July 12, 1938. J. R. MORRIS 2,123,543

METHOD OF FORMING ARTICLES FOR MANIPULATING AND CONTAINING MATERIALS

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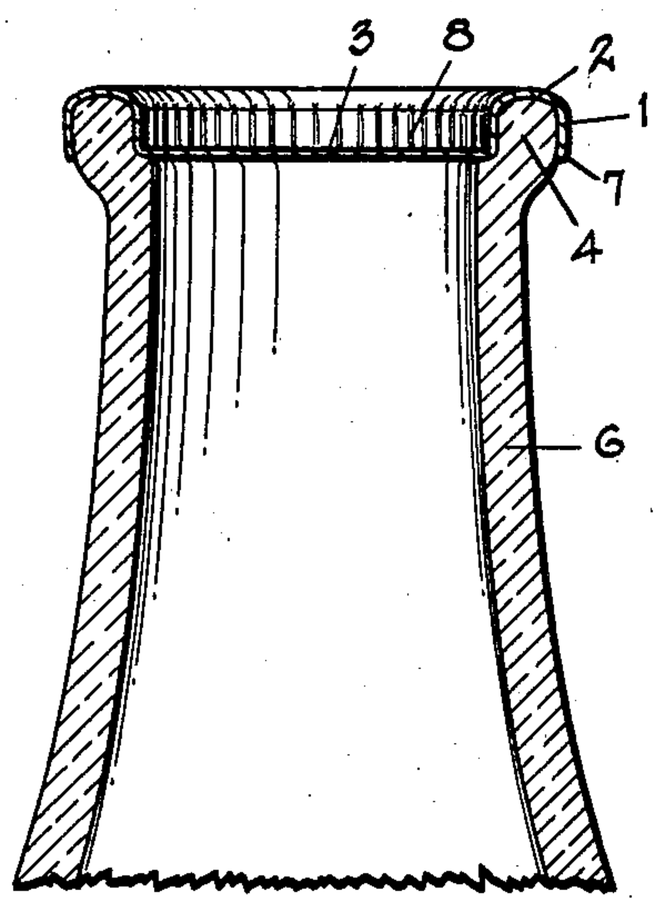


Fig 1

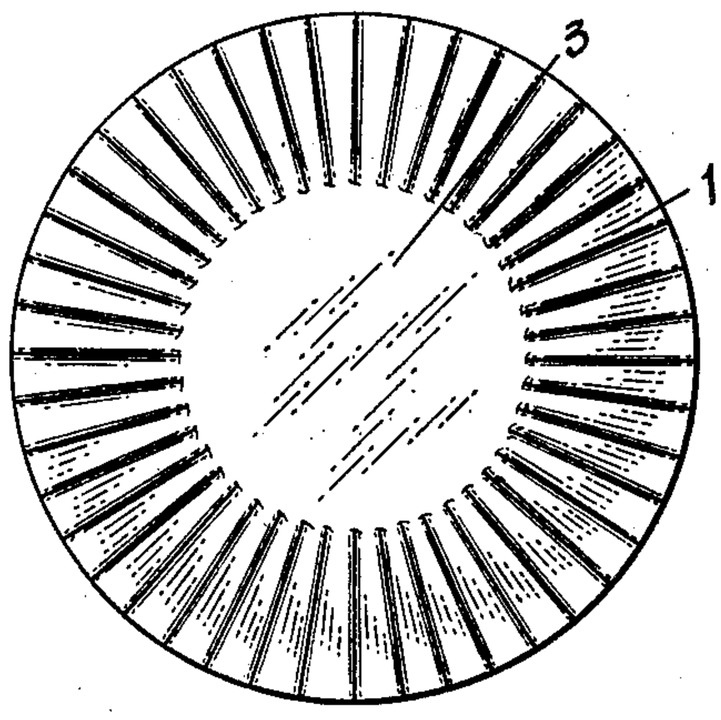


Fig 2


Fig 3

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## METHOD OF FORMING ARTICLES FOR MANIPULATING AND CONTAINING MATERIALS

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4 Claims. (Cl. 18—56)

My invention relates to articles formed from cellulosic material that is treated and shaped to produce a durable, translucent material, resistant to moisture and many alkalis and acids, particularly such as are found in foods and oleaginous materials of different kinds. The invention is thus applicable to the formation of articles of different forms usable for many purposes. The invention is particularly advantageously applicable to the production of utensils and containers or parts thereof for manipulating or containing foods and oils.

The invention consists in the method of producing a durable article that will not affect nor be affected by foods or oleaginous materials over a considerable period of time. The invention particularly has for its object to produce closure members or covers for containers formed of glass or any other material, such as preformed cellulosic material or plastics, suitable for containing oleaginous materials and foods of different kinds, such as milk, fruit and vegetable juices.

The closure members are produced by subjecting blanks cut from cellulosic sheet material to molten wax under conditions of temperature and pressure to produce penetration of a large amount of wax into the interstices formed by the matted fibres of the cellulosic sheet material, and then subjecting the fibrous material of the wax-impregnated blank to a limited quantity of moisture, under such conditions that will produce absorption and osmotic or capillaric transfer of the moisture through the fibres within the wax to soften and swell the fibrous portions of the blank and render them as pliable and shapeable as the wax that is lodged within the voids originally existing in the blank. The blanks are then shaped by high pressure to compress the fibres and the wax and force the fibres into intimate contact with the wax and forcibly displace a portion of the water.

The moisture quantity is limited to produce, upon standing for a period of time, a uniform predetermined mulling of all of the fibres of the blanks to enable exact die shaping. The temperatures of the wax, water, and the blanks and the period lengths of the wax-impregnation and water absorption are controlled to produce incorporation of a large quantity of the wax in the blank by submersion and uniform distribution of a controlled quantity of the water. The pressure produces first, excretion of a portion of the moisture from the pores or spaces between the fibres, second, wax-penetration, and third, interlocking of all of the fibres by the wax. Interlocking of the contacting parts of the fibres produces retention of the configuration into which the blanks are pressed. There is thus formed a structural tissue that reduces subsequent absorption of moisture that, if occurring, results in permanent deformation.

A bottle cap produced in the conduit of the method involving the use of the invention is shown in the accompanying drawing. The bottle cap and the preferred method of producing the cap are described hereinafter.

Fig. 1 illustrates a bottle cap particularly adapted for closing milk bottles. Fig. 2 illustrates a wax-impregnated, peripherally crimped disc from which the cap is formed. Fig. 3 illustrates an edge view of the disc, shown in Fig. 2.

In the formation of the articles embodying the invention, such as milk bottle caps, circular blanks are cut from cellulose sheet material composed largely of fibres extending in all directions and in interlaced relation. The multi-directional interlacing of the fibres prevents distortion of the sheet cellulosic material in the subsequent die-shaping of the articles that is otherwise caused by surface dragging of the dies.

The particular milk bottle cap shown in the drawing is formed from blanks of the character described. The blanks are first printed with water- and wax-resistant ink to decorate by color and present suitable indicia, trade-marks, and/or descriptive matter. The blanks are wax-impregnated, and while the wax is still hot, the blanks are subjected to moisture and allowed to stand in a humid atmosphere to produce the required mulling in order to obtain the best die-operating results. The blanks are then marginally crimped radially, as indicated at **1** on the disc shown in Fig. 2, to enable flowing and distribution of the material of the marginal portion of the disc as its parts are stretched and gathered and compressed to form a smooth, semi-polished surface. The disc is then die-pressed into shape at a high pressure to form the annular shell part **2** that is centrally spanned by the portion **3** of the disc. The bottle cap as thus formed snugly fits all parts of the lip **4** of the bottle **6**. The edge portion **7** engages the curvedly inwardly sloping outer edge part of the lip of the bottle and contacts the lip of the bottle in a direction counter to the portion **8**, forming the inner side wall of the annular shell that engages the curved surface of the inside of the lip of the bottle. Removal of the cap may be easily accomplished without deformation, by a rotative outward pull of the cap from the bottle.

In the treatment of the cellulosic material, the

wax in which the blanks are submerged is preferably well above 130° F. The blanks are then removed and moistened in any suitable manner, as by dipping, spraying, or water contacting as by rollers or brushes, or enveloping in a humid atmosphere. To regulate the degree of mulling, the fibres at the surface of the blank are alone moistened. The moisture contained in the surface fibres is distributed by absorption throughout the body of the blanks. This prevents the incorporation of more than a predetermined amount of water in the blanks. Excess moisture causes surface tearing by the dies. Also, when the excess moisture is removed, as by drying, subsequent resistance to liquid absorption is reduced.

The blanks are allowed to remain in a humid atmosphere a considerable length of time to permit uniform dampening or mulling throughout the entire body of the blank. Preferably the moistened blanks are enclosed in containers to produce from the water of the surface fibres of the blanks a humid atmosphere that produces, when the blanks are thus enclosed for a period of time, a limited dampness throughout the blanks. The same result may be obtained when the blanks are allowed to stand in a humid atmosphere without submerging them in water or without spraying. The blanks then absorb their proportional amount of water from the atmosphere until the dampness of the blanks approximates the humidity of the atmosphere.

Preferably, the wax blanks are allowed to remain in a container from six to twenty-four hours after wetting, depending upon the characteristics of the cellulosic material, the characteristics of the wax, the length of time that it has been subjected to the molten wax bath, the temperature of the water, the temperature of the wax, and the humidity conditions of the atmosphere, the objective being to produce a uniform mulled condition throughout the body of the blank by producing a definite predetermined and uniformly distributed water content. When the blanks are subjected to pressure between the shaping dies, the wax will be forced into the interstices from which the moisture of limited amount is exuded by the pressure. Thus, by the use of my invention, I am able to produce translucent bodies that are highly resistant to moisture, acids, and alkalis and oils.

I claim:

1. The method of forming articles from sheet cellulosic material which consists in wax-impregnating blanks cut from the said cellulosic material, then enveloping the blanks in a humid atmosphere until a uniform dampness is produced throughout the fibres of the blanks, and die-pressing and shaping the blanks by high pressure.

2. The method of forming water-, acid-, and alkali-resistant articles from sheet cellulosic material which consists in wax-impregnating blanks cut from the said cellulosic material, then subjecting the surface fibres of the wax-impregnated blanks to water, enclosing the water treated, wax-impregnated blanks to create a humid, blank-enveloping atmosphere, from the water charged surface fibres of the blanks, and maintaining the blanks in the humid atmosphere until a uniform limited dampness is produced throughout the fibres of the blanks, and die-pressing and shaping the blanks by high pressure.

3. The method of forming articles from sheet cellulosic material, which consists in submerging blanks cut from the said cellulosic material in molten wax, then subjecting the blanks to predetermined, limited quantities of moisture, distributing the moisture throughout the blanks by absorption, and die-shaping the blanks by a high pressure to form the articles.

4. The method of forming water-, acid-, and alkali-resistant articles from sheet cellulosic material which consists in wax-impregnating blanks cut from the said cellulosic material, then subjecting the wax impregnated blanks to an atmosphere of a predetermined humidity until uniform dampness exists in the atmosphere and the blanks, and die-pressing and shaping the said blanks by high pressure.

JAMES R. MORRIS.