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(54) DISPOSABLE PAINT CUP

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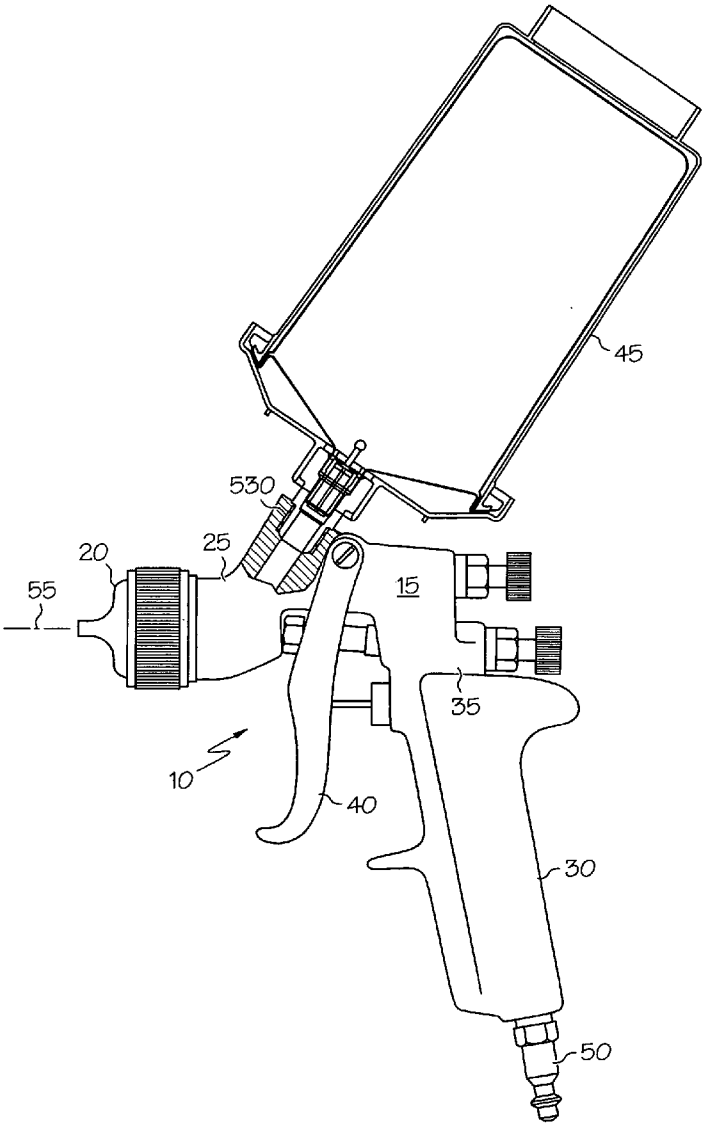
(57) **ABSTRACT**

A flexible, disposable cup. The disposable cup comprising a side wall, an open outlet end, and a closed bottom defining an interior, the sidewall having a first portion adjacent to the outlet end, a second portion adjacent to the bottom, and a third portion between the outlet end and the bottom, the first and second portions having a thickness greater than a thickness of the third portion.



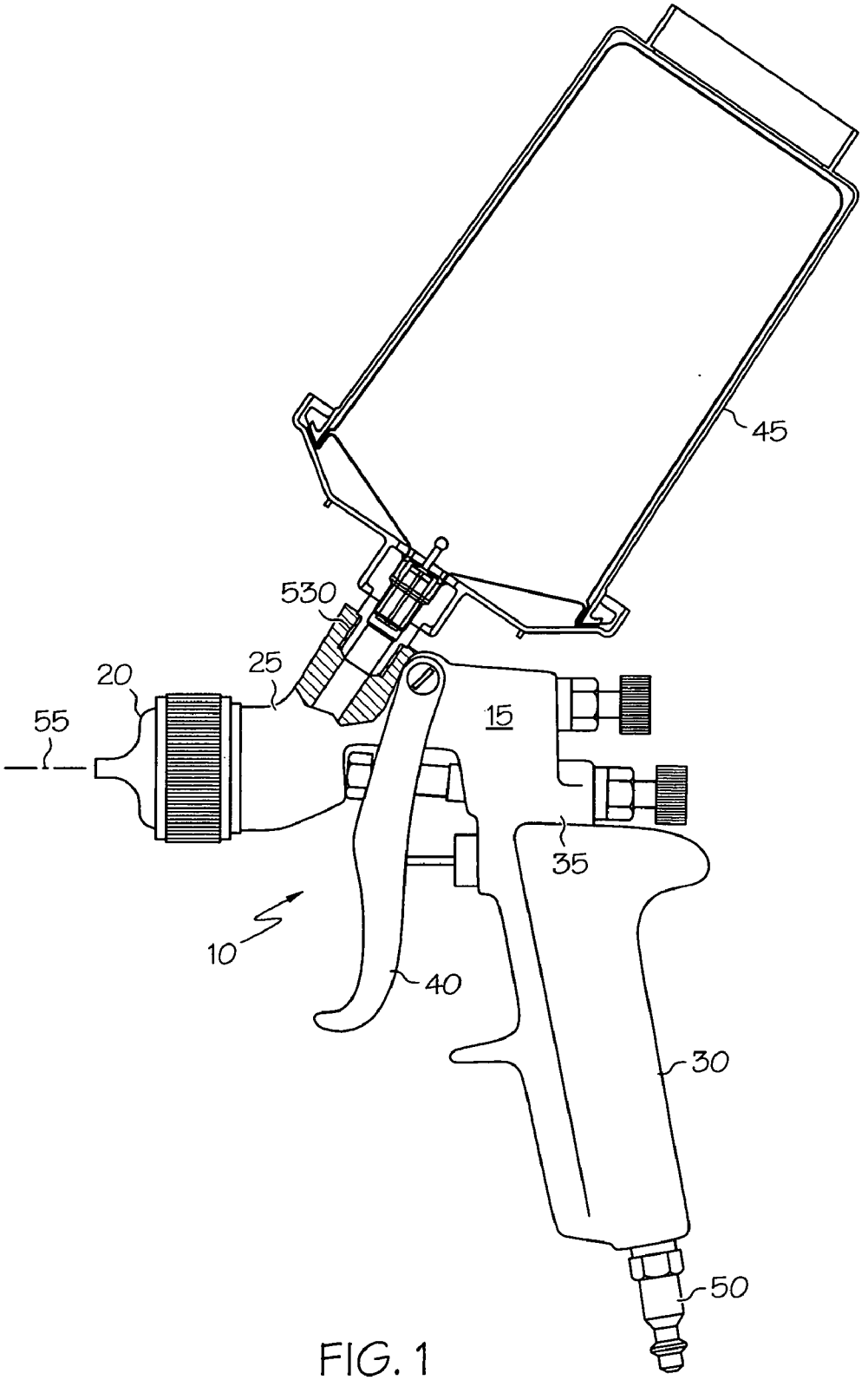


FIG. 1

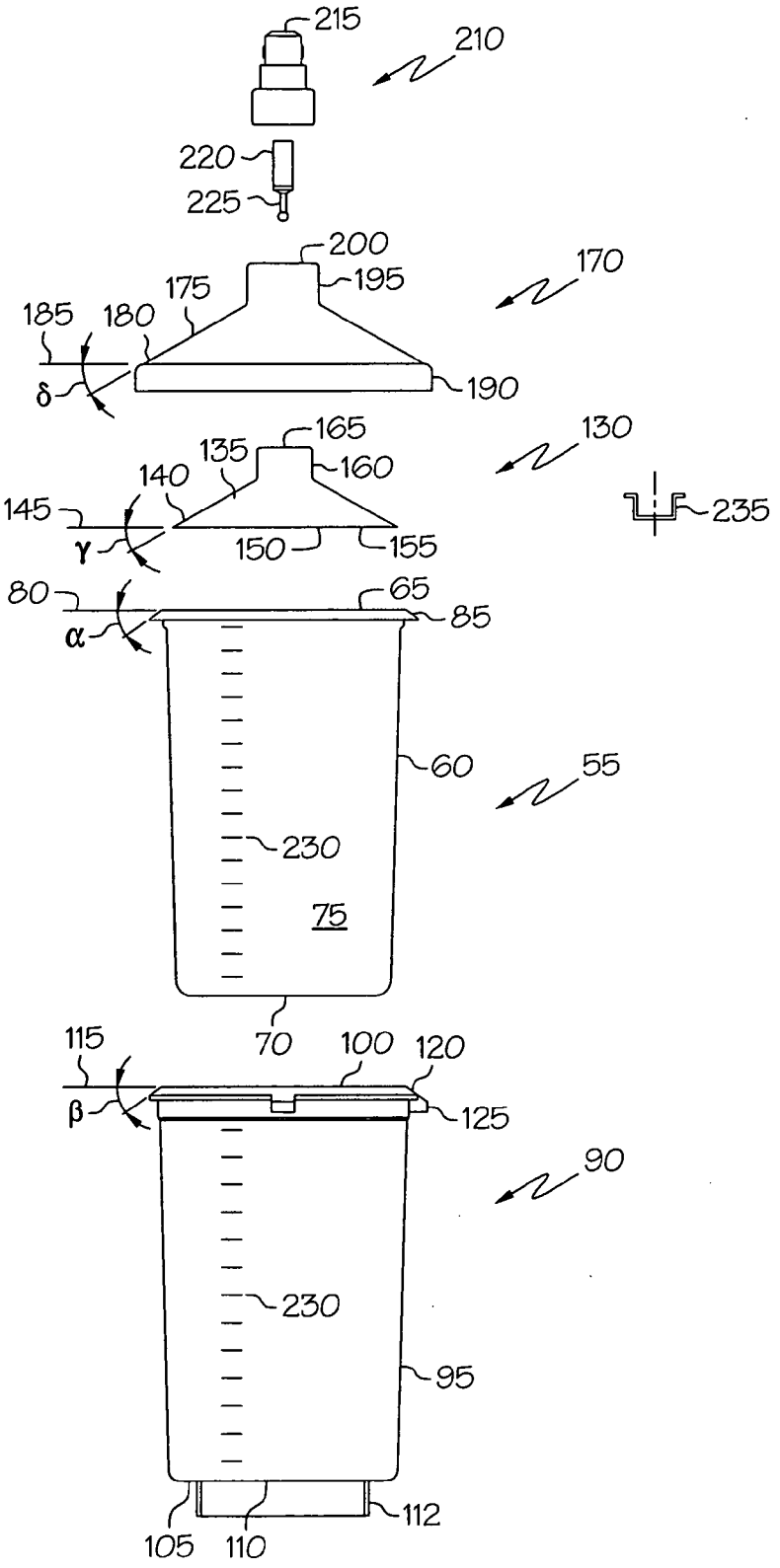

215
210
220
225
200
195
170
175
185
180
δ
190
165
130
135
160
140
145
γ
150
155
235
80
65
α
85
60
55
230
75
70
115
100
120
β
125
90
230
95
112
105
110

FIG. 2

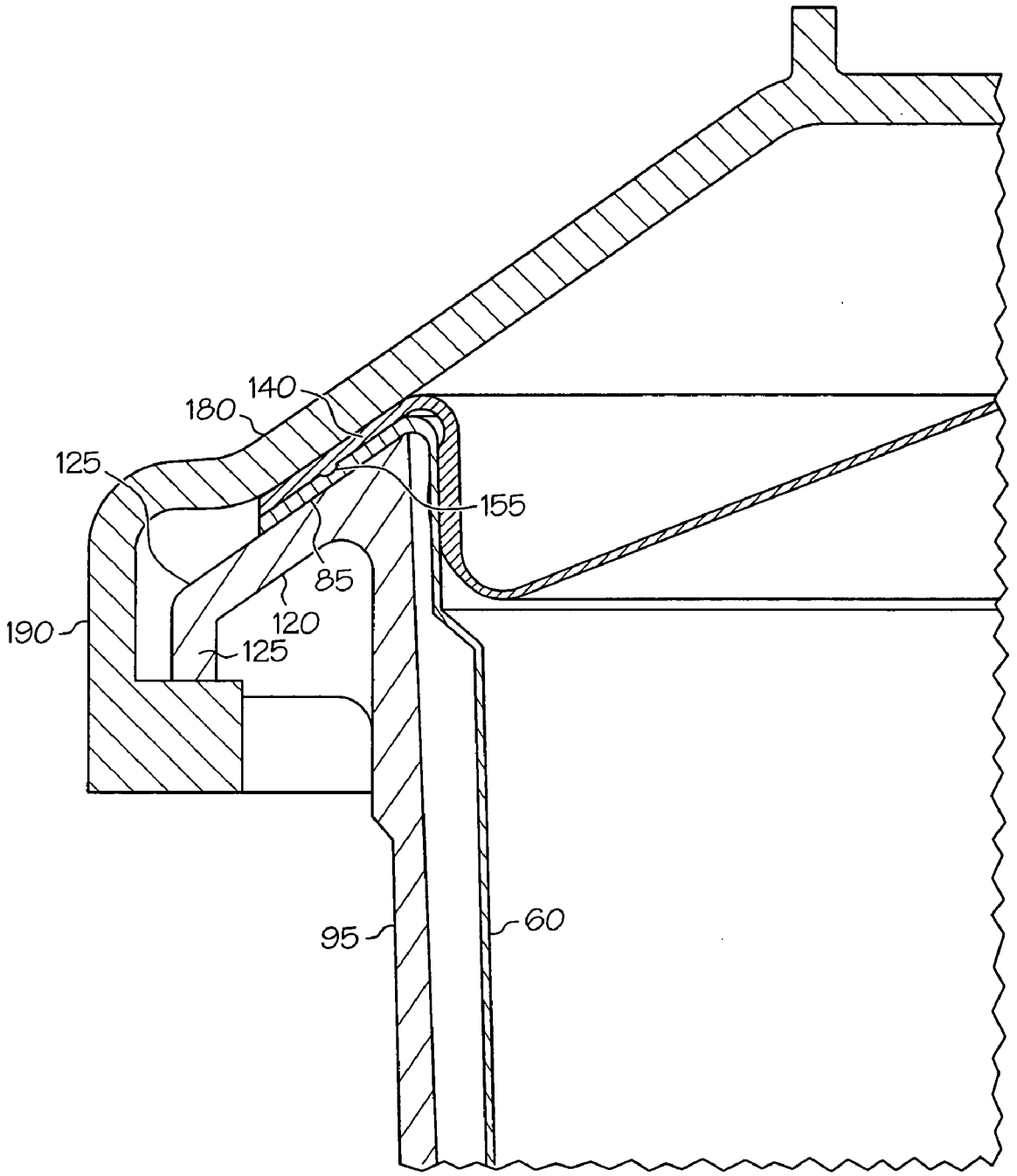


FIG. 3

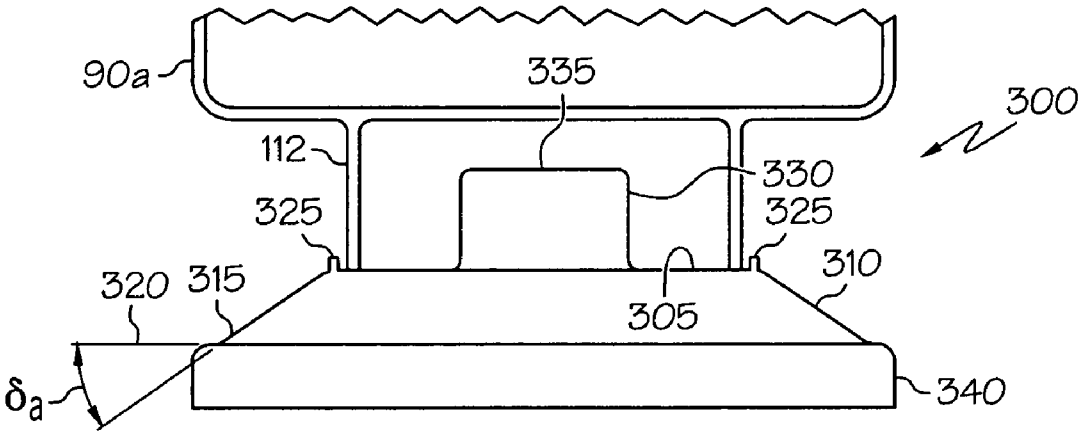

90a
335
300
112
330
325
325
310
320
315
305
δ_a
340

FIG. 4

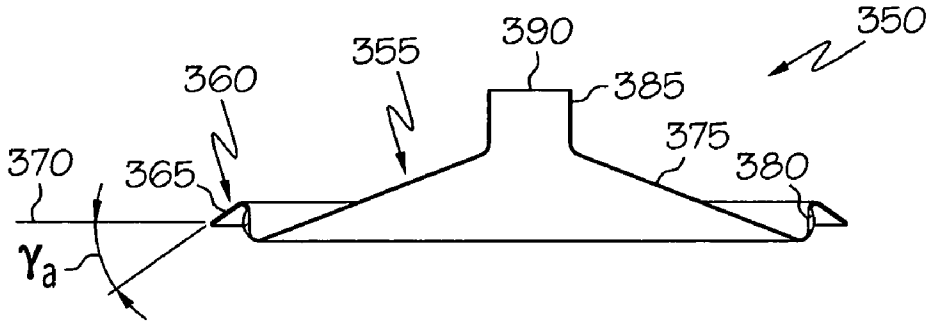

350
390
355
360
385
375
370
365
380
γ_a

FIG. 5

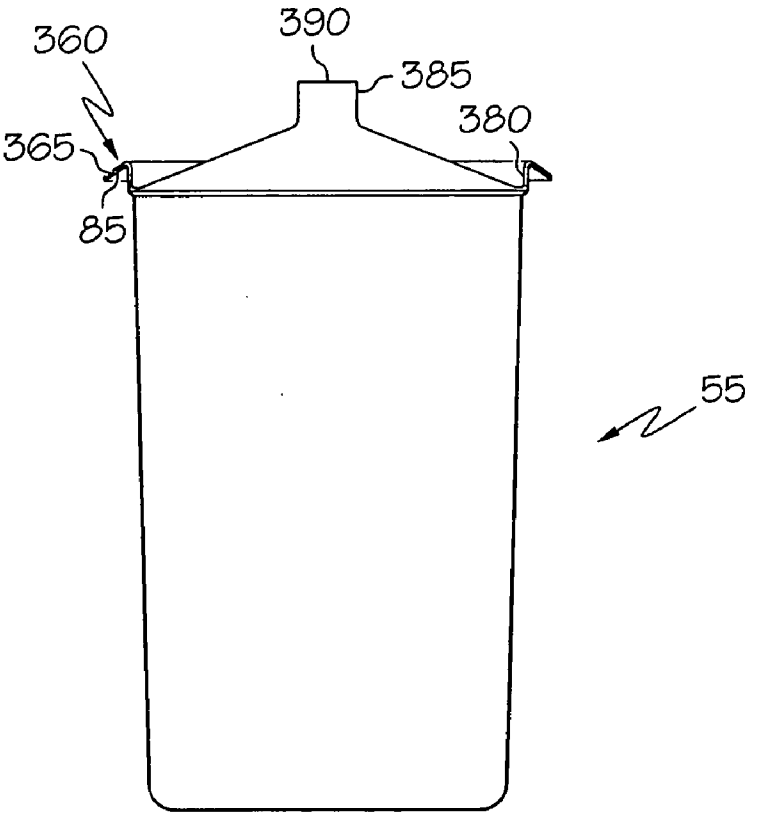

360
390
385
380
365
85
55

FIG. 6

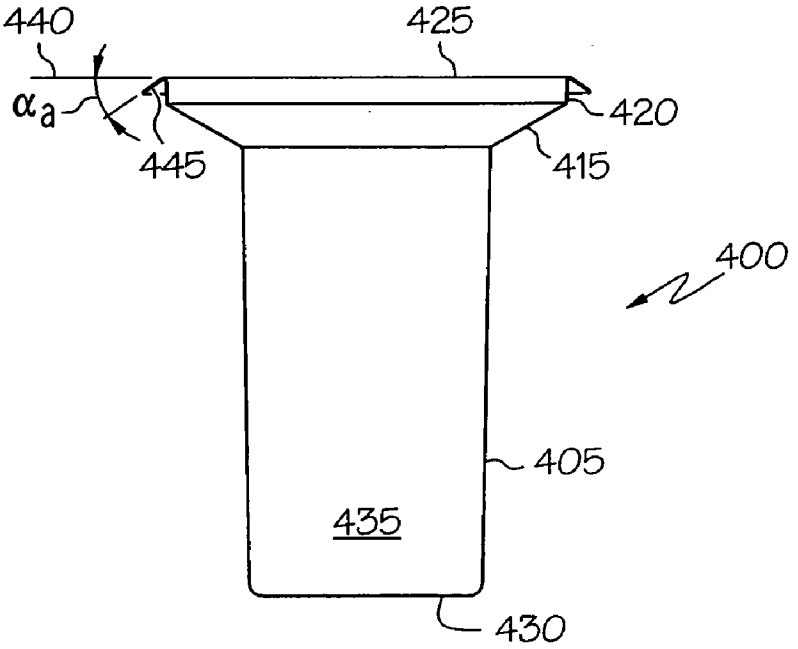

440
425
α_a
420
445
415
400
405
435
430

FIG. 7

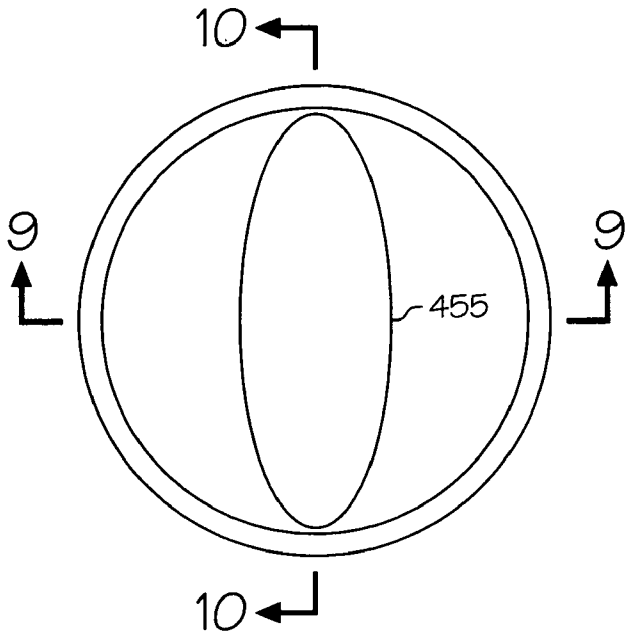


FIG. 8

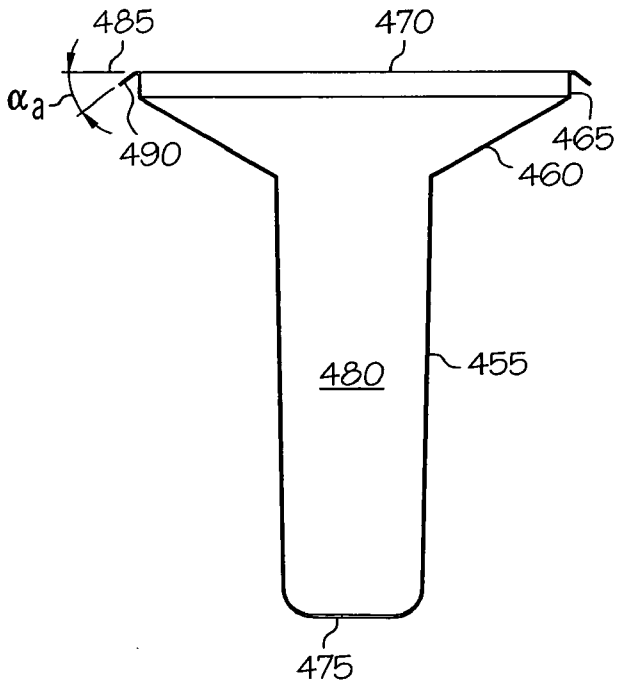


FIG. 9

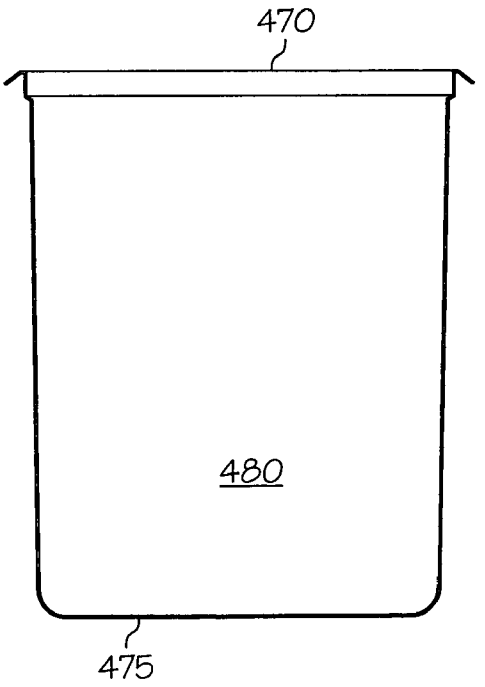


FIG. 10

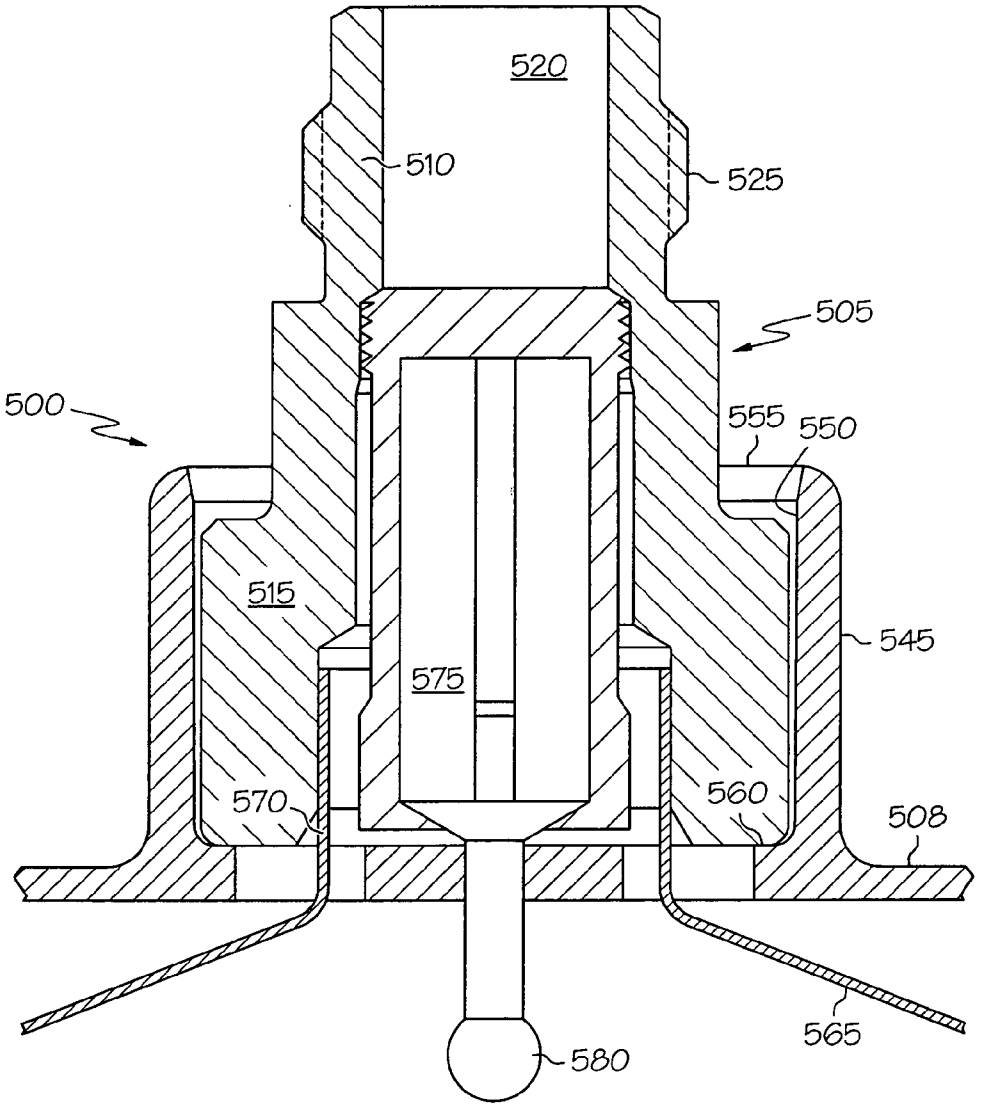


FIG. 11

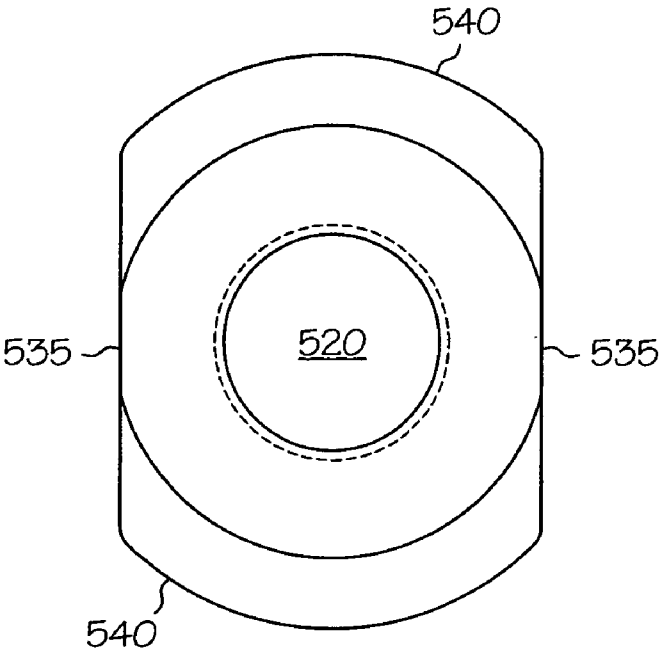


FIG. 12

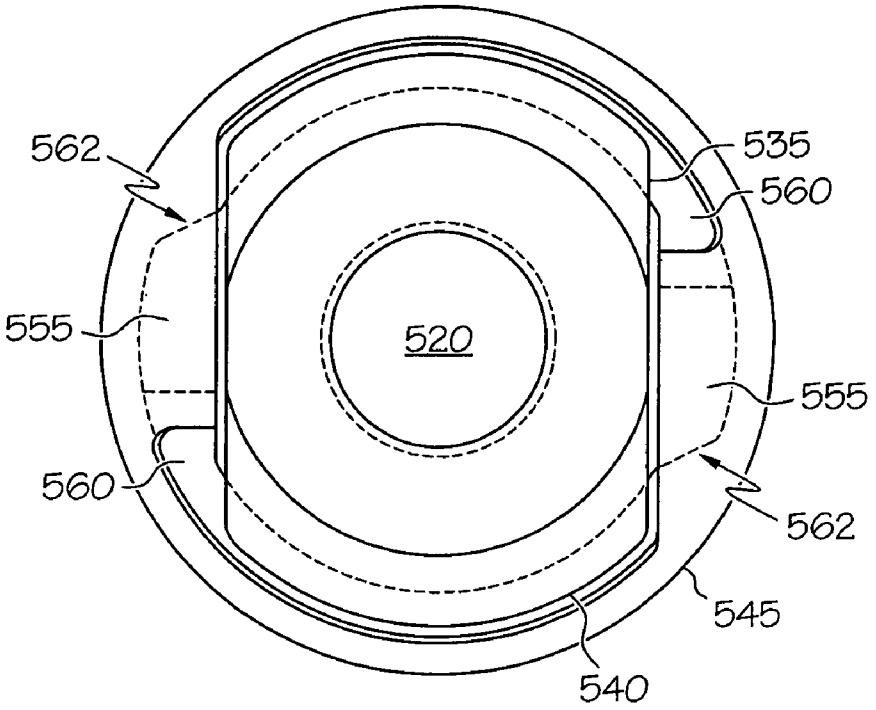


FIG. 13

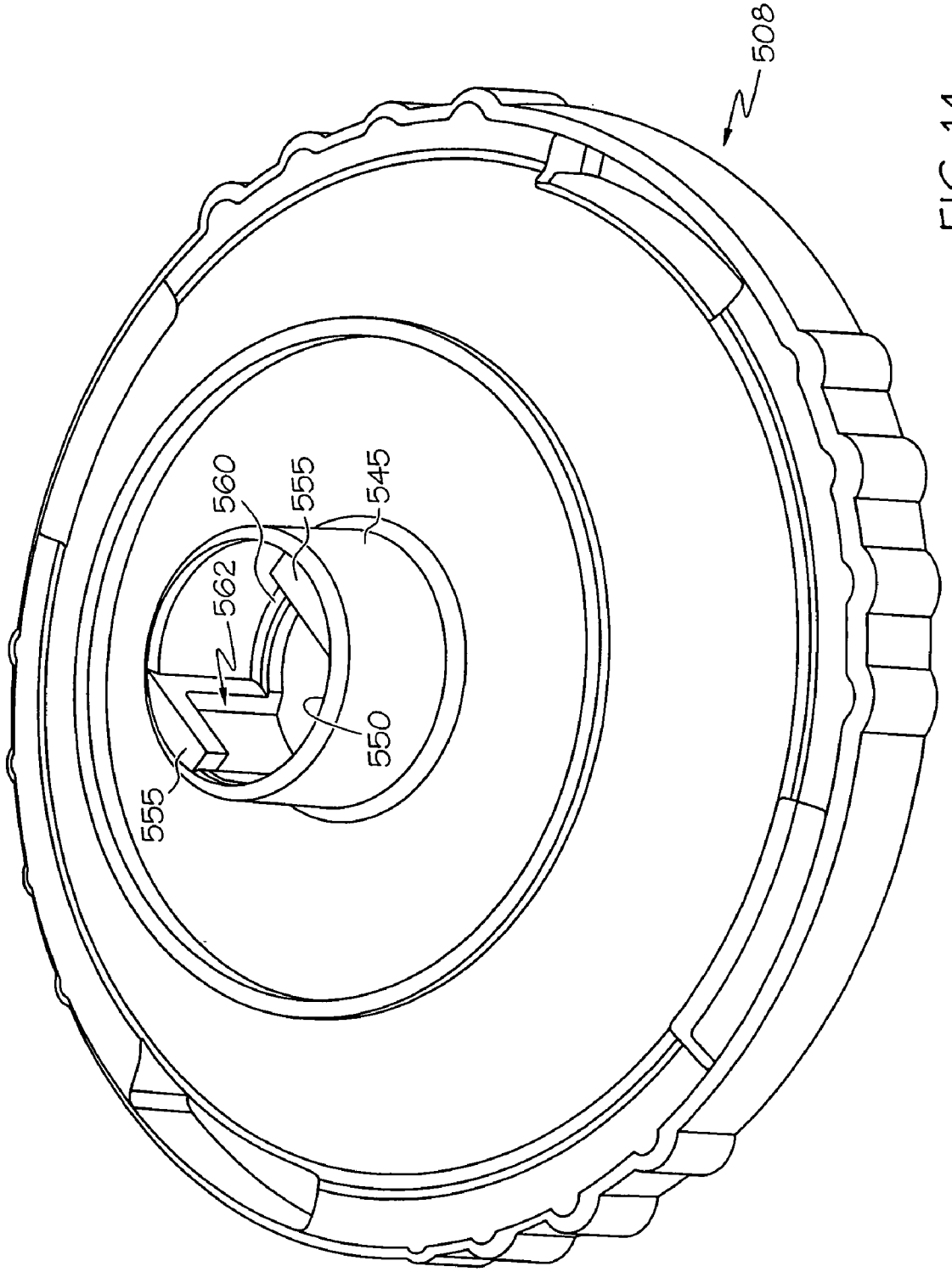


FIG. 14

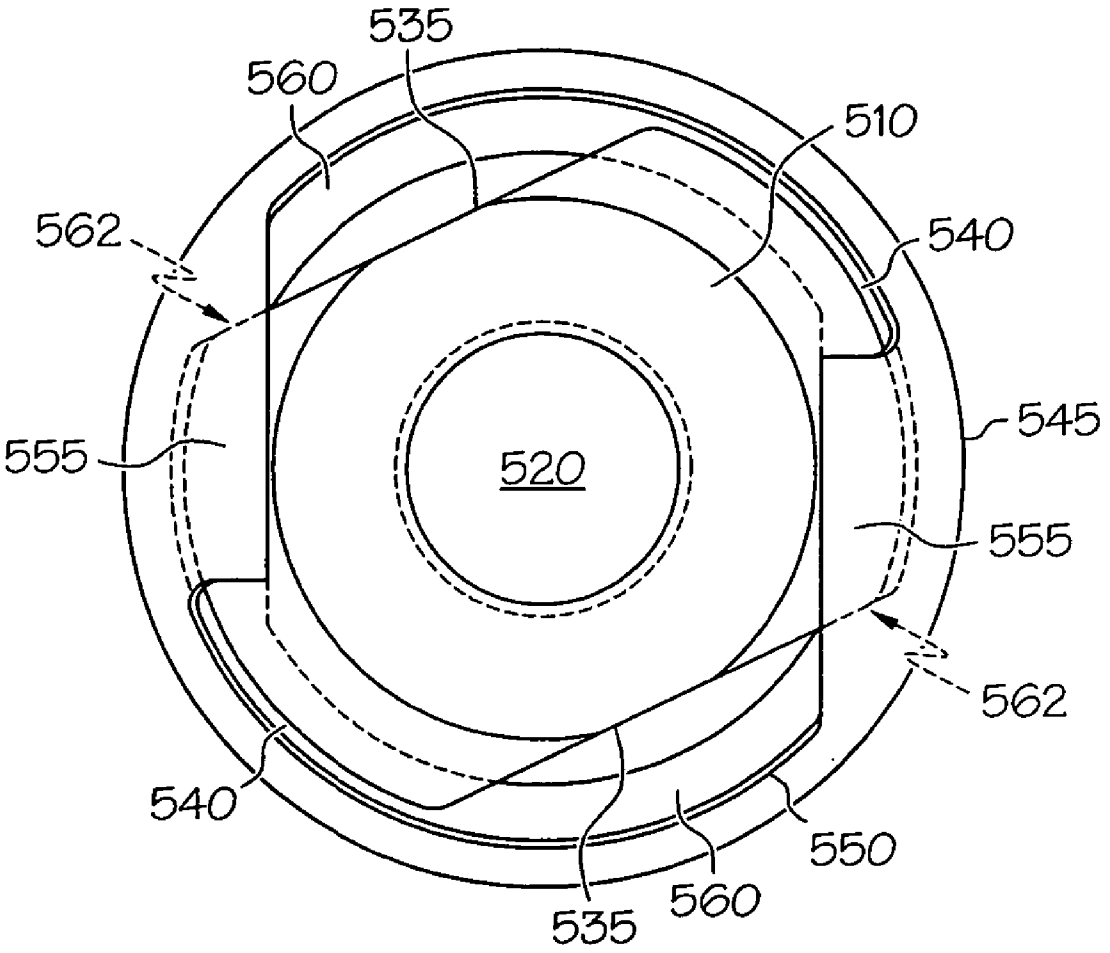


FIG. 15

DISPOSABLE PAINT CUP

BACKGROUND OF THE INVENTION

[0001] The present invention is directed generally to a fluid supply assembly for a fluid applicator, and more particularly to a disposable cup for a fluid supply assembly having varying sidewall thicknesses.

[0002] Some fluid applicators, such as gravity feed paint spray guns, have a fluid supply cup mounted on top of the fluid applicator. The fluid supply cup is typically reusable. Fluid, such as paint, is generally measured and mixed in a separate container, and then poured into the fluid supply cup for use. The container for measuring and mixing must be either cleaned or disposed of.

[0003] Reducing paint waste is an important consideration because the cost for a typical mixed paint is over $1.00 per fluid ounce.

[0004] Attempts have been made to provide fluid supply assemblies which reduce the amount of wasted paint. For example, U.S. Pat. No. 5,582,350 describes a hand held spray gun with a top mounted paint cup. The paint can be sealed in a collapsible closed bag in the paint cup, eliminating the need for a vent. Using the closed bag, the gun can be operated at all angles without the paint leaking out of the vent in the paint cup. The use of the closed bag also allows more of the paint to be used. In addition, it reduces cleanup time and cost because the bag keeps the paint cup clean. Thus, U.S. Pat. No. 5,582,350 represented a significant advance in the art.

[0005] Paint cups with outer containers and disposable cups have also been developed. Typically, the sidewalls of the disposable cup have a uniform thickness in the range of about 0.003 in. to about 0.007 in. The disposable cup collapses as the paint is dispensed. However, this creates random sidewall folds, forming pockets in which paint can become trapped. Depending on the capacity of the cup, this can result in 1 to 2 ounces of unused paint.

SUMMARY OF THE INVENTION

[0006] Therefore, there remains a need for an improved disposable cup which reduces paint waste.

[0007] The present invention meets this need by providing a flexible, disposable cup. The disposable cup comprises a side wall, an open outlet end, and a closed bottom defining an interior. The sidewall has a first portion adjacent to the outlet end, a second portion adjacent to the bottom, and a third portion between the outlet end and the bottom, the first and second portions having a thickness greater than a thickness of the third portion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] **FIG. 1** is side elevation view of a gravity-feed paint sprayer with a fluid supply assembly.

[0009] **FIG. 2** is an exploded side sectional view of one embodiment of a fluid supply assembly.

[0010] **FIG. 3** is partial side sectional view of the assembled connection between the reusable cup holder and reusable outer lid.

[0011] **FIG. 4** is a partial side sectional view of an alternate embodiment of the reusable outer lid showing stacking of the fluid supply assemblies.

[0012] **FIG. 5** is a side sectional view of an alternate embodiment of the disposable lid.

[0013] **FIG. 6** is an assembled side sectional view of the alternate embodiment of the disposable lid of **FIG. 5** and the disposable cup.

[0014] **FIG. 7** is a side sectional view of an alternate embodiment of the disposable cup.

[0015] **FIG. 8** is a top view of an alternate embodiment of the disposable cup.

[0016] **FIG. 9** is a side sectional view of the disposable cup of **FIG. 8** in one axis.

[0017] **FIG. 10** is a side sectional view of the disposable cup of **FIG. 8** in another axis.

[0018] **FIG. 11** is a partial assembled side sectional view of the connection between one embodiment of an adapter and the reusable outer lid.

[0019] **FIG. 12** is a top view of the adapter of **FIG. 11**.

[0020] **FIG. 13** is a top view of the assembled connection of **FIG. 11** before rotation (without the filter).

[0021] **FIG. 14** is a perspective view of reusable outer lid.

[0022] **FIG. 15** is a top view of the assembled connection of **FIG. 11** after rotation (without the filter).

DETAILED DESCRIPTION OF THE INVENTION

[0023] A fluid supply assembly attached to a fluid applicator is shown in **FIG. 1**. In one embodiment, the fluid supply assembly is for feeding liquid, such as paint, to the fluid applicator, such as a paint sprayer. The present invention will be described for a paint sprayer, such as a gravity feed paint sprayer for use in applying paint to coat substrate surfaces. The paint sprayer can be used in the automotive refinishing market, such as automobile body shops, for repainting automobiles. Although the fluid supply assembly is described for a paint sprayer, it is not limited to such use. It can be used for supplying other flowable liquids, including, but not limited to, beverages, foods, condiments (such as ketchup), gasoline, petrochemicals and hydrocarbons, water, water-based solutions, solvent-based solutions, emulsions, adhesives, and the like.

[0024] Referring to **FIG. 1**, a paint sprayer **10** is shown. It includes a body **15**, a nozzle assembly **20** secured to a front end **25** of body **15**, and a handle **30** depending from a rear end **35** of body **15**. A trigger **40** is pivotally secured to body **15** for the manual actuation of sprayer **10**. A top-mounted paint supply assembly **45** is mounted to body **15** near front end **25** for feeding paint to nozzle assembly **20**. An air connector **50** is connected to an air hose (not shown) for the delivery of pressurized air to nozzle assembly **20**, wherein the delivery of pressurized air is controlled by trigger **40**.

[0025] Compressed air from air connector **50** is delivered through an internal passage (not shown) to nozzle assembly **20** and the compressed air acts to atomize paint and deliver

it through nozzle assembly **20** to spray paint about paint axis **55**. Paint is delivered to nozzle assembly **20** from paint supply assembly **45**.

[**0026**] **FIGS. 1-3** show a first embodiment of paint supply assembly **45**. The paint supply assembly includes disposable cup **55**. Disposable cup **55** has a side wall **60** which is generally cylindrical. The outlet end **65** at the top of the cup is open, and the bottom **70** is closed. The side wall **60**, outlet end **65**, and bottom **70** define an interior **75**.

[**0027**] The disposable cup has flexible side walls which are designed to allow the disposable cup to collapse with a minimum of folds and use almost all of the paint. The side walls adjacent to the outlet end and the bottom are thicker than the middle portion of the sidewall. With this arrangement, the cup appears almost to roll inside out as it collapses. The sidewall adjacent to the outlet end and the bottom can be about two to about three times thicker than the middle of the sidewall. For example, the sidewalls adjacent to the outlet end and the bottom can be about 0.006 in. to about 0.015 in., while the middle portion is about 0.003 in. to about 0.005 in. The thicker portions adjacent to the outlet end and the bottom can cover about ¼ of the sidewall, if desired. One of skill in the art will understand that other thickness can be used, as well as other ratios of the thicker end portions to the thinner middle portion.

[**0028**] The bottom can be in the range of about 0.003 to about 0.02 in., so that the bottom will remain substantially flat as the side walls collapse, if desired. No air vent is needed in the disposable cup because the side walls collapse. This allows the user to discharge the paint sprayer at any angle without leaks and to use more of the paint in the cup than is possible with conventional gravity feed paint cups.

[**0029**] The outlet end **65** defines an axis **80**. There is a flange **85** extending outward and downward from the edge of the outlet end **65**. The flange **85** extends downward at an angle α in a range of from about 10° to about 70° from the axis **80** of the outlet end **65**.

[**0030**] The disposable cup **55** can be made of transparent or translucent plastic if desired. Suitable plastics include, but are not limited to, low density polyethylene.

[**0031**] If desired, the disposable cup can be made of an antistatic material, which dissipates the static charge which can develop during manufacture, storage, and use. The term "antistatic material" is intended to include conventional antistatic materials, as well as static dissipative materials, i.e., materials which have the ability to discharge static charges at a rate higher than typical antistatic additives, and conductive materials, which have the ability to discharge electrostatic charges rapidly. Generally, the antistatic material comprises a polymeric material containing an antistatic additive. Suitable polymeric materials include, but are limited to, polyethylene, polypropylene, or other soft, flexible polymers. Suitable antistatic additives include, but are not limited to, long-chain aliphatic amines and amides, phosphates, quaternary ammonium compounds, polyethylene glycols, glycol esters, ethoxylated long-chain aliphatic amines, polymeric antistatic additives composed of hydrophilic copolymers, intrinsic conductive polymers, such as polyaniline and polythiophene, and conductive fillers, such as carbon black, metal powder and fibers, and graphite fibers.

[**0032**] Reusable cup holder **90** is generally cylindrical. It has a side wall **95**, an open upper end **100**, and a lower end **105**. The lower end **105** has an opening **110** in it. The opening **110** can cover all or almost all of the lower end **105**, if desired. Alternatively, the lower end **105** could have one or more smaller openings. The opening **110** in the lower end **105** allows ambient air pressure to help the disposable cup collapse during use. Optionally, the reusable cup holder **90** can include one or more legs **112** extending downward from the lower end **105**. The legs can extend all of the way around the opening **110** (i.e., a circular rib) or only a part of the way around the opening **110**. The legs **112** can assist in stacking the fluid supply assemblies as described below.

[**0033**] The upper end **100** defines an axis **115**. A flange **120** extends outward and downward from an edge of the upper end **100**. The flange **120** extends downward at an angle β in a range of from about 10° to about 70° from the axis **115** of the upper end **100**. The angle β is substantially the same as the angle α of the flange **85** of disposable cup **55**. When the disposable cup **55** is placed in the reusable cup holder **90**, the flange **120** of reusable cup holder **90** supports the flange **85** of the disposable cup **55**.

[**0034**] There is a connecting surface **125** at the upper end **100** of the reusable cup holder **90**. The connecting surface **125** can be on the sidewall, extend out from the side wall, or it can extend outward from the end of the flange **120**, if desired.

[**0035**] The reusable cup holder **90** can be made of a rigid plastic, including, but not limited to, polypropylene or high density polyethylene. Desirably, the plastic selected is strong enough that the reusable cup holder can withstand the clamping force of a paint shaker machine. The plastic is desirably transparent or translucent, although it could be opaque. If an opaque plastic is used, the side wall should have elongated openings in it so that the disposable cup and its contents can be seen. Typically, the walls can be in the range of from about 0.02 in. to about 0.08 in. thick.

[**0036**] The disposable lid **130** has a generally frustoconical portion **135**. The outer edge **140** of the generally frustoconical portion **135** defines an axis **145**. The angle γ of the outer edge **140** of the generally frustoconical portion **135** is in a range of from about 10° to about 70° from the axis **145**. The angle γ is substantially the same as the angle α of the flange **85** of disposable cup **55**. The disposable lid **130** fits over the disposable cup **55**, and the edge **140** of the disposable lid **130** mates with the flange **85** of the disposable cup **55**. The inside of the disposable lid **130** can have a downward extending rib **150**, if desired. The downward extending rib **150** extends into the interior **75** of the disposable cup and mates with the inside of the side wall **60** of the disposable cup **55**, forming a seal. Additionally, there can be a downwardly projecting sealing bead **155** on the inside of the disposable lid **130**. The downwardly projecting sealing bead **155** mates with the flange **85** of the disposable cup **55** to aid in forming a seal.

[**0037**] There is a fitting **160** integrally connected to the generally frustoconical portion **135**. The fitting **160** has an opening **165** extending through it.

[**0038**] The disposable lid **130** can be made of a transparent, translucent, or opaque plastic. Suitable plastics include, but are not limited to, polypropylene or high density polyethylene.

[0039] The reusable outer lid **170** has a generally frustoconical portion **175**. The outer edge **180** of the generally frustoconical portion **175** defines an axis **185**. The angle δ of the outer edge **180** of the generally frustoconical portion **175** is in a range of from about 10° to about 70° from the axis **185**. The angle δ is substantially the same as the angle β of the flange **120** of reusable cup holder **90**. The outer edge **180** of the reusable outer lid **170** mates with the flange **120** of the reusable cup holder **90**. There is a complementary connecting surface **190** at the outer edge **180** of the reusable outer lid **170**. In this embodiment, the complementary connecting surface **190** extends downward from the outer edge **180**, although other arrangements are possible. The complementary connecting surface **190** mates with the connecting surface **125** of the reusable cup holder **90** to seal the reusable cup holder **90** and reusable outer lid **170** together.

[0040] The reusable outer lid has a fitting **195** integrally connected to the generally frustoconical portion **175**. The fitting **195** has an opening **200** extending through it. The fitting **160** of the disposable lid **130** fits into the fitting **195** of the reusable outer lid **170**.

[0041] The reusable outer lid **170** can be made of a strong, tough plastic. Desirably, the plastic selected is strong enough that the reusable outer lid can withstand the clamping force of a paint shaker machine. Examples of suitable plastic include, but are not limited to, acetal. Acetal is not typically transparent. The reusable outer lid **170** can include one or more sight holes so that the paint level is visible to the user, if desired. The sight hole can also allow the user to write the name of the name of the paint type on the disposable lid, and it permits easy removal of the disposable lid from the reusable outer lid.

[0042] A conduit **210** connects the fluid supply assembly to the paint sprayer **10**. The conduit **210** mates with the fitting **195** of the reusable outer lid **170** and the fitting **160** of the disposable lid **130**. The conduit **210** has an opening **215** through it. There is a path for fluid to flow from the interior **75** of the disposable cup **55** through the opening **165** in the disposable lid **130** through the opening **215** in conduit **210** to the paint sprayer **10**. An optional filter **220** can be placed into the opening **215** in the conduit **210**, the opening **200** in the reusable outer lid **170**, or the opening **165** in the disposable lid **130** to filter out impurities.

[0043] In order to use the fluid supply assembly, the disposable cup **55** is placed into the reusable cup holder **90**. The flange **85** of the disposable cup **55** mates with the flange **120** of the reusable cup holder **90**. The flange **85** centers the disposable cup **55** in the reusable cup holder **90**.

[0044] Optionally, there can be indicia **230** on either the disposable cup **55** or the reusable cup holder **90** or both. The indicia **230** can be molded in the side, printed on the side, a label can be attached to the side, or the indicia can be supplied in some other fashion. The indicia **230** can be used to measure paint components. Alternatively, the disposable cup and reusable cup holder can be used on a scale, or with a measuring stick to measure the paint components.

[0045] The indicia can include mixing scales with one or more mixing ratios, e.g., 4:1 mixing ratio, 2:1 mixing ratio; 3:2:1 mixing ratio, etc. Each mixing ratio might include one or more different sized divisions so that different amounts of fluid could be measured using each mixing ratio. The indicia can also include one or more universal scales, i.e., scales with equal sized divisions. One universal scale might have 20 equal divisions, another 10 equal divisions, a third 5 equal divisions. There can be as many universal scales as needed. The multiple universal scales allow the user to measure different amounts of fluid without using the mixing ratio scales, which would not have to be included. The user could select the appropriate universal scale based on the amount of fluid needed.

[0046] Alternatively, the measuring guide could have indicia printed on a clear, thin, flat, plastic sheet. The plastic sheet has connecting parts on opposite sides of the sheet, including, but not limited to, tabs and slots. The plastic sheet is formed into a cylinder, and the tabs are inserted into the slots. The measuring guide can be placed on the table, and the disposable cup, or the reusable cup holder with the disposable cup in it, can be placed inside the cylinder. After the paint components are measured, the disposable cup (and the reusable cup holder if present) is removed from the cylinder. This can be done by lifting the disposable cup by the flange, or by disconnecting the tabs and slots on the sheet. Optional removal tabs on the flange 180 degrees apart can assist in removing the disposable cup. The disposable cup can then be placed in the reusable cup holder (if not already there). This measuring guide improves visibility and accuracy in measuring the paint components. The rectangular shape is easy to manufacture. It eliminates the necessity for accurate placement of a label on the disposable cup or reusable cup holder. It also allows more direct viewing of the indicia than with the label (i.e., through the label, the reusable cup holder, and the disposable cup). It is particularly advantageous when a smaller diameter disposable cup is used because the indicia can be placed right next to the disposable cup. Finally, if the disposable cup is used alone, the reusable cup holder stays cleaner because it is not used when pouring and measuring paint.

[0047] The sheets may be formed in different sizes so that the measuring guides can be used with different sizes of disposable cups. A larger sheet could be used with the reusable cup holder and/or the larger disposable cup. The cylinder formed by the larger sheet is big enough so that the reusable cup holder and/or the larger disposable cup fit inside. The larger sheet could include a marking, such as a dotted line near the bottom, to allow proper alignment of the indicia depending whether the larger disposable cup is used with the reusable cup holder or not. The entire sheet might be used when the larger disposable cup is used with a reusable cup holder having legs. When the larger disposable cup is used alone (or the reusable cup does not affect the alignment, e.g. because it does not have legs), the sheet could be cut at the marking. This allows proper alignment in either situation. A smaller sheet could be used when a smaller disposable cup is used. The reusable cup holder would not generally be used with the smaller disposable cup when measuring fluid in order to provide proper alignment of the indicia and the smaller disposable cup.

[0048] After the disposable cup **55** is filled with paint, the disposable lid **130** is placed on top of the disposable cup **55**. The angle γ of the edge **140** of disposable lid **130** is substantially the same as the angle α of the flange **85** of disposable cup **55** so that the edge **140** of disposable lid **130** mates with the flange **85** of the disposable cup **55**. The angle γ centers the disposable lid **130** on the disposable cup **55**.

The angle γ of the disposable lid **130** also allows for additional sealing area without an increase in the overall outside diameter of the fluid supply assembly.

[**0049**] The downward extending rib **150** on the inside of the disposable lid **130** fits inside the disposable cup **55**. There can be one or more downward extending ribs **150** around the disposable lid **130** which extend part way around the inside of the disposable lid **55**, or the rib can extend all the way around. The downward extending rib **150** keeps the disposable lid **55** in place, and it can also act as a seal. The disposable lid **55** can also have a downwardly extending sealing bead **155** which contacts the flange **85** of the disposable cup **55** to improve sealing.

[**0050**] The reusable outer lid **170** is placed on top of the disposable lid **130**. It is tightened to the reusable cup holder **90** using the connecting surface **125** of the reusable cup holder **90** and the complementary connecting surface **190** of the reusable outer lid **170**. Suitable connecting surfaces and complementary connecting surfaces include, but are not limited to, threaded connections, lugs and grooves, and pins and slots.

[**0051**] The outer edge **180** of the reusable outer lid **170** has an angle δ which is substantially the same as the angle β of the flange **120** of reusable cup holder **90**. The tightening of the reusable outer lid **170** to the reusable cup holder **90** clamps the edge **140** of disposable lid **130** and flange **85** of disposable cup **55** together between edge **180** of reusable outer lid **170** and flange **120** of reusable cup holder **90**. The angle increases the clamping force without an increase in torque.

[**0052**] The angles α of the flange **85** of disposable cup **55**, γ of the edge **140** of disposable lid **130**, β of flange **120** of reusable cup holder **90**, and δ of edge **180** of reusable outer lid **170** are generally in the range of about 10° to about 70° from the respective axis, typically about 20° to about 60°, more typically about 30° to about 50°, more typically about 35° to about 45°.

[**0053**] When the angles α and γ of the flange **85** of disposable cup **55** and the edge **140** of disposable lid **130** match the angle at which the fluid supply assembly is attached to the paint sprayer so that in use the disposable lid is substantially parallel to the paint axis of the paint sprayer, almost all of the paint in the disposable cup is used.

[**0054**] A plug **235** can be used to cover the fitting **160** on the disposable lid **130**. The plug **235** can fit inside or outside of the fitting **160**. The plug **230** seals the opening **165** in the fitting **160** for shaking or storage.

[**0055**] In one embodiment, the fluid supply assembly is strong enough to be placed in a paint shaker machine without any additional support.

[**0056**] The conduit **210** is placed into the fitting **195** in the reusable outer lid **170**. An optional filter **220** is inserted in the opening **215** of the conduit **210**. Alternatively, the filter **220** could be placed in the fitting **160** of the disposable lid **130** or the fitting **195** of the reusable outer lid **170**. The filter **220** can have a projection **225**, if desired, which prevents the collapsing disposable cup **55** from blocking the opening **165** through to the conduit **210**. Projection **225** can also be used to remove the filter **220** for cleaning or disposal. The conduit **210** can be filled with solvent and plugged for storage, if desired. If an inside fitting plug **235** is used for the fitting **160** on the disposable cup **130**, the same size plug may also fit in the conduit.

[**0057**] The fluid supply assembly is attached to the conduit **210**. The conduit **210** connects to the reusable outer lid **170** and the paint sprayer **10** and provides a flow path from the interior **75** of the disposable cup **55** to the paint sprayer **10**.

[**0058**] Various types of conduits could be used, as are well known to those of skill in the art. For example, U.S. Ser. No. 10/458,436, filed Jun. 10, 2003, entitled "Friction Fit Paint Cup Connection" describes a suitable conduit.

[**0059**] Another suitable conduit is shown in **FIGS. 11-15**. The conduit can be an adapter **505** for connecting between paint sprayer **10** and outer lid **508**. Adapter **505** includes a first end **510** engagable with paint sprayer **10**, shown in **FIG. 1**, a second end **515** engagable with reusable outer lid **508**, and a hollow bore **520** between first end **510** and second end **515**.

[**0060**] In one embodiment, the first end **510** has a diameter smaller than the second end **515**. The first end **510** is generally cylindrical in shape. The first end **510** has a connecting surface **525** for engaging with a complementary connecting surface **530** on the paint sprayer **10**. Suitable connecting surface **525** and complementary connecting surface **530** include, but are not limited to, threading helical surfaces, lugs and grooves, tapered connections, bayonet connections, snap connections, or first end **510** can be integral with paint sprayer **10** so that the adapter **505** is a feed conduit into sprayer **10**. Desirably, the connecting surface **525** and complementary connecting surface **530** are threads of a typical size and pitch for paint sprayers so that the fluid supply assembly can be used with any of several sprayers.

[**0061**] The second end **515** has a portion having a first shape **535** and a portion having a second shape **540**. The portion having a first shape **535** can be flat and the portion having the second shape **540** can be curved, if desired. Alternatively, the portion having the first shape can have a simple or complex shape, including, but not limited to, curved outward or inward. If the portion having the first shape is curved, it should have a different curvature from that of the portion having the second shape. The portion having the second shape can also have a shape other than curved. Desirably, the second end **515** has opposing flat portions **535** and opposing curved portions **540**. There can be one or more curved portions, and one or more flat portions. Desirably, there are two opposing flat portions and two opposing curved portions.

[**0062**] The outer lid **508** has an integral generally cylindrical fitting **545** with an opening **550** therethrough. The opening **550** is generally circular. The opening **550** in the outer lid **508** has at least one tab **555** extending inward at the upper edge of the opening **550**. Tab **555** has a shape that allows the portion having the first shape to pass next to it, but not the portion having the second shape, so that the second end **515** can be inserted into opening **550**. If a flat portion **535** is used, tab **555** is typically flat. Tab **555** can be at the edge of the upper end of the fitting **545**, or it can be downward from the edge, as desired.

[**0063**] There is at least one horizontal stop **560** in opening **550** below tab **555**. Second end **515** has a height so that it

fits between horizontal stop **560** and tab **555** of the fitting **545** so that the second end **515** enters only the desired distance. When second end **515** hits horizontal stop **560**, the adapter **505** is rotated to lock the fluid supply assembly to the paint sprayer **10**, as shown in **FIG. 15**. Alternatively, the outer lid **508** could be rotated onto the adapter **505**. When the adapter **505** is rotated, tabs **555** are engaged with the top of curved portion **540** of second end **515**.

[**0064**] There is at least one vertical stop **562** on the inside of opening **550**. Vertical stop **562** prevents the adapter **505** from rotating so far that the flat portions **535** again become mated with the tabs **555** so that the adapter **505** could become disengaged. Vertical stops **562** can extend from tab **555** to horizontal stop **560**, if desired. Alternatively, vertical stops **562** can extend part of the distance between tab **555** and horizontal stop **560**.

[**0065**] The adapter **505** cannot be rotated until it is fully inserted into opening **550** because of flat portions **535** and curved portions **540** of second end **515**, flat tabs **555** of the fitting **545**, and the height of second end **515**. This prevents the fluid supply assembly from falling off the adapter **505** due to improper assembly of the connection. In addition, the sides of fitting **545** support the curved portion **540** of second end **515** which reduces the ability of second end **515** to move within fitting **545**. This helps to provide a stable connection between the fluid supply assembly and the adapter.

[**0066**] The disposable lid **565** has a fitting **570**. As the second end **515** of the adapter **505** enters the fitting **545** of the outer lid **508**, the fitting **570** of the disposable lid **565** enters the bore **520** of the adapter **505**. This connects the interior of the fluid supply assembly to the passageway in the spray gun.

[**0067**] An alternate embodiment for the reusable outer lid is shown in **FIG. 4**. In this embodiment, the reusable outer lid **300** has an inner portion **305** and an outer portion **310**. The outer portion **310** is generally frustoconical. The outer edge **315** defines an axis **320**. The angle δa of the outer edge **315** is in a range of from about 10° to about 70° from the axis **320**. As in the first embodiment, the angle δa is substantially the same as the angle β of the flange **120** of reusable cup holder **90**.

[**0068**] The inner portion **305** is substantially flat. Alternatively, it could be at an angle different from the angle δa of the outer edge **315**. It can optionally include one or more upward extending prongs **325**. The prongs **325** can extend all or part of the way around the reusable outer lid **300**. They can be positioned to mate with the legs **112** of an adjacent reusable cup holder **90***a*, allowing the fluid supply assemblies to be stacked on top of one another.

[**0069**] If the distance across the legs **112** of the reusable cup holder is smaller than the diameter of the lower end of the reusable cup and the reusable cup holder is to be used in a paint shaker, it may be desirable to include a second ring on the bottom of the reusable cup holder. The second ring should be the same (or substantially the same) diameter as the lower end of the reusable cup holder in order to transfer the paint shaker's clamping force to the side wall of the reusable cup holder, reducing deflection of the bottom of the reusable cup holder.

[**0070**] The reusable outer lid has a fitting **330** integrally connected to the inner portion **305**. The fitting **330** has an opening **335** extending through it.

[**0071**] The outer edge **315** of the reusable outer lid **300** mates with the flange **120** of the reusable cup holder **90**. There is a complementary connecting surface **340** at the outer edge **315** of the reusable outer lid **300**. The complementary connecting surface **340** mates with the connecting surface **125** of the reusable cup holder **90** to seal the reusable cup holder **90** and reusable outer lid **300** together.

[**0072**] An alternative embodiment of the disposable lid is shown in **FIGS. 5-6**. The disposable lid **350** has an inner portion **355** and an outer portion **360**. The outer portion **360** is generally frustoconical. The outer edge **365** of the outer portion **360** defines an axis **370**. The angle γa of the outer edge **365** of the outer portion **360** is in a range of from about 10° to about 70° from the axis **370**. As in the first embodiment, the angle γa is substantially the same as the angle α of the flange **85** of disposable cup **55**.

[**0073**] The inner portion **355** has a generally frustoconical part **375** and an upwardly extending projection **380** at the outer end. The upwardly extending projection **380** is connected to the outer portion **360**. There is a fitting **385** integrally connected to the inner portion **355**. The fitting **385** has an opening **390** extending through it.

[**0074**] The outer portion **360** mates with the flange **85** of the disposable cup **55**. The upwardly extending projection **380** fits inside the outlet end **65** the disposable cup **55** forming an additional seal.

[**0075**] Alternate embodiments of the disposable cup are shown in **FIGS. 7-10**. In **FIG. 7**, the disposable cup **400** has a generally cylindrical lower side wall portion **405**, a generally frustoconical intermediate side wall portion **415**, and a generally cylindrical upper side wall portion **420**.

[**0076**] The outlet end **425** at the top of the disposable cup **400** is open, and the bottom **430** is closed. The lower side wall portion **405**, intermediate side wall portion **415**, and upper side wall portion **420**, outlet end **425**, and bottom **430** define an interior **435**. The interior **435** is smaller than the interior **75**. The smaller diameter of the lower side wall portion allows accurate measuring of the paint ratios when less paint is to be used.

[**0077**] The outlet end **425** defines an axis **440**. There is a flange **445** extending outward and downward from the edge of the outlet end **425**. The flange **445** extends downward at an angle αa in a range of from about 10° to about 70° from the axis **440** of the outlet end **425**. The outlet end **425** is adapted to be placed into the reusable cup holder, so it sized to fit in the reusable cup holder.

[**0078**] Alternatively, the generally cylindrical lower side wall portion could be off centered, i.e., not concentric with the upper side wall portion. This would bring the lower side wall portion close to the side wall of the reusable cup holder, allowing easy reading of any measuring indicia.

[**0079**] In **FIGS. 8-10**, the disposable cup **450** has a generally elliptical lower side wall portion **455**, and intermediate side wall portion **460** extending from the lower side wall portion to the generally cylindrical upper side wall portion **465**.

[**0080**] The outlet end **470** at the top of the disposable cup **450** is open, and the bottom **475** is closed. The lower side wall portion **455**, intermediate side wall portion **460**, and upper side wall portion **465**, outlet end **470**, and bottom **475**

define an interior **480**. The interior **480** is smaller than the interior **75**. The elliptical shape makes it easier to read the indicia for measuring paint because the disposable cup extends close to the reusable cup holder. The longer axis of the ellipse can extend all or substantially all the way across the diameter of the reusable cup holder, or something less than all or substantially all the way across the diameter.

[**0081**] The outlet end **470** defines an axis **485**. There is a flange **490** extending outward and downward from the edge of the outlet end **470**. The flange **490** extends downward at an angle αa in a range of from about 10° to about 70° from the axis **485** of the outlet end **470**. The outlet end **470** is adapted to be placed into the reusable cup holder, so it sized to fit in the reusable cup holder.

[**0082**] In these embodiments, the distance across the outlet end of the disposable cup is greater than the distance across the bottom in at least one direction. The smaller portion of the disposable cup can extend the entire height of the side wall or less than the entire height of the side wall. If the side wall is cylindrical, and the smaller diameter portion extends the entire height of the sidewall, it can be connected to the flange by a flat annular portion. If it does not extend the entire height of the side wall, it can be can be connected by a generally frustoconical upper side wall portion. Other side wall arrangements are possible, as are well known to those of skill in the art.

[**0083**] This embodiment of the disposable cup can be used with the reusable cup holder and outer lid and disposable lid without any modification to the assembly, allowing different sizes of disposable cups to be used in the fluid supply assembly.

[**0084**] The fluid supply assembly has been shown and described with the disposable cup and reusable cup holder being generally cylindrical, which is a typical shape because of ease of manufacture and use. However, it could be made in other shapes, including, but not limited to, square, triangular, pentagonal, elliptical, etc.

[**0085**] While certain representative embodiments and details have been shown for purposes of illustrating the invention, it will be apparent to those skilled in the art that various changes in the compositions and methods disclosed herein may be made without departing from the scope of the invention, which is defined in the appended claims.

What is claimed is:

1. A flexible, disposable cup comprising a side wall, an open outlet end, and a closed bottom defining an interior, the sidewall having a first portion adjacent to the outlet end, a second portion adjacent to the bottom, and a third portion between the outlet end and the bottom, the first and second portions having a thickness greater than a thickness of the third portion.

2. The disposable cup of claim 1 wherein the thickness of the first and second portions is in a range of about 2 to about 3 times the thickness of the third portion.

3. The disposable cup of claim 1 wherein the thickness of the first and second portions is in a range of about 0.006 in. to about 0.015 in.

4. The disposable cup of claim 1 wherein the thickness of the third portion is in a range of about 0.003 in. to about 0.005 in.

5. The disposable cup of claim 1 wherein the first and second portions each cover about one fourth of the sidewall.

6. The disposable cup of claim 1 wherein a thickness of the bottom is in a range of about 0.003 in. to about 0.02 in.

7. The disposable cup of claim 1 wherein the disposable cup is made of a polymeric material.

8. The disposable cup of claim 7 wherein the polymeric material is selected from polyethylene, or polypropylene.

9. The disposable cup of claim 1 wherein the disposable cup is made of an antistatic material.

10. The disposable cup of claim 1 wherein the disposable cup has indicia for measuring fluids on the side wall.

11. The disposable cup of claim 1 further comprising a flange at the outlet end of the sidewall.

12. A flexible, disposable cup comprising a side wall, an open outlet end, and a closed bottom defining an interior, the sidewall having a first portion adjacent to the outlet end, a second portion adjacent to the bottom, and a third portion between the outlet end and the bottom, the first and second portions having a thickness greater than a thickness of the third portion, wherein the thickness of the first and second portions is in a range of about 0.006 in. to about 0.015 in. and wherein the thickness of the third portion is in a range of about 0.003 in. to about 0.005 in.

13. The disposable cup of claim 12 wherein the first and second portions each cover about one fourth of the sidewall.

14. A flexible, disposable cup comprising a side wall, an open outlet end, and a closed bottom defining an interior, the sidewall having a first portion adjacent to the outlet end, a second portion adjacent to the bottom, and a third portion between the outlet end and the bottom, the first and second portions having a thickness greater than a thickness of the third portion, and wherein the thickness of the first and second portions is in a range of about 2 to about 3 times the thickness of the third portion.

15. The disposable cup of claim 14 wherein the thickness of the first and second portions is in a range of about 0.006 in. to about 0.015 in.

16. The disposable cup of claim 14 wherein the thickness of the third portion is in a range of about 0.003 in. to about 0.005 in.

17. The disposable cup of claim 14 wherein the first and second portions each cover about one fourth of the sidewall.

18. A fluid supply assembly for a fluid applicator comprising:

a flexible, disposable cup comprising a side wall, an open outlet end, and a closed bottom defining an interior, the sidewall having a first portion adjacent to the outlet end, a second portion adjacent to the bottom, and a third portion between the outlet end and the bottom, the first and second portions having a thickness greater than a thickness of the third portion;

a reusable cup holder having a side wall, an open upper end, and a lower end, the lower end having an opening therein, a connecting surface at the upper end, the reusable cup holder being adapted to receive the disposable cup;

a reusable outer lid having an integral fitting, the fitting of the reusable outer lid having an opening therethrough, a complementary connecting surface at an edge of the reusable outer lid, the complementary connecting surface of the reusable outer lid adapted to mate with the

connecting surface of the reusable cup holder to seal the reusable cup holder and reusable outer lid together.

19. The fluid supply assembly of claim 18 wherein the thickness of the first and second portions of the disposable cup is in a range of about 2 to about 3 times the thickness of the third portion of the disposable cup.

20. The fluid supply assembly of claim 18 wherein the thickness of the first and second portions of the disposable cup is in a range of about 0.006 in. to about 0.015 in.

21. The fluid supply assembly of claim 18 wherein the thickness of the third portion of the disposable cup is in a range of about 0.003 in. to about 0.005 in.

22. The fluid supply assembly of claim 18 wherein the first and second portions each cover about one fourth of the sidewall of the disposable cup.

23. The fluid supply assembly of claim 18 wherein a thickness of the bottom of the disposable cup is in a range of about 0.003 in. to about 0.02 in.

24. The fluid supply assembly of claim 18 wherein the disposable cup is made of a polymeric material.

25. The fluid supply assembly of claim 18 wherein the fluid supply assembly is a paint supply assembly.

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