May 31, 1960 M. L. GEISER ET AL 2,938,643

CLOSURE

Filed Oct. 15, 1956

Fig. 1

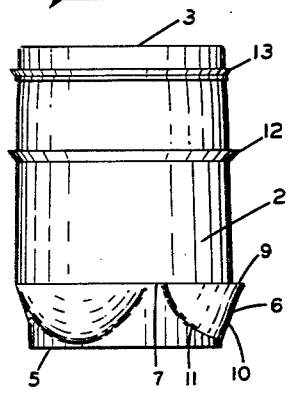


Fig. 2

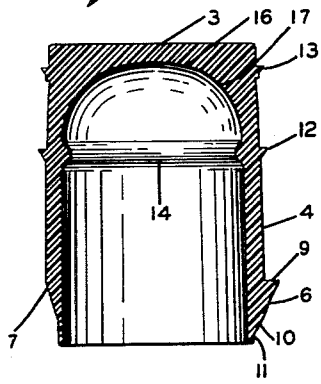


Fig. 5

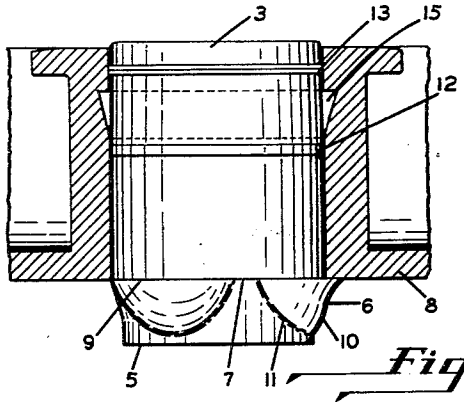


Fig. 3

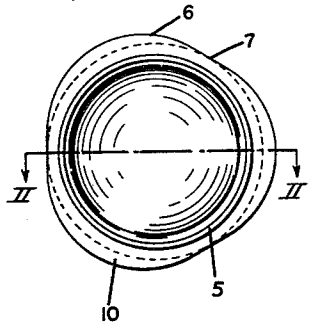
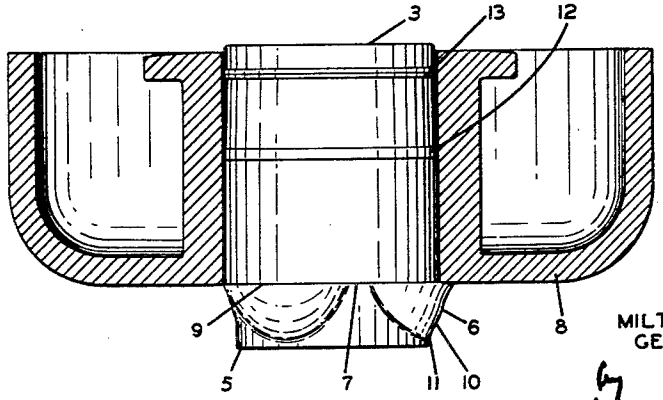


Fig. 4



INVENTOR
MILTON L. GEISER
GEORGE L. HERR

By

ATTORNEY

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2,938,643

CLOSURE

Milton L. Geiser, Manor Township, and George L. Herr, West Lampeter Township, Lancaster County, Pa., assignors to Armstrong Cork Company, Lancaster, Pa., a corporation of Pennsylvania

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This invention relates to a bung, and more particularly to an elastomeric bung to replace the cork bung for insertion in the bung bushing of a barrel.

The conventional tap bungs for barrels containing beer, ale, and the like have been made from cork; however, due to recent economic conditions cork has become relatively expensive for this purpose, and also with the development of certain synthetic plastic products suitable substitutes for cork have been developed for most uses.

In order for a bung to function properly for this purpose, it is necessary that it be designed so that it can be driven easily into the bung bushing with existing driving equipment, will be held securely in position in the bung bushing to prevent the pressure developed in the keg from blowing the bung out of its sealing position, and also can be driven on through the bung bushing into the keg when the tap pump is inserted to remove the beer from the keg. Due to the fact that it must be driven into the keg and also due to the fact that the interior of the bung is in engagement with the contents of the keg, it is essential that the bung be produced from materials which will not have a toxic or other deleterious effect on the contents of the keg.

Several attempts have been made to produce bungs from plastic material such as polyethylene, and the general trend has been toward a bung which forms a seal by providing a continuous ledge around the bottom edge of the bung which is exerted against the shoulder or bottom surface of the bung bushing. In order to insure this seal, it is necessary to have a rather heavily reinforced bottom edge on the skirt of the bung which is usually deformed during the insertion of the bung into the keg, which deformation impairs the sealing characteristics of the bung. When this reinforcing ring is compressed during insertion, there is no space provided into which the compressed material can be distributed. Because of this material distribution, the bottom skirt either develops a fold or the reinforced ring assumes an oval shape in the opening in the bung bushing. In the case of the fold, the material forming the bung is usually ruptured, resulting in an improper seal; and in the case of the assumed oval, the bung is cocked in the bushing to such an extent that the top edge of the opening in the bushing gouges sections from the side of the bung. In either instance the sealing qualities of the bung are greatly impaired.

Other plastic bungs have been developed having a series of ribs around the skirt of the bung, giving line contact between the bung and the bushing at several points in the bushing. This line contact has not been satisfactory due to the fact that bushings through reuse become scored on their inner or sealing surface. With these score marks, it is not easy to seal the contents of the barrel with a polyethylene bung having several line contact points throughout the depth of the bung. In structures having a plurality of sealing rings around the skirt of the bung, these rings are of necessity of such nature that they serve as reinforcing rings and prevent the expansion of the bung to permit the wall of the bung to be urged against the bushing by the internal pressure on the bung. Here again, with a plurality of reinforcing rings surrounding the bung, there is no opportunity for the material in the rings to be redistributed; therefore, the ring tries to assume an oval shape and in so doing cocks the bung in the opening

in the bushing, causing areas near the top of the bushing to be gouged.

Keeping in mind the limitations of the existing bungs, the hollow, cup-shaped bung of this invention was developed to be easily inserted without deformation of the bottom of the cylindrical skirt and without cocking of the bung in the opening of the bung bushing, leaving a relatively large area of the skirt of the bung for sealing engagement with the internal surface of the bushing, and at the same time provide suitably reinforced rings for sealing score marks in the bung bushing.

In order that our invention may be more readily understood, it will be described in connection with the attached drawing, in which:

Figure 1 is an elevational view of the bung;

Figure 2 is a cross sectional view of the bung taken on the line II—II of Figure 3;

Figure 3 is a plan view looking at the bottom of the bung;

Figure 4 is a sectional view of a bung bushing showing the position of the bung in sealing engagement therewith; and

Figure 5 is a view similar to Figure 4 showing a modified form of bung bushing.

Referring to Figure 1, there is shown a bung designated generally by the numeral **2** having a relatively flat top portion **3** for engagement by driving means to insert the bung in the bushing and to remove it therefrom. The bung **2** has a relatively thin depending skirt portion **4** terminating in a beveled lip **5** having a diameter slightly less than the diameter of the bung opening in the bushing into which the bung is to be driven. The bottom of the bung **2** is open for the admission of gaseous pressure into the bung cavity. Located adjacent the beveled portion of the bung are a plurality of locking lobes **6**. These locking lobes **6** are so spaced around the periphery of the skirt as to leave areas **7** positioned therebetween which are of relatively thin wall thickness. The purpose of the lobes **6** is to lock the bung firmly in engagement with the bushing **8** (Figures 4 and 5) by means of the flat surface **9** on the top of the lobe disposed angularly from the skirt of the bung, engaging the underneath surface of the bushing. The top surfaces of all the lobes **6** are flat and are disposed on substantially the same horizontal plane. The outer surface of the body of the lobes is tapered from the outer edge of the top surface **9** to the line where it blends into the skirt of the bung near its lower extremity. This tapered design in the area **10** facilitates inserting the bung into the bushing **8**. The lobes **6** are also arcuate in a plane normal to the longitudinal axis of the bung, resulting in a lobe configuration in which the lobe gradually blends into the surface of the skirt at all points except those lying on the line where the top surface **9** joins the skirt of the bung. The line at which the lobe blends into the skirt of the bung is designated by the numeral **11**. With this design, when the bung is driven into the bushing, the elastomeric material of which the lobe is comprised can be redistributed temporarily during the driving operation into the area between lobes so that the bottom skirt of the bung is not deformed during the inserting operation. With the arcuate design as here disclosed (Figure 3) there are no sharp angles present to offer resistance to the redistribution of the elastomeric material during this driving operation. The resistance to redistribution caused by sharp angles results in pieces being broken off the edges of the elastomeric piece. This tendency to break under compression is practically eliminated by this design. With a structure of this type, the bottom skirt of the bung has engaging means for engaging the bushing to lock the bung in sealing position, but at the same time there is no continuous reinforcing rib around

the lower extremity of the bung to prevent the gaseous pressure exerted on the interior of the bung from expanding the bung into firm sealing engagement with the sides of the bushing. This is a highly desirable feature because the lobes by this specific design furnish two functions—one, holding the bung in position; and second, holding the bottom skirt of the bung in proper shape but at the same time permitting the relatively thin side wall to expand due to the internal pressure exerted, forcing the bung against the bushing over a large area throughout substantially the entire depth of the bung in the bushing.

The seal effected between the smooth sides of the bung with the bushing is satisfactory with unmarred bushings; however, careless insertion of the tap rod in the bushing results in scoring the side of the bushing to such an extent that the elastomeric material of the side wall of the bung will not distribute itself into the score marks and seal the score marks. In order to insure a proper seal in those instances where score marks are present on the inner surface of the bushing, there are included on the bung here under consideration two sealing rings **12** and **13**. The positioning of these sealing rings is such that a major portion of the smooth surface of the bung is exposed between the locking means **6** and the first sealing ring **12** to allow ample sealing surface for unmarred bushings. Also this ring **12** is so positioned as not to restrict the expansion of the lower portion of the skirt of the bung.

The sealing ring **12** may be referred to as a semi-stiff sealing ring. It is triangular in cross section, having a flat top surface and a beveled side extending from the outer extremity of the flat ledge to the line where it blends into the body of the bung. In juxtaposition to the ring **12** is a reinforcing ring **14** on the inner surface of the bung. With this structure it will be obvious that the elastomeric material of the ring **12** is forced into any score lines or other irregularities in the bushing by means of the spring action of the barrel section of the bung further supported by the inside reinforcing ring **14**. As the bung is driven into the bushing, the ring **12** is squeezed between the bushing and the bung and assumes a flattened out configuration.

The ring **12** does not cause cocking of the bung during the insertion of the bung into the bushing because the ring **12** itself does not have sufficient strength to resist deformation, and the reinforcing member **14** which backs up the ring **12** is of a diameter less than the diameter of the bushing and, therefore, does not offer the resistance which is experienced with the external reinforcing rings of the prior art. Furthermore, by the time the ring **12** enters the opening in the bushing, a major portion of the bung body is in the bushing and resists cocking.

The other sealing ring **13** is positioned near the top of the bung in an area where it is backed up by the hard unyielding dome section of the interior of the bung. Upon insertion this massive unyielding head drives the ring **13** against the side of the bushing at forces beyond the elastic limit of the elastomeric material, causing the material of the ring to conform to the deformation and form a tight seal. The ring **13** is so positioned that when it enters the opening in the bushing substantially the entire body of the bung is in the bushing and cocking of the bung is thereby prevented. This resistance to cocking also aids in forcing the sealing ring **13** into any deformities in the bushing.

From a study of Figure 5, it will be observed that sealing rings **12** and **13** are so positioned that when used in bushings having the cork lock groove **15** one of the sealing rings is located below the groove and the other is located above. It is, therefore, immediately apparent that all of the sealing features of this bung function on bushings having the cork lock groove as well as on smooth bore bushings.

The hollow cavity in the bung is arch-shaped as shown at **16**, resulting in a relatively thin wall in the center of the top portion of the bung but a heavily reinforced area **17** on either side leading over toward the depending skirt. The purpose of this reinforced area **17** is to impart to the bung sufficient strength to prevent the tap rod, which is used to push the bung into the barrel, from puncturing the top surface, but instead the rod engages the bung in a relatively wide area over the heavily reinforced portion and pushes the entire bung into the barrel. This is a highly desirable feature, inasmuch as the bung is completely removed from the bushing and can be taken out of the barrel in one piece after the contents have been tapped therefrom. Another reason for this heavily reinforced area **17** is that expressed earlier in connection with the sealing ring **13** wherein the mass of material **17** acts as a resistance to deformation of the top of the bung during insertion, forcing the sealing ring **13** into conformity with the formation of the opening in the bushing.

We have found polyethylene particularly well adapted for the purpose of carrying out this invention; however, any elastomeric material capable of deformation under the pressures used in inserting articles of this type is suitable, provided, of course, the material is so selected as not to deleteriously affect the contents of the barrel.

It will be obvious to those skilled in the art that the plastic bung herein described is of such construction that it may be easily driven into a tap bushing without deforming the lower skirt of the bung, leaving a relatively large area of the skirt of the bung for sealing engagement with the tap bushing. The bung is also provided with auxiliary sealing means to seal against any deformities which may be present in the interior surface of the bushing.

We claim:

A cup-shaped bung for insertion into the bung bushing of a barrel, said bung comprising a relatively heavy top section, a flexible cylindrical skirt depending from said top section, a beveled portion on the lower extremity of said cylindrical skirt, the diameter of the terminal edge of the beveled portion being less than the diameter of the opening in the bushing, the flexible skirt of said bung being capable of expansion under pressure to form a tight seal between the bung and the bushing, a plurality of angularly projecting lobes disposed on the beveled portion of the skirt to engage the under portion of the bushing throughout a major portion of the circumference of the opening in the bushing to hold the bung in sealing position in the bushing, said lobes being of an arcuate shape on a plane normal to the longitudinal central axis of the bung and having flat top portions for engagement with the bushing, said lobes extending from the top of said beveled portion throughout substantially the entire depth thereof, the outer surface of said lobes tapering from the outer edges of said flat top portions to the lower portions of said lobes, said lobes being spaced from one another by segments of said beveled portion, an outward circumferential projection in the sealing zone between the top section and the flexible depending skirt, and an inner reinforcing ring in juxtaposition to said outward projection.

References Cited in the file of this patent

UNITED STATES PATENTS

1,033,730	Peacock	July 23, 1912
1,814,141	Fox et al.	July 14, 1931
2,353,674	Kimber	July 18, 1944
2,526,225	Gronemeyer et al.	Oct. 17, 1950
2,657,817	Alvear	Nov. 3, 1953
2,669,370	Royall	Feb. 16, 1954
2,690,946	Roehrl	Oct. 5, 1954
2,738,890	Dahl et al.	Mar. 20, 1956

FOREIGN PATENTS

519,553	Great Britain	Mar. 29, 1940
653,023	Great Britain	May 9, 1951
1,120,713	France	Apr. 23, 1956