March 7, 1944. L. NAST 2,343,470

NONINFLAMMABLE AND SHOCKPROOF HOLLOW VESSEL

Filed Sept. 23, 1942

Fig. 1.

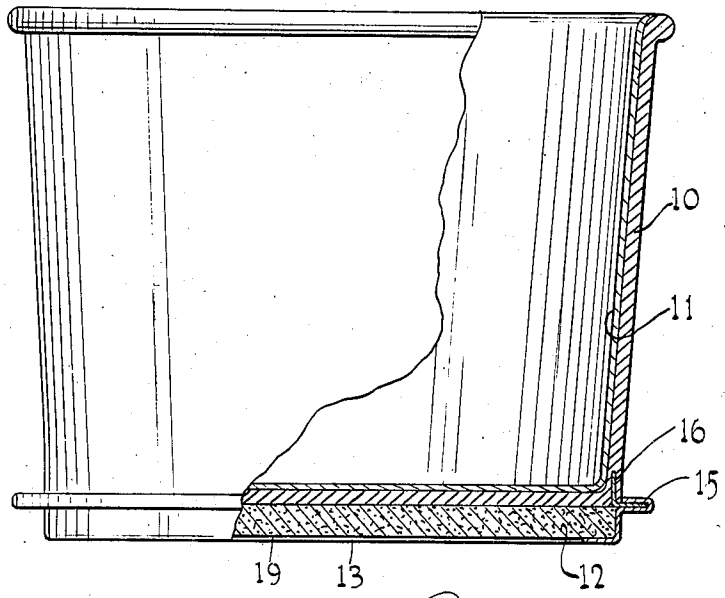


Fig. 2.

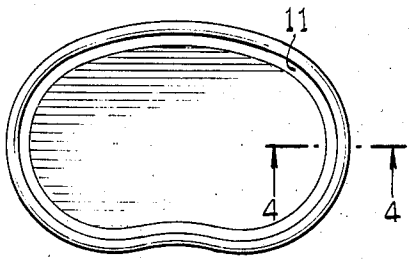


Fig. 3.

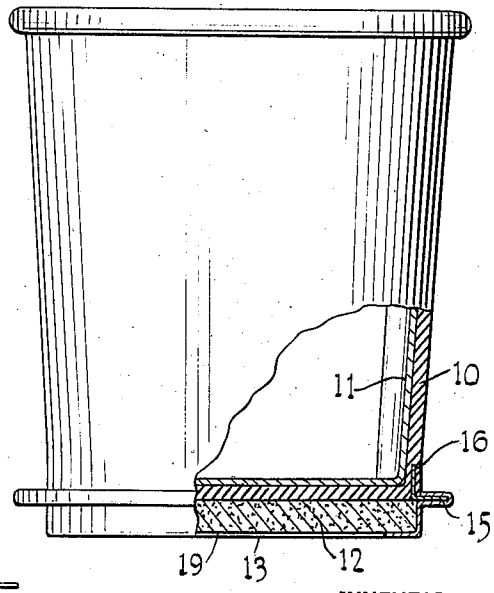


Fig. 4.

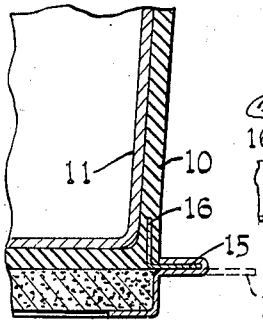
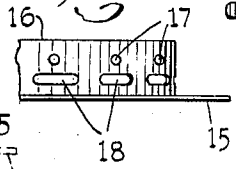


Fig. 5.



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UNITED STATES PATENT OFFICE

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NONINFLAMMABLE AND SHOCKPROOF HOLLOW VESSEL

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4 Claims. (Cl. 126—390)

This invention relates to hollow vessels or containers, such as cups or pots, which are heat resistant, non-inflammable and shockproof, and permit heating on an open flame.

Heretofore vessels of this type were made of metal, such as iron, aluminum and copper. These metals are now scarce, substitutes are looked for, and it was quite obvious to use moldable plastic materials for the manufacture of such vessels. However, although there are moldable plastic materials on a phenol formaldehyde basis which are heat resistant, non-inflammable and shockproof, they cannot be exposed to an open flame. The plastic material would neither soften nor burn but be carbonized by the flame and thereby rendered useless within a short time.

It is therefore an object of the invention to provide hollow vessels or containers, and in particular cups or pots of moldable plastic material which can be exposed to an open flame.

It is a further object of the invention to produce hollow vessels or containers, in particular cups and pots, of moldable plastic material which is non-inflammable, shock-proof and heat resistant, and to provide parts of such vessels or containers to be exposed to an open flame with protective means so as to avoid the detrimental effects of the flame on the material of the container or vessel.

It is still another object of the invention to provide a new article of manufacture which, as a unit, mainly consists of moldable plastic material which is heat resistant, non-inflammable and shockproof, and includes protective means against the detrimental effects of an open flame upon the vessel or container when exposed to the flame.

It is still a further object of the invention to provide a new article of manufacture which, as a unit, consists mainly of non-inflammable, heat resistant and shockproof moldable plastic material including a phenol formaldehyde hasis, the bottom of which is provided and made an entity with protective means against the detrimental effects of an open flame directed to the bottom.

These and other objects of the invention will be more clearly understood when the specification proceeds with reference to the drawing in which, by way of exemplification, a cup is shown as to be used by soldiers for receiving warm beverages, and it will be understood that the principles of the invention shown in this exemplification can be applied to any other hollow vessel or container such as a pot which is open at its top, although it may be provided with a removable lid preferably made of the same kind of moldable plastic material.

In the drawing, Fig. 1 shows such a cup in elevation with parts in cross section, Fig. 2 a top view, Fig. 3 a side elevation with parts in cross section, Fig. 4 on a larger scale a cross section along line 4—4 in Fig. 3, and Fig. 5 in elevation a detail of the invention.

Referring to Figs. 1, 2 and 3, the hollow vessel or cup consists of an outer hollow container 10 which is molded in a suitable mold of any suitable shockproof, heat resistant and non-inflammable plastic moldable material on a phenol formaldehyde basis. This type of plastic material is also known as a thermosetting plastic material which becomes plastic when heated in the mold and solidifies upon continued application of proper heat. Pressure may be applied simultaneously with heating. After solidification, the material does not become plastic again uopn heating and answers the requirement of being heat resistant, shockproof and non-inflammable. Ordinary plastic materials of this type retain, however, some odor resulting from carbolic acid introduced by the phenol. Therefore, according to the invention, another cup 11 is snugly fitted into cup 10. This second cup is also made of moldable plastic material on a phenol formaldehyde basis to which, however, urea is added which renders the completed material odorless. Moreover, moldable plastic material that contains urea is of a whitish color which is more appealing to the user than the dark and dull color of plastic material on a phenol formaldehyde basis only. As to the latter, it is understood that any pigment and/or filler, such as finely powdered sand, may be added in order to improve the color of the completed material as well as to save as much of it as possible. In the same way, some coloring and saving of the plastic material used for cup 11 can be obtained.

Cups 10 and 11 are molded separately, and cup 11 after being cooled is inserted into cup 10 while the latter is still hot and preferably before it is fully cured. The cold cup 11 snugly fits into the still hot cup 10 so that upon cooling and shrinking of cup 10 the tight connection of the two sleeved cups is secured.

Cup 11 may be cured and thereby fully completed before it is inserted into cup 10, or cup 11 may be inserted when cold but before it is fully cured, and in the latter case both sleeved cups will be finally cured together. It is well known in the art of producing objects of mold-

able plastic material concerned herein, to mold them in the heat and preferably under pressure, take them out of the molds and to complete curing of the material in suitable heating chambers.

It is understood that the thicknesses of the walls of the cups 10 and 11 are to be such that molding is facilitated without waste of material, and sufficient stiffness is given to the completed article. For a cup for soldiers' use, the side wall of cup 10 may be of a thickness of about .09" to .1", the side wall of cup 11 of a thickness of about .06" to .07", and the bottoms of the cups either of the same or slightly greater thickness as their side walls. It should also be understood that in the event that color and odor do not affect the use of the vessel, the lining formed by cup 11 can be omitted and the thickness of the wall of cup 10 either kept the same as indicated or equal to the combined wall thicknesses of cups 10 and 11.

In order to render the vessel capable of being exposed to the action of a flame playing against its bottom, protective means are provided outside the bottom. They consist in this exemplification of the invention of an outside bottom of heat resisting material which is not affected by an open flame and conducts the heat uniformly to the bottom proper of the united cups 10, 11. This outside bottom consists of a refractory mass or body 12 of finely powdered or granulated sand, ceramics or refractories, etc., or of a shaped and baked coherent ceramic piece. This mass or body is covered on the outside by a flat and shallow metal cup 13 provided with a laterally projecting flange or rim 14. An angular ring comprised of a laterally projecting flange 15 and another upright flange 16 is inserted in and integrally connected with the outer cup 10 in the way shown more clearly in Fig. 4. The ring is preferably inserted in the mold in which cup 10 is to be produced so that flange 15 lies flush with the outside surface of the bottom of cup 10 to be produced in the mold while flange 16 freely extends into the cavity of the mold. After the plastic material has been introduced into the mold and the latter closed, heat and, if desired, pressure is applied so that the plastic material to form cup 10 is also molded around flange 16. Upon curing and cooling, the plastic material shrinks somewhat and firmly holds flange 16. If desired, flange 16 may be provided with one or more rows of openings 17 and/or slots 18, as shown in Fig. 5, through which the plasticized material penetrates whereby flange 16 is in addition mechanically anchored in the lower edge portion of cup 10.

To the bottom of cup 10 thus provided with a flange 15 projecting beyond its circumference, the protective bottom comprised of mass or body 12 and metal cup 13 is now to be attached. To this end, flange 14 of cup 13 is made larger than flange 15 so that it projects beyond the outer periphery of flange 15 in the manner shown in dotted lines in Fig. 4, and the projecting portion of flange 14 is then bent back or rolled over flange 15 as shown in full lines in Fig. 4.

If a coherent and sufficiently solid body 12 is used, metal may be saved by cutting out the center portion 19 of cup 13, Fig. 1.

The advantages of the invention will be appreciated. By molding cups 10 and 11, if the latter be used, each in a single piece, any leakage is avoided. Their manufacture in mass production is simple, easy and inexpensive. The connecting member or angular ring 15, 16 can be permanently united with the cup in the same operation which is used and necessary for molding cup 10.

The metal cup 13 can be made of any suitable sheet material, such as thin steel, copper, aluminum, etc., and particularly from waste material. A considerable amount of material required for cup 13 can be saved by giving it a ring-like shape and cutting it out as described above, leaving practically only the side portion required for retaining body 12 in place and connecting it with flange 15. Cup 13 can be shaped and cut in one operation in simple mass manufacture.

If loose material is used as a filling for cup 13, it can be introduced and distributed in cup 13 in machines well known in the art, permitting simple and inexpensive mass operation. If a coherent body is intended to be used, it can be made of any ceramic or refractory mass admixed with any suitable binder, pressed to shape and baked in well known and inexpensive mass production.

The connection of mass or body 12 and cup 13 with cup 10 also requires little work and skill, and can be effected in mass production by means of well known rolling or spinning-over machines. If desired, flange 14 must not project beyond flange 15 and the two flanges may be connected by welding or spot welding.

In this manner ultimately a vessel or container is obtained which forms a unitary article of manufacture, the protective bottom 12, 13 being permanently connected with the portable vessel or container. It can be exposed to an open flame without danger of burning and carbonizing the vessel proper. The projecting flanges 14, 15 also prevent the hot portion of the flame from playing directly against the side wall of vessel 10, and depending upon the size and intended use of the vessel, flanges 14, 15 and, if they are connected by welding, at least one of them may be measured so as to securely prevent any direct play of the hot portion of the flame against the uncovered side wall of the vessel or container.

The thickness of the body 12 should be such that the intended effect is obtained. If the vessel should be exposed to a flame only for the purpose of keeping its fluid content warm, a thinner body or layer of powdery mass suffices than if the liquid content of the vessel should be heated to boiling temperature. In any event, a thickness of the mass or body 12 of about .25" will suffice. In order to prevent playing of the hot part of the flame directly against the side wall of cup 10, flanges 14, 15 may project outwardly also for about .25".

It is advisable to make the connecting member 15, 16 of the same metal material as cup 13 so as to secure equal heat expansion and contraction of flanges 14, 15.

However, the invention is not limited to any specific exemplification and dimension as hereinbefore mentioned and shown but to be derived in its broadest aspect from the appended claims.

What I claim is:

1. As a new article of manufacture, a hollow vessel or container, such as a cup or pot, substantially of organic thermosetting plastic material which is solid and heat resistant at elevated temperatures, non-inflammable and shockproof but carbonizable in an open flame, substantially comprising a hollow body of said material open at its top and provided with a bottom to be exposed at its outside to an open flame, protective refractory

means arranged at said outside of the bottom, and metallic means permanently and integrally connected with said body and laterally projecting beyond said bottom so as to protect its side wall against the attack of an open flame, said metallic means also holding said refractory means in place.

2. As a new article of manufacture, a hollow vessel or container, such as a cup or pot, substantially of organic thermosetting plastic material which is solid and heat resistant at elevated temperatures, non-inflammable and shockproof but carbonizable in an open flame, substantially comprising a hollow body of said material open at its top and provided with a bottom to be exposed at its outside to an open flame, a protective self-supporting plate of refractory material shaped so as to cover said exposed outside of the bottom and to contact it over its outside area, and metallic means as exemplified by a metal ring or cup engaging said plate at its lateral circumference and exposed outside, said metallic means including a projection molded into said body and thereby permanently and integrally connected with it.

3. As a new article of manufacture, a hollow vessel or container, such as a cup or pot, substantially of organic thermosetting plastic material which is solid and heat resistant at elevated temperatures, non-inflammable and shockproof but carbonizable in an open flame, substantially comprising a hollow body of said material open at its top and provided with a bottom to be exposed at its outside to an open flame, an angular metallic ring including an upright and another laterally projecting flange, said upright flange molded into said body and thereby permanently and integrally connected with it, said other flange laterally projecting beyond said body, a cup of metal arranged at said outside of the bottom and including a rim permanently connected with said lateral flange, and refractory material within said cup in heat conducting relation to said outside of the bottom.

4. As a new article of manufacture, a hollow vessel or container, such as a cup or pot, substantially consisting of two sleeved hollow bodies each of organic thermosetting plastic material which is solid and heat resistant at elevated temperatures, non-inflammable and shockproof but carbonizable in an open flame, the outer one of said sleeved bodies of thermosetting plastic material on a phenol formaldehyde basis and the inner one of said bodies of thermosetting plastic material on a phenol formaldehyde urea basis, said sleeved bodies in intimate contact and permanently connected with one another, an angular ring of metal of a melting point considerably higher than the temperature to which it can be heated by an open flame, said ring including an upright flange and another laterally projecting flange, said upright flange molded into the bottom of the outer one of said sleeved bodies close to its circumference and thereby permanently and integrally connected therewith, a flat and shallow cup of metal of a melting point considerably higher than to which it can be heated by an open flame, said cup arranged at and extending over said outside of the bottom and provided with a rim permanently connected with, such as bent over, said laterally projecting flange, and a refractory mass within said metal cup in heat conducting relation to said bottom and covering its said exposed outside.

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