

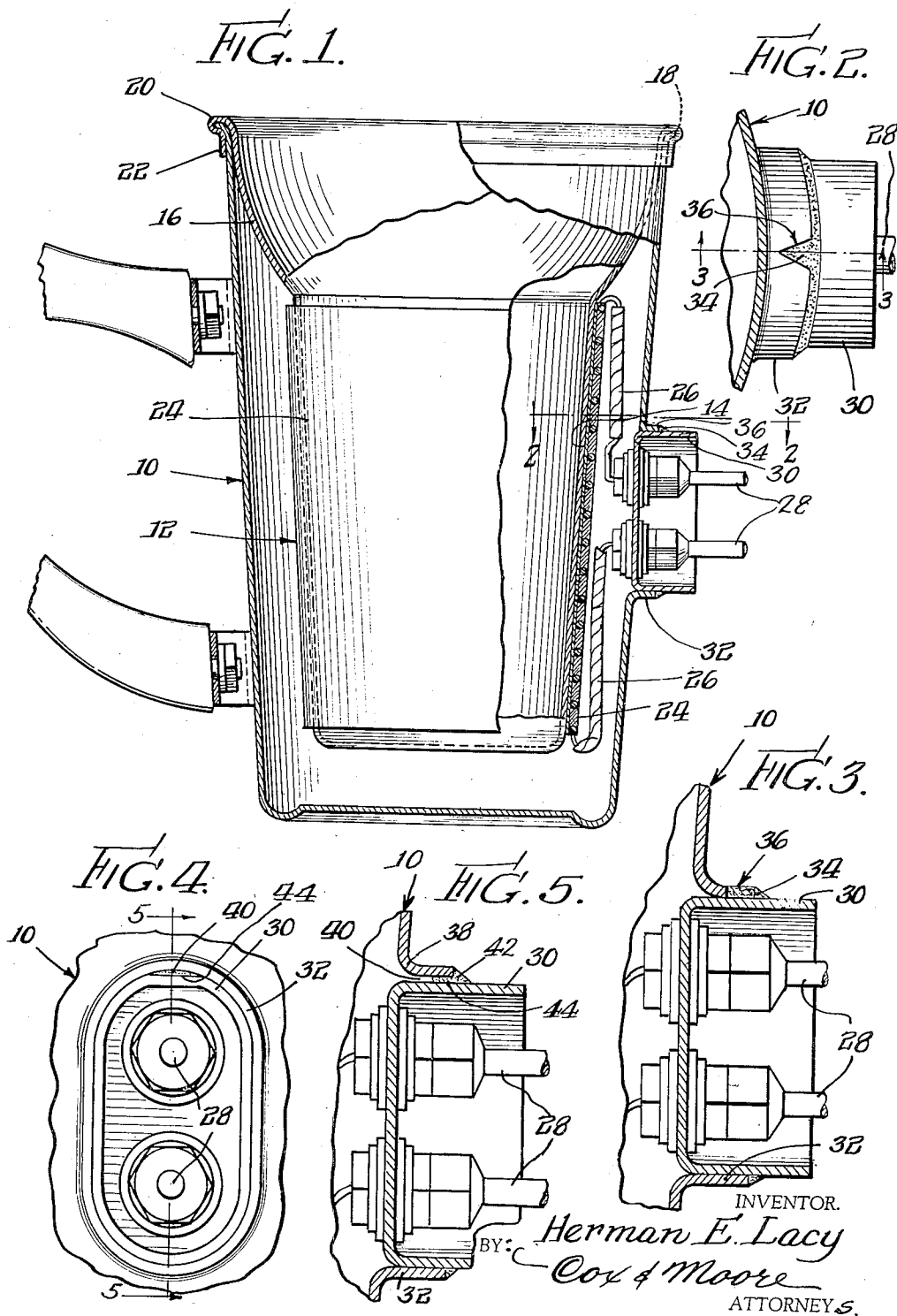
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2,236,238

HOT CUP

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HOT CUP

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9 Claims. (Cl. 219—44)

The present invention relates to a self-heated container, and more particularly to an electrically heated device of the type known as a hot cup.

5 The present invention contemplates the provision of an electrically heated cup of the foregoing character which is safe and effective in operation and which provides for the controlled release of disruptive energy which may be created
10 due to improper operation of such device. Heating cups of the present class have, in the past, presented a serious hazard and many efforts have been directed to the solution of this problem in order to effect a more wide-spread and general
15 use of the present units. In my United States Letters Patent, Serial No. 2,142,852, issued January 3, 1939, I have disclosed a hot cup construction in which the spaced shell portions are positively interlocked together by a construction designed to permit gradual release of disruptive
20 pressures set up therebetween. I have discovered, however, that extremely close manufacturing tolerances are essential to permit full utilization of this dual function.

25 It is an object of the present invention to obviate the foregoing difficulties and to provide a completely non-hazardous self-heating cup construction in which the separate parts of the cup are permanently joined and sealed together
30 against all possibility of hazardous disruption and wherein separate means is provided for the release of internal pressures at a predetermined pressure capable of being adequately retained by the shell junctures.

35 It is a more particular object of the present invention to provide a rigid interlocking shell construction as above combined with a pressure release responsive to predetermined heat conditions and so located as to be substantially directly
40 under the influence of the heat adjacent the heating element. In this connection, therefore, the invention contemplates the location of the pressure releasing construction at a point wherein the heat dissipating influences normally remain
45 constant, irrespective of how the cup is mounted or supported.

It is a yet further object of the present invention to provide an electrical hot cup construction, as above, provided with a predetermined pressure
50 release passage located in accordance with the foregoing principles and adapted to be opened at predetermined temperatures by the softening of fusible sealing material.

55 The present invention particularly contemplates the attainment of all the foregoing objects

without detrimentally effecting or varying the appearance of the unit and without sacrifice of the essential structural properties and, in particular, embodies a construction having throughout rigid wall surfaces independent of the fusible sealing material for their structural continuity.

Yet other and further objects and advantages of the present invention will be apparent throughout the course of the following specification, wherein:

Fig. 1 is an elevational view of a hot cup embodying the present invention and having portions broken away to disclose the interior construction.

Fig. 2 is a sectional detail view taken horizontally on the line 2—2 of Fig. 1.

Fig. 3 is a sectional detail view taken vertically through the detail of Fig. 2 on the line 3—3 thereof.

Fig. 4 is a detail elevational view taken from the right hand side of a hot cup embodying further modification of the present invention.

Fig. 5 is a sectional detail view taken vertically through the construction of Fig. 4 on the line 5—5 thereof.

Referring to the drawing wherein the present invention is disclosed more in detail, Figs. 1 to 3 show one preferred illustrative construction comprising an inner shell 12 and an outer shell 10. The inner shell comprises a lower frusto conical receiving cup or container 14 terminating at its upper portion in a flared configuration 16.

It should be noted that the outer container 10 is of frusto conical form substantially throughout to receive the inner cup, as shown in Fig. 1, with the upper wall portions in continuous contact for a substantial axial distance, as shown, adjacent the rim.

The upper margin of the outer cup terminates in a laterally outwardly extending short flange 18 and it will be seen that the marginal extremity of the inner cup is formed closely thereabout as at 20. More specifically, the sheet material of the inner shell is firmly forced into engagement with the flange 18 over the top portion thereof and the outer extremity and extends downwardly therefrom a substantial axial distance in firm, positive inter-engagement with the vertically extending wall of the inner shell as at 22.

It is extremely important to note that in accordance with this construction the two shells are, in effect, mechanically sealed at their upper rim, even though I prefer to assure the hermetic nature of the seal by brazing or soldering. The fore-

going mechanical interfitting engagement may be obtained by any well-known forming steps, such as spinning, wherein the sheet material of the inner shell is caused to flow into tight-fitting conformation with the outer surface of the outer shell, as shown. It has been found that, in accordance with the present invention, the foregoing parts remain positively united under all conceivable conditions of operation, and particularly under the action of excess pressures created existing within the space between the two shells.

Such pressures may, and frequently do, upon carelessness in operation, result from the heat liberated by a heating element 24 embracing the inner cup and located within the aforesaid space. Terminals 26 also in this space provide conduit connections between the heating element 24 and prongs 28 sealed within the socket 30. Attention is particularly directed to the fact that the socket 30 comprises a concave cup-shaped member of general oval configuration, if viewed from the exterior of the container providing a receptacle for the extremity of a standard electrical plug connector. The spaced prongs 28 are received by the contacting portions of the plug connector and, in turn, are permanently connected interiorly of the shell with the conduits or leads 26.

It will be seen from the foregoing that the connector socket 30 is mounted in the wall of the outer shell and, to this end, the shell is provided with an oval opening corresponding with the marginal form of the cup or receptacle or socket 30 and defined by a radially outwardly projecting peripheral marginal flange 32. It will be seen, therefore, that the flange 32 functions to grippingly embrace the peripheral wall of the socket or cup 30. While I prefer to seal the juncture by solder or brazing metal as at 34, it is nevertheless apparent from the foregoing that independent mechanical engagement of the structural parts is obtained.

Referring now more particularly to Figs. 2 and 3, it is extremely important to note that I have provided pressure release means comprising a relieved, recessed or notched portion 36 formed in the outwardly extending flange 32 adjacent the upper marginal extremity of the socket 30. It will be noted that the notch 32 projects inwardly to a point approaching the vertical wall of the outer shell, but nevertheless spaced therefrom. It will be further noted that the notch 36 projects inwardly substantially to the point wherein the curved portion 37 of the flange commences to merge with the part of the flange residing flatwise against the wall of the socket 30. Accordingly, therefore, the recess 36 provides a relief passage sealed by fusible material.

It is of extreme importance to note that the foregoing relief passage construction is located at a substantial distance from the bottom of the hot cup construction and at a point removed from the upper rim thereof. I have determined by long experiment that the disposal of the foregoing construction at points in the vicinity of the lower portion of the socket 30 and therebelow are inoperative to effect a permanent, predetermined control of the pressure release. In other words, I have determined the definite elevational zone in which the foregoing structure must necessarily be arranged in a hot cup of the type disclosed and having a total six-inch elevation and have discovered that the venting construction should not be disposed closer than two and one-half inches from the base if safety of operation is to be assured. While the following is proposed

only as a theoretical explanation, I nevertheless conceive that the foregoing results from the variable and sometimes material dissipation of heat from the lower portion of the device and particularly to the base upon which the device rests. Such dissipation of heat may interfere with the fusion of the sealing material at an accurately predetermined temperature insufficient to create excessive pressures. The same factors pertain, although in lesser degree, with respect to the upper portions of the cup and I accordingly dispose the pressure relieving construction substantially centrally of the hot cup and preferably opposite the central portion thereof opposite the windings of the heating element 24. By the term "centrally" I mean the portions of the side wall between the top and bottom margins and spaced substantially from the top and bottom margins. In other words, it will be apparent that the term "centrally" includes a wide range of wall space between the top and bottom margins, preferably vertically opposite or adjacent a portion of the heating element.

From the foregoing it will be apparent that in operation the interior space between the shells remain continuously sealed. Assuming that negligent operation results in energizing of the heating element while dry, it will be apparent that the pressure will result within the aforesaid interior space increasing in effect as the temperature unrestrainedly rises. At a predetermined temperature determined in accordance with the foregoing construction and the melting point of the fusible sealing metal, the latter substance will fuse and soften, permitting free egress of the gases past the interior of the curved portion 38 and out through the notch 36. Since the pressure of release corresponds quite closely with the predetermined temperature conditions prevailing at the point of release, it will be seen that the limiting pressure will have a value occurring within a relatively narrow predetermined range.

The upper interlocking rim construction is designed to adequately resist and withstand the foregoing pressures, so that disruptive separation of the two shells cannot occur in an axial direction. It will be further evident that disruption in this direction, characteristic of previous known devices, has been productive of potentially disastrous results which the invention completely overcomes.

Referring to Figures 4 and 5, I have disclosed a slight modification of the present invention, wherein I have provided a combination of connector socket 30 and receiving flange 32 which are marginally disaligned at their upper extremity to provide a relatively minute space 40 therebetween at the time of initial assembly. This space becomes ultimately occupied by fusible sealing material 42 which functions in the manner of the previously described embodiment to release the pressures at a predetermined value.

It should be noted that the passage 40 results from the assembly within the flange opening in the shell of a socket 30, the upper side wall of which is slightly flattened, as at 44. This area need not be completely flattened and may merely vary slightly from the curvature of the flange 36 at this point to provide a relief space. It is to be understood that the figures are more or less diagrammatic in that the disclosure of the space 40 is somewhat exaggerated in order to more clearly exemplify the principles underlying the present invention. In general, a space, not substantially over a thousandth of an inch in

transverse width, has been found adequate to gradually release the pressure.

It has been found that quite restricted passages 40 are not only suitable but are preferable in that the pressure release occurs more gradually.

From the foregoing, it will be apparent that I have provided an improved construction, obviating a long-standing and serious problem in the art. Thus, the present invention provides a hot cup construction comprising two shells axially interlocked against any possible compressive forces which may be internally created, in combination with pressure release means adapted to invariably release at a pressure below that at which disruption can occur.

In accordance with the present invention, the unit, while providing a fusible release point, nevertheless presents rigid, infusible outer supporting walls at all points, and is nowhere structurally dependent for resistance to mechanical impact or blows upon soft fusible material. It is of great importance that the present construction provides a release point so disposed that it is under the direct heating effect of the heat inducing element within the cup and accordingly relatively unsusceptible to variations occurring at the relatively remote extremities of the cup due to characteristic heat dissipating influences.

It is to be noted that in accordance with the preferred embodiment disclosed, the pressure release point is located somewhat above the median point in the elevation of the hot cup. It has been found that in a cup of the type disclosed the operating characteristics reach a substantial degree of refinement when the device is so constructed. It will be understood, however, that analogous, if relatively inferior, results are obtained, even though the socket 30 and its associated parts be located upwardly or downwardly from the relative position shown in the drawing within reasonable limits so long as the relief point is spaced from the upper and lower margins of the cup.

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.

The invention is hereby claimed as follows:

1. A self-heating cup comprising an outer shell and an inner shell positively mechanically interlocked adjacent their upper marginal rim and providing an interior sealed space therebetween, a heating element within said space, and means for releasing abnormal pressures in said space comprising a connector socket mounted in said outer shell, an outwardly projecting flange embracing said socket, and a restricted passage between said flange and socket at the upper extremity thereof, said passage being closed by relatively low-melting-point sealing material.

2. In a hot cup comprising inner and outer shells, coaxially joined together providing an internal sealed space therebetween, a heating element located in said space and extending axially, and means for releasing pressure in said space at a substantially predetermined value, said last-named means comprising a socket connector having outwardly extending wall portions mounted in said outer shell, said outer shell being provided with an aperture receiving said socket, said aperture being defined by an outwardly extending peripheral marginal flange snugly embracing said

socket and radially coextensive with the radially extending walls of the socket over a substantial distance and a restricted outwardly extending passage between said flange and socket at the upper portion thereof, said passage being sealed.

3. In a cup comprising inner and outer shells coaxially joined together providing an internal sealed space therebetween, a heating element located in said space and extending axially, and means for releasing pressure in said space at a substantially predetermined value, said last-named means comprising a socket connector having outwardly extending wall portions mounted in said outer shell, said outer shell being provided with an aperture receiving said socket, said aperture being defined by an outwardly extending peripheral marginal flange, said flange supporting said socket and residing snugly against the said outwardly extending wall of the socket throughout its peripheral extent, a restricted passage between the wall of said socket and the adjacent flange being closed by low melting point fusible material, said restricted passage being disposed substantially centrally of the axial extremities of said side wall and at a point substantially spaced from said extremities.

4. In a hot cup comprising inner and outer shells co-axially joined together providing an internal sealed space therebetween, a heating element located in said space and extending axially, and means for releasing pressure in said space at a substantially predetermined value, said last-named means comprising a socket connector having outwardly extending wall portions mounted in said outer shell, said outer shell being provided with an aperture receiving said socket, said aperture being defined by an outwardly extending peripheral marginal flange, said flange supporting said socket and residing snugly against the said outwardly extending wall of the socket throughout its peripheral extent, a restricted passage between the wall of said socket and the adjacent flange being closed by low melting point fusible material, said restricted passage being disposed substantially centrally of the axial extremities of said side wall and at a point substantially spaced from the lower extremity of the cup.

5. In a hot cup comprising inner and outer shells co-axially joined together providing an internal sealed space therebetween, a heating element located in said space and extending axially, and means for releasing pressure in said space at a substantially predetermined value, said last-named means comprising means extending through an aperture in the wall of the outer shell and having an outwardly extending wall surface, said aperture being defined by an outwardly extending flange co-extensive with the wall and flatwise thereto, and a relatively restricted passage at a predetermined point between said flange and wall and adapted to preferentially release internal pressure, said passage being spaced a substantial distance from the lower extremity of the cup and being closed by low melting point fusible sealing material.

6. In a hot cup comprising inner and outer shells co-axially joined together providing an internal sealed space therebetween, a heating element located in said space and extending axially, and means for releasing pressure in said space at a substantially predetermined value, said last-named means comprising means extending through an aperture in the wall of the outer shell and having an outwardly extending wall surface, said aperture being defined by an outwardly ex-

tending flange co-extensive with the wall and flatwise thereto, and a relatively restricted passage between said flange and wall, said passage being spaced at a predetermined point a substantial distance from the lower extremity of the cup and being closed by low melting point fusible sealing material, said passage being formed by inwardly notching said flange at said predetermined point.

7. In a hot cup comprising inner and outer shells co-axially joined together providing an internal sealed space therebetween, a heating element located in said space and extending axially, and means for releasing pressure in said space at a substantially predetermined value, said last-named means comprising means extending through the wall of the outer shell and having an outwardly extending wall surface, said aperture being defined by an outwardly extending flange co-extensive with the wall and flatwise thereto, and a relatively restricted passage between said flange and wall, said passage being spaced a substantial distance from the lower extremity of the cup and being closed by low melting point fusible sealing material, said passage being formed by a notch extending inwardly of the margin of said flange to a point spaced from the plane of the outer shell.

8. In combination, a hot cup having an outer shell and an inner shell axially positively interlocked at the upper marginal rim of the cup and sealed together to provide an internal space, a heating element in said space, and pressure releasing means disposed on said outer cup, said pressure release means comprising a restricted passage formed in said outer wall and closed by low melting point sealing material, said passage being located substantially centrally of the vertical wall of said outer shell at a point substantially spaced from the bottom of the cup.

9. In combination, a hot cup having an outer shell and an inner shell axially positively interlocked at the upper marginal rim of the cup and sealed together to provide an internal space, a heating element in said space, and pressure releasing means disposed on said outer cup, said pressure release means comprising a restricted passage formed in said outer wall and closed by low melting point sealing material, said passage being located substantially centrally of the vertical wall of said outer shell and opposite the heating element, but above the vertical median point of the cup.

HERMAN E. LACY.

CERTIFICATE OF CORRECTION.

Patent No. 2,236,238.

March 25, 1941.

HERMAN E. LACY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 6, claim 3, before the word "cup" insert --hot--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 20th day of May, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

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