Dec. 3, 1940. F. M. CARATHERS 2,223,780

HOT CUP

Filed May 3, 1939

FIG. 1.

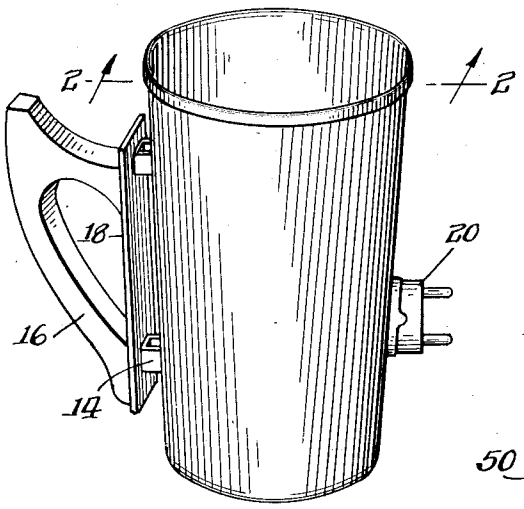


FIG. 3.

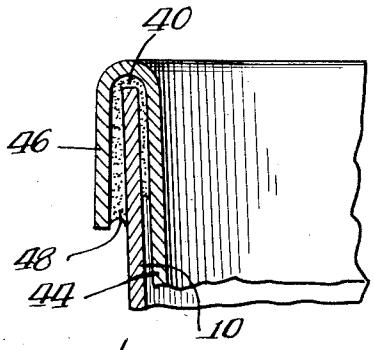


FIG. 4.

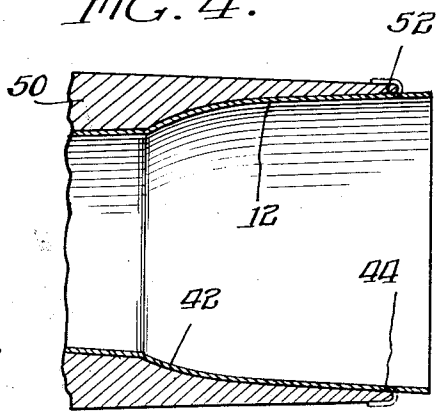


FIG. 2.

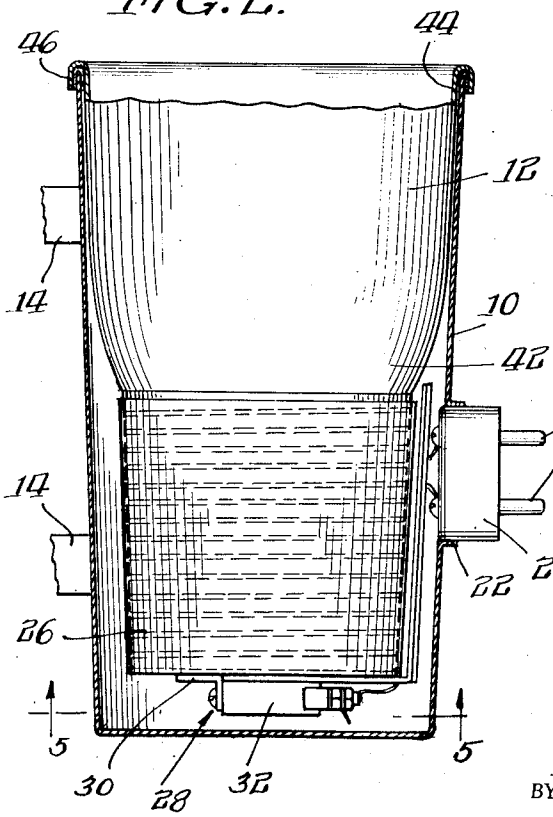
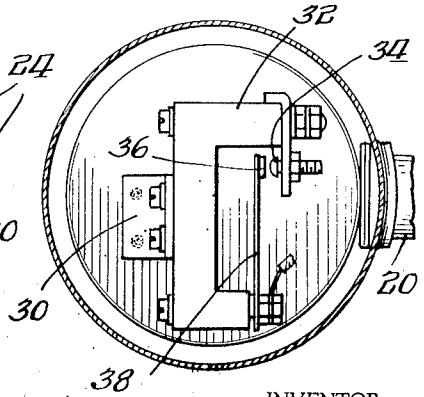


FIG. 5.



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HOT CUP

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5 Claims. (Cl. 219—44)

The present invention relates to a heating or warming device and more particularly to a construction known as a hot cup and employed at so-called beverage dispensing fountains for the preparation of warm beverages and hot mixed drinks.

The present invention relates yet more particularly to an improved hot cup which is permanent, rigid and serviceable, but which may be readily manipulated for disassembly and repair. Hot cup constructions in general comprise an inner and outer shell providing therebetween an annular space accommodating a heating element, together with a thermostatic control, where such a control is desired. In the past many expedients have been availed to assure the structural interassembly of the two shells. Many of the prior constructions failed to withstand the conditions of service including the jars and impacts to which the present device is normally subjected particularly adjacent the upper rim portion.

Hot cup constructions are necessarily and preferably so assembled as to seal the internal space for preventing the access of moisture thereto during washing. As a result when due to the inadvertent or accidental operation of the device overheating occurs, a pressure may be built up in the internal space and such pressures have been known to cause an explosion. By employing hitherto known constructions wherein the individual shells are forced together under pressure as by means of a "press fit," or by otherwise forcing the metal of the shells into firm engagement by metal bending and shaping operations, the danger of serious explosion is obviously increased. Periodic repair and inspection is additionally rendered difficult with these devices since it is normally quite impossible to expeditiously separate the parts so joined, necessitating the cutting apart of the shells adjacent their point of juncture.

It is an important object of the present invention to obviate the above difficulties by providing a hot cup construction in which the shells are freely interengaged during assembly, which construction may accordingly be relatively readily and freely separated for repair purposes. More particularly, the present invention contemplates a hot cup construction wherein the inner and outer shells are associated mechanically with each other during assembly by means of a simple free fit, the inner cup having wall portions parallel with the outer cup providing coextensive mutually supporting wall portions, both terminating in an interlocking engagement at the upper rim or edge portion of the hot cup to provide a strong, rigid, shock-resistant reenforcement at this point.

It is a further object of the present invention to provide a construction as above wherein the interengaging rim portions are freely separable at the time of assembly, but providing a suitable recess for a body of welding or sealing material such as solder. In accordance with the present improved construction, the mere softening of the solder permits free separation of the shells and in the event of inadvertent overheating, abnormal internal pressures are freely relieved through the space between the coextensive shell portions.

Numerous other objects and advantages will be apparent throughout the progress of the following specification.

The accompanying drawing illustrates a selected embodiment of the invention and the views therein are as follows:

Fig. 1 is a perspective view of a hot cup embodying the principles of the present invention.

Fig. 2 is a sectional view taken centrally through the hot cup of Fig. 1 along the line 2—2 of Fig. 1.

Fig. 3 is a detailed sectional view of the rim construction taken along the line 3—3 of Fig. 2.

Fig. 4 is a detailed view taken centrally through a spinning die, showing a hot cup shell in place therein, illustrating the method of formation of the upper rim portion thereof.

Fig. 5 is a detailed sectional view taken along the line 5—5 in Fig. 2 and illustrating the thermostatic construction.

The hot cup shown herein for the purpose of illustrating the present invention comprises an outer shell 10 and an inner shell 12, the two shells being coaxially arranged in assembled position. Upon the surface of the outer shell are affixed a pair of brackets 14 which mount a preferably heat insulating handle portion 16 and a guard plate or wall 18 to protect the hand against contact with the heated surfaces of the cup. Upon the opposite surface of the outer shell is mounted a socket fitting 20 arranged within a suitable opening bounded by flange 22. The fitting comprises a pair of prongs 24 adapted to receive a suitable electric plug for current supply to an electrical heating element 26 embracing the lower portion of the inner shell 12.

A thermostatic control element 28 mounted on

the bottom surface of the inner shell 12 by means of a bracket 30, comprises an insulating block 32 upon which is supported a fixed but adjustable contact 34 and a movable contact 36 mounted upon a bimetallic strip 38. It will be understood that at a predetermined temperature the bimetallic strip 38 moves away from contact 34 to break the circuit to the heating element 26, thus limiting the temperature of the contents of the cup to a predetermined value.

It is particularly important to note as clearly shown in Figs. 2 and 3 that the circular wall of the outer shell 10 is slightly tapered and terminates upwardly in a substantially undeformed edge 40. The inner shell 12, while being of substantially reduced diameter adjacent its lower portions to accommodate the heating element 26 flares outwardly as at 42 and upon approaching the upper edge 40 of the outer shell, resides in parallel relationship with the coaxial wall of the outer shell as at 44. It is of particular significance to note that these wall sections while being in parallel coextensive relationship, are nevertheless so formed that they slide freely upon one another into assembled position. This is accomplished by carefully preforming the shells to a dimension such that ample clearance is provided. Such a dimension may be of the order to provide a clearance of ten one-thousandths ($^{10}/_{1000}$) of an inch between parallel wall portions. It must be remembered that according to prior known constructions in general use, the practice has been to interengage the inner and outer shells by what is known to the art as a force or driving fit followed by soldering which rendered it impractical to separate the shells without damage and sometimes resulted in the violent release of pressures under explosive conditions. It may be stated that the present interassociation of the shells is characterized by a free or sliding fit.

It should be further particularly noted that the inner shell 12 terminates at its upper edge in a reversely extending flange portion 46 which in assembled relationship completely embraces the upper edge 40 of the outer shell 10. It has been found in accordance with the present invention that the clearance provided between the inner surface of the flange 46 and the outer adjacent surface of the shell 10 must be amply sufficient to permit perfectly free interengagement while permitting structural cooperation of the parts in reenforcing relationship as will hereinafter more fully appear. As much as thirty one-thousandths ($^{30}/_{1000}$) of an inch clearance at this point has been found to result in a satisfactory construction.

After the interassembly of the parts as shown in Figs. 1, 2 and 3, the residual space within the recess formed by the reversely extending flange 46 is filled with solder 48. It will be understood that this may be accomplished in any conventional manner, as for example by first tinning the adjacent surfaces and then dipping the upper edge into a molten bath of solder.

The resulting construction provides a hot cup in which the two shells are firmly and permanently interjoined and sealed together and which provides a strongly reenforced upper edge or rim portion which is nevertheless non-protrusive and neat in appearance. It is believed important to note that in spite of the substantial clearance provided between the adjacent shell surfaces, the metal of the two shells cooperates in resisting structural deformation. Thus while it is realized that solders are normally relatively soft, the arrangement of the present sealing metal in relatively thin sections and embraced upon all sides by the rigid metal of the shells effectively supports and combines the rims of the inner and outer shells into a reenforced construction of improved structural properties.

The coextensive wall portions 44 of the inner shell residing adjacent the parallel coextensive wall portions of the outer shell 10 similarly cooperate to brace and mechanically interengage the parts against deformation or separation. In other words, these wall sections while providing a free fit are nevertheless for all practical purposes arranged in contiguous juxtaposition. In accordance with the present invention, it has been discovered where the wall surface 44 is not so arranged in contiguous parallel relationship to the outer adjacent wall, the point of juncture is markedly weakened to a degree seriously affecting the serviceability of the finished article.

It may sometimes occur as stated above that the device may be subject to overheating and the creation of an abnormal pressure due to careless operation, to a failure of the control device, or due to the inattention of the operator when employing a unit of the type which is not provided with a thermostatic control, to which type of hot cup construction the present invention is likewise applicable. Under such circumstances, it will be evident from the foregoing that the body of fusible metal at the point 48 will fuse or soften so that the internal pressure will be relieved at a moderate temperature. Should any substantial pressure exist within the internal space, the inner cup 10 will freely move upwardly a short distance while the compressed gases are progressively relieved through the clearance space between the parallel sections of the shells.

It will be obvious from the foregoing that the present construction demands careful preformation of the inner shell, and to this end I have provided for the formation of the reversely extending flange 46 through the medium of a simple spinning operation involving a spinning die or form such as shown in Fig. 4. The shell, preferably previously shaped, is placed within the central recess in the form 50 and the projecting edge spun or formed over rim portion 52 of the die as indicated by the dotted lines in Fig. 4. Upon withdrawal from the die the inner shell will have a rim configuration disclosed in Figs. 2 and 3, formed within predetermined tolerances. It will be understood that the fabrication of the inner shell by means of a spinning step is disclosed for illustrative purposes only and that the invention is not so limited, but comprehends the assembly of parts in accordance with the present invention, however they are shaped or derived.

The present invention provides a hot cup invention which is extremely simple, but which obviates all of the defects hitherto encountered. It is understood that the figures of the drawing do not purport to accurately represent the relative dimensions of the parts. The clearances involved, for example, are so minor that it would be impractical to specifically represent them upon a drawing of this kind and it is, accordingly, the purpose of the present drawing to illustrate the relation of the parts in more or less exaggerated form.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as

fairly fall within the scope of the following claims.

What is claimed as new and desired to be secured by Letters Patent of the United States is as follows:

1. A self-heating hot cup construction for warming beverages comprising an outer shell and an inner shell, said inner shell having an upstanding side wall projecting to the upper rim of the cup and being reversely bent at said margin to provide a flange substantially parallel to said side wall and spaced therefrom a predetermined distance to provide an axially, downwardly opening recess, an outer shell co-axially receiving said inner shell and having an annular side wall substantially parallel to and co-extensive with said annular wall of the inner shell over a substantial axial extent but spaced therefrom a predetermined distance by a substantial clearance providing a passage of substantial lateral dimension permitting free axial separation of the shells, said outer wall extending to said rim and having its upper marginal periphery received within said recess, said upper margin being spaced from said flange by a predetermined lateral clearance providing a passage operative to permit free axial separation of the margin from the recess, and a fusible sealing material within the recess and sealing the passage between the inner and outer shells, said walls being tapered downwardly.

2. A self-heating hot cup construction for warming beverages comprising an outer shell and an inner shell, said outer shell comprising an annular wall portion being substantially straight in an axial direction and terminating in a free upper edge at the upper rim of the cup, said inner shell having an upper annular wall portion arranged interiorly of said first-mentioned annular wall and extending in parallel relationship therewith over a substantial axial distance to provide a freely separable sliding fit, the extremity of said inner wall being flanged to provide a reversely axially extending flange parallel to both of said wall portions and spaced from said outer wall portion to freely receive the said edge of the outer wall within the recess formed by said flange, and a body of solder material within said recess and sealing said edges together.

3. In a self-heating hot cup comprising an inner and outer shell providing an intermediate chamber for accommodating a heating element, the outer shell having an upstanding side wall of substantial vertical extent extending in a straight line to the upper marginal rim, the inner shell having an upper wall comprising a side wall received within said first named side wall and being parallel and coextensive therewith over a substantial axial distance, said inner shell having a flanged rim at its upper margin bent reversely to enclose the outer shell rim, said flange extending downwardly substantially parallel to both of said side walls in spaced relation thereto, said walls and said flange having substantial lateral clearances providing passages of substantial width between the inner and outer shell and between the outer shell and said flange for free axial separation of the inner and outer shells, and low melting sealing material in said clearance spaces and sealingly engaging the walls and the flange.

4. In a self-heating hot cup comprising an inner and outer shell providing an intermediate chamber for accommodating a heating element, the outer shell having an upstanding side wall of substantial vertical extent extending in a straight line to the upper marginal rim, the inner shell having an upper wall comprising a side wall received within said first named side wall and being parallel and coextensive therewith over a substantial axial distance, said inner shell having a flanged rim at the upper margin bent reversely to enclose the outer shell rim, said flange extending downwardly substantially parallel to both of said side walls in spaced relation thereto, said walls and said flange having substantial lateral clearances providing passages of substantial width between the inner and outer shell and between the outer shell and said flange for free axial separation of the inner and outer shells.

5. In a self-heating hot cup construction for warming beverages comprising an outer shell and inner shell coaxially disposed and spaced adjacent their lower portions to accommodate an electrical heating element therebetween; said inner shell having an upstanding side wall projecting to the upper rim of the cup and being reversely bent at said rim to provide a flange substantially parallel to said side wall and spaced outwardly therefrom a predetermined distance to provide a downwardly opening recess, the outer shell coaxially receiving said inner shell and having an annular side wall residing in relatively close juxtaposition to said inner wall above said lower portions, said last named walls being substantially parallel and coextensive over a substantial axial extent but being laterally spaced by sufficient clearance to provide a permanent passageway, said outer wall having its upper periphery received within said recess and being spaced from said flange by a substantial clearance providing a permanent passageway and operative to permit free passage of gaseous fluid, and fusible sealing material within the recess and sealing at least one of said passages between the inner and outer shells.

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