

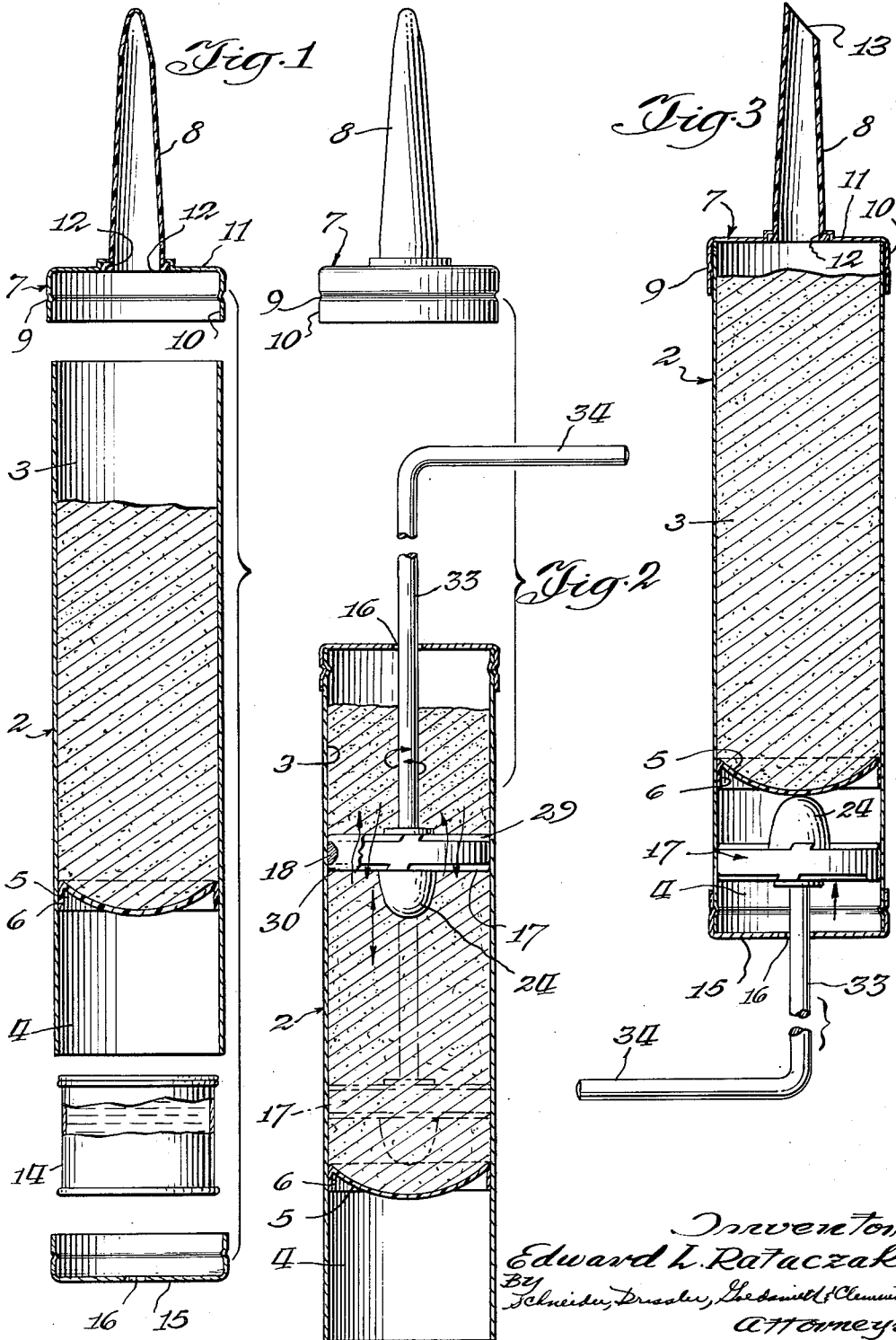
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E. L. RATA CZAK
CARTRIDGE ASSEMBLY

3,197,067

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

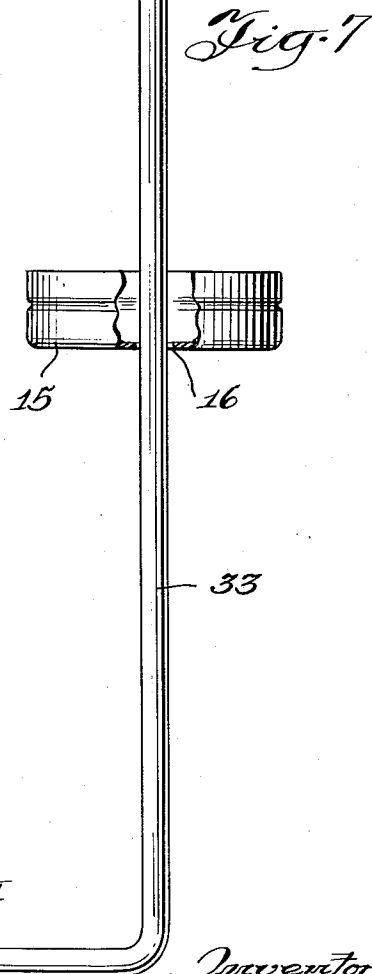
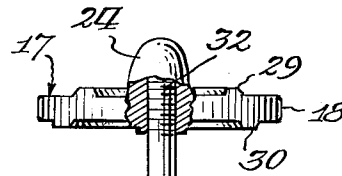
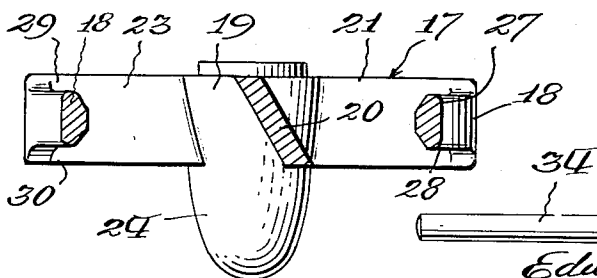
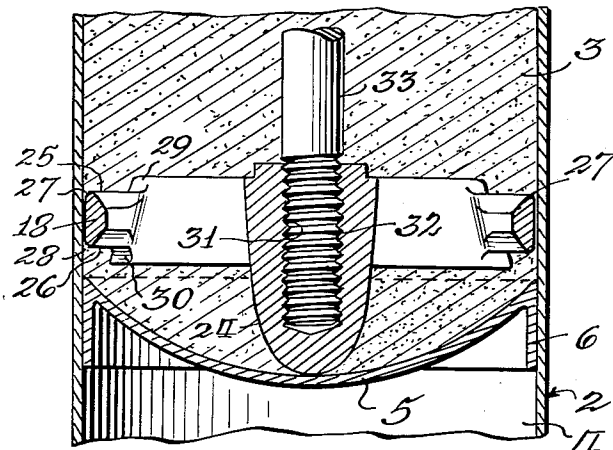
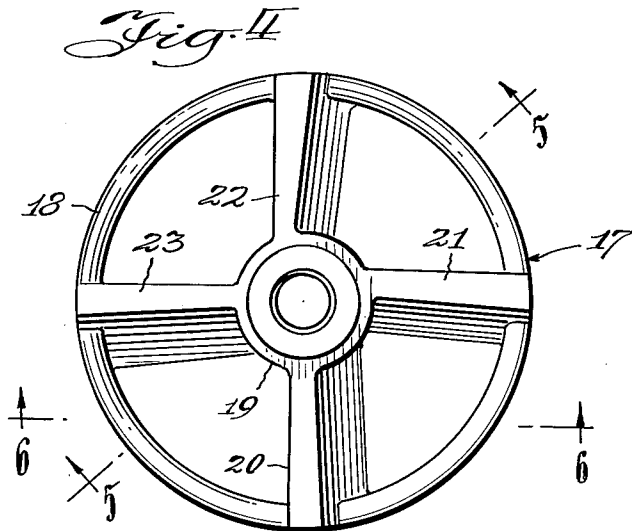


Fig. 6

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3,197,067

CARTRIDGE ASSEMBLY

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This invention relates to a cartridge assembly that may be used for storage, mixing and dispensing any multiple component composition having one component that must be kept separate from one or more other components until immediately prior to use of the composition.

For convenience, it will be described in connection with the use of a two-component caulking compound in which each component is housed in a separate compartment in a tubular cartridge adapted for use in a standard caulking gun. The cartridge has two compartments divided by a follower plate that provides a concave end wall for the compartment in which the two components of the composition are mixed, and is moved longitudinally toward the discharge end of the cartridge when the composition is being dispensed.

For convenience, the cartridge assembly will be described in the vertical position shown in FIGS. 1 to 3 of the drawings, but it will be understood that it may be held horizontally, or at any desired angle, when it is being used.

One component of the composition is housed loosely in the upper compartment of the cartridge between the follower plate and the upper end of the cartridge that is sealed by a combined closure member and nozzle member. The closure member is detachably secured to the upper end of the cylindrical tube that comprises the body of the cartridge, and an imperforate conical nozzle is firmly secured to the closure member with the open base of the cone secured in registration with an opening of substantially the same size in the closure member. If desired, the upper end of the tube, on which the upper closure member is mounted, may be sealed by a diaphragm to hold the first mentioned component within the upper compartment after the upper closure member is removed. Normally the nozzle, preferably of plastic material, is imperforate, and its outer end is cut off to provide a dispensing outlet after the components of the caulking composition are mixed together in a manner hereinafter described. It is also possible to use a nozzle having an opening at its outer end, and to provide a seal at the base of the nozzle to seal the first component in said upper compartment of the cartridge.

The lower end of the cylindrical tube is closed by a bottom end cap provided with a centrally disposed opening therein. The follower plate in the cartridge is spaced from the lower end of the tube to form a lower compartment, smaller than the upper compartment. A catalyst, packed in a sealed container, is positioned in the lower compartment between the follower plate and the bottom end cap.

The assembly also includes a rod threaded at one end and a mixing head comprising a threaded hub for securement to the threaded end of the rod. The mixing head includes ribs extending from the hub to the periphery. The ribs are inclined at different vertical angles to improve the efficiency of the mixing means. The inclination of the ribs effects a folding action both on the upstroke and downstroke of the mixing head through the composition. A slight rotation of the mixing head at each end of the stroke causes the ribs to move through a new path in the composition, and thus improves the mixing action. When the composition is to be used, the end cap is removed and the sealed container is removed from the lower compartment. The threaded end of the rod is

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pushed through the centrally disposed opening in the bottom end cap. The mixing head is then threaded onto the threaded end of the rod. The upper closure member is then removed from the upper end of the tube. The sealed container is opened, and the second component is emptied into the upper compartment containing the first component. The mixing head is inserted into the upper compartment, and the bottom end cap, with the rod extending through the aperture therein is secured to the upper end of the tube to close the upper end of the upper compartment, in which both components are contained. The mixing head is then reciprocated longitudinally in the tube and is turned about one-fourth of a turn at the end of each stroke to mix the two components. The centrally disposed opening in the bottom end cap through which the rod extends, provides a guide and wiper action when the rod is pushed into the upper compartment to mix the components. The opening may be provided with a rubber or plastic grommet to provide a better wiper action.

After the components are thoroughly mixed, the bottom end cap is removed from the upper end of the cartridge and is replaced by the combined closure member and nozzle. The nozzle may be cut to provide a dispensing outlet of any desired diameter. The bottom end cap is put back on the lower end of the cartridge. The cartridge may be placed in a caulking gun of conventional design, or the caulking composition may be dispensed through the nozzle by pushing the follower plate toward the nozzle in any suitable manner.

The structure by means of which the above mentioned and other advantages of the invention are attained is fully described in the following specification, taken in conjunction with the accompanying drawings, showing a preferred illustrative embodiment of the invention, in which:

FIGURE 1 is an exploded sectional view showing a cartridge with the parts separated;

FIG. 2 is a sectional view of the cartridge with the upper closure member removed and the mixing means in operative position in the cartridge;

FIG. 3 is a sectional view of the cartridge in dispensing position;

FIG. 4 is an end elevational view of the mixing head;

FIG. 5 is a cross sectional view, taken along the line 5-5 of FIG. 4, and showing the adjacent cartridge structure;

FIG. 6 is a cross sectional view, taken along the line 6-6 of FIG. 4; and

FIG. 7 is a side view, partly in elevation and partly in section, of the means for mixing the components of the composition.

Referring to the drawings, the cartridge comprises an open-ended cylindrical tube 2 divided into a comparatively large upper compartment 3 and a comparatively small lower compartment 4 by a follower plate 5 slidably mounted in the tube. The follower plate provides a concave bottom for the upper compartment. The tube may be of any suitable material, such as, for example, paper, metal foil, metal, plastic or a combination of two or more of the specified materials. The follower plate, which has a flange 6 extending toward the end of the tube constituting the lower end of the smaller compartment 4, is preferably of plastic material, although it may be made of metal or any other suitable material. Flange 6 fits snugly against the inner surface of tube 2 so that it will generally retain its place in the tube, although it may be pushed axially of the tube in either direction. If desired, the upper and lower compartments of the cartridge may be separated by a thin diaphragm instead of by the follower plate 5. The diaphragm may be broken by any suitable means when the two compartments are to be mixed together.

A combined closure member 7 and nozzle 8 is detach-

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ably secured to the upper end of the tube 2 to seal the upper end of compartment 3 in which one component of the composition is held. Closure member 7 has a bead 9 extending inwardly of its skirt 10 to insure a tight fit on the end of tube 2. The top 11 of the closure member has an opening 12 in registration with the open base of nozzle 8 which is preferably conical. The closure member may be of any suitable material, but is preferably metal. The nozzle is preferably plastic, and its base is secured to the top 11 of the closure member in any suitable manner. The outer end of the nozzle 8 may be cut off, as indicated at 13, FIG. 3, to form a dispensing outlet of any desirable diameter.

If the nozzle is cut off at the factory, the opening 12 may be sealed with a diaphragm (not shown) that need not be broken until it is desired to dispense the composition. It is also possible to seal the upper end of tube 2 independently of the closure member 7 by a diaphragm (not shown) at the end of the tube 2 to hold the first component in compartment 3. Such seal need not be broken until the second component, housed in compartment 4, is to be mixed with the first component.

A sealed container 14, containing a suitable catalyst constituting the second component of the composition, is housed in compartment 4 and is held therein by a bottom end cap 15. The container 14 may be paper, plastic, glass, metal or a combination thereof. The sealed container prevents escape of any of the catalyst during storage and has straight sides to enable complete removal of the catalyst component. End cap 15 fits tightly on the lower end of tube 2 and is provided with a centrally disposed opening 16, provided for a purpose hereinafter described. Since the tube 2 is cylindrical and is of uniform size, the bottom end cap 15 and upper closure member 7 may be interchanged. The end cap 15 is preferably of metal, but may be plastic or any other suitable material. The second component of the composition must be kept separate from the first component until the composition is to be used. The sealed container 14 may be opened and the contents spilled into compartment 3 after the closure member 7 is removed from the outer end of compartment 3. The two components of the composition are then ready to be mixed together for use as a unitary composition.

The mixing means comprises a mixing head 17 having a rim 18, a hub 19 and ribs 20, 21, 22 and 23 interconnecting the rim and the hub. The mixing head is preferably metal but may be plastic or other suitable material. The hub 19 extends below the ribs and terminates in a rounded knob 24. The inner surface of rim 18 is tapered downwardly and inwardly from its upper edge, as indicated at 25, and is tapered upwardly and inwardly from its lower edge, as indicated at 26. The upper and lower edges of the rim are rounded, as indicated at 27 and 28, respectively, where the inner, tapered surfaces of the rim merge with the peripheral surface of the rim to eliminate any sharp edges that might cut the wall of tube 2 when the composition is being mixed by reciprocating the mixing head through the composition in compartment 3 in a manner hereinafter described.

The web of the mixing head is not symmetrical, the ribs 20 and 22 being inclined downwardly to the right, as seen in FIG. 4, looking outwardly from the top of the hub, and the ribs 21 and 23, being inclined downwardly and forwardly, looking from the same reference point. The angle of inclination of the ribs may vary between 30° and 60° from the vertical, but angularity of 45° is preferred. The inclination of the ribs effects a folding action with reference to the composition as the mixing head is reciprocated in compartment 3. Each of the ribs projects above and below the corresponding edges of the rim, as indicated at 29 and 30, respectively.

Hub 19 is threaded, as indicated at 31, to receive the threaded end 32 of a rod 33. Rod 33 is bent, preferably at right angles, adjacent its opposite end to form a handle 34 adapted to facilitate manual manipulation of the mix-

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ing head. When the closure member 7 has been removed from the upper end of tube 2 and the component from container 14 has been spilled into compartment 3 for mixing with the first component, the threaded end of rod 32 is passed through aperture 16 in bottom end cap 15, and mixing head 17 is then screwed onto the threaded end of the rod. The bottom end cap is then fitted on the upper end of tube 2, with the mixing head within compartment 3. Reciprocation of handle 34 outside the upper end of compartment 3 imparts a reciprocatory motion to the mixing head inside compartment 3.

The peripheral surface of rim 18 of the mixing head closely engages the inner wall surface of tube 2. Accordingly, as the mixing head is being moved toward the follower plate, tapered surface 26 of rim 18 scrapes the material from the inner wall surface of compartment 3 below the mixing head and directs it toward the hub, whereby the ribs of the mixing head mix the components thoroughly. The portions of the ribs projecting below the rim 18 increase the mixing action as the mixing head is moved downwardly. As knob 24 approaches the concave surface of follower plate 5, the rounded surface of the knob forces the material at the bottom of compartment 3 outwardly towards rim 18. The material rides upwardly and outwardly on the concave surface of the follower plate until it is turned back toward the hub by the tapered surface 26. Thus knob 24 cooperates with tapered surface 26 to insure thorough mixing of the components at the lower end of compartment 3 adjacent the follower plate. As the mixing head is moved upwardly in compartment 3, the tapered surface 25 scrapes the material from the inner wall surface of compartment 3 above the mixing head and guides it toward the hub. The portions of the ribs projecting above rim 18 help increase the mixing action as the mixing head is moved upwardly in compartment 3.

The number of strokes required to mix the composition thoroughly depends upon the viscosity of the composition, but it should be noted that a slight rotation of the rod at the end of each stroke increases the efficiency of the mixing operation by causing the ribs to follow a new path through the composition on each stroke.

After the two components have been thoroughly mixed in compartment 3, the bottom end cap 15, and the mixing head associated therewith, are removed from the upper end of tube 2 constituting the end of compartment 3 and is replaced by the closure member 7 and nozzle 8 secured thereto. If the nozzle is imperforate, it may be cut to provide a dispensing outlet of any desired diameter. The cartridge may be emptied by a conventional caulking gun or by a manually operated plunger.

If the cartridge is to be emptied by hand, the bottom end cap 15 is placed back on the lower end of tube 2 adjacent compartment 4, with the threaded end of rod 33 projecting into compartment 4. The mixing head may be left on rod 33, or may be removed therefrom. If the mixing head is left on the rod, knob 24 engages the rear side of follower plate 5. If the mixing head is removed from the rod, the end of the rod engages the rear side of the follower plate. As pressure on the rod 33 moves the follower plate 5 toward the upper end of the tube, to which the nozzle is secured, the composition is forced out of the dispensing opening at the end of the nozzle.

Although I have described a preferred illustrative embodiment of the invention in considerable detail, it will be understood that the description thereof is intended to be illustrative, rather than restrictive, as many details of construction may be modified or changed without departing from the spirit or scope of the invention. Accordingly, I do not desire to be restricted to the exact construction described.

I claim:

1. A cartridge for storing and mixing a two component composition, said cartridge comprising an open ended cylindrical tube divided into two compartments by a

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follower plate slidable in said tube, means removably secured to the outer end of each of said compartments to hold one of said components in each compartment, one of said compartments being capable of holding both of said components, and means movable between said follower plate and the opposite end of said one compartment for mixing said two components in said one compartment, said means comprising a rim having a circumference substantially equal to the circumference of said one compartment, a hub threaded to receive a rod, and a plurality of ribs extending from the rim to said hub, said ribs being inclined vertically in different directions.

2. A cartridge assembly for mixing two components of a composition, said assembly comprising an open ended cylindrical tube having a compartment closed at one end by a follower plate slidable in said tube, an end cap fitting over one end of the tube forming the other end of said compartment, said end cap having an opening therein, a mixing member insertable into said compartment, and a rod secured at one end to said mixing member, the other end of said rod projecting through said opening, said rod being manually operable to move said mixing member longitudinally and rotationally within said compartment to mix any materials positioned in said compartment.

3. A cartridge assembly for mixing two components of a composition, said assembly comprising an open ended cylindrical tube having a compartment closed at one end by a follower plate slidable in said tube, an end cap fitting over one end of the tube forming the other end of said compartment, said end cap having an opening therein, a mixing member insertable into said compartment, said mixing member comprising a head having a plurality of ribs inclined angularly in different directions and a rod secured at one end to said mixing member, the other end of said rod projecting through said opening, said rod being manually operable to move said mixing member longitudinally and rotationally within said compartment between said end cap and said follower plate to mix any materials positioned in said compartment.

4. A cartridge assembly for mixing two components of a composition, said assembly comprising an open ended cylindrical tube having a compartment closed at one end by a follower plate slidable in said tube, an end cap fitting over one end of the tube forming the other end of said compartment, said end cap having an opening therein, a mixing member insertable into said compartment, and a rod secured at one end to said mixing member, the other end of said rod projecting through said opening, said rod being manually operable to move said mixing member longitudinally and rotationally within said compartment to mix any materials positioned in said compartment, and a combined closure member and nozzle interchangeable with said end cap for closing said one end of said tube, said rod being engageable with said follower plate through the opposite end of said tube to move it longitudinally through said tube toward the first mentioned end of said tube to thereby dispense said composition through said nozzle when said combined closure member and nozzle is on the end of the tube forming the second mentioned end of said compartment.

5. A cartridge assembly for mixing two components of a composition, said assembly comprising an open ended cylindrical tube, a slidable follower plate in said tube, said components being stored in said tube on opposite sides of said follower, a removable closure sealing said one end of said tube, a removable end cap on the other end of said tube, said end cap being interchangeable with said closure member, said end cap having a centrally disposed opening therein, a rod insertable through said opening, and a mixing member insertable in said one end of said tube after said closure member is removed, said mixing member having means for securement to the inner end of said rod, whereby said components can be mixed together in said one end of said tube by manual movement

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of said mixing member after said second component and said mixing member have been positioned in said one end of said tube and said closure member has been replaced by said end cap, with the mixing member secured to the inner end of said rod.

6. A cartridge assembly for mixing two compounds of a composition, said assembly comprising an open ended cylindrical tube, a slidable follower plate in said tube, said components being stored in said tube on opposite sides of said follower, a removable closure member sealing said one end of said tube, a removable end cap on the other end of said tube, said end cap being interchangeable with said closure member, said end cap having a centrally disposed opening therein, a rod insertable through said opening, and a mixing head insertable in said one end of said tube after said closure member is removed, said mixing head having ribs inclined in different directions and means for securement to the inner end of said rod, whereby said components can be mixed together in said one end of said tube by manual movement of said mixing head after said second component and said mixing head have been positioned in said one end of said tube and said closure member has been replaced by said end cap, with the mixing head secured to the inner end of said rod and said rod projecting through said opening.

7. A cartridge assembly for storing and mixing two components of a composition, said assembly comprising an open ended cylindrical tube, a slidable follower plate in said tube dividing it into a first compartment and a second compartment, one of said components being stored in each of said compartments, said first compartment being large enough to hold both of said components, a removable closure member sealing the outer end of said first compartment, a removable end cap closing the outer end of said second compartment, said end cap being interchangeable with said closure member, said end cap having a centrally disposed opening therein, a rod insertable through said opening, said rod having a threaded end, and a mixing head insertable in said first compartment after said closure member is removed, said mixing head having a threaded hub for receiving the threaded end of said rod, whereby said components can be mixed together in said first compartment by manual movement of said mixing head after said second component and the mixing head have been placed in said first compartment, and said closure member on the outer end of said first compartment has been replaced by said end cap with the mixing head threaded on the inner end of said rod.

8. A cartridge assembly for storing and mixing two components of a composition, said assembly comprising an open ended cylindrical tube, a slidable follower plate in said tube dividing it into a first compartment and a second compartment, one of said components being stored in each of said compartments, said first compartment being large enough to hold both of said components, a removable combined closure member and nozzle on the outer end of said first compartment, a removable end cap closing the outer end of said second compartment, said end cap being interchangeable with said combined closure member and nozzle, said end cap having a centrally disposed opening therein, a rod insertable through said opening, said rod having a threaded end, and a mixing head insertable in said first compartment after said combined closure member and nozzle is removed, said mixing head having a threaded hub for receiving the threaded end of said rod, whereby said components can be mixed together in said first compartment by manual movement of said mixing head after said second component and the mixing head have been placed in said first compartment, and said combined closure member and nozzle on the outer end of said first compartment have been replaced by said end cap with the mixing head threaded on the inner end of said rod, said composition being dispensable through an open end of said nozzle by

pressure against slidable follower after the end cap on the outer end of said first compartment has been replaced by said combined closure member and nozzle, said nozzle having an open end.

9. A cartridge assembly comprising an open ended cylindrical tube, a follower plate slidable in said tube, said follower plate forming one end of a compartment adapted to contain two components to be mixed and then dispensed from said tube, an end cap detachably securable to either end of said tube, said end cap having a centrally disposed opening, a rod extending through said opening, and a mixing head secured to one end of said rod, said mixing head being reciprocable in said tube on one side of said follower plate by manipulation of said rod to mix the contents of said compartment when said end cap is secured to one end of said tube, and on the other side of said follower plate to dispense the contents from said compartment when said end cap is secured to the other end of said tube.

10. A cartridge assembly comprising a cylindrical container and a mixing head fitting within said cylindrical container said mixing head comprising a rim, a hub, and a plurality of ribs interconnecting said hub and rim, said ribs being inclined vertically in different directions, and means for reciprocating said mixing head axially in said container, said rim being engageable with the inner cylindrical surface of said container to scrape materials being mixed in said container from the inner cylindrical wall surface as said mixing head is reciprocated in said container, the inner surface of said rim being tapered downwardly and inwardly from its upper edge and upwardly and inwardly from its lower edge to more materials being mixed in said container from the areas in proximity to the inner cylindrical wall surface of said container toward the center of said container as said mixing head is reciprocated in said container to increase the mixing action of said mixing head.

11. A cartridge assembly comprising a cylindrical container having a concave end wall and a mixing head fitting within said cylindrical container, said mixing head comprising a rim, a hub, and a plurality of ribs interconnecting said hub and rim, said ribs being inclined vertically in different directions, and means for reciprocating said mixing head axially in said container, said rim being engageable with the inner cylindrical wall surface of said container, and a rounded projection extending downwardly from said hub and cooperating with said concave end wall to move materials being mixed in said container outwardly toward said rim as said mixing head is moved close to said concave end wall to increase the mixing action in the region immediately adjacent said concave end wall.

12. A cartridge assembly comprising a cylindrical container and a mixing head fitting within said cylindrical container, said mixing head comprising a rim, a hub, and a plurality of ribs interconnecting said hub and rim, said ribs being inclined vertically in different directions and

extending vertically beyond both the upper and lower edges of said rim, and means for moving said mixing head longitudinally and rotationally within said container, said rim being engageable with the inner cylindrical wall surface of said container.

13. A cartridge assembly for mixing two components of a composition, said assembly comprising an open ended cylindrical tube having a compartment closed at one end by a follower plate slidable in said tube, an end cap fitting over one end of the tube forming the other end of said compartment, said end cap having an opening therein, a mixing member insertable into said compartment, and a rod secured at one end to said mixing member, the other end of said rod projecting through said opening, said rod being manually operable to move said mixing member longitudinally and rotationally within said compartment to mix any materials positioned in said compartment, said mixing member comprising a rim, a hub, a plurality of ribs interconnecting said rim and hub, and means integral with said rim for moving material to be mixed from the inner wall surface of said cylindrical tube and directing it toward said ribs to increase the mixing action as said mixing head is moved longitudinally within said compartment.

14. A cartridge assembly for mixing two components of a composition, said assembly comprising an open ended cylindrical tube having a compartment closed at one end by a concave end member, an end cap fitting over the other end of said compartment, said end cap having an opening therein, a mixing member insertable into said compartment, said mixing member comprising a hub, a rim, and a plurality of ribs interconnecting said hub and rim, a rod secured at one end to said mixing member, the other end of said rod projecting through said opening, said rod being manually operable to reciprocate said mixing member within said compartment to mix the components in said compartment, and means projecting from said hub and cooperating with said concave end member to move material from said concave end toward the rim of said mixing member to increase the mixing action in the region immediately adjacent said concave end member.

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