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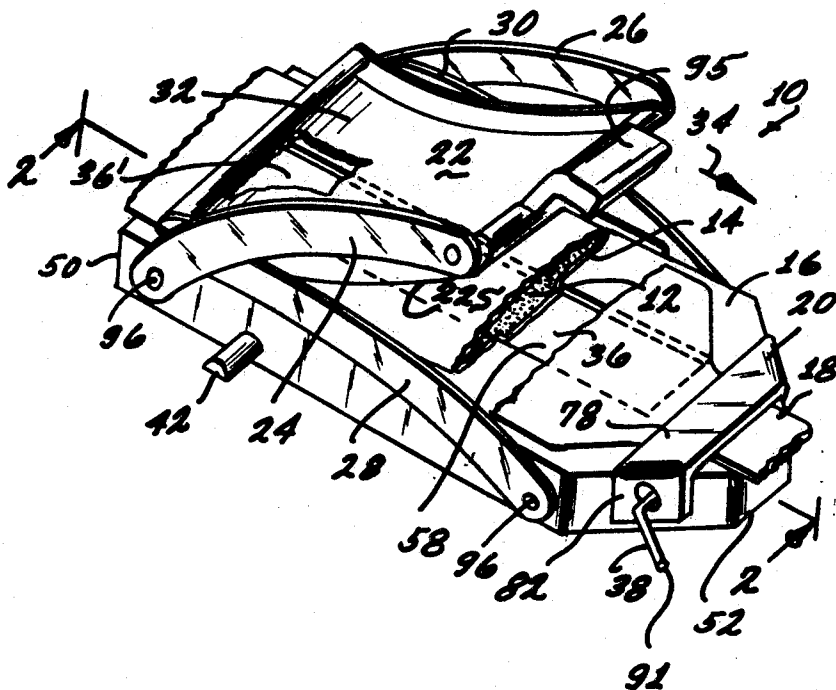
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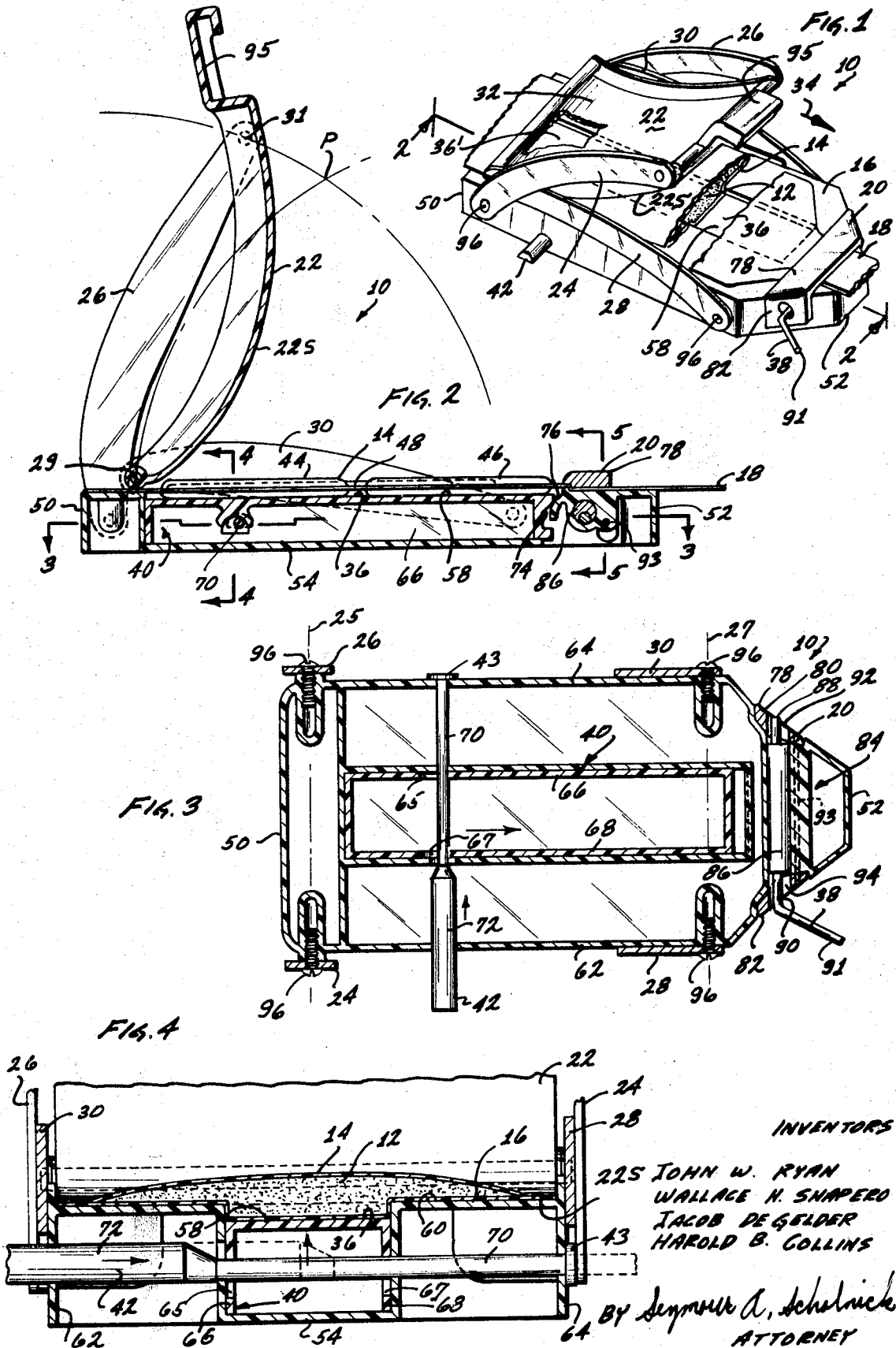
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[54] **MIXING AND DISPENSING DEVICE**
9 Claims, 15 Drawing Figs.

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 222/101; 259/72
 [51] Int. Cl. B65d 35/22
 [50] Field of Search 222/95,
 94, 101, 103; 206/47(Mix); 259/72, 29

ABSTRACT: Apparatus for mixing two or more products in a flexible package and then dispensing them, comprising a platform for holding the package and a rocker which rolls back and forth over the platform. The platform has a channel which receives a portion of the flexible package, so that the products flow back through the channel as the rocker rolls forward. A bar forming the bottom of the channel can be raised to close the channel, and the front of the package can be opened, so that forward movement of the rocker expels the mixed product from the package.

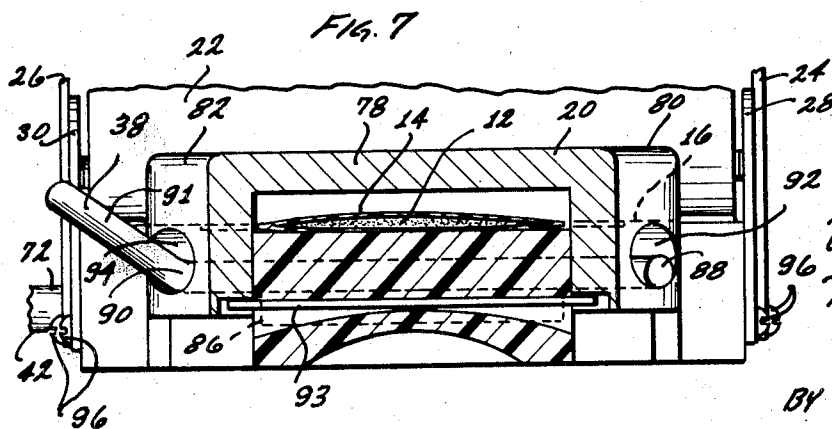
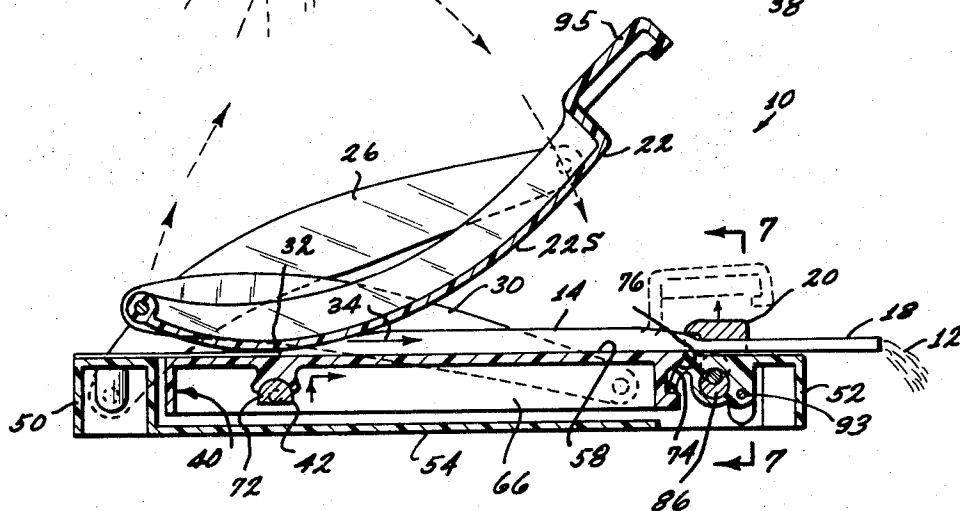
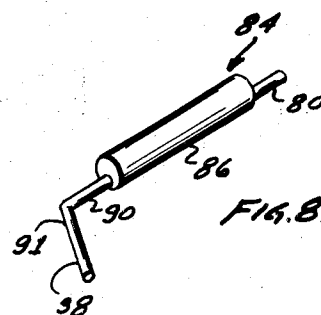
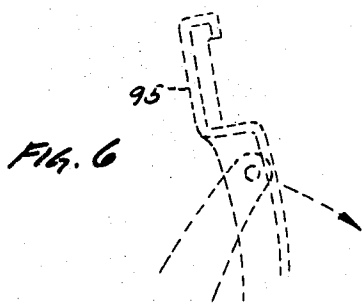
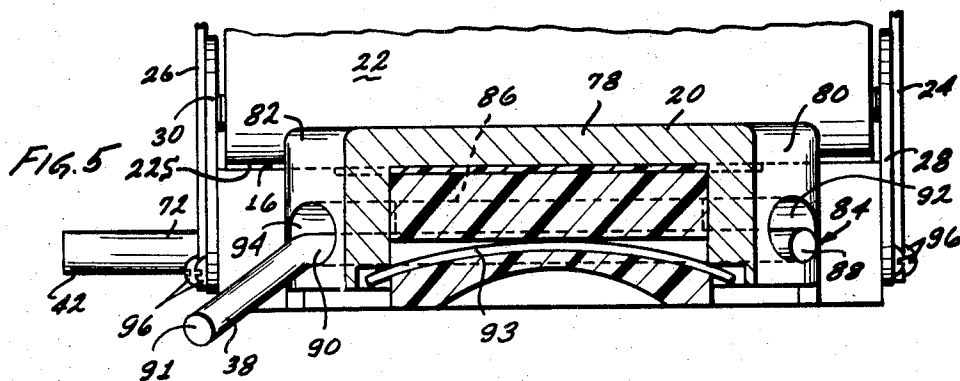




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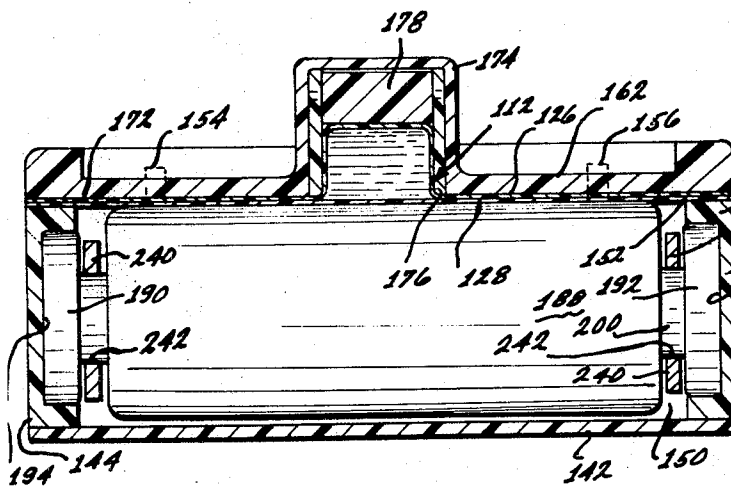
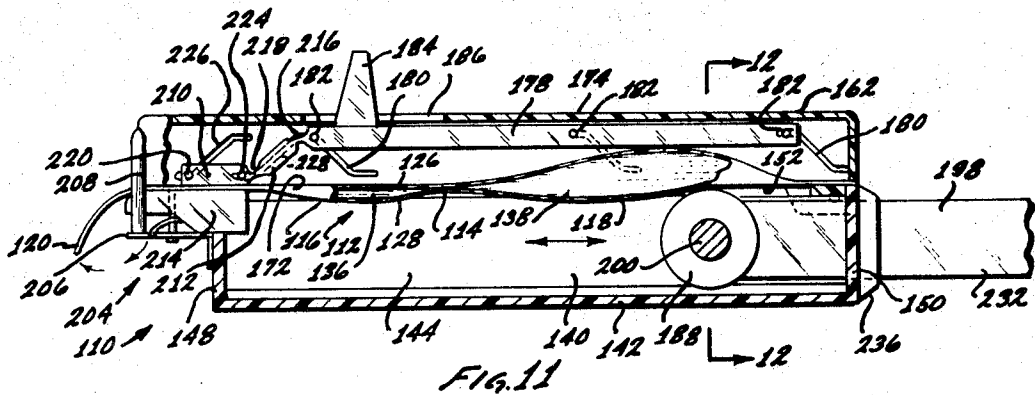
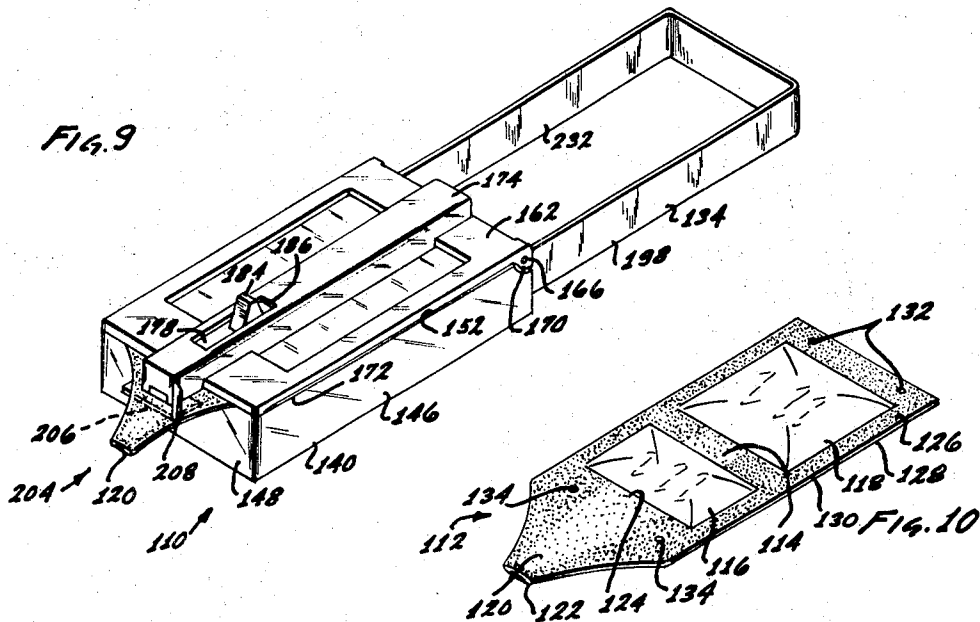
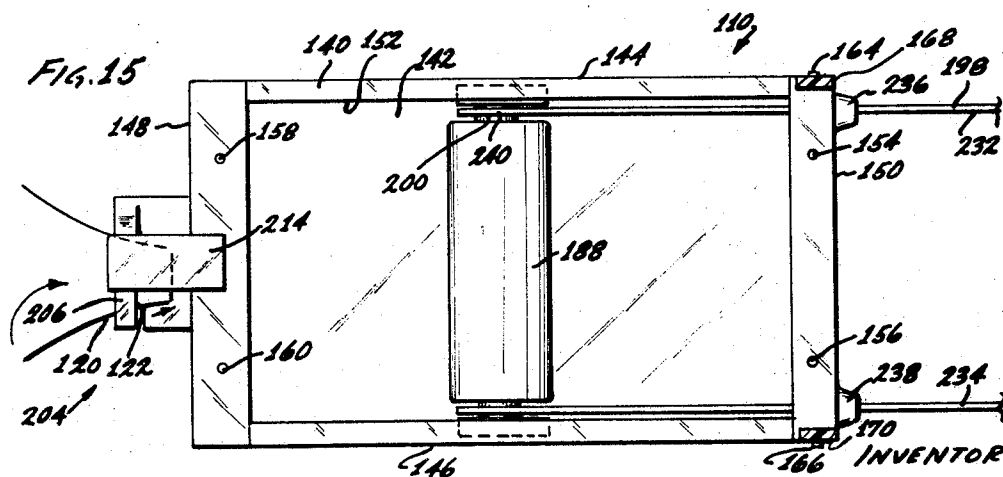
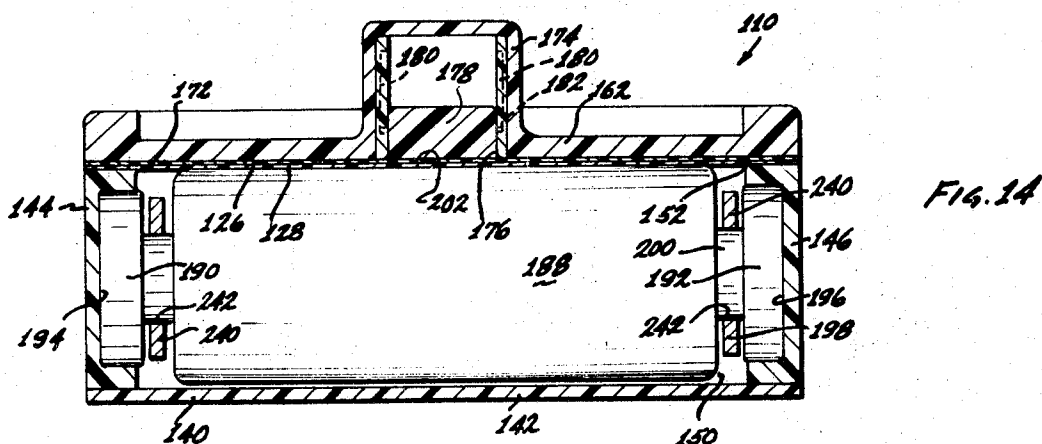
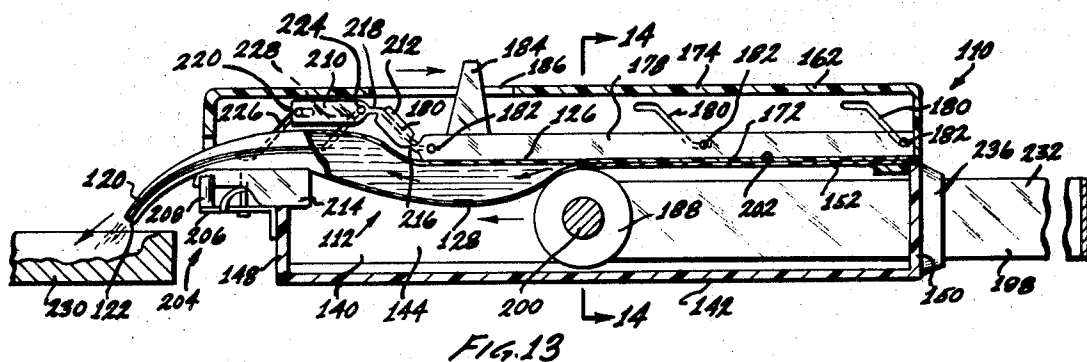


Fig. 12

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MIXING AND DISPENSING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to mixing and dispensing devices.

2. Description of the Prior Art

Many products, such as a resin and a hardening agent, must be mixed together prior to use. The two (or more) products can be packaged in separate containers for mixing in a cup or the like. However, the cup and mixing blade must then be cleaned or discarded.

Two or more products which must be mixed can also be packaged together, but separated by a rupturable or otherwise extinguishable seal. Heretofore, however, the difficulty of quickly and thoroughly mixing the products while they are in the package, and of controlling the dispensing of the mixed solution without getting drops of it on the hands, has limited the usefulness of such packaging methods. The slowness of mixing has prevented the wider use of certain fast-reacting chemical systems, and the messiness of use has discouraged the use of even slow reacting systems.

SUMMARY OF THE INVENTION

In accordance with the present invention, apparatus is provided for readily mixing products in a flexible package and dispensing them therefrom, without contact between the products and the apparatus. The apparatus comprises means for constricting the flexible package to divide it into two orifice connected compartments. The constricting means is moved from one end of the package to the other end, to reduce the volume of one compartment while increasing the volume of the other, so that the products move through the orifice from one compartment to the other. The movement of the products back and forth through the orifice results in rapid shear mixing. After thus mixing, a forward end of the package may be opened. Then, while the constricting means is at the rear of the package, the constriction is made complete to essentially close the orifice. Finally, the constriction is slowly moved forward to dispense the mixed products from the opened forward end of the package.

One embodiment of the invention includes a platform for supporting the package and a rocker which presses on the package to divide it into two compartments, one compartment behind the rocker and one ahead of it. The rocker is held tight against the platform by two sets of links that connect it to the platform. The platform has a trough or depression extending along its length which can receive a portion of the package, to form the orifice that connects the compartments. As the rocker rolls back and forth along the platform, the products move back and forth through the orifice formed in the trough. A bar at the bottom of the trough can be moved so its surface is even with the platform, to eliminate the trough. Then, the forward end of the package is opened, and the rocker is rolled slowly forward to squeeze out the product through the opening. In another embodiment of the invention, a roller is employed instead of a rocker, to press the package against the platform.

The novel features of the invention are set forth with particularity in the appended claims. The invention will be best understood from the following description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of mixing and dispensing apparatus constructed in accordance with the invention, shown holding a package with contents to be mixed;

FIG. 2 is a sectional side view taken on the line 2-2 of FIG. 1;

FIG. 3 is a sectional view taken on the line 3-3 of FIG. 2;

FIG. 4 is a sectional view taken on the line 4-4 of FIG. 2;

FIG. 5 is a sectional view taken on the line 5-5 of FIG. 2;

FIG. 6 is a view similar to FIG. 2, showing the device during a material dispensing operation;

FIG. 7 is a sectional view taken on the line 7-7 of FIG. 6;

FIG. 8 is a perspective view of the clamp operating cam of the device of FIG. 2;

FIG. 9 is a perspective view of mixing and dispensing apparatus constructed in accordance with another embodiment of the invention;

FIG. 10 is a perspective view of the package held in the apparatus of FIG. 9;

FIG. 11 is a sectional side view of the apparatus of FIG. 9;

FIG. 12 is a sectional view taken on the line 12-12 of FIG. 11;

FIG. 13 is a view similar to FIG. 11, showing the device during a material dispensing operation;

FIG. 14 is a sectional view taken on the line 14-14 of FIG. 13; and

FIG. 15 is a plan view of the apparatus of FIG. 9 with the cover removed, and indicating schematically the manner of cutting the package spout.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a mixing and dispensing device 10 for mixing a product 12 held in a flexible package 14. The package may be manufactured with two or more portions separated by easily ruptured seals, and with different products such as a resin and a hardening agent in each portion. The seals are ruptured so that the two or more package portions become one large compartment, and the two or more products are then mixed by the device 10.

In order to mix the products within the package 14, the package is laid on a platform 16 of the mixing device. A spout 18 on the package, used for pouring out the products after they are mixed, is clamped onto the platform by a clamp 20. A constricting member in the form of a convexly rounded rocker 22 is disposed opposite the platform to press the package tight against the platform. The rocker is held against the platform by two pairs of links 24, 26, 28 and 30. The rocker 22 presses on the package along a laterally extending area indicated at 32.

The links allow the rocker to rock on the platform, so that the laterally extending area 32, where the package is pressed down, moves from one end of the platform to the other. As the rocker rolls forward, so that the constricted area 32 moves in the direction or arrow 34, all of the product 12 within the package is squeezed forward.

In accordance with the invention, a channel-shaped depression or trough 36 is formed in the middle of the platform, the depression extending longitudinally from one end of the platform to the other. The lateral area 32 where the rocker presses down on the package essentially divides the package into two compartments, one behind this lateral area and one in front of it. However, the trough 36 forms an orifice 36' that connects these compartments. As the rocker rocks forward in the direction of arrow 34 to squeeze the product into the forward compartment, which is constantly decreasing in volume, the product flows back through the orifice 36' into the rear compartment.

By repeatedly rolling the rocker back and forth, the product 12 is made to flow back and forth through the orifice formed in the orifice surface or trough 36 under the rocker. This produces shear mixing, and after repeated rocking the two or more originally separate products are thoroughly mixed and can be dispensed into a mold or the like.

The dispensing of the mixed product is accomplished by first rolling the rocker to the rear position so that all of the material in the package is in front of it. Then the clamp 20 is lifted by rotating a clamp lever 38. If the rocker 22 is then rolled forward, most of the product will be squeezed forward and out of the spout 18. However, some of the product might remain in the trough 36, or move backward through it and not be dispensed. To prevent this, the bottom of the trough is

formed by a bar 40 that can be raised to a level even with the rest of the platform, by pressing in on a bar-raising cam 42. This eliminates the trough and essentially narrows the orifice 36' under the area 32 to a substantially zero cross section. When the rocker is then rolled forward, practically all of the product is dispensed through the spout.

FIG. 2 shows the apparatus of FIG. 1 prior to the beginning of the mixing operation, showing the package 14 with two portions 44 and 46 separated by a rupturable seal 48, although more than two portions may be used in some packages. When the rocker 22 is first rolled forward with the bar 40 raised, the seal will break and the products can be mixed. Mixing is accomplished by first lowering the bar 40 and then repeatedly rolling the rocker back and forth.

As shown in FIGS. 2, 3 and 4, the platform 16 which supports the package, has a rear end 50 and a front end 52. The platform has a slot in which the trough is formed, and has a bottom wall 54 extending beneath the slot. The bar 40 lies in the slot and is supported by the bottom wall 54 of the platform. The bar has an upper surface 58 which can form the bottom of the trough 36. The bar can be raised up so that its upper surface 58 is even with the main, package-supporting surface 60 of the platform. As mentioned above, this is accomplished by pressing in the cam 42. Otherwise, the bar surface 58 lies below the platform surface 60 to form the trough.

The cam 42 extends laterally through the platform between the sidewalls 62 and 64 thereof, and through holes 65 and 67 in the sidewalls 66 and 68 of the bar. The cam has a lowering portion 70 and a raising portion 72. When the raising portion 72 is pressed in, it raises the rear end of the bar so its upper surface 58 is even with the platform's surface 60, and it also shoves the bar forward slightly. The forward end of the bar has an inclined portion 74 that engages an inclined portion 76 on the platform. When the bar 56 is shoved forward, the inclined portions 74 and 76 raise the forward end of the bar so it is even with the platform surface 60. Thus, pressing in on the platform 40 raises the entire bar to eliminate the depression or trough 36.

The clamp 20 at the forward end of the platform can be operated to hold the spout of the package tight against the platform, thereby preventing the accumulation of some of the product in the spout during mixing. FIGS. 2, 3 and 5 show the clamp held tight against the spout. The clamp includes a clamp member 78 which extends laterally across the front end of the platform, and which has sidewalls 80 and 82 held down by a clamp-operating cam 84. As also shown in FIG. 8, the cam 84 includes a large diameter central bearing portion 86 that is rotatably mounted on a cylindrical hole in the platform. A pair of offcenter rods 88 and 90 extend from opposite ends of the portion 86 of the cam. These rods engage holes 92 and 94 in the walls 80 and 82, respectively, in the clamp member 78. One of the rods 90 has a bent portion 91 for hand turning the cam.

As shown in FIG. 5, the sidewalls 80 and 82 of the clamp member 78 are biased upward by a pinlike spring 93 that extends through a hole in the platform. When the bent portion 91 of the cam member is turned to the front, as shown in FIGS. 3 and 5, the rods 88 and 90 of the cam member press down the clamp member 78 against the force of spring 93, to hold down the package spout 18. However, when the bent portion 91 is turned 180° to face backward, the clamp is released to move up and open the spout. The open condition is shown in FIG. 7.

The rocker 22 is supported by the four links 24, 26, 28 and 30 so that it is always pressed against the platform surface 60, except when the rocker is moved very far back to the position shown in FIG. 2. In the configuration of FIG. 2, the back of the rocker is spaced above the platform, to facilitate the initial placement of the package on the platform. At all other rocker positions, however, the links keep the rocker down tight against the platform. To assure that the rocker always bears tightly on the platform, but not so hard that it cannot be rolled therealong, the rocker surface 22S must be precisely con-

toured for a given placement of the pivot points or axes 25, 27, 29 and 31 of the links, and given lengths of links. The rocker surface 22S can have a curve close to that of a circle drawn about a point P where the paths of the link pivot axes 29 and 31 cross, and with a radius equal to the perpendicular distance from point P to the platform surface 60. The rocker 22 primarily rolls on the platform surface, with only a small amount of sliding relative to it.

The front end 95 of the rocker, which serves as a handle, is formed to fit over the clamp member 78. This is to allow the rocker to press on all portions of the package up to the clamp, so that no part of the product escapes mixing or dispensing.

Dispensing of the mixed product is accomplished in the manner shown in FIG. 6. With the bar-raising cam 42 pushed in to raise the bar 40, and the clamp cam 84 turned to raise the clamp 78, the rocker is slowly rolled forward. The spout 18 may have a rupturable seal, which is prevented from rupturing during mixing by the clamp 78, but which ruptures during dispensing when the clamp is lifted. Alternatively, the end of the spout can be cut off prior to dispensing. As the rocker rolls forward, the product is dispensed through the spout, the rate of dispensing being controlled by the speed of forward rocking. The entire device generally can be held over a mold or the like and operated by one hand, and close control can be maintained over the amount of product dispensed.

The apparatus is designed for easy disassembly for cleaning, in case a package should burst. The rocker 22 and its links 24, 26, 28 and 30 can be removed by unscrewing the screws 96 that hold the four links to the platform and the rocker. The bar 40 will then fall out when the platform is turned upside down. The bar-raising cam 42 can be removed by removing a retaining nut 43 on its end. The clamp member 78 can be removed by pulling out the cam 84. Reassembly is accomplished in the reverse manner.

While the apparatus is shown with a single trough 36 which forms a single orifice 36', the device could be constructed with two or more troughs so that the orifice connected compartments are connected by two or more orifices. However, the total cross-sectional area of the orifices must be limited to cause a considerable flow of products through them. It is also possible to constrict the package into three or more orifice connected compartments.

FIGS. 9 through 15 illustrate a mixing and dispensing device 110 constructed in accordance with another embodiment of the invention. As shown in FIG. 11, it employs a roller 188 attached to a handle 198 that is pushed back and forth along a housing 140. A flexible package 112 is held near the top of the housing, is pressed upward against the underside 172 of a cover 162 by the roller. A channel-shaped member 174 in the cover, which holds a bar 178, forms a trough. As the roller rolls along the surface 172, to form two compartments in the package, one in front of the roller and one behind it, the trough provides an orifice that connects these compartments. The products to be mixed flow through the orifice thus formed, to provide shear mixing.

As shown in FIG. 10, the package 112 has rupturable seal means 114 separating a first package portion 116 from a second portion 118. The package 112 may be made from suitable flexible materials and is provided with a pouring spout 120 having a discharge end 122 and an open end 124. Package 112 includes an upper ply 126 and a lower ply 128 which may be sealed together around a peripheral margin 130 thereof. Package 112 is provided with a pair of rear apertures 132 and a pair of front apertures 134 which may be used in a manner to be hereinafter described to secure package 112 in device 110. Package portion 116 may contain a first product 136 and portion 118 may contain a second product 138 which may comprise suitable liquids to be mixed together.

Mixing and dispensing device 110 includes a housing 140 having a bottom wall 142, a pair of sidewalls 144, a front wall 148, a rear wall 150 and an open top 152. The rear wall 150 supports a pair of upstanding pins 154, 156 and the front wall supports a pair of upstanding pins 158, 160 engageable with

package apertures 132 and 134, respectively, for supporting package 112 in open top 152. A cover 162, which is pivotally connected to sidewalls 144 and 146 by fixed pins 164, 166 respectively, that engage tabs 168, 170, respectively, provided on cover 162, may then be swung to a closed position securing package 112 in housing 140 against the underside 172 of cover 162.

Cover 162 includes a channel-shaped member 174 having an opening 176 extending over housing 140 along its major axis. A bar 178 is mounted in opening 176 in a plurality of guide ways 180 provided in channel-shaped member 174. Bar 178 carries a plurality of pins 182 slidably engaging ways 180 for guiding bar 178 from the elevated position shown in FIGS. 11 and 12 where it is behind the surface 172 to the lowered position shown in FIGS. 13 and 14 where it is even with the surface 172. Bar 178 carries an actuating finger 184 which is disposed within a slot 186 provided in cover 162 and which may be reciprocated therein for moving bar 178 from one position to the other. When bar 178 is in its FIGS. 11 and 12 position, opening 176 defines a space into which a portion of package 112 may be forced by the roller 188.

The roller 188 is mounted in housing 140 on a pair of wheels 190 and 192 rollingly mounted in ways 194, 196 provided in sidewalls 144 and 146, respectively. Roller 188 may be reciprocated within housing 140 by the U-shaped handle 198 which is connected to an axle 200 which, in turn, connects roller 188 to wheels 190 and 192. Forcing a portion of package 112 into opening 176 causes the products 136 and 138 to be pushed through an aperture formed in package 112 ahead of roller 188 in opening 176 so seal 114 will rupture and the products will be mixed together during reciprocation of roller 188 within housing 140. After mixing, bar 178 may be moved to the position shown in FIGS. 13 and 14, closing opening 176 so that the underside 202 of bar 178 is disposed in the plane of underside 172. Roller 188 may then be moved from the rear wall 150 toward front wall 148 to dispense the mixed product from the container 112, as shown in FIG. 13.

Device 110 includes a package-opening member 204 having a blade 206 adapted to receive pouring spout 120, as shown in FIG. 15. The blade is not operated to cut off the end of the spout, however, until the cover 162 is later closed. After the spout 120 is engaged in package-opening member 204, the package 112 is swung over opening 152 in housing 140 and engaged in position on pins 154, 156, 158 and 160. Cover 162 carries a pin 208 at its front end which engages blade 206 when cover 162 is closed, causing blade 206 to sever sealed end 122 of spout 120. As shown in FIG. 11, the products 136 and 138 are then retained in package 112 by a pressure foot 210 which is connected to bar 178 by a link 212 in such a manner that pressure foot 210 will press spout 120 against an anvil 214 when bar 178 is in its elevated position. As also shown in FIG. 13, link 212 is connected to bar 178 by a first live hinge 216 and to pressure foot 210 by a second live hinge 218. Pressure foot 210 carries pins 220, 224 engaged in ways 226, 228, respectively, provided in channel-shaped member 174. Bar 178, link 212 and pressure foot 210 may be molded as a unit from a suitable polypropylene material having a reduced cross section forming live hinges 216 and 218. Pressure foot 210 becomes elevated to the position shown in FIG. 13 when bar 178 is lowered, so that the mixed product is free to flow from spout 120 into a suitable container 230 when roller 188 is moved from rear wall 150 toward front wall 148.

Handle 198 includes a pair of legs 232, 234 reciprocally mounted in hollow bosses 236, 238, respectively, provided in rear wall 150. Arms 232, 234 each include an end 240 provided with an aperture 242 in which axle 200 is received.

Thus, the invention provides apparatus for mixing and dispensing products contained in a flexible package, without requiring contact between the product and apparatus at any time.

Although particular embodiments of the invention have been described and illustrated herein it is recognized that modifications and variations may readily occur to those skilled

in the art, and consequently, it is intended that the claims be interpreted to cover such modifications and equivalents.

I claim:

1. Apparatus for mixing products in a flexible package comprising:

means for constricting a portion of said package into an orifice that divides said package into two orifice connected compartments, said means including a platform having a channel extending therealong to receive a portion of said package to form said orifice;

means for moving said means for constricting along said package to reduce the volume of one compartment while increasing the volume of the other, whereby to force said products form one compartment through said orifice in said channel into the other; and

closing means for selectively reducing said channel to a substantially zero cross-sectional area whereby subsequent movement of said constricting means along said package discharges said products from said package.

2. The apparatus described in claim 1 wherein:

said closing means is movably disposed in said channel; and means for moving said closing means between a first position spaced from said platform surface to open said channel and a second position substantially even with said platform surface to close said channel.

3. Apparatus for mixing products in a flexible package comprising:

means for constricting a portion of said package into an orifice that divides said package into two orifice connected compartments;

said means for constricting comprising a platform for supporting at least a portion of one side of said package, said platform having first and second end portions, and a rocker with a convexly rounded surface positioned opposite said platform, said rocker having first and second end portions; and

said means for moving comprising a first pair of links coupling said first end portion of said platform to said second end portion of said rocker, and a second pair of links coupling said second end portion of said platform to said first end portion of said rocker, for holding said convexly rounded surface pressed against said platform as said rocker rocks thereon.

4. Apparatus for mixing products in a flexible package comprising:

a platform having first and second ends, said platform having a package-supporting surface with a longitudinally extending slot therein and means in said slot for defining an orifice surface spaced behind said package-supporting surface;

means for pressing said package against said package-supporting surface along a substantially laterally extending area; and

means for moving said means for pressing longitudinally back and forth over said package supporting surface, said means in said slot comprising movable bar means and means for moving said bar means to a level substantially even with said package-supporting surface.

5. Apparatus for mixing products in a flexible package comprising:

a platform having first and second ends, said platform having a package-supporting surface with a longitudinally extending slot therein and means in said slot for defining an orifice surface spaced behind said package-supporting surface;

means for pressing said package against said package-supporting surface along a substantially laterally extending area;

means for moving said means for pressing longitudinally back and forth over said package-supporting surface;

clamp means for alternately closing and opening said package to block and permit the dispensing of material therefrom; and

means for raising said means for defining an orifice surface to the level of said package-supporting surface, whereby to press out all of said products after they are mixed.

6. Apparatus for mixing products in a flexible package comprising:

a platform having first and second ends, said platform having a package-supporting surface with a longitudinally extending slot therein and means in said slot for defining an orifice surface spaced behind said package-supporting surface;

means for pressing said package against said package-supporting surface along a substantially laterally extending area;

means for moving said means for pressing longitudinally back and forth over said package-supporting surface;

said package including spout means for dispensing said products; a clamp mounted on said platform for receiving said spout means between it and said platform; and means for moving said clamp against and away from said platform to close and open said spout.

7. Apparatus for moving products held in a flexible package

comprising:

a platform for supporting said package, said platform having forward and rearward end portions;

a rocker having forward and rearward end portions;

5 a first pair of links, each having one end pivotally joined to said forward end portion of said platform and an opposite end joined to said rearward end portion of said rocker;

10 a second pair of links, each having one end pivotally joined to said rearward end portion of said platform and an opposite end joined to said forward end portion of said rocker; and

said rocker shaped to continually bear against said platform as it is pivoted on said links.

15 8. The apparatus described in claim 7 wherein: said platform has means defining a channel extending substantially longitudinally therealong.

20 9. The apparatus described in claim 8 including means for raising the bottom of said channel to substantially the level reached by said rocker.

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