

- [54] **MIXING CONTAINER FOR DENTAL MATERIALS**
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- [73] Assignee: **Sterndent Corporation**, Mount Vernon, N.Y.
- [22] Filed: **Nov. 1, 1974**
- [21] Appl. No.: **520,162**

3,344,914	10/1967	Bloom et al.	206/22
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- [52] U.S. Cl. **206/219; 259/DIG. 20; 215/DIG. 8; 206/63.5; 32/39**
- [51] Int. Cl.² **B65D 25/08; A61B 19/02**
- [58] Field of Search **206/219, 63.5; 128/218 U, 128/272; 259/DIG. 20; 215/DIG. 8; 32/39, 40 A**

[56] References Cited

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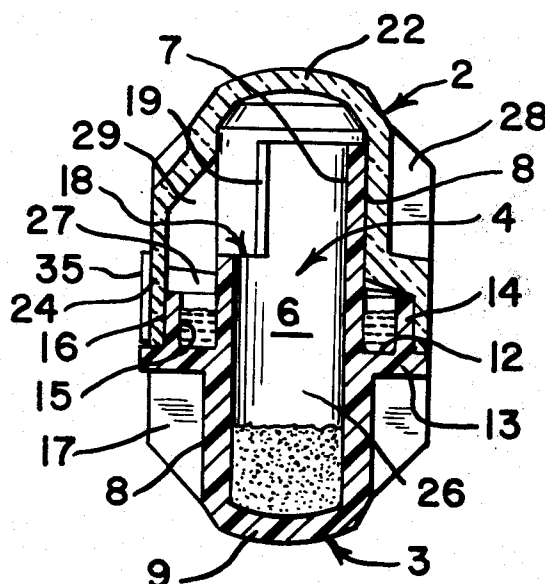
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3,023,889	3/1962	Barr	32/40
3,139,180	6/1964	Kobernick	206/220
3,139,181	6/1964	Kobernick	206/63.5

Primary Examiner—William I. Price
Assistant Examiner—Douglas B. Farrow
Attorney, Agent, or Firm—Pennie & Edmonds

[57] ABSTRACT

A container for confining premeasured amounts of dental material until mixing of the materials is desired. The container has an upper housing and a lower housing which fit together to confine the dental material from each other. When the housings are moved to a predetermined position relative to each other the previously confined materials are allowed to mix.

14 Claims, 8 Drawing Figures



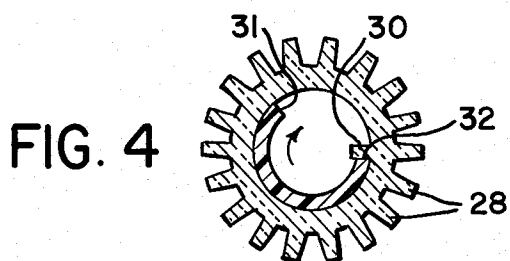
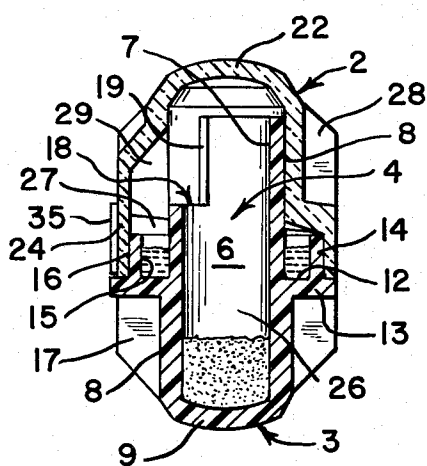
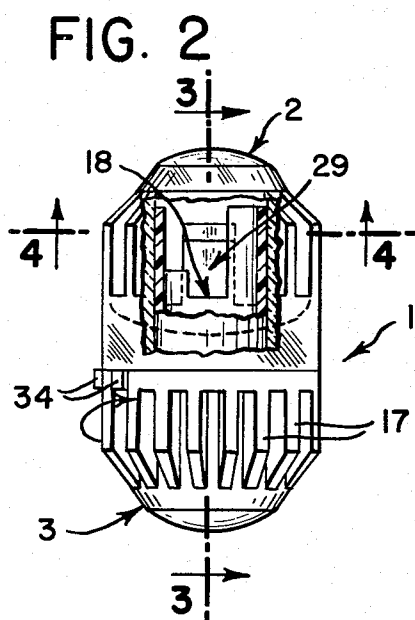
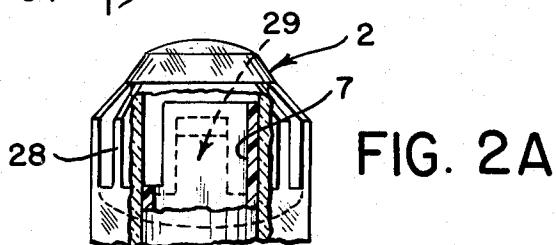
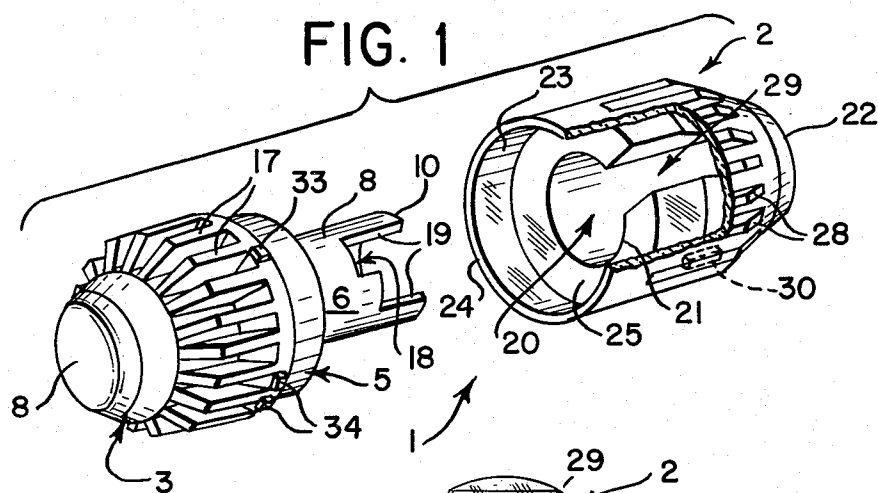


FIG. 5

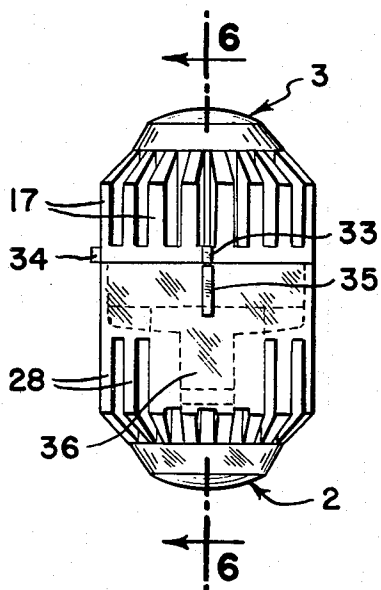
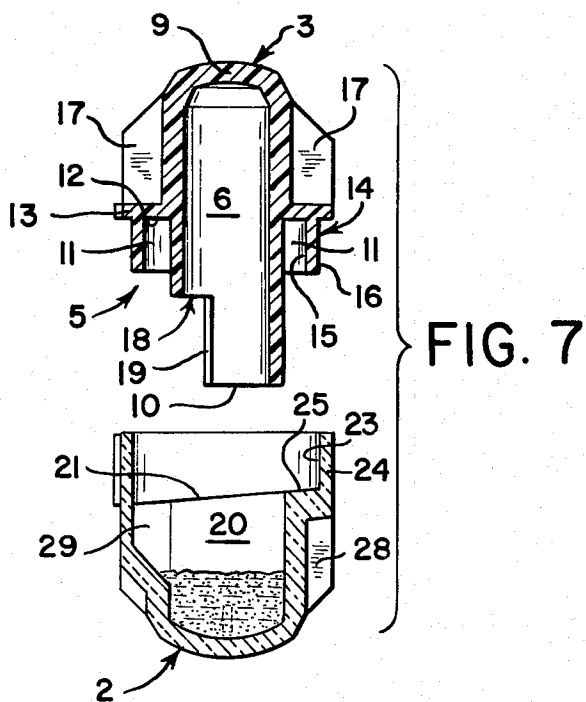
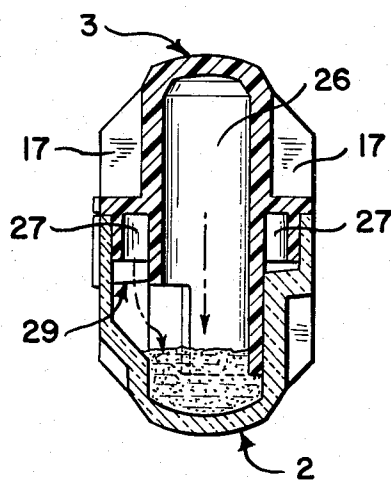


FIG. 6



MIXING CONTAINER FOR DENTAL MATERIALS

BACKGROUND OF THE INVENTION

Materials used by dentists to fill cavities have come in premeasured packages to facilitate measuring and combining of the materials in preparation for their use as a filling material. Typically these packages have involved several interacting parts requiring a rather sophisticated method of manufacture and loading. They have also included frangible portions which have to be broken before mixing can ensue. Also, these packages are opaque making it difficult to determine whether the material in the package has been completely dispensed into the mixing area to insure proper mixing of the materials.

An example of such a capsule is the U.S. Patent to Greenburg No. 2,527,991 which discloses a capsule having compartments for separating ingredients which are used to fill cavities. The device shown has a cap with a partition having a hole therethrough. This cap fits into a lower casing which also has a partition with a hole therethrough. The cap and casing fit together such that the partitions are adjacent one another with their holes registerable. In this manner, when the cap is rotated to the proper position, the holes are aligned to allow passage of mercury in the cap into the mixing cavity with other mixing ingredients. To hold the cap in place there is required a special securing means such as a ribbon or projection which snaps into a groove. In filling the capsule it is necessary that it be assembled first and then the cavities are filled after which they are sealed by a cork or other cap means.

Another such device is one shown by the U.S. Patent to Kobernick, No. 3,139,181. In that patent there is shown a three piece device having an upper portion, a lower portion and an insert. The lower portion has external threads for engaging internal threads to the upper portion. The insert defines a bead which cooperates with a groove in the upper portion for maintaining the insert in the proper position. A stem extends upwardly from the insert and rests against the inside of the upper portion to provide support for the insert. A slot is provided on the edge of the insert such that mercury can flow from the upper portion into the lower portion when the seal between them is broken. To break the seal, it is necessary to unscrew the lower portion slightly from the upper portion which will provide a gap in the area of the slot allowing the mercury to pass into the lower portion.

The above mentioned patents disclose capsules which are rather complex having several separate parts. Furthermore, the loading of dental materials must take place in a special sequence, increasing the cost and time needed to manufacture and prepare the capsule.

SUMMARY OF THE INVENTION

A container for dental materials having an upper housing and a lower housing for receiving materials to be mixed. The lower housing has two receptacles with each being configured to receive dental materials independently of the other. The upper housing when fitted with the lower housing cooperates with the lower housing to confine the materials contained in each receptacle from each other until the housings are rotated relative to each other to a predetermined position where the materials in one receptacle can pass into the other receptacle.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view in perspective of the two housings of the container;

FIG. 2 is a rear elevation of the container when both are in full engagement with a portions cutaway showing the housings in an open disposition;

FIG. 2a is a partial view of FIG. 2 showing the housings in a closed disposition;

FIG. 3 is a cross-section of the view shown FIG. 2 taken vertically along the lines 3—3;

FIG. 4 is a cross-section view of FIG. 2 taken horizontally along lines 4—4;

FIG. 5 is a front elevation of the container inverted showing the housings in an open disposition;

FIG. 6 is a cross-section of the view shown in FIG. 5 showing mixing of the materials in the open disposition; and

FIG. 7 is a cross-sectional view of FIG. 5 taken along lines 6—6, with the dental materials mixed and the housings withdrawn.

DETAILED DESCRIPTION OF THE INVENTION

In FIG. 1 there is shown a container 1 separated into its two constituent parts, which include an upper housing 2 and a lower housing 3. The lower housing 3 is of unitary structure configured to have a first receptacle 4 and a second receptacle 5. As shown in FIG. 3, the first receptacle is a cylinder 6 having inner wall 7 and outer wall 8. The bottom of the cylinder 6 is closed at 9 with the top 10 being left open. With this configuration silver power or other dental material can be loaded into the first receptacle through the cylinder top 10 and retained in the bottom 9 until it is ready to be mixed, as shown in FIG. 3.

The second receptacle 5 is an annulus 11 formed concentrically about cylinder 6 and located approximately midway between the top 10, and the bottom 9. An annulus bottom 12 is part of a flange 13 which extends outwardly the cylinder 6, perpendicular to the other cylinder wall 8. Extending upwardly from flange 13 is circular wall 14 which has inner surface 15 and outer surface 16 both of which are parallel and concentric to the cylinder walls 7, 8. With this configuration the annulus is formed by the outer cylinder wall 8, annulus bottom 12, and the inner circular surface 15. The height of the circular wall 14 is sufficient to retain a given amount of mercury within the annulus 11. The second receptacle 5 is loaded by pouring the desired material into the receptacle 4 until mixing is desired.

Extending outwardly from the outer cylinder walls 8 and connected to flange 13 and cylinder bottom 9 are ribs 17. By providing ribs in this manner structural stability is achieved for both the annulus 11 and the cylinder 7 and a gripping surface is also provided for holding and turning the lower housing.

In the cylinder 6 there is keyway 18 cut out near the top 10 to provide an opening through the cylinder walls 7, 8. In communication with keyway 18 is a slot 19 which is cut out of the open-end and also extends entirely through cylinder walls 7, 8. The slot 19, however, is a larger section of the housing cut out from the cylinder 6 as can be seen in FIG. 1. As will be discussed in more detail later the keyway 18 and slot 19, cooperate with upper housing 2, to locate keyway 18 in a predetermined position relative to the upper housing 2.

The upper housing, as best seen in FIG. 1, is cylindrical in shape having a circular female receptacle 20

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which is open at end 21 for receiving the cylinder 6 and a closed end 22. Female receptacle 20 has a diameter slightly larger than cylinder wall 8 such that when the housings are engaged as shown in FIG. 3 the top 10 of cylinder 6 will be sealed from the annulus 11 but rotation of the cylinder 6 relative the female receptacle 20 can be accomplished. As seen in FIG. 1 an annular area 23 is provided at the lower part of upper housing 3. This annular area is defined by cylinder walls 24 having an internal diameter which is slightly larger than the diameter of the outer surface 16 of circular wall 14 of the lower housing. In this manner when upper and lower housings are engaged, as shown in FIG. 3, the cylinder walls 24 of the upper portion 2 cooperate with outer surface 16 to seal the annulus 11 from the outside while allowing the portions 2, 3 to be rotated relative to each other.

Forming the bottom of the annular area 23 is annular surface 25 which connects open-end 21 of female receptacle 20 to the cylinder walls 24. As with the lower housing 3, ribs 28 connect the female receptacle to the annular surface 25 to provide structural stability as well as a gripping surface.

With this configuration two cavities are formed when the upper and lower housings are fully engaged. Cavity 26 is formed by the engagement of cylinder 6 with female receptacle 20 and an annular cavity 27 is formed by the engagement of annular area 23 with annulus 11.

An opening 29 is provided in the upper housing 2 to register with the keyway 18 in the lower portion such that a passage is formed to connect the mixing cavity 26 with the annular cavity 27. However, this passage is not complete until the housings are rotated to a predetermined position relative to one another. To insure that the opening 29 and the keyway 18 are properly registered, an extension 30 is placed within the female receptacle 20 approximately 90° from the opening 28 for locating the keyway 18. This extension 30 cooperates with the slot 19 to insure the proper location. In the closed position, wall 31 of slot 19 abuts against extension 30. In this position, as shown in FIG. 2a, the cylinder 6 seals the opening 29 to block the passageway between mixing cavity 26 and annular cavity 27. To open the passageway, the bottom housing is rotated relative to the top housing until the other wall 32 of slot 19 abuts extension 30 as shown FIG. 4. In this position shown in FIG. 2 the keyway 18 and opening 29 are registered to form the passageway. As can be seen in FIG. 4 the interaction of the extension 30 and slot walls 31, 32 prevents the rotation of the lower portion beyond the limits defined by the slot walls 31, 32. This acts as a safety feature to prevent inadvertent opening or closing of the passage by turning the portions in the wrong direction.

In addition to the use of extension 30 as discussed above, to facilitate this proper location of the keyway 18 relative to the opening 28, markings are provided on the exterior of each housing of the container. As shown in FIG. 1, the lower housing has two separate markings to indicate the open and closed positions. A single nipple 33 defines the closed position and a double nipple 34 defines the open position. These markings are registerable with a protrusion 35 shown in FIG. 5, on the upper portion for locating the keyway 18. Thus, when the portions 23 are fully engaged, and the single nipple 33 is aligned with protrusion 35 the cavities 26, 27 are sealed from one another, but when the housings are rotated to a position where the double nipple 34 is

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aligned with protrusion 35 a passage connecting the two cavities 26, 27 is opened. With these markings, 33, 34, 35 in combination with the extension 30 and slot walls 31, 32 one is always assured that rotation is being made in the proper direction when it is desired to either open or close the passage.

In the area of opening 29 there is provided a window 36 on the exterior of the upper housing 2. This allows the user to view the area around the opening 29 and determine the disposition of the material in the annular cavity 27. It should be noted that the annular surface 25 is sloped toward the opening 29. When the container is inverted, as shown in FIGS. 5, 6 and 7, the slope of the surface 25 will force the material to congregate in the area of the opening 29. This insures proper dispensing of the annular cavity 27 and enhances viewability of the material disposition in the annular cavity 27.

In preparation and use of the capsule, the lower portion 3 is arranged as shown in FIG. 1 but in an upright position. Mercury is loaded into the annulus 11 and silver in granulated form is loaded into the cylinder 6. The upper housing 2 is then fully engaged with the lower housing 3. The housings 2, 3 are rotated to a closed position to seal the mixing cavity 26 from the annular cavity 27. When it is desired to mix the materials, the container is simply inverted and the housings 2, 3 rotated to an open position. In this open position due to the slope of surface 25, the mercury will flow toward the opening 19 and through keyway 28 into the mixing cavity 26. The dispensing of the mercury in this manner can be viewed through the window 36. When the user is satisfied that the mercury in annular cavity 27 is sufficiently transferred, the housings are rotated to a closed position. The container is then put in a shaker to insure good mixing of the silver and mercury. After mixing, in the inverted position the lower housing 2 is simply withdrawn by pulling the housings 2, 3 apart to expose the silver-mercury amalgam for use as filling material.

For engaging, rotating, and disengaging the portions 2, 3, the friction generated by the contacting surfaces is relied upon. The tolerances of these surfaces are such that desired relative movement can be readily made without loss in the sealing features. This avoids the need to employ threaded elements or other complex and sophisticated securing means to obtain the desired relative movement.

In the embodiment described above the upper housing 2 is preferably translucent and the lower portion 3 is opaque. However, it is contemplated that a color code can be used to indicate various types of mixtures contained in the capsules. In this manner the user, merely at a glance, can determine which capsule contains the proper mixture.

The container described above is one which is economical to manufacture and provides efficient and accurate mixing. By having a container in which only two housings are needed, and each is of unitary structure, only two molds are required to manufacture the container. As two receptacles are formed in one of the housings, the loading of one receptacle can take place independently of the other providing versatility and efficiency in preparing the capsules for use. In addition, by simply rotating the portions mixing can occur, thus avoiding frangible, threaded, and other complex devices which have existed heretofore. Proper mixing is insured by features which include the slope of surface 25 and the window 36. Thus, with this invention econ-

omy has been achieved with enhanced efficiency in operation not obtained by other devices.

I claim:

1. A container for dental materials comprising:

- a. an upper housing and a lower housing;
- b. said lower housing having a first receptacle and a second receptacle separated from the first receptacles, said receptacles configured to receive predetermined amounts of dental materials independent of each other such that loading of the container can be accomplished solely in said lower housing;
- c. said upper housing having a surface for cooperating with said lower housing to define a closed first cavity with said first receptacle and a closed second cavity with said second receptacle, each cavity being separated from the other; and
- d. said housings defining a passage for connecting the first cavity to the second cavity when one portion is moved to a predetermined position relative to the other portion.

2. The container according to claim 1 wherein said housings are of a unitary structure.

3. The container according to claim 2 wherein at least one of said housings is made of a clear material such that disposition of the dental materials within the container can be viewed.

4. The container according to claim 3 wherein the first receptacle is defined by an elongated cylindrical surface having a top and bottom, the bottom of such surface being closed and the top being open, said second receptacle is defined by an annulus having a bottom and sidewalls concentric with the elongated cylindrical surface.

5. The container according to claim 4 wherein the surface of the upper housing defines a female receptacle for receiving the cylindrical surface of the lower portion such that a cavity is formed by the second portion.

6. The container according to claim 5 wherein the surface of the upper housing defines an annular area concentric with the circular surface, said annular area cooperates with the annulus of the lower housing to form said second cavity.

7. The container according to claim 6 wherein the surface of the upper housing defines an opening connecting said annular area with the circular surface, said cylindrical surface defines a keyway therethrough said opening cooperating with the keyway in the cylindrical surface to provide a passage from the first cavity to the second cavity when said upper housing is rotated to a predetermined position relative the lower housing, said position being where the keyway registers with the opening.

8. The container according to claim 7 wherein said predetermined position as defined by a protrusion in said circular surface cooperating with the keyway to stop the keyway to a position where it registers with the opening.

9. The container according to claim 8 wherein said annulus further defines inside and outside walls concentric with the cylindrical surface of said lower housing, the annular area having inner and outer walls, the inner walls of the annular area being slightly larger than the outer walls of the upper housing for fitting the inner walls snugly over the outer walls of the annulus to allow relative rotational movement and to seal the constituents within the second cavity.

10. The container according to claim 9 wherein the cylindrical member has an inner and outer wall, the outer wall having a diameter slightly smaller than the circular female receptacle of the upper housing for fitting the cylindrical member snugly into the female receptacle allowing the housing to rotate relative to each other and sealing the first cavity from the second cavity.

11. The container according to claim 10 wherein the bottom of the annular area is a surface intersecting the inner wall of the annular area and sloping toward the opening such that material in the second cavity will tend to flow toward said opening.

12. The container according to claim 11 wherein each housing is provided with ribs to enhance gripping and turning of housing relative to each other and to provide structural support for said housing.

13. The container according to claim 12 wherein the housing are marked to indicate where the keyway and opening register with each other and where they are removed from each other to a position for sealing the cavities from each other.

14. A container for dental materials comprising:

- a. an upper housing and a lower housing with both housing being made of semi-rigid plastic;
- b. the lower housing being opaque, the upper housing being translucent, and both being of a unitary structure;
- c. the lower housing having an elongated cylinder closed at the bottom and open at the top such that dental material can be loaded into the cylinder through the top;
- d. an annular member circumscribing the elongated cylinder approximately midway between the top and the bottom of the cylinder, the annular member being defined by a bottom surface extending perpendicular to the cylinder, a circular wall extending parallel to said elongated cylinder and upwardly from the outer edge of the bottom surface, and the outer wall of said elongated cylinder;
- e. ribs extending in a radial direction outwardly from the cylinder connecting the bottom surface of the annular member to the outer wall and bottom of the cylinder;
- f. said cylinder defining at the top thereof a keyway cut out of the inner and outer walls and a slot circumferentially larger than said keyway, also cut out of the top and in communication with the keyway;
- g. the upper housing defining a cylindrical receptacle for receiving the cylinder of the lower housing, said receptacle being closed at one end and open at the other annular area concentric with said receptacle extending from the upper end thereof;
- h. said annular area being defined by cylinder wall having an internal diameter slightly larger than the diameter of the outer wall of the cylinder of the lower housing such that the cylinder wall can fit snugly over the outer walls of the annulus and allow rotational movement, and a bottom surface extending from the end of the receptacle connecting the receptacle to the cylinder wall;
- i. an opening is provided through said bottom surface to form a passageway the annular area and the receptacle;
- j. the receptacle having an internal diameter slightly larger than the diameter of the outer wall of the cylinder such that the receptacle can fit snugly over the cylinder wall and rotational movement;

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- k. said cylinder being engageable with said receptacle to that form a mixing cavity defined by the bottom of the receptacle and the cylinder which confines material therein from the annular area, and said annular cavity for confining material therein from the mixing cavity and the outside;
- l. said housing being rotatable relative each other for moving the housings to an open position where the keyway and the open position register and moving housing to a closed position where the cavities are sealed from one another;

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- m. a stop member extending from the internal surface of the receptacle to cooperate with the slot in the cylinder for stopping the slot at the open position and the closed position;
- n. said upper housing having a mark in the area of the opening and said lower housing having markings to register with the mark on the upper housing to indicate the open and closed position; and
- o. said upper and lower housings being engageable and disengageable by moving each housing opposite each other on a direction along the center line.

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,917,062
DATED : November 4, 1975
INVENTOR(S) : Robert Winters

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In column 2, line 6, "portions" should read --portion--;
line 25, delete the comma; line 32, "power" should
read --powder--; line 40 after "outwardly" and before
"the cylinder" insert --from--; line 50 delete "4" and
insert --5 and retained there--; line 64 delete the
comma; line 65 delete the comma;

In column 3, line 46, after "position" insert a comma;
line 47 after "Fig. 2" and before "the keyway" insert
a comma;

In column 4, line 30 "28" should read --18--; and

In column 6, line 19, "housing" should read --housings--;
line 30, "closd" should read --closed--; line 38 "to to"
should read --to--; line 63, after "passageway" and
before "the annular" insert --between--; line 68 after
"wall and" and before "rotational" insert --allow for
relative--

Signed and Sealed this

twenty-second Day of June 1976

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

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