Nov. 20, 1962 C. W. FERM 3,064,849

CAP FOR BARREL TAP OPENING

Filed Sept. 5, 1958 3 Sheets-Sheet 1

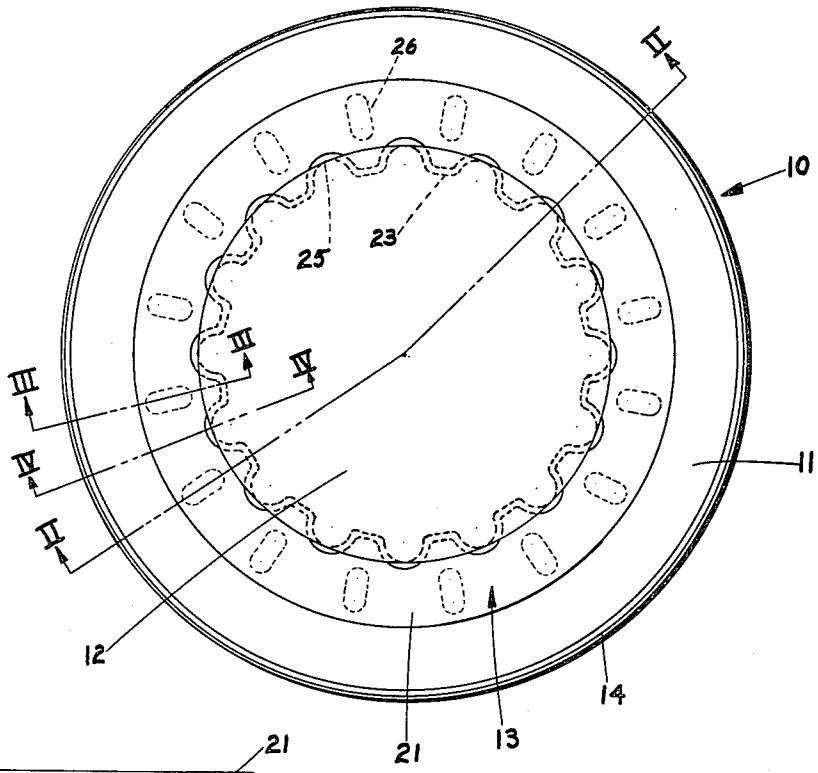


Fig. 1

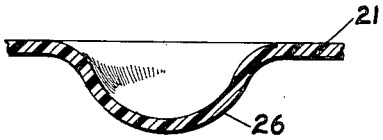


Fig. 5

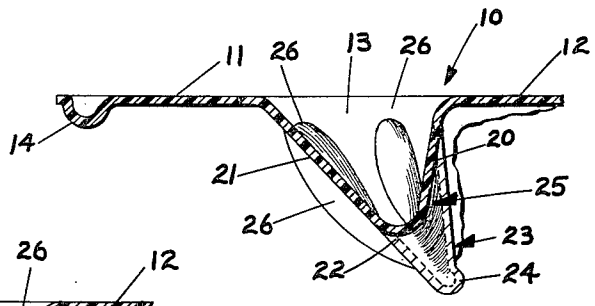


Fig. 4

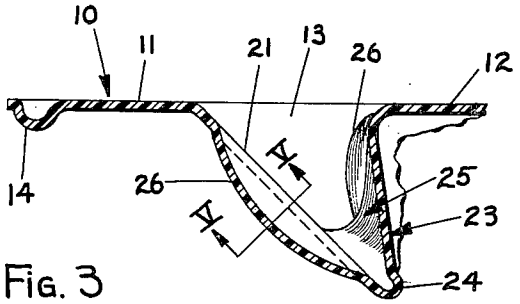


Fig. 3

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CAP FOR BARREL TAP OPENING

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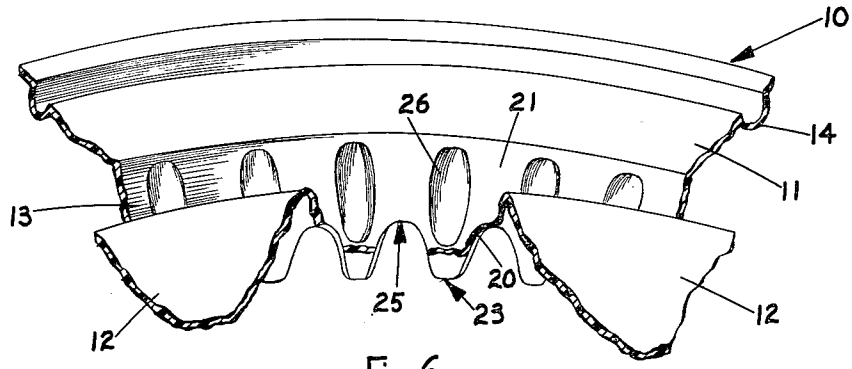


Fig. 6

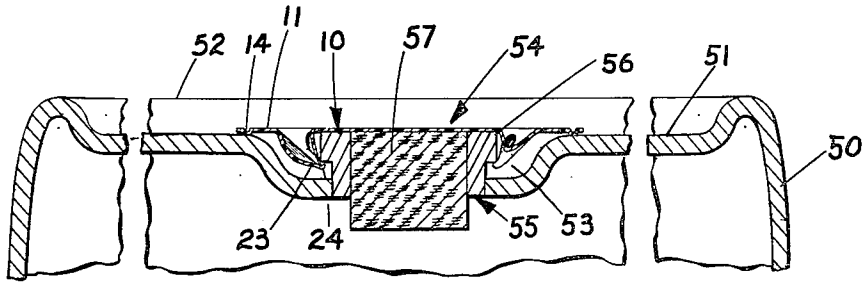


Fig. 2

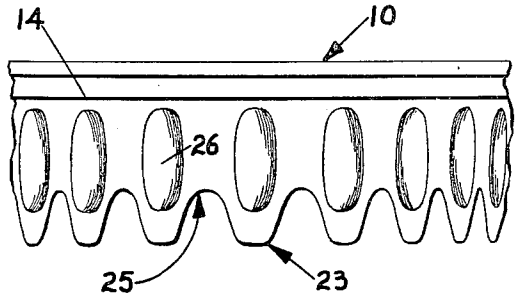


Fig. 7

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CAP FOR BARREL TAP OPENING

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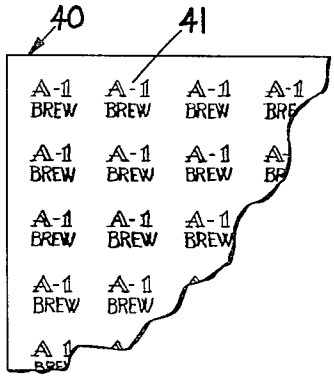


Fig. 9

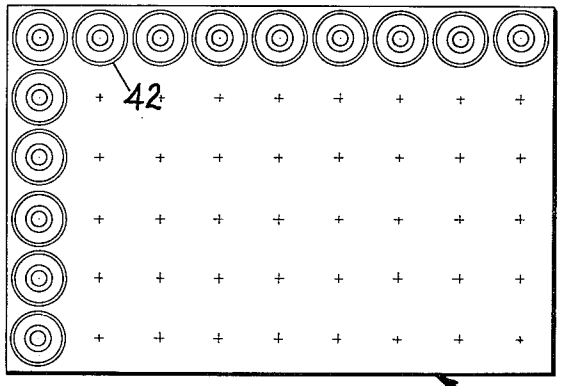


Fig. 11

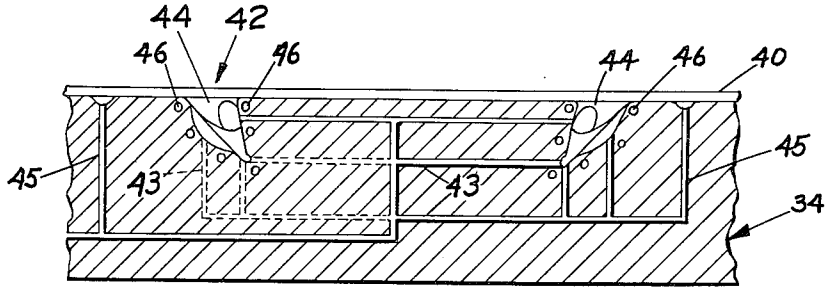


Fig. 10

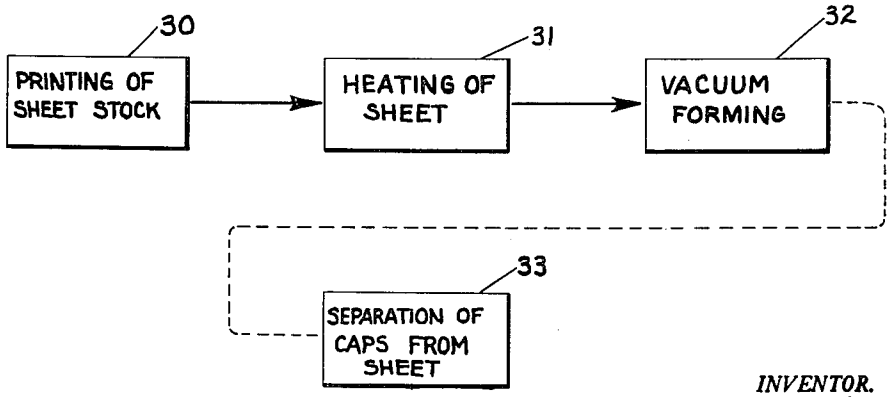


Fig. 8

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United States Patent Office

3,064,849
Patented Nov. 20, 1962

3,064,849

CAP FOR BARREL TAP OPENING

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Filed Sept. 5, 1958, Ser. No. 764,474
2 Claims. (Cl. 217—114)

This invention relates to disposable caps for beer barrels and more particularly to a disposable, vacuum formed, snap-on plastic cap for covering the tap opening of the barrel.

Previously, caps of this type have been manufactured by molding them from plastic materials. This has not been entirely satisfactory because of the difficulty of applying the printed indicia to the surface of the cap. Most breweries desire and many jurisdictions require by statute that the name of the beer be applied to the cap. Meeting this requirement has proved to be expensive and difficult with molded caps.

The shape and flexibility of the caps make it virtually impossible to apply this printing by means other than silk screens. The nature of the caps requires separate application of the silk screen to each individual cap. This is so slow and expensive that it virtually renders the caps economically impractical. Further, the rough surface of the caps, particularly at the edges, causes rapid wear of the silk screens. This problem is so serious that the silk screens normally have but a fraction of their expected life. This situation further increased the cost of the caps. The same difficulty was experienced whether or not the caps had the form of the indicia molded as a raised impression on their surface. The use of a raised impression requires individual dies for every make of beer, eliminating the economies of mass production.

This invention has eliminated this problem by making it possible to utilize sheet stock on which the indicia is printed by suitable means such as a silk screen. Thus, the indicia for twenty, fifty or one hundred caps is printed simultaneously in one pass of the press. The printed sheet is then blanked to form disks of the desired size. These are subsequently heated and vacuum formed to shape. This can be done without distortion of the printing. The surface of the sheet stock is smooth and excessive wear of the screens is eliminated. By this method, the cost of the caps is reduced materially and a single cap design can be used for all brands.

In addition, this invention provides a cap having a firmer grip when installed on the barrel and a tighter seal around the tap opening. This reduces the possibility of loss in transit and more effectively restricts the entrance of dirt into the area of the tap opening.

These and other objects and advantages of this invention will be immediately understood by those acquainted with the design and use of the barrels such as those used for beer upon reading the following specification and the accompanying drawings.

In the drawings:

FIG. 1 is an enlarged plan view of my improved cap.

FIG. 2 is a sectional elevation view taken along the plane II—II showing the cap installed on the barrel.

FIG. 3 is a fragmentary enlarged sectional elevation view taken along the plane III—III of FIG. 1.

FIG. 4 is an enlarged fragmentary sectional elevation view taken along the plane IV—IV of FIG. 1.

FIG. 5 is a fragmentary sectional enlarged sectional view taken along the plane V—V of FIG. 3.

FIG. 6 is a fragmentary enlarged oblique partially broken view of my improved cap.

FIG. 7 is an enlarged fragmentary side elevation view of my improved cap.

FIG. 8 is a diagrammatic presentation of a method of making my improved cap.

FIG. 9 is a broken view of a sheet which has been printed ready for forming.

FIG. 10 is a schematic presentation of a section of a vacuum mold for forming one of the caps.

FIG. 11 is a somewhat schematic view of the mold showing a group of cavities.

In executing the objects and purposes of this invention, I form a cap by first imprinting on a sheet of suitable synthetic resinous stock the desired indicia for a plurality of the caps. The printed sheet is heated by suitable means such as infra-red radiation and placed on a vacuum mold containing a plurality of cavities, each of which will form one of the caps. The sheet is then drawn to the shape of the finished caps by pulling it simultaneously into all of the cavities of the mold by means of the vacuum. This mold is chilled to set the caps substantially immediately upon contact. This sheet is then passed through a machine which cuts the individual caps from the sheet. The caps are then ready for use.

Referring specifically to the drawings, the numeral 10 refers to a cap having a wide outer or peripheral flange 11 and a circular, central portion 12 separated from the peripheral flange 11 by a circular trough 13. Adjacent the perimeter of the peripheral flange 11, the cap has a shallow, circular, depressed ridge 14. The purpose of this ridge 14 will appear more fully hereinafter. The peripheral flange 11 and the central portion 12 are flat and co-planar.

The trough 13 is generally V-shaped with downwardly converging inner and outer walls 20 and 21 (FIGS. 3 and 4). The bottom of the trough is closed by a bottom wall 22 (FIG. 4). This bottom wall 22 is undulating in shape, forming a plurality of spaced fingers 23 projecting substantially below the rest of the trough. Each of the fingers, on its lower end, has an inwardly directed boss 24. The purpose of the bosses will appear more fully hereinafter.

The walls of the fingers 23 curve upwardly and outwardly into the bottoms of those portions of the trough on each side of the finger. Thus, the intermediate portions of the trough form bridges 25 between the fingers. These bridges serve as structural reinforcements for the fingers. They cooperate with the fingers to give them sufficient strength and resistance to deflection to form a secure grip yet permitting the fingers sufficient resiliency that they may be spread to pass over and lock about the ridge surrounding the tap opening of the barrel. To further increase this characteristic of resiliency and ability to clamp about an object, the outer wall 21 of each of the fingers is provided with reinforcements in the form of the outwardly concave reinforcement beads 26. These beads are narrow circumferentially of the wall and are elongated vertically of the wall. They extend from a short distance below the top of the wall almost to the bottom of each of the fingers. One of the reinforcement beads 26 is provided for each finger. The action of the beads 26 is in the nature of a spring, urging the fingers inwardly.

Those portions of the inner and outer walls 20 and 21 forming the fingers 23 are both inclined radially inwardly, giving the fingers 23 an inward inclination. The bottoms of the fingers 23 even without the bosses 24 define a circle of smaller diameter than the upper portions of the fingers. The bosses 24 provide a small, segmented ridge defining a circle of even smaller diameter.

To make the caps, a sheet of suitable synthetic resinous material is selected. The size of the sheet will depend on that which is commercially available and on the capacity of the equipment available. The material selected for

making this sheet must be of a type adapted to forming under vacuum conditions while heated. For this purpose, polystyrene, particularly high-impact polystyrene, has been found to be satisfactory.

The sheet is first passed through suitable equipment for imprinting the desired indicia on the sheet. This is represented by station **30** (FIG. 8). For this purpose silk screening has been found to be quite satisfactory. The indicia **41** (FIG. 9) for a plurality of the caps is printed simultaneously on the sheet at a spacing permitting subsequent cutting of the individual caps from the sheets (FIG. 9). While the indicia **41** normally is printed only in the portions of the sheet which ultimately will become the central portion **12** of the formed cap, it may be printed in the portions which will become the outer portion surrounding the trough or even that portion which will be formed into the trough. If it is printed on a portion which will be deformed or stretched during forming, the printing may be so shaped at the time of application that after forming the reshaping of the sheet will cause the printing to assume a non-distorted shape.

While a number of materials are suitable for printing the indicia **41**, a cellulose base ink having a solvent which also is a solvent for the resinous material of the sheet has been found particularly desirable. Such an ink tends to etch the surface of the sheet, creating an impression which is both of a contrasting color and is so embedded anchored to the sheet that it will not flake or rub off. It becomes an integral part of the sheet. A solvent is selected which evaporates rapidly and only a small quantity is applied in the printing process. Thus the solvent is only present in such quantities and for such a short period that it will etch only the surface of the sheet stock.

After the sheet stock **40** has been printed, it is passed to station **31** (FIG. 3) where it is heated by suitable means such as infra-red radiation. Infra-red radiation is particularly suitable for this heating. However, other types of heat sources may be used. This heating is continued only to the point of softening the sheet sufficiently that it can be formed in the vacuum mold at station **31**.

The heated sheet is then placed on the mold **34** (FIGS. 10 and 11) at station **31** (FIG. 8). The mold contains a plurality of cavities **42** each designed to form one cap. These cavities **42** are so spaced that only sufficient distance remains between the caps that they may be properly cut from the sheet **40** after forming. By means of the conduits **43** (FIG. 10) air is withdrawn from under the sheet at each cavity and the softened sheet is drawn into the trough cavities **44** and the ridge cavities **48** of the mold by air pressure exerted on the sheet's upper surface. In so doing, the sheet is reshaped in the trough cavity to form the bridges **25** and fingers **23**. This will not cause distortion of the central portion **12** of the cap because the depth of the cavity **44** is only about one-fourth of an inch while the finished caps are two and five-eighths inches or more in diameter. This is not sufficient to result in pulling of the center portion and consequent distortion of the indicia **41**. The shape of the cavity creates a zone of substantial resistance to drawing or pulling.

To draw material from the center of the disk requires stretching the central portion of the disk, creating appreciable resistance. If it is desired to provide further assurance against stretching or distortion of the central portion of the disk, suitable clamping means may be provided at this point. The drawing of the disk into the trough cavity **44** occurs rapidly. Vacuum is simultaneously applied to the conduits **45** to form the peripheral ridge **14**.

The mold **34** is kept chilled by water or other cooling means circulated through suitable openings **46** in the molds. This effects rapid setting of the plastic after it makes contact with the walls of the mold. This produces a rapid operating cycle, permitting the sheet to be removed from the mold almost immediately after forming. It is important to utilize a production rate high enough to make these caps economically feasible.

It will be recognized that the showing of the mold **34** is schematic only and that molds of various constructions and having various types of equipment to operate them may be used in connection with this invention. The mold itself and its operating mechanism form no part of the invention. Accordingly, more detailed description of the mold is not considered necessary to a full disclosure of this invention.

The sheet **40**, after forming, is transported to station **33** (FIG. 8) where the individual caps are cut from the sheet. This may be accomplished by any suitable type of equipment. Preferably it should be equipment suitable for blanking out all of the caps simultaneously or at least a complete row of them in each operating cycle.

The application of this invention is illustrated in FIG. 2. It is now conventional practice to utilize beer barrels of metal construction. In some instances barrels of plastic construction are being employed. This invention is designed for use with either type.

While there are barrels of various designs, the most commonly used design is illustrated in FIG. 2 wherein the sides **50** of the barrel where they join the top **51** are formed into an upstanding rim **52**. At the center of the top is a recess **53** surrounding the tap opening **54**. The tap opening is surrounded by a collar **55** having a radially extending flange **56** at its upper end. The upper end of the collar **55** is substantially flush with the outer surface of the barrel top **51**. The collar **55** is secured to the barrel by any suitable means such as welding. The tap opening is normally closed by a cork **57** mounted in the collar **55**.

The cap **10** is installed by pressing it over the flange **56** of the collar **55**. This causes the finger **23** to spread as it passes around the flange. The depth of the fingers **23** is such that when the cap is seated on the collar **55** the bosses **24** at the lower end of the fingers **23** seat under the bottom edge of the flange **56**, locking the cap in place. The resiliency of the fingers **23** urges the fingers against the flange **56**, firmly seating the bosses **24** under the flange. The inward inclination of the fingers **23** tends to pull the cap **10** tightly down upon the collar **55**.

The cap **10** has a diameter greater than that of the recess **53**. When seated on the collar **55**, the peripheral ridge **14** is pressed down against the outer surface of the barrel top **51** radially outwardly of the recess. At this point it seals the recess against the entrance of dirt. The use of the cap not only prevents entrance of dirt into the recess **53** and around the exterior of the collar **55** but it protects the end of the cork **57** from dirt. Since these corks are dislodged by pushing them into the barrel by insertion of the tap, protecting the end of the cork from contamination helps to keep the beer in more sanitary condition.

This invention makes the cost of these caps so negligible that it is entirely feasible to use them once and discard them when the barrel is tapped. This makes them particularly desirable as a protective cover for the tap opening during transportation, handling and storage of the filled barrels. Where the user wishes to be careful with the barrel he may remove the cap **10** at the time the barrel is tapped and restore it when the barrel is empty. This will prevent the entrance of insects, dirt and other sources of contamination while the barrel is being returned to the brewery. This is particularly desirable because it eliminates much of the slow and expensive washing and sterilization process currently required.

It will be recognized that while I have described a preferred embodiment of my invention, modifications of this invention may be made. Each of these modifications which embodies the principles of the invention is to be considered as included in the hereinafter appended claims unless these claims by their language expressly state otherwise.

I claim:

1. A cover for the tap opening of a barrel, said cover comprising: a disk; a plurality of spaced hollow fingers projecting downwardly from said disk; said fingers being arranged in a circle spaced inwardly from the perimeter of said disk; said fingers away from said disk being inclined radially inwardly and being joined by bridges of lesser depth; an elongated reinforcement bead on the outer wall of each of said fingers, said reinforcement beads projecting radially outwardly from said fingers.

2. A cover for the tap opening of a barrel, said tap opening being surrounded by a fitting having a terminal flange, said fitting being seated in a depression in said barrel with the terminal flange of said fitting substantially flush with the plane of the surface of said barrel surrounding said depression, said cover comprising: a disk having an annular trough therein spaced from the perimeter thereof; said trough being generally V-shaped in cross section; the bottom wall of said trough at spaced intervals projecting downwardly to form fingers joined by bridges of substantially lesser depth; said trough being radially inwardly inclined with said fingers engaged over said terminal flange and the perimeter of said disk seated on the surface of the barrel beyond the depression.

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