July 19, 1966 R. C. ALLEN 3,261,516

PLASTIC CLOSURE

Filed March 2, 1964

FIG. 1

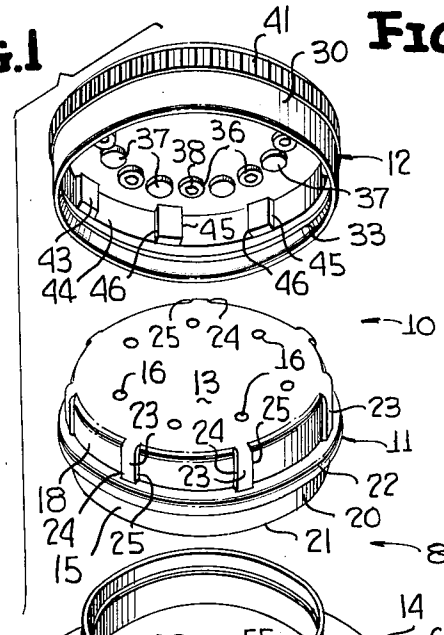


FIG. 2

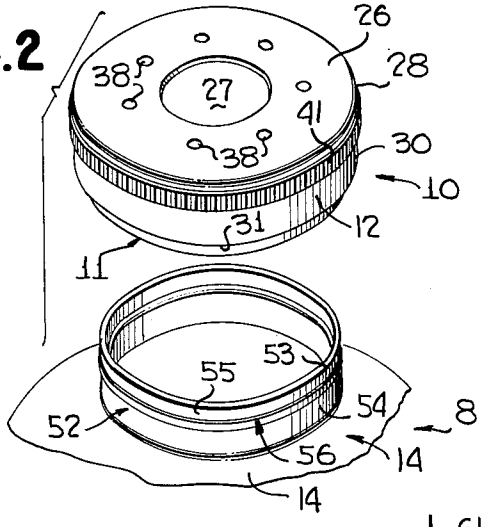


FIG. 3

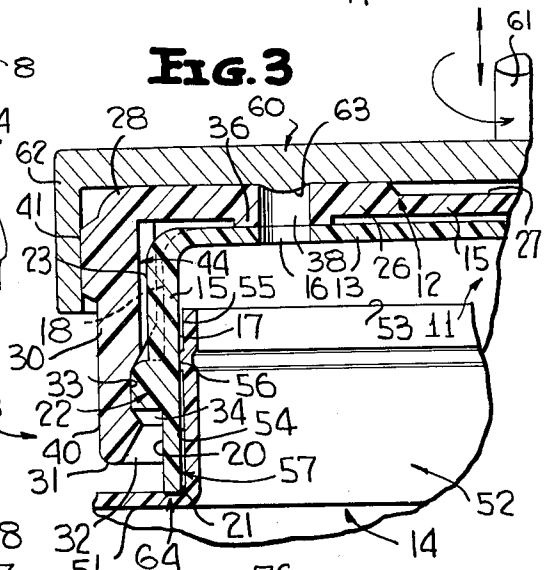
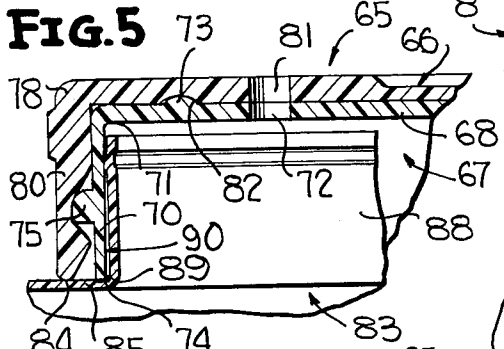


FIG. 5



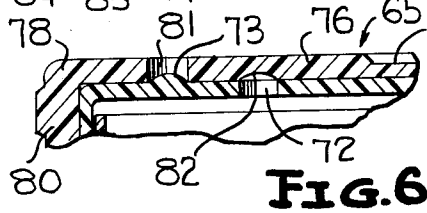
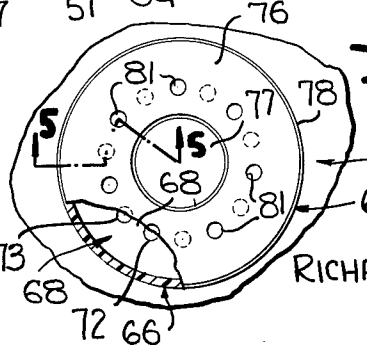


FIG. 6

FIG. 4



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PLASTIC CLOSURE

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This invention relates to a novel plastic dispensing closure and to a novel method of securing the dispensing closure to a plastic container by a novel spin-welding process.

It is an object of this invention to provide a novel method of securing a separable plastic dispensing closure to a plastic container by performing the steps of interlockingly assembling a plurality of caps which form the closure, positioning a peripheral skirt of an innermost one of the caps in spaced telescoped relationship to a neck of a container, and rapidly relatively rotating an outermost one of the caps thereby indirectly rotating the innermost cap relative to the container to fuse together the material of the innermost cap and the container whereby the dispensing closure is fixedly secured to the container.

A further object of this invention is to provide a novel method of securing a plastic dispensing closure including innermost and outermost caps having peripheral skirts terminating in peripheral edges to a plastic container terminating in a neck by interlockingly assembling the caps in telescoped relationship, positioning the peripheral skirt of the innermost cap in telescoped spaced relationship to the neck of the container, rapidly relatively rotating the outermost cap and indirectly rotating the innermost cap with respect to the container, maintaining the skirt of the innermost cap and the neck of the container in relative spaced relation, and contacting the peripheral edge of the innermost cap against the container body whereby the material of the innermost cap and the container is fused together, and any excess material which may flow during the fusion of the innermost cap and the container is permitted to enter the space between the neck of the container and the skirt of the innermost cap.

A further object of this invention is to provide a novel method of securing a plastic closure to the neck of a plastic container, the closure being of the type which includes innermost and outermost relatively rotatable caps having means for limiting the relative rotation thereof and including peripheral skirts terminating in peripheral edges comprising the steps of assembling the caps and telescoping the skirt of the innermost cap in spaced relationship to the neck of the container, rotating the outermost cap relative to the innermost cap until the limiting means prevents further relative rotation therebetween, thereafter rotating both caps relative to the container by solely rotating the outermost cap, and contacting the peripheral edge of the innermost cap against the container body whereby the material of the innermost cap and the container is fused together.

Still another object of this invention is to provide a novel method including each of the steps immediately above set out, in which the caps additionally include registrable dispensing openings by which the relative movement between the caps unregisters any of the openings in the caps which are in registration prior to the relative rotation between the caps.

A further object of this invention is to provide a novel dispensing closure particularly adapted to be spinwelded to a container including an innermost and outermost relatively telscoped caps, each of the caps having an end wall provided with dispensing openings and a depending peripheral skirt, the openings being in registration in one relative position of rotation of the caps and out of registration in a second relative position of the caps, means automatically positioning the caps with the openings out of registration during the spin-welding of the closure to a container, and the peripheral skirt of the innermost cap having a smooth unbroken interior surface to facilitate and guide the rotation of the innermost cap relative to the neck of a container to which the closure is secured during a spin-welding operation.

Still another object of this invention is to provide a novel container including a container body having a neck, a cap having a skirt telescopically received on the neck, the skirt and neck being relatively spaced, and a peripheral edge of the skirt being secured to the container body by an area of fused material.

Another object of this invention is to provide a novel container including a container body terminating in a neck, an exterior peripheral rib on the neck, a cap having a skirt telescopically received on the neck with the rib maintaining the skirt and neck in relative spaced relationship, and a peripheral edge of the skirt being secured to the body by an area of fused material.

With the above, and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings:

In the drawings:

FIGURE 1 is an exploded fragmentary perspective view of a dispensing closure of this invention and illustrates a snap cap and a spin cap of the closure prior to the assembly thereof and a container with which the closure is associated.

FIGURE 2 is a fragmentary exploded top perspective view of the assembled snap cap and spin cap prior to being secured to the container.

FIGURE 3 is an enlarged fragmentary sectional view taken through the axis of the assembled caps, and illustrates the spin cap being spin-welded to the container by rotating a chuck engaging the snap cap.

FIGURE 4 is a fragmentary top view with parts broken away for clarity, and illustrates another dispensing closure secured to a container.

FIGURE 5 is an enlarged fragmentary sectional view taken along line 5—5 of FIGURE 4, and illustrates a spin cap spin-welded to a container and a dispensing position of the dispensing closure.

FIGURE 6 is an enlarged fragmentary sectional view taken along line 5—5 of FIGURE 4 after a snap cap of the closure has been rotated relative to the spin cap, and illustrates the non-dispensing position of the dispensing closure.

A novel combined dispensing closure and container is shown in FIGURES 1 through 3 of the drawing, and is generally designated by the reference numeral **8**. The dispensing closure and container **8** includes a dispensing closure **10** having a spin cap **11** and a snap cap **12**, while the container is generally designated by the reference numeral **14**. The dispensing closure **10** and the container **14** are both preferably constructed from relatively resilient plastic material, such as polyethylene or similar plastic material.

The spin cap **11** has an end wall **13** integrally joined at a radius portion (unnumbered) to a depending peripheral skirt **15**. A plurality of identical dispensing openings **16** (FIGURE 1) are formed in the end wall **13** of the spin cap **11**. In the preferred form of the invention,

there are seven such dispensing openings **16** formed in the end wall **13** of the spin cap **11**. However, more or less than this number of dispensing openings can be provided in the spin cap **11**.

The depending peripheral skirt **15** of the spin cap **11** includes an inner surface or wall **17**, an upper external surface or wall **18**, a lower external surface or wall **20** spaced from the upper external surface **18** and a bottom edge **21**. An external peripheral bead **22** forms an integral portion of the skirt **15** between the exterior surfaces **18** and **20**.

A plurality of identical keys or projections **23** (FIGURE 1) project radially outwardly beyond the upper external surface **18** of the skirt **15** between the annular bead **22** and the end wall **13**. Each of the keys **23** includes oppositely directed abutment surfaces **24** and **25**, the purpose of which will be described more fully hereafter.

The snap cap **12** comprises a substantially thick end wall **26** (FIGURE 3) which is centrally recessed and reduced in thickness at **27**. The end wall **26** is joined by an annular radius portion **28** to a depending peripheral skirt **30**. A bottom edge **31** of the peripheral skirt **30** has a camming surface or wall **32**.

The camming wall **32** permits the snap cap **12** to be externally telescoped and secured to the spin cap **11** by a conventional snapping action which seats the bead **22** of the spin cap **11** in a radially inwardly directed annular groove **33** of the skirt **30**. The bead **22** cooperates with a camming wall or surface **34** of the groove **33** to constantly urge a plurality of integral circular bosses **36** and **37** (FIGURES 1 and 3) into contact with the end wall **13** of the spin cap **11**.

The bosses **36** and **37** are substantially identical except for the provision of an identical dispensing opening **38** in each of the bosses **36** whereas no such openings are provided in the bosses **37**. In the preferred embodiment of this invention there are seven such bosses **36** corresponding to the seven dispensing openings **16** in the end wall **13** of the spin cap **11**, and a single dispensing opening **38** in each of the bosses **36**. The bosses **36** are spaced from each other and from the axis of the snap cap **12** a distance substantially equal to the spacing between adjacent ones of the dispensing openings **16** and the respective distance between each of the dispensing openings **16** and the axis of the spin cap **11**.

The bosses **37** are similarly spaced and each boss **37** is positioned between adjacent ones of the bosses **36**, as is clearly illustrated in FIGURE 1 of the drawing. The particular arrangement of the bosses **36**, **37** and the dispensing openings **16** and **38** is such that the dispensing closure **10** can be either closed or opened for dispensing purposes by rotating the snap cap **12** with respect to the spin cap **11** in a manner which will be described fully hereafter.

The depending peripheral skirt **30** of the snap cap **12** has an exterior surface **40** provided with an annular knurled portion **41** (FIGURE 3) to facilitate the gripping of the snap cap **12** both for purposes of dispensing and to secure the dispensing closure **10** to the container **14** in a manner to be described hereafter. An internal wall or surface **42** of the skirt **30** is provided with a plurality of axially extending inwardly directed identical projections **43** (FIGURE 1), between adjacent ones of which lies a keyway **44**. The number of keyways **44** corresponds to the number of keys **23** of the spin cap **11** and each key **23** is received in an associated keyway **44**, in the manner best shown in FIGURE 3 of the drawing. Each of the keyways **44** further includes opposing abutment surfaces **45** and **46** (FIGURE 1). As can be best visualized in FIGURE 1 of the drawing, each abutment surface **46** of an associated keyway **44** cooperates with an abutment surface **24** on an associated key **23** of the spin cap **11** to limit the counterclockwise rotation of the snap cap **12** with respect to the spin cap **11**, at which point the openings **16** and **38** are not in registration and are closed by associated ones of the non-apertured bosses **37** of the snap cap **12**. When the snap cap **12** is rotated in a clockwise direction, again as visualized in FIGURE 1 of the drawing, to bring the openings **16** and **38** into registration, each of the abutment surfaces **45** of the keyways **44** contacts an abutment surface **25** of an associated key **23** of the spin cap **11**, to stop the rotation of the snap cap **12** in a position in which the openings **16** and **38** are substantially axially aligned (FIGURE 3). This clockwise rotation of the snap cap **12** with respect to the spin cap **11** to bring the openings **16** and **38** into registration in the dispensing position of the dispensing closure **10** is opposite to the "normal" counterclockwise rotation required to open a conventional closure.

The container **14** comprises a container body **50** having a shoulder **51** integrally joined to an upstanding neck **52** terminating in an upper edge **53** defining an opening (unnumbered) of the container **14**. The neck **52** of the container **14** has a lower peripheral wall or surface **54**, an upper peripheral wall or surface **55** and an outwardly directed shallow annular bead or rib **56** between the walls **54** and **55**, as is best illustrated in FIGURES 1 and 3 of the drawing.

In accordance with the novel method of this invention, the snap cap **12** is first assembled to the spin cap **11** by telescoping the peripheral skirts **15** and **30** relative to each other until the bead **22** of the skirt **15** snaps into the groove **33** of the snap cap **12**. In the assembled position of the dispensing closure **10**, the keys **23** are each positioned in an associated one of the keyways **44** of the snap cap **12**, and depending upon the position of the keys **23** and the keyways **44**, the dispensing openings **16** and **38** in the respective spin and snap caps **11** and **12** are either in complete registration as shown in FIGURE 3 of the drawings, or are completely unregistered with the bosses **37** overlying the closing an associated one of the openings **16**, or are in partial registration.

The container **14** is then filled with a dusty or pulverulent product, such as baby powder, which is to be dispensed therefrom. This is accomplished by merely filling the container **14** through the opening (unnumbered) in the neck **52** of the container **14**.

The dispensing closure **10** is then telescoped with respect to the neck **52** of the container **14** in the manner clearly illustrated in FIGURE 3 with the inner surface **17** of the spin cap **11** being slightly spaced from the upper and lower external surfaces **55** and **54** respectively of the neck **52** by the rib **56**. The skirt **15** of the spin cap **11** is thus spaced from a major portion of the neck **52** of the container **14** by a narrow annular space or volume **57** and the bottom edge **21** of the depending skirt **15** rests upon the shoulder **51** of the container **14** closely adjacent the neck **52**.

The assembled container **14** and the dispensing closure **10** is then positioned beneath a vertically reciprocal and rotatable driving tool **60** which is normally spaced above and in axial alignment with the container **14**.

The driving tool **60** forms a portion of a conventional spin-welding machine (not shown) which may, for example, comprise an air cylinder into which is received a piston rod **61** of the driving tool **60**. The piston rod **61** is driven in a conventional manner by a variable speed motor (also not shown) in order that the rotational speed of the driving tool **60** can be varied. The driving tool **60** includes an annular skirt **62** which frictionally grips the knurled portion **41** of the snap cap **12** when the driving tool **60** is reciprocated downwardly to the position illustrated in FIGURE 3. The driving tool **60** also includes a plurality of downwardly directed bosses **63** (only one of which is shown in FIGURE 3) which corresponds to the number of dispensing openings **38** in the snap cap **12** and which seats in the openings **38** as shown in FIGURE 3.

With the driving tool **60** positioned as show in FIGURE 3 of the drawing and the container **14** held in a conventional chuck (not shown) the variable speed motor is energized to rotate the piston rod **61** and the driving tool **60**. The rotation of the driving tool **60** is imparted to the snap cap **12** through the frictional contact between the annular skirt **62** and the knurled portion **41** as well as through the engagement of the bosses **63** in the dispensing openings **38**. The rotation of the snap cap **12** is imparted to the spin cap **11** by the abutting contact between the surfaces **24** and **25** of the plurality of keys **23** with the respective surfaces **45** and **46** of the keyways **44** depending upon the direction in which the driving tool **60** and the spin cap **12** are rotated. Since the counterclockwise rotation of the snap cap **12** with respect to the spin cap **11** places the dispensing closure **10** in the non-dispensing position thereof with the bosses **37** overlying the dispensing openings **16** in the spin cap **11**, the driving tool **60** is preferably rotated in a counterclockwise direction as is indicated by the directional arrow of FIGURE 3. If the surfaces **24** and **46** of the respective keys **23** and keyways **44** are in engagement the spin cap **11** will immediately rotate in a counterclockwise direction. However, if the dispensing closure **10** is in the dispensing position thereof with the dispensing openings **16** and **38** in axial alignment, the snap cap **12** will rotate relative to the spin cap **11** until the surfaces **46** and **24** are in abutment, after which both caps will rotate simultaneously.

During this rotation of the snap cap **12** and the spin cap **11**, air is introduced into the air cylinder of the conventional spin-welding apparatus to force the driving tool **60** downwardly as viewed in FIGURE 3 of the drawings at a predetermined pressure to force the bottom edge **21** of the spin cap skirt **15** against the shoulder **51** of the container **14**. The combination of the heat of friction between the bottom edge **21** of the skirt **15**, and the shoulder **51** of the container **14** and the pressure applied by the driving tool **60** causes the material of both the container and the skirt **15** to melt and flow. The rotation of the driving tool **60** is then stopped by a conventional clutch mechanism (not shown) and the melt solidifies and fuses to form a generally annular spin weld area **64** (FIGURE 3) between the bottom edge **21** of the skirt **15** and the shoulder **51** of the container **14**. A portion of the material forming the spin-weld area **64** flows into the annular volume **57** between the surfaces **17** and **54** of the respective spin cap **11** and the neck **52** during the spin-welding operation and is entrapped therein. After the material forming the spin-weld **64** has solidified, the piston rod **61** is reciprocated upwardly to relieve the pressure between the spin cap **11** and the container **14**. After the drive tool **60** is spaced sufficiently above the dispensing closure **10**, the container **14** is removed from the chuck (not shown) and an additional container and dispensing closure may then be spin-welded together in the manner just described.

A product packaged in the container **14** is dispensed therefrom by rotating the snap cap **12** in a clockwise direction as viewed in FIGURE 2 of the drawing until the openings **16** and **18** of the respective caps **11** and **12** are in axial alignment as shown in FIGURE 3. When the dispensing operation is completed, the snap cap **12** is merely rotated in a counterclockwise direction as viewed in FIGURE 2 of the drawing until the bosses **37** overlie and close the dispensing opening **16** in the end wall **13** of the spin cap **11**.

Another dispensing closure of this invention is shown in FIGURES 4 through 6 of the drawing and is generally designated by the reference numeral **65**. The dispensing closure **65** comprises a snap cap **66** and a spin cap **67**, each of which is preferably constructed from plastic material such as polyethylene or similar thermoplastic material.

The spin cap **67** comprises an end wall **68** having upper and lower surfaces (unnumbered). The end wall **68** of the spin cap **67** is joined to an integral depending peripheral skirt **70** by an annular radius portion **71**. A plurality of dispensing openings **72**, only one of which is illustrated in FIGURES 5 and 6 are formed in the end wall **68** of the spin cap **67**. There are seven such dispensing openings **72** and the relationship of adjacent ones of the openings **72** as well as the distance of each of the openings **72** from the axis of the spin cap **67** is identical, for the purposes of this invention, to the relationship of the dispensing openings **16** of the spin cap **11**.

Midway between each of the dispensing openings **72** in the end wall **68** of the spin cap **67** is an upwardly directed integral convex boss **73**. There are seven such bosses **73** with each boss being positioned between adjacent ones of the openings **72**, and each boss is spaced from the axis of the spin cap **67** a distance equal to the distance between the axis of the spin cap **67** and the dispensing openings **72**.

The peripheral skirt **70** of the spin cap **67** terminates in a bottom edge **74** and includes an integral external annular bead **75**. The bead **75** of the skirt **70** is identical to the bead **22** of the skirt **15** and it is therefore considered unnecessary to describe the bead **75** for a complete understanding of the construction and operation of the dispensing closure **65**.

The snap cap **66** of the dispensing closure **65** comprises a thickened end wall **76** having a reduced central area **77**. The end wall **76** of the snap cap **66** is integrally joined by an annular radius portion **78** to a depending peripheral skirt **80** telescoped about the skirt **70** of the spin cap **67**, as is best illustrated in FIGURE 5 of the drawing.

The end wall **76** of the snap cap **66** is provided with a plurality of dispensing openings **81**, only one of which is shown in FIGURES 5 and 6 of the drawings. There are preferably seven such dispensing openings **81**, as is clearly shown in FIGURE 4 of the drawing, and each of the dispensing openings **81** is spaced from an adjacent opening **81** a distance equal to the spacing between the dispensing opening **72** in the end wall **68** of the spin cap **67**. The dispensing openings **81** are also spaced a distance from the axis of the snap cap **66** equal to the distance between the opening **72** and the axis of the spin cap **67**. Thus, in a dispensing position of the dispensing closure **65** (FIGURE 7), the plurality of dispensing openings **72** and **81** are in alignment.

Midway between adjacent ones of the plurality of dispensing openings **81** in the end wall **76** of the snap cap **66** is a downwardly opening concave recess or identation **82**, only one of which is illustrated in FIGURES 5 and 6 of the drawing. There are seven such recesses **82** in the end wall **76** of the snap cap **66**, and each recess **82** is spaced from the axis of the snap cap **66** a distance corresponding to the spacing of the bosses **73** from the axis of the spin cap **67**. Thus, the bosses **73** and the recesses **82** are in axial alignment when the snap cap **66** and the spin cap **67** are positioned as shown in FIGURES 4 and 5 of the drawing, with the dispensing openings **72** and **81** in registration. The snap cap **66** is rotated in either a clockwise or a counterclockwise direction as viewed in FIGURE 4 to bring the dispensing openings **72** and **81** out of registration, as shown in FIGURE 6 of the drawing. The entry of the bosses **73** into the dispensing openings **81** provides positive stops for securing the caps **66** and **67** in the non-dispensing position thereof (FIGURE 6) while the entrance of the bosses **73** into the recesses or indentations **82** (FIGURE 5) provides positive stops for maintaining the dispensing openings **72** and **81** in axial alignment in the dispensing position of the dispensing closure as shown in FIGURES 4 and 5.

The peripheral skirt **80** of the snap cap **66** is substantially identical to the peripheral skirt **30** of the snap cap **12** of FIGURES 1 through 3 of the drawing. However, the skirt **80** is slightly longer than the skirt **30**, and

prior to securing the dispensing closure 65 to a container 83 by the spin-welding process heretofore described, a bottom edge 84 of the skirt 80 is spaced slightly above the bottom edge of the skirt 70 of the spin cap 67. This slight projection of the bottom edge 74 of the skirt 70 beyond the bottom edge 84 of the skirt 80 allows the skirt 70 to be spin-welded to a shoulder 85 of the container 83 in a manner identical to that heretofore described in the consideration of the dispensing closure 10, without the occurrence of a spin-weld developing between the bottom edge 84 of the skirt 80 and the shoulder 85.

The skirt 80 of the snap cap 66 has a radially inwardly opening annular groove 86 including a camming surface or wall 87 against which an annular bottom edge (unnumbered) of the annular bead 75 coacts in the manner heretofore described in connection with the dispensing closure 10. Thus, the spin caps 67 and the snap cap 66 are assembled in a manner substantially identical to the assembly of the dispensing closure 10, except that the dispensing closure 65 has no keys or keyways corresponding to the respective elements 23 and 44 of the dispensing closure 10. However, the bosses 73, the recesses 82 and the plurality of dispensing openings 81 in the end wall 76 prevent the rotation of the snap cap 66 relative to the spin cap 67 when the bosses 73 are engaged in the recesses 82 or in the dispensing openings 81. Thus, the container 83 can be first filled with a dispensible pulverulent product through an open neck 88 thereof, identical to the neck 82 of the container 14, after which the dispensing closure 65 can be spin-welded to the shoulder 85 in the manner identical to that heretofore discussed. It should be particularly noted that if the dispensing closure is in the position shown in FIGURE 5 with the bosses 73 engaging in the recesses 82 the spin cap 67 will be driven or rotated by the snap cap 66 through this interlocking or keying arrangement of the bosses and indentations. The spin cap 67 is similarly rotated by the snap cap 66 when the bosses 73 are engaged in the dispensing openings 81 of the snap cap 66 as shown in FIGURE 6 of the drawings.

When the driving tool 60 is coupled to the dispensing closure 65, the spin cap 67 is indirectly rotated through the snap cap 66 to melt the material at the bottom edge 74 of the skirt 70 and the shoulder 85 to form a generally annular spin-weld area 89, a portion of which flows in an annular volume or space 90 between the neck 88 of the container 83 and the skirt 70 of the spin cap 67. No welding occurs between the shoulder 85 of the container 83 and the bottom edge 84 of the snap cap skirt 80 because of the slightly greater length of the spin cap skirt 70, as has been heretofore noted.

While the spin caps 11 and 67, the snap caps 12 and 66, and the containers 14 and 83 have been described as being proferably constructed from plastic material, such as polyethylene, it is within the scope of this invention to construct each of these elements from other material such as metal so long as the dispensing closures and the containers are compatible with the product packaged therein.

It is also desirable, but not necessary, to form the container 83 from the same material as the spin cap 67 in order that a high strength spin weld between these elements is achieved. That is, in the case of plastic material, dissimilar plastic material can be spin-welded together but as a general rule the strength of the spin welded joint is generally less than that achieved when identical materials are spin-welded together.

From the foregoing, it will be seen that novel and advantageous provision has been made for carrying out the desired end. However, attention is again directed to the fact that variations may be made in the example dispensing closures and containers, the components thereof and the method of securing the dispensing closures to the containers without departing from the spirit and scope of this invention as defined in the appended claims.

I claim:

1. A container comprising a plastic container body including a neck, an exterior peripheral rib on said neck, a plastic cap having a skirt telescopically received on said neck with said rib maintaining the skirt and neck in relative spaced relationship to define a circumferential void therebetween, and a peripheral edge of said skirt being secured to said body by a quantity of fused material from both said skirt and body with a portion of said quantity of fused material being located in said void.

2. A container comprising a plastic container body including a neck, a plastic cap having a skirt telescopically received on said neck, means spacing said skirt and neck to define a circumferential void therebetween, and said skirt and body being spin-welded together by a quantity of fused material from both said skirt and body with a portion of said quantity of fused material being located in said void.

3. A container comprising a plastic container body including a neck, a plastic cap having a skirt telescopically received on said neck, means spacing said skirt and neck to define a circumferential void therebetween, and said skirt and body being fused together by a quantity of fused material from both said skirt and body with a portion of said quantity of fused material being located in said void.

4. A container comprising a plastic container body including a neck, a first plastic cap having an end panel and a peripheral skirt, a second plastic cap having an end panel and a peripheral skirt, said peripheral skirts being in telescopic relationship to each other and to said neck, means spacing said first cap skirt and neck to define a circumferential void therebetween, said first cap and body being spin-welded together by a quantity of fused material from both said skirt and body with a portion of said quantity of fused material being located in said void, said caps including registrable dispensing opening means, and means for limiting the rotation of said caps relative to each other between a position at which said dispensing opening means are out of registration and another position at which said dispensing opening means are in registration.

5. A container comprising a plastic container body including a neck, a plastic cap having a skirt telescopically received on said neck, means spacing said skirt and neck to define a circumferential void therebetween, and said cap and body being spin-welded together by a quantity of fused material from both said cap and body with a portion of said quantity of fused material being located in said void.

6. A container comprising a plastic container body including a neck, a plastic cap having a skirt telescopically received on said neck, means spacing said skirt and neck to define a circumferential void therebetween, and a peripheral edge of said skirt being secured to said body by a quantity of fused material from both said skirt and body with a portion of said quantity of fused material being located in said void.

References Cited by the Examiner

UNITED STATES PATENTS

1,445,736	2/1923	Wilcox	222—548
1,669,884	5/1928	Wacker	222—548 X
2,064,189	12/1936	Bodor	222—548
2,088,607	8/1937	Peters	222—548
2,206,209	7/1940	Thorn	222—548
2,449,285	9/1948	Ekstrom	222—548 X
2,526,397	10/1950	Nyden et al.	222—548
2,627,992	2/1953	Kurz	222—555 X
2,633,894	4/1953	Carwile	156—73
2,785,841	3/1957	Westgate	222—545

(Other references on following page)

9

UNITED STATES PATENTS

2,817,451	12/1957	Giles et al.	222—548 X
2,956,611	10/1960	Jendrisak et al.	156—73
3,029,003	4/1962	Gronemeyer	222—545
3,125,260	3/1964	Dreps	222—548
3,134,518	5/1964	Sagarin et al.	156—73
3,163,331	12/1964	Wallberg	222—485 X

10

FOREIGN PATENTS

1,262,351	4/1961	France.
484,138	5/1938	Great Britain.

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WALTER SOBIN, *Examiner.*