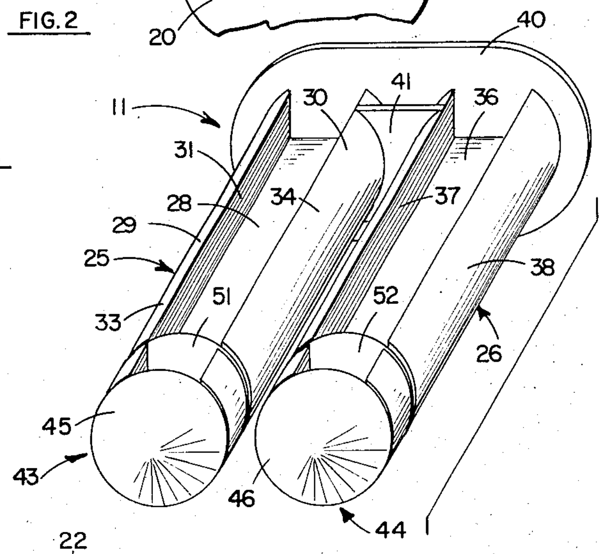
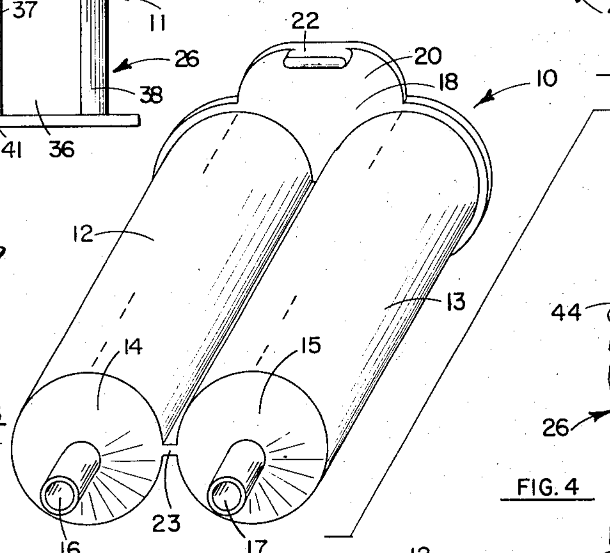


FIG. 3



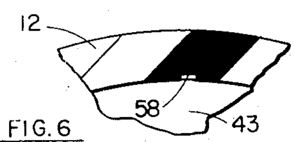


FIG. 6

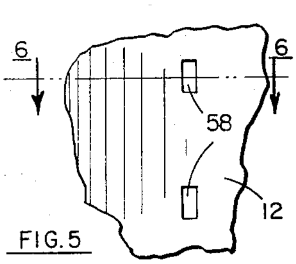


FIG. 5

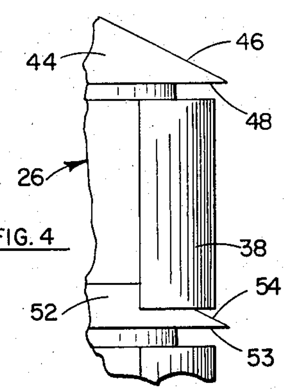
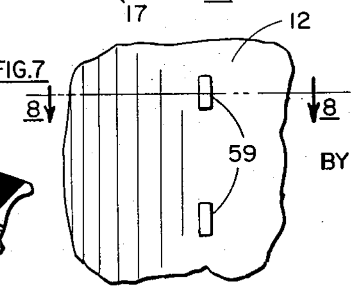


FIG. 4

FIG. 7



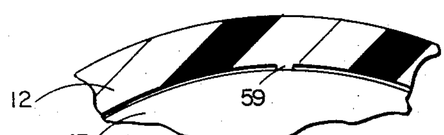


FIG. 8

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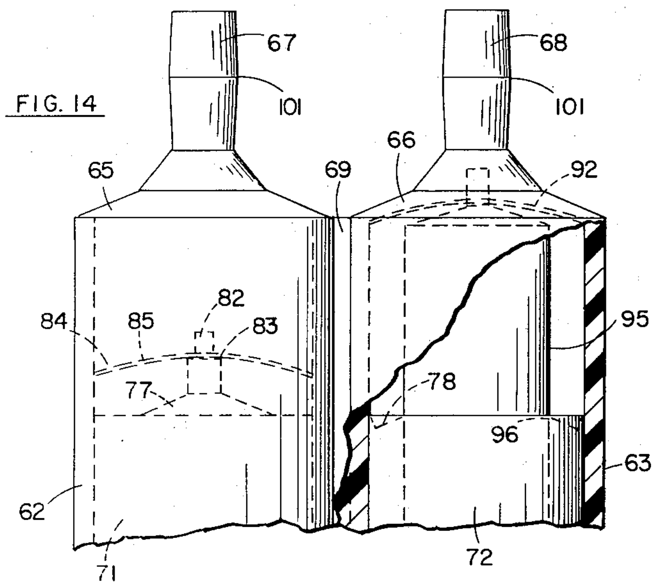
FIG. 14



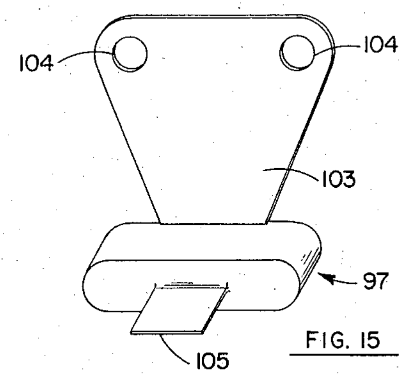


FIG. 15

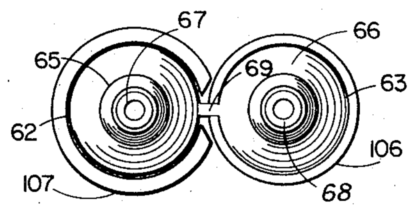


FIG. 18

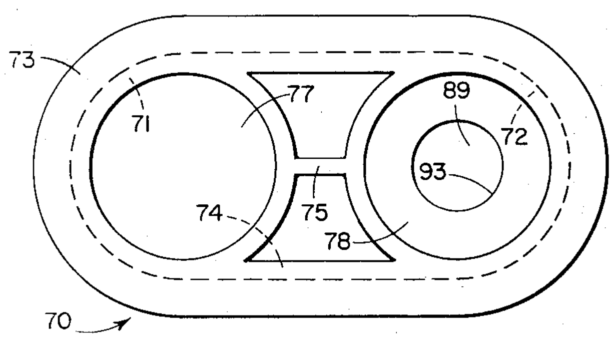


FIG. 10

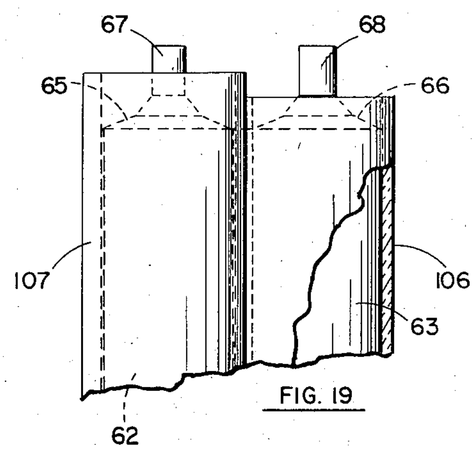


FIG. 19

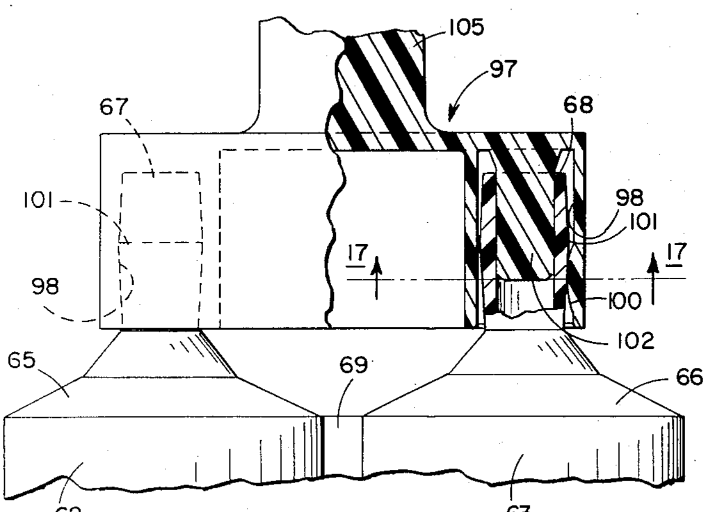


FIG. 16

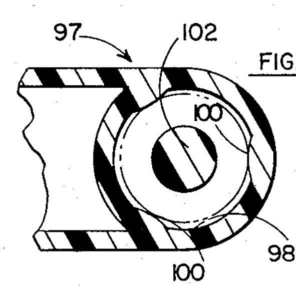


FIG. 17

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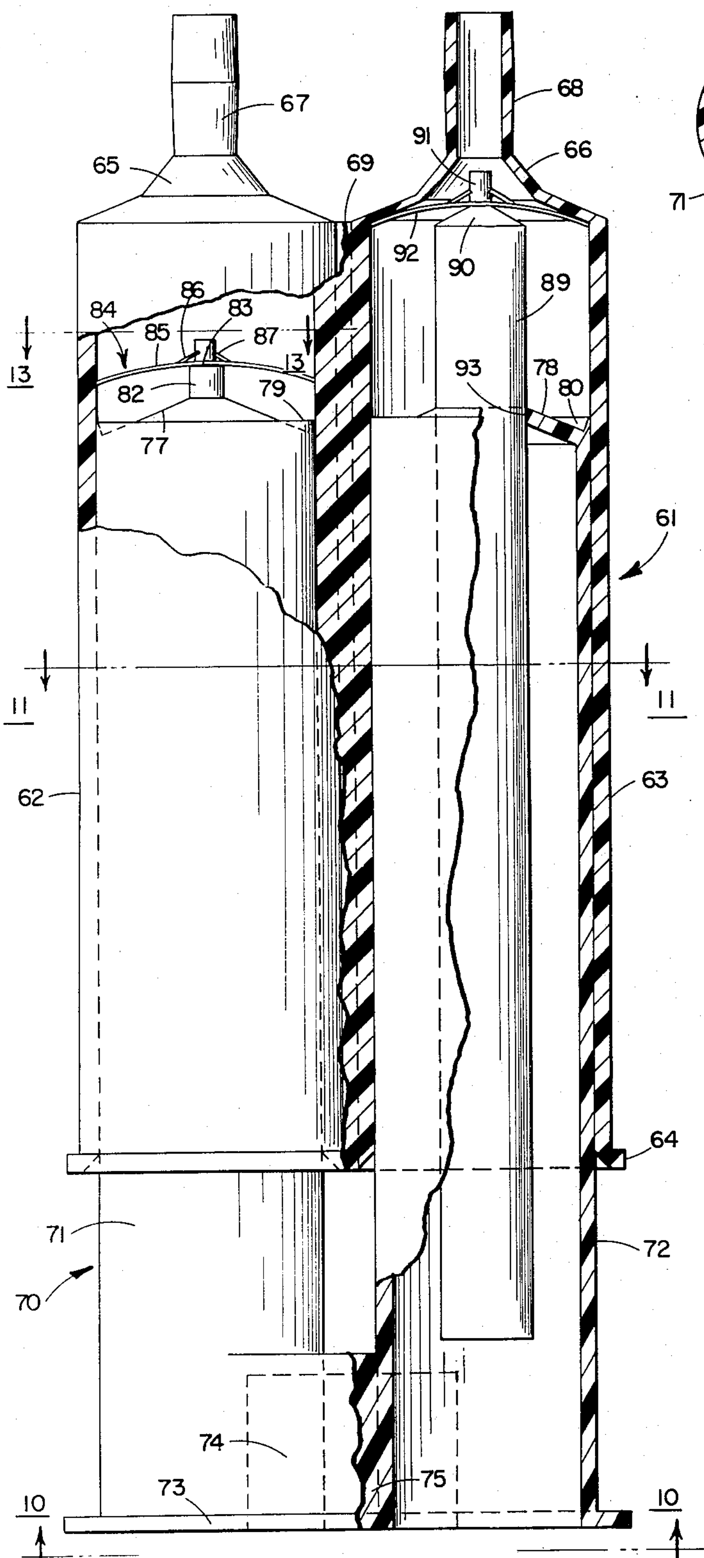


FIG. 9

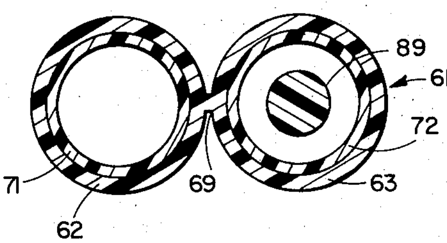
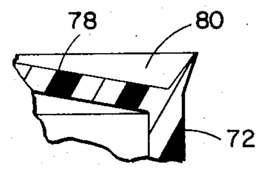


FIG. 11

FIG. 12



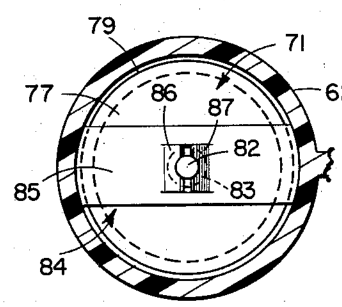


FIG. 13

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DUAL TUBULAR DISPENSING DEVICE

This application is a continuation of Ser. No. 84,059 filed Oct. 26, 1970, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains to a syringe for dispensing a plurality of materials.

2. Description of the Prior Art

Certain materials in both commercial and domestic use must be mixed at the time of use but require separate storage. Typically, this is a two-component adhesive system, such as an epoxy resin and its catalyst. The resin and catalyst must be mixed shortly before application to avoid premature setting up of the adhesive. Commonly, the adhesive and catalyst are marketed in separate metal foil tubes. Quantities of the adhesive and catalyst are dispensed by squeezing the two tubes, and the two components then are mixed together. For domestic use, this normally is accomplished by observing the amounts that are squeezed from the tubes and estimating when equal quantities have been obtained. Similarly, visual estimates are made of total quantities of the components that are needed. Inherently, true accuracy cannot be achieved.

For commercial use, it may be necessary to more accurately attain the correct quantities of the components by weighing. This, of course, is a time-consuming and, therefore, costly operation. Unless performed with care, the weighing operation may not produce precisely identical quantities of the resin and catalyst. In any event, the operation of obtaining the appropriate quantities of the two components becomes messy, relatively slow and requires cleanup.

When metal foil tubes are used, faulty crimping or puncturing frequently produces leaks in the tubes. By being in two separate containers, one or the other component may become misplaced before the components are to be mixed together. Furthermore, often there are air pockets in the containers for the components to be dispensed, which makes it impossible to estimate the amounts remaining in the containers for future use.

Added difficulties arise when the two components are not to be mixed together in equal quantities. In such instance it becomes impossible to estimate with any accuracy the proportions of the two materials by observing the amounts discharged from the tubes. The more tedious weighing procedure is mandatory in obtaining specific ratios. Again, problems from wastage due to leftovers and the cleanup operation must be contended with. Extreme care must be exercised in weighing or the ratios will not correspond to desired values. Where ratios are relatively high, the minute amount of the lesser component needed for small batches makes it impractical to attempt to mix the components in the quantities actually needed. As a result, extra mixed material must be thrown away.

SUMMARY OF THE INVENTION

The present invention provides an improved unitary dispensing device which will accurately discharge correct proportions of the two components to be mixed. The dispenser is made of only two components, each integrally formed, providing a leakproof syringe very easily usable to provide precise results and avoiding the shortcomings of the prior art noted above. The device includes two parallel cylindrical barrels connected together. At one end, each of the barrels has an outlet nozzle, the two nozzles being covered by a single cap. The opposite ends of the barrels are open and receive a plunger assembly. The latter element includes a pair of pistons, one piston being received in each of the barrels. The pistons have sealing lips at their forward ends for engagement with the interior walls of the barrels to prevent leakage past the pistons. The pistons include shanks inwardly from the piston heads and, at their outer ends, are rigidly interconnected. Therefore, by pushing on the plunger assembly, the pistons are moved simultaneously and through equal increments. The shanks of the pistons may be of I-beam configuration, with outer webs substantially complementary to the barrel walls and interconnected by central transverse webs. This provides great rigidity to the piston shanks to assure that the pistons will move without distortion in discharging the liquids. The I-beam construction may be produced by a side-closing mold, which closes perpendicularly to the shank axis, resulting in a favorable molding operation. This construction has the greatest stiffness-to-weight ratio of any section producible by a side-closing mold action.

A scale may be imprinted on the exterior of one of the barrels so that, when these barrels are of translucent or transparent material, the quantities of the liquids dispensed can be accurately ascertained. In use of the device, the operation of the plunger rapidly and correctly dispenses and proportions the two components retained in the barrels. No weighing or guesswork is involved, yet complete accuracy is assured when the liquids are dispensed. There is a considerable saving in time and labor in obtaining the appropriate amounts of the components. The precision of the results also eliminates the need for certain inspection procedures, further reducing cost and time.

The two barrels may be made of equal diameters so that identical quantities of the two components will be ejected. For situations where unequal proportions are desired, the barrels may be made of unequal diameters so as to supply the components in the proper proportions. A wide range of proportions without changing the barrel configuration may be obtained by providing an insert in one of the barrels to reduce its volume. A cylindrical insert can be held in the barrel by a sheet metal clip and extend through a complementary opening in the piston. In this instance, the piston is of tubular configuration so that the insert may fit within it as the plunger moves. The tubular pistons, while not producible by a side-closing mold as for the I-beam shanks, produce the cross section having the greatest stiffness obtainable. Volume ratios of the components may be varied by introducing inserts of different diameters into the barrel that is to be reduced in dimension. A hole will be formed in the piston head of that barrel of appropriate dimension to complementarily receive the piston in each instance. An extensive variety of ratios can be obtained by using a quantity of different inserts and using them with barrels of different diameters.

The barrels become entirely filled with the components, with no air pockets within them through the provision of a means to bleed the air past the pistons as the barrels are filled. This may be accomplished by the use of spaced, short, longitudinally directed grooves in the barrel walls to permit the air to flow past the pistons as the pistons are displaced when the liquid is poured into the barrels. The grooves are made of a depth sufficient to permit the passage of air, but of a size which will substantially preclude the flow of the viscous liquid past the piston. Alternative to the grooves, short, longitudinally extending ridges may be provided in the barrel walls. These prevent the pistons from sealing against the walls of the barrels when the ridges are encountered, thereby again providing narrow passageways to allow the outward flow of air past the pistons.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevational view, partially broken away, of the dispenser of this invention;

FIG. **2** is an enlarged transverse sectional view taken along line **2—2** of FIG. **1**;

FIG. **3** is an exploded perspective view of the barrel and plunger separated from each other;

FIG. **4** is a fragmentary side elevational view of the end portion of one of the pistons, illustrating the sealing arrangement;

FIG. **5** is an enlarged fragmentary side elevational view of the interior of one of the barrels, illustrating the slot for bleeding air from within the barrel;

FIG. **6** is a fragmentary sectional view taken along line **6—6** of FIG. **5**;

FIG. **7** is an enlarged fragmentary side elevational view of the interior of one of the barrels, showing an alternate arrangement for bleeding air through the use of a projecting ridge;

FIG. **8** is a sectional view taken along line **8—8** of FIG. **7**;

FIG. **9** is a side elevational view, partially in section, of a modified form of the dispenser which discharges unequal quantities from the barrels;

FIG. **10** is a bottom plan view of the dispenser of FIG. **9**;

FIG. **11** is a transverse sectional view taken along line **11—11** of FIG. **9**;

FIG. **12** is an enlarged fragmentary sectional view of the end portion of one of the pistons, illustrating the seal;

FIG. **13** is a transverse sectional view taken along line **13—13** of FIG. **9**;

FIG. **14** is a fragmentary side elevational view, partially broken away, illustrating the dispenser with a larger insert in one barrel for further reducing the volume;

FIG. **15** is a perspective view of the end cap separated from the remaining components of the dispenser;

FIG. **16** is a fragmentary side elevational view, partially in section, showing the end cap positioned on the nozzles;

FIG. **17** is a transverse sectional view taken along line **17—17** of FIG. **16**;

FIG. **18** is a top plan view illustrating an arrangement for heating one barrel of the dispenser, while insulating the other; and

FIG. **19** is a side elevational view, partially broken away, of the arrangement of FIG. **18**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The dispenser, as shown in FIGS. **1–4**, includes a body **10** which receives a plunger **11**. The body **10** includes a pair of cylindrical barrels **12** and **13** having open bottom ends, as the device is positioned in FIG. **1**. The upper ends of the barrels are provided with walls **14** and **15** at the centers of which are cylindrical discharge nozzles **16** and **17**. At their open ends, the barrels **12** and **13** are interconnected by a transverse web **18** which is provided with lateral enlargements **19** and **20** having short longitudinal flanges **21** and **22** at their outer edges. The elements **19** and **20**, with their flanges **21** and **22**, provide finger-gripping portions for holding the body **10** when the plunger is being moved to discharge fluid from the barrels **12** and **13**. A narrow longitudinally extending web **23** interconnects the barrels **12** and **13** along their entire lengths at their adjacent edges.

The plunger **11** includes a pair of pistons **25** and **26** that fit within the barrels **12** and **13**, respectively. The pistons **25** and **26**, for a major portion of the length of the plunger, are formed in cross-section as I-beams, which provides them with considerable rigidity, at the same time allowing them to be produced readily by molding. Thus, the piston **25** includes a central web **28** at the ends of which are webs **29** and **30** at right angles to the central web **28**. The inner surfaces **31** and **32** of the webs **29** and **30** are straight, but the outer surfaces **33** and **34** of these webs are cylindrical segments generally complementary to the interior of the barrel **12**.

The piston **26** is similarly formed, having a central web **36** at the outer ends of which are webs **37** and **38** perpendicular to it. The outer longitudinal surfaces of the webs **37** and **38** are cylindrical segments generally complementary to the barrel **13**. The transverse webs **28** and **36** are in the same plane, which also is the plane in which the longitudinal axes of the nozzles fall. This positions the end webs **29, 30, 37** and **38** perpendicular to this plane, producing the maximum moment of inertia for each piston about an axis normal to and bisecting the central web. The result is the greatest resistance to bending in the directions of greatest stress during use, as well as adapting the part for production by economical injection molding using opposed matched mold dies.

At one end of the plunger **11**, the pistons **25** and **26** are interconnected by an enlarged transverse web **40** which projects outwardly beyond the pistons to provide a flange. An additional smaller transverse web **41**, parallel and spaced inwardly from the web **40**, extends between the adjacent longitudinal webs **30** and **37** of the pistons **25** and **26**, respectively. The pistons **25** and **26** are completely separated for the remainder of their lengths.

The opposite ends of the pistons **25** and **26** are provided with piston heads **43** and **44** which include conical outer surfaces **45** and **46**. The longitudinal outer webs **29** and **30** of the piston **25**, and **37** and **38** of the piston **26**, stop short of the piston heads **43** and **44**. As may be seen in FIG. **4** for the piston **26**, there is a transverse undersurface **48** for the piston head **44**, the piston head **43** having a similar undersurface. As a result, the piston heads taper radially outwardly in thickness to provide thin circumferential edges. These edges are slightly larger in diameter than the diameter of the barrels that receive them. Hence, the edges of the piston heads are deflected slightly when the pistons are received in the barrles **12** and **13** and bear firmly against the walls of the barrels to prevent flow of fluid past the piston heads.

Additional sealing elements **51** and **52**, generally similar to the piston heads **43** and **44**, may be provided on the pistons **25** and **26**, respectively. The longitudinal webs of the pistons are interrupted to accommodate the members **51** and **52**, which are spaced inwardly a short distance from the piston heads **43** and **44**. As may be seen in FIG. **4** for the piston **26**, the sealing element **52** includes a flat transverse undersurface **53** and a frustoconical outer surface **54**. Again, therefore, the sealing member tapers to a thin deflectable outer edge, which provides a seal with respect to the inner circumferential surface of the barrel that receives it.

In use of the dispenser, the barrels **12** and **13** first are filled with the two components of the adhesive or other fluids to be dispensed. Then, the plunger **11** is pushed to advance the pistons **25** and **26** in the barrels **12** and **13**. As this is done, the pistons **25** and **26** move equal distances to eject equal quantities of the fluids from the nozzles **16** and **17**. The rigid I-beam construction of the pistons and their interconnection by the webs **40** and **41** assures that the pistons will be advanced in equal increments and that precise metering of the ejected fluids will be accomplished. Also, the barrels **12** and **13** are rigidly interconnected by the webs **18** and **23**, again avoiding any distortion of the elements to result in inaccurate expulsion of the fluids.

On the exterior of at least one of the barrels, such as the barrel **12**, there is a measuring scale **56**. With the barrel being made of translucent or transparent plastic material, this provides a means for accomplishing accurate metering of the fluid ejected. By simple observation of the fluid level with respect to the scale **56**, it can be readily determined how much fluid has been displaced by the pistons **25** and **26** and how much remains. Thus, precise amounts of the components dispensed from the barrels **12** and **13** can be established by observation.

The barrels **12** and **13** include provision for bleeding air from the liquids introduced into them. As best seen in FIGS. **5** and **6**, this may be accomplished by providing short longitudinally extending grooves **58** in the sidewalls of the barrels. These grooves allow any entrapped air to flow past the sealing lips provided by the elements **43, 44, 51** and **52** on the pistons **25** and **26** as the dispenser is filled. Filling may be accomplished by inserting the plunger **11** all the way in the body **12** so that the piston heads **43** and **44** are adjacent the end walls **14** and **15** of the barrels **12** and **13**, respectively. Then, the liquids to be dispensed are introduced through the nozzles **16** and **17**, forcing the pistons outwardly as the barrels are filled. As this occurs, the air which may be entrapped bleeds past the grooves **58**. There may be several of the grooves **58** around the perimeter of the barrels at each location where the grooves are provided. By being at comparable positions on the two barrels, the grooves can bleed out air when the two barrels are tilted in the same direction. While the grooves **58** allow the passage of air, they are too small to allow appreciable flow of the relatively viscous liquids usually retained in the dispenser.

As an alternative to the grooves, small ridges may be provided on the inner surfaces of the barrels, as shown in FIGS. **7** and **8**. Thus, as seen in these figures, there are raised portions **59** on the barrel walls which prevent the sealing lips from fully engaging the walls of the barrels. As a result, there are narrow gaps between the sealing lips and the barrel walls at the locations of the ridges **59**, which allow the air bleeding to take place.

The construction shown in FIGS. **9—12** permits the dispenser to discharge unequal amounts from the two barrels of the unit. This is useful where the two liquids may need to be combined in something other than a 1:1 ratio. The body **61** in this embodiment of the invention is generally similar to that described above, including two cylindrical barrels **62** and **63** of equal lengths and diameters. A transverse web **64** at one end of the body **61** interconnects the barrels **62** and **63** and provides outwardly projecting flanges for gripping during use of the dispenser. At the opposite end, tapering end walls **65** and **66** on the barrels **62** and **63**, respectively, connect the barrels to discharge nozzles **67** and **68**. A longitudinal web **69** extends the lengths of the barrels **62** and **63** and forms a connection between them.

The plunger **70** includes two pistons **71** and **72**, which are tubular members substantially complementary to the interiors of the barrels **62** and **63**. The outer ends of the pistons **71** and **72** are connected by a circumscribing transverse flange **73**, a wall **74** and an intermediate longitudinal web **75**. At the opposite ends of the pistons **71** and **72** are frustoconical end walls **77** and **78**.

Around the end walls are thin forwardly projecting wedge-shaped annular lips **79** and **80**, respectively. These lips in their free positions project outwardly to a diameter slightly greater than the interior diameters of the barrels **62** and **63** as well as that of the pistons **71** and **72**, as best seen in FIG. **12**. Hence, when the pistons **71** and **72** are received in the the barrels **62** and **63**, the lips **79** and **80** are deflected inwardly. Consequently, the lips tightly engage the inner peripheries of the barrels and provide effective seals at the forward ends of the pistons **71** and **72**. While the seals firmly engage the barrels, there may be some clearance between the sidewalls of the pistons and the barrels. When the plunger **70** is moved, the fluid pressure against the lips **79** and **80** reacts against their tapered inner surfaces to force them into even tighter engagement with the barrel walls, enhancing the sealing effect.

At the forward end of the piston **71**, projecting from the center of the end wall **77**, is a post **82**. The outer portion of the post **82** is of reduced diameter, thereby providing an annular shoulder **83**. Received on the post **82** and brought into engagement with the shoulder **83** is a stop member **84** which prevents outward movement of the plunger **70** with respect to the body **61**. This is useful in preventing the pistons from drawing air into the barrels **62** and **63**, which can occur upon reverse movement. Also, it prevents reuse of the syringe as required under certain pharmaceutical laws when pharmaceutical materials are being dispensed. The stop member **84** is merely a conventional sheet metal speed nut which includes an arcuate base portion **85**, which is rectangular in plan, at the center of which tabs **86** and **87** are bent outwardly. These tabs are appropriately recessed to define an aperture which receives and grips the outer portion of the post **82**. The base portion **85** is of slightly greater length than the diameter of the barrel **62**, so that its outer edges bear against the inner surface of the barrel **62**, and the base **85** is bowed so as to present a concave surface toward the outer end of the barrel. This causes the stop member **84** to be tightly pressed against the wall of the barrel **62** when an outward force is imposed on the plunger, thereby locking against the barrel to prevent the reverse piston movement. With the two pistons being secured together, locking one piston automatically locks the other.

While the stop **84** is a desirable feature for many purposes, in some instances outward movement of the pistons may be advantageous, so the stop will be eliminated. This permits the plunger to be reciprocated to effect mixing of the component in each of the barrels. This may be needed, for example, for a component containing a steel powder.

Mixing also can be obtained by including an agitator ball in either or both of the barrels to break up pigment or other material upon shaking the dispenser.

An insert **89** is received in the barrel **63** at its longitudinal axis to reduce the interior volume of the barrel. The insert **89** is a rod or cylindrical tube which has an inner end wall **90** from which projects a short post **91.** A stop **92** is received on the post **91** to prevent the insert **89** from being withdrawn from the barrel **63.** The stop **92** may be similar to the stop **84,** operating in the same manner. The insert **89** is installed by pushing it into the barrel **63** to a position where the stop **92** is adjacent the barrel end wall **66.**

An opening **93** is provided in the end wall **78** of the piston **72,** complementarily and slidably receiving the insert **89.** The interior of the piston, beyond the end wall **78,** is tubular and of greater diameter than the insert **89.** Therefore, the insert readily extends into the interior of the piston, and there is no interference to the travel of the plunger.

With the volume of the barrel **63** being reduced by the presence of the insert **89,** less liquid will be dispensed from the barrel **63** than from the barrel **62** as the plunger **70** is advanced. Consequently, unequal amounts of liquid will be discharged from the nozzles **67** and **68.** By appropriately dimensioning the insert **89,** a predetermined ratio of liquid ejection may be obtained.

The ratios of liquids ejected by the syringe may be varied by providing inserts of different sizes in the barrel **63.** For example, as seen in FIG. **14,** the insert **95** is of larger cross-sectional area than the insert **89** shown in FIG. **9.** This means that a lesser amount of liquid will be contained in the barrel **63** in this instance, and less of this liquid will be discharged from the nozzle **68** in proportion to the liquid in the barrel **62** as the plunger is advanced. The stop member **92** again anchors the insert in position adjacent the end wall **66** of the barrel **63.** In this instance, a larger opening **96** is provided in the end wall **78** to substantially complementarily receive the insert **95.** The volume ratios of the ejected fluids may be made greater or smaller by providing inserts of appropriate sizes. A **1:1** ratio is obtained by including no insert in the barrel **63.** Greater variety in the ratios is possible by supplying the body **61** with barrels **62** and **63** of different diameters, as well as including inserts of several sizes.

The nozzles **67** and **68** may be closed by a removable cap **97,** as seen in FIGS. **14–16.** The cap **97** includes receptacle portions **98** that fit over the nozzles **67** and **68.** Spaced protrusions **100** on the inner walls of the receptacle portions **98** engage the lower sections of the nozzles, the exterior surfaces of which flare outwardly to enlarged parts **101.** This keeps the cap **97** in place. Axial extensions **102** fit within the nozzles to act as closures. A flexible membrane **103,** with openings **104** that fit over the nozzles, will hold the cap **97** to the dispenser when it is removed from the nozzles. A spreader **105** also may be included on the cap **97.**

Some polymer systems require the use of a solid, or very viscous, catalyst resin which is melted prior to use. Such a catalyst may be heated at the time it is introduced into the barrel and then allowed to solidify. At the time of use, the syringe may be placed in an oven to raise the temperature above the melting point for the catalyst. In order to avoid heating the other component, which would raise the temperature of the mixture of the components and reduce its pot life, the second barrel may be protected from the heat by a longitudinally split insulating sleeve **106,** as seen in FIGS. **18** and **19.** Also, direct heating of the barrel containing the catalyst may be accomplished by using a tubular heater **107,** which will receive one of the barrels.

The foregoing detailed description is to be clearly understood as given by way of illustration and example only, the spirit and scope of this invention being limited solely by the appended claims.

I claim:

1. A device for dispensing materials comprising
a duality of tubular barrels,
each of said barrels being of substantially uniform cross-section and having an outlet opening at one end thereof,
means attaching said barrels together,
a piston slidably received in each of said barrels,
means attaching said pistons together,
whereby said pistons are movable simultaneously and equally in said barrels from a location adjacent the opposite ends of said barrels toward said outlet openings for ejecting material from said barrels in a first substantially constant ratio,
and means for selectively varying the volume of one of said barrels for thereby varying the ratio of material ejected from said one barrel to material ejected from the other of said barrels,
said means for selectively varying the volume of one of said barrels including
an elongated member receivable in said one barrel,
said elongated member having a continuous exterior surface and being of substantially uniform predetermined cross section,
and means to secure said member in said one barrel substantially at the longitudinal axis thereof with one end of said member adjacent said one end of said barrel,
said member being of a length such that when it is so positioned the opposite end of said member extends at least to said location adjacent said opposite end of said one barrel, whereby said member occupies a predetermined volume of said barrel at said longitudinal axis thereof,
the piston in said one barrel being adapted to have an opening formed therein for slidably receiving said member, whereby when said pistons are so moved simultaneously said pistons can eject material from said barrels in a second substantially constant ratio.

2. A device as recited in claim **1** in which
said piston in said one barrel has an end wall adjacent said outlet opening, and a tubular portion extending from said end wall,

said elongated member being smaller in transverse dimension than that of the interior of said tubular portion,

whereby upon forming an opening in said end wall said elongated member is receivable in said tubular portion.

3. A device as recited in claim 1 in which said means to secure said member in said one barrel includes a resilient sheet metal member connected to said elongated member and extending transversely thereof,

said sheet metal member having a free dimension in which it extends transversely a greater distance than the interior transverse dimension of said one barrel,

and having edge surfaces engageable with the inner surface of said one barrel,

whereby said sheet metal member bears against the inner surface of said one barrel and can prevent movement of said elongated member away from said outlet opening in said one barrel.

4. A device as recited in claim 3 in which said sheet metal member is arcuate for presenting a concave surface remote from said outlet opening in said one barrel.

5. A device as recited in claim 4 in which

said elongated member has a post at one end thereof,

said sheet metal member having opposed tabs defining an aperture receiving said post,

said tabs engaging said post at said aperture for attaching said sheet metal member to said elongated member,

said sheet metal member being substantially rectangular in plan.

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