DISPENSER WITH HEATING MEANS

Original Filed Jan. 17, 1966 5 Sheets-Sheet 1

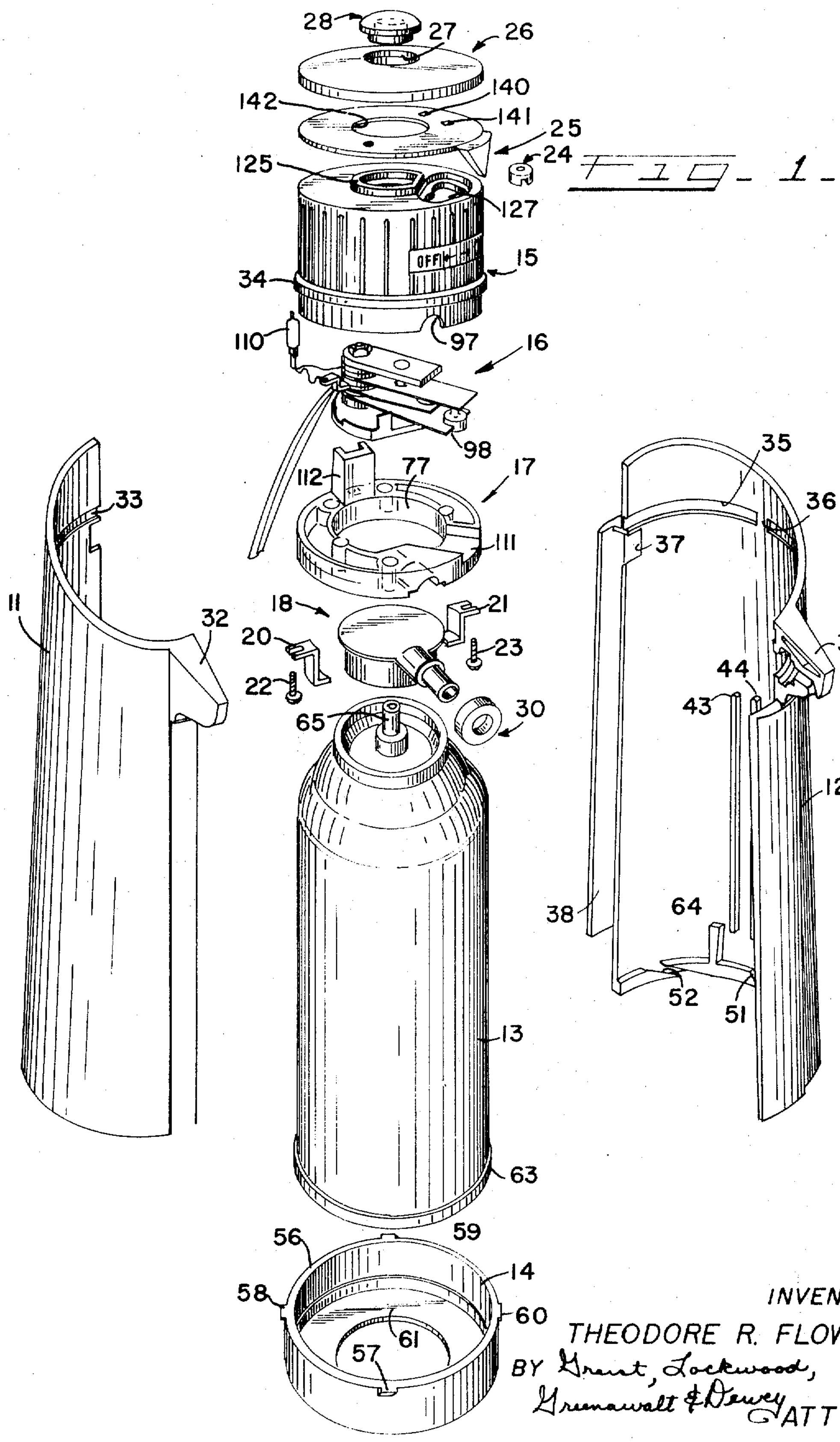

FIG. 1

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March 14, 1972 T. R. FLOWERS Re. 27,304

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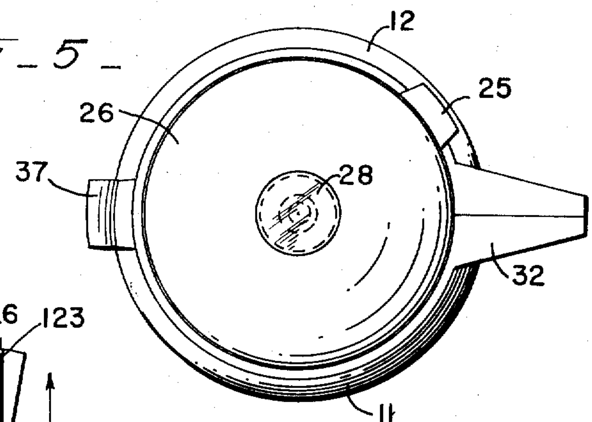
FIG-5



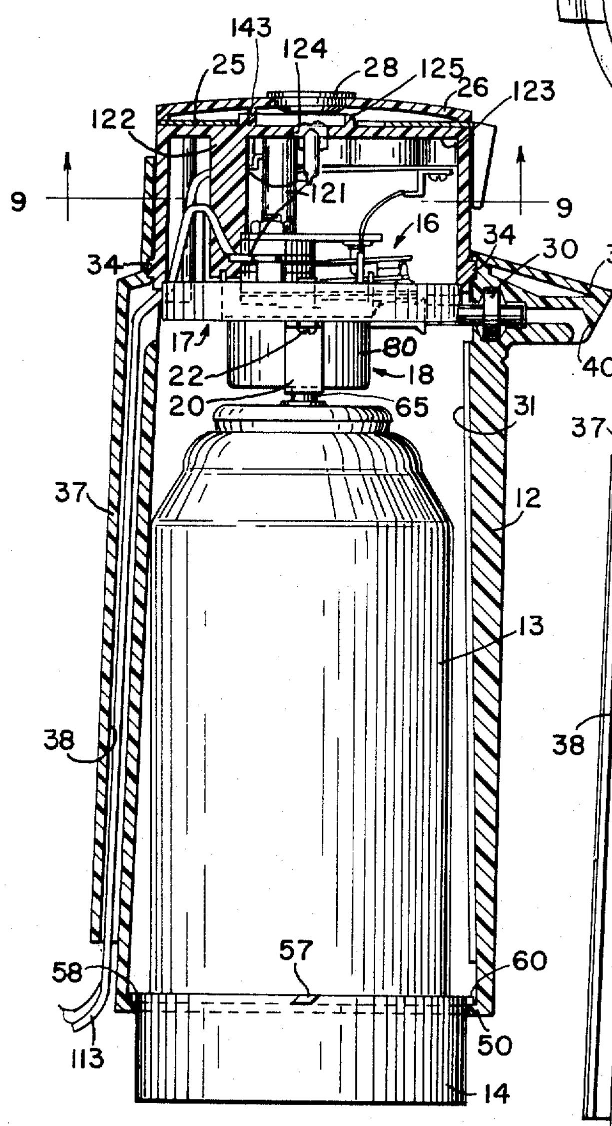
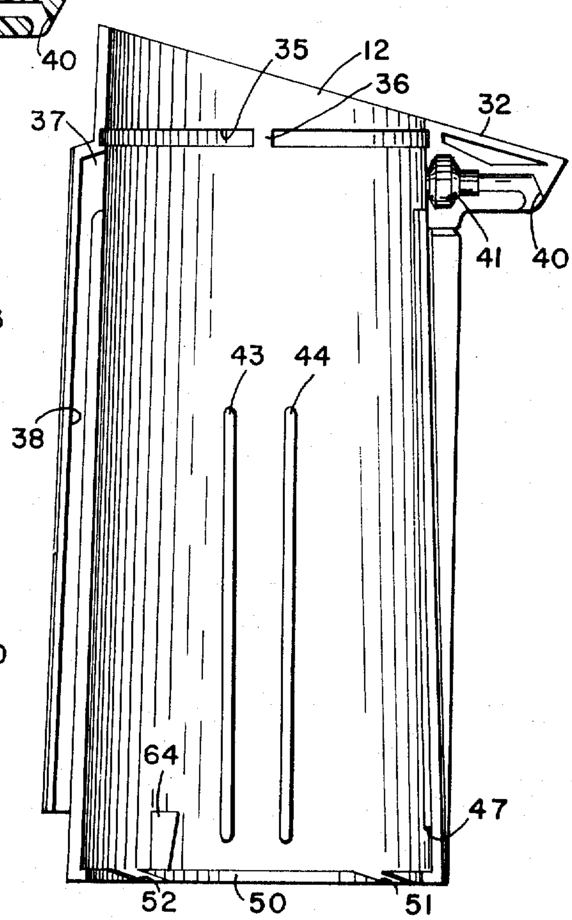


FIG-2

FIG-6



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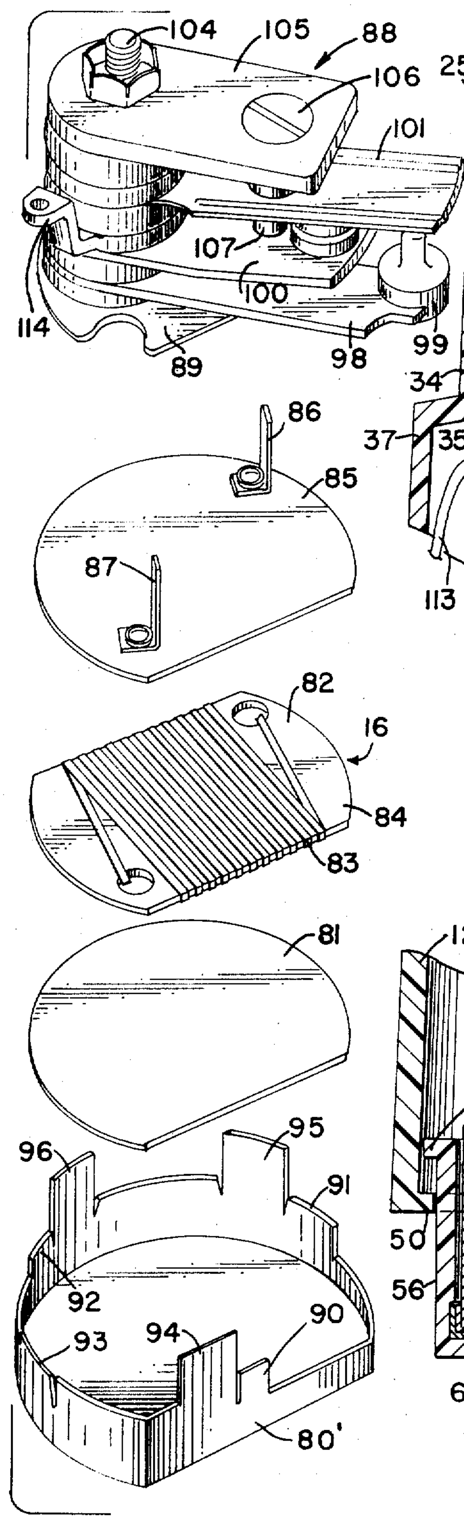

FIG. 4

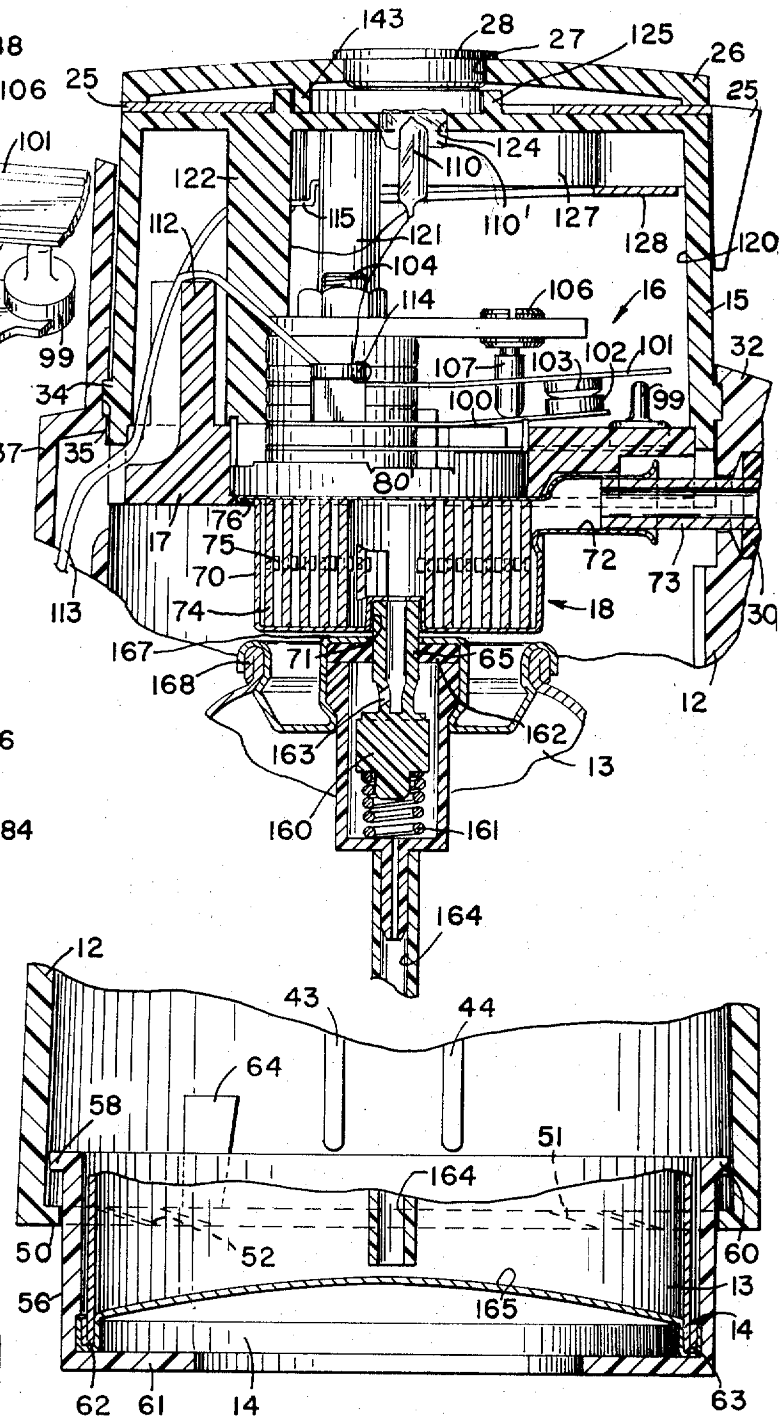

FIG. 3

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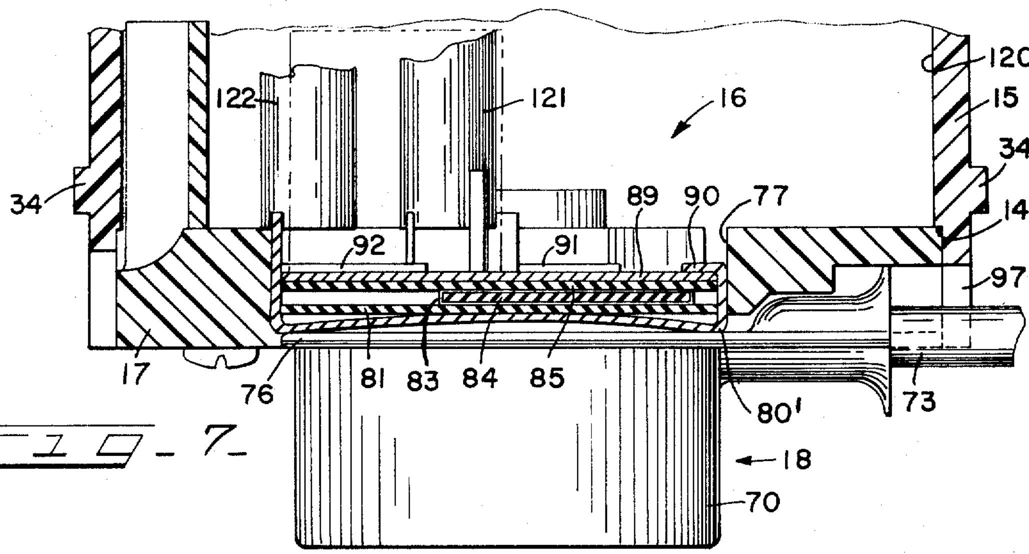

FIG. 7

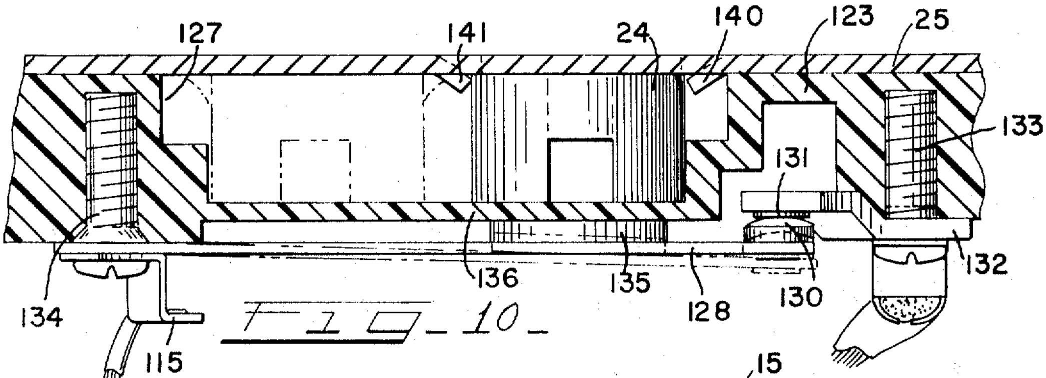

FIG. 10

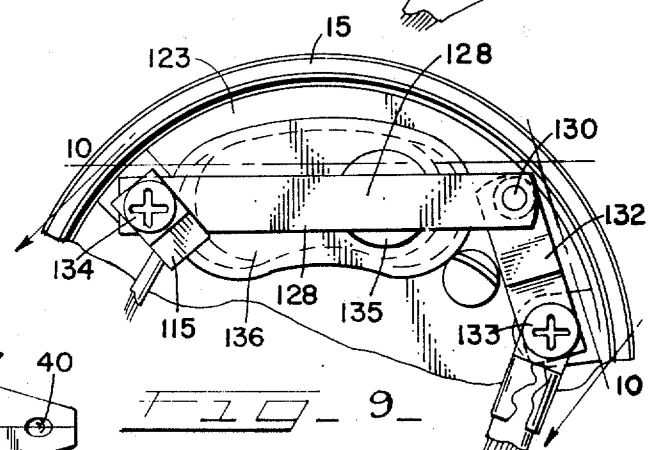

FIG. 9

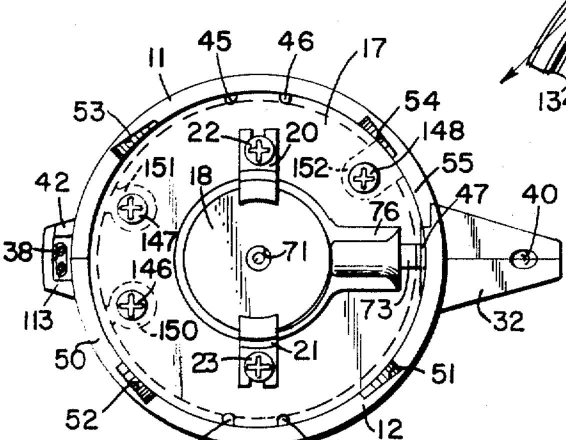

FIG. 8

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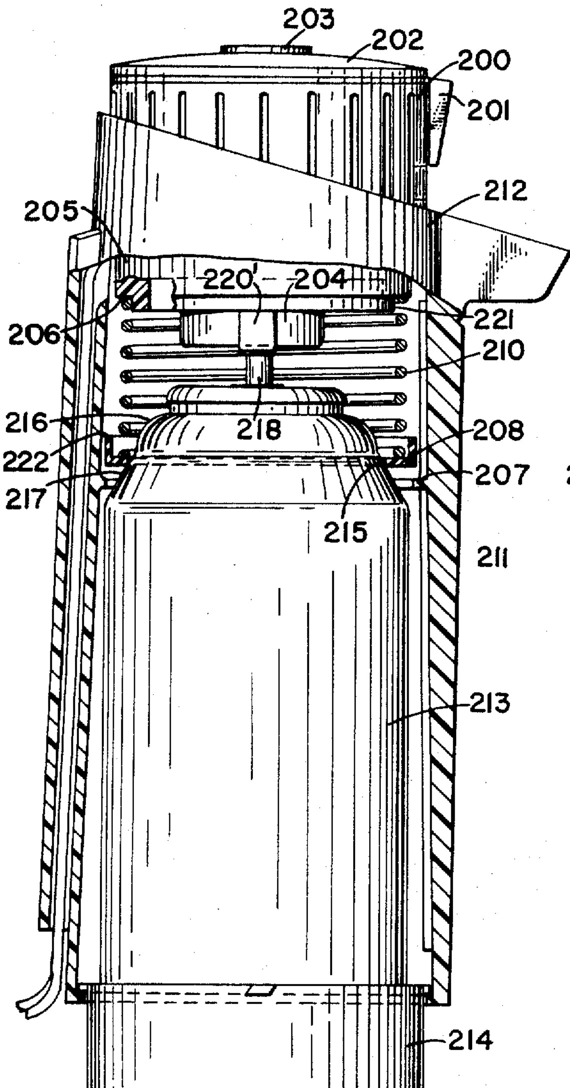

Fig. 11

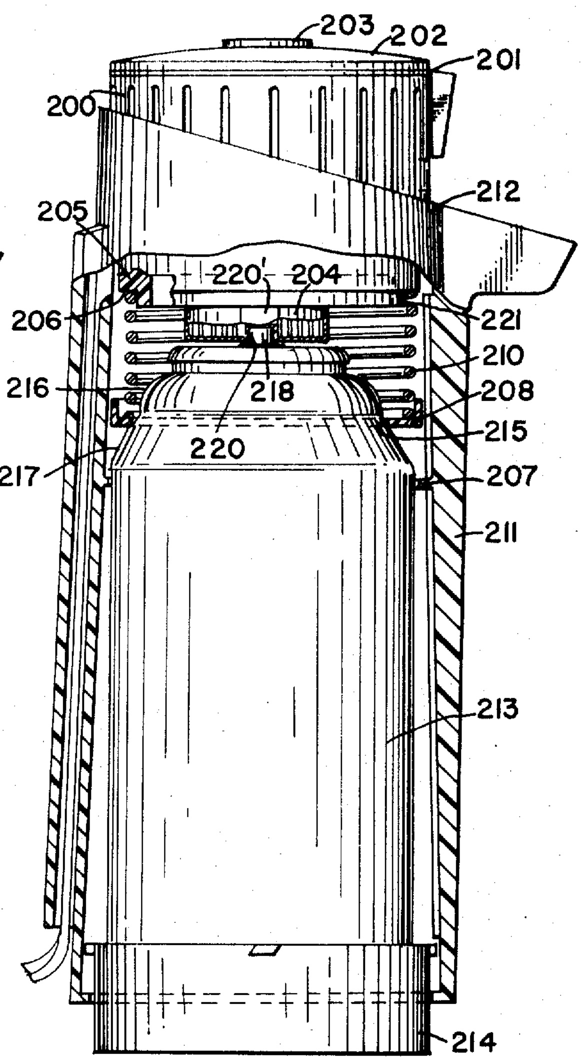

Fig. 12

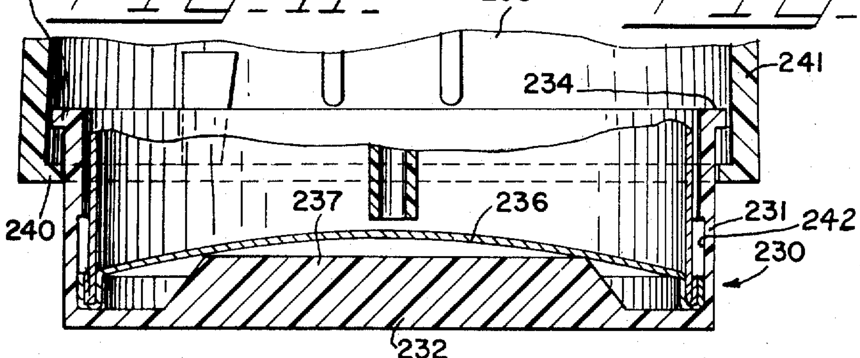

Fig. 13

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United States Patent Office

Re. 27,304
Reissued Mar. 14, 1972

27,304

DISPENSER WITH HEATING MEANS

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Original No. 3,358,885, dated Dec. 19, 1967, Ser. No. 521,118, Jan. 17, 1966. Application for reissue Dec. 18, 1969, Ser. No. 10,663
Int. Cl. B67d *5/62*
U.S. Cl. 222—146 HA 5 Claims

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

ABSTRACT OF THE DISCLOSURE

A dispensing arrangement for heating and dispensing a product from an aerosol container. The aerosol container is loosely locked within the dispenser in spaced relation thereto and downward movement of the dispenser actuates the aerosol valve, releasing the contents into an electrically heated heat exchanger. Means is provided to release the contents of the can in the event of overheating by the electrical heating means with additional means provided to effect release of the container contents if heated externally.

This invention relates to a heated dispensing arrangement and more specifically is directed to an electrically heated dispenser which is particularly adapted for use with products packaged in pressurized aerosol-type containers.

Broadly speaking, electrical heaters for use with aerosol-type containers are old in the art, however, none of those proposed to date have served to teach the practical art how to design and manufacture an electrically heated dispenser for use with an aerosol-type container which would be commercially feasible. Practically speaking, a variety of reasons may be given for the failure of the prior art to meet this demand. These reasons are mainly centered on design, manufacturing and safety problems in existing designs which preclude their widespread use.

One of the considerations is that of heating the product after it has been released from the container and thereafter continuously discharging it in its expanded form at an elevated temperature without substantially changing its characteristics during such heating. Another consideration confronting those who propose the commercial use of an electrically heated dispensing arrangement for use with aerosol-type containers was one of somewhat greater concern. This had to do with the problem of safety, as aerosol-type containers should not be subject to heating or a heated environment. More specifically, elevating the temperature of the aerosol container above normal ambient temperatures presents a potential hazard which must be avoided especially in commercial products where the intelligence of the users varies. Accordingly, if heating or a heated environment is to be provided for the contents of the aerosol-type container, it must be under carefully controlled circumstances with adequate safety features to protect the users. Additional considerations included properly locating the electrical heating means where it would be precluded from contact with the container contents to eliminate any possible shock hazard, but yet be located for good heat transferring efficiency. Coupled with the foregoing, the usual considerations of manufacturing convenience and economy have prevented wide scale commercialization of electrically heated dispensers usable with aerosol-type containers.

The present invention relates to a new and improved dispensing arrangement having an electrical heating means

appropriately located where it may warm a heat exchanger which in turn transfers the heat to a product released from an aerosol-type container. The heat transfer occurs after expansion of the product and does not substantially affect the characteristics prior to discharge from a dispensing nozzle. Suitable means is provided whereby the aerosol-type container is removably locked in the dispenser shell with the nozzle portion in axial alignment with a heat exchange means. Limited relative axial movement between the aerosol-type container and dispenser is permitted whereby the dispensing function will occur when the dispenser shell enclosing the heater and heat exchange means is depressed.

The dispenser is formed from two shell sections which co-operate to form a cylindrical barrel and a dispensing nozzle. A housing closes off one end of the shell and serves as a mounting means for supporting a heat exchanger, and a heater in intimate heat exchange relation. An outlet on the heat exchanger permits release of the expanded product through the dispensing nozzle which is formed integral with the co-operating shell sections. A novel switch arrangement is provided which positively precludes contact by the user with the electrical circuit thereby eliminating the usual hazards.

The present invention permits the use of aerosol-type containers as replaceable cartridges for the heated dispensing arrangement. Obviously, the contents of the aerosol container may be varied to include any substance which may be packaged therein and which is flowable through a heat exchanger to take on heat prior to dispensing. For convenience, however, the present invention will be described in connection with a known type of shaving lather packaged in an aerosol-type container. The aerosol container is provided with a base having means thereon to interlcok it within the cylindrical shell forming the dispensing arrangement which means also serves to limit the longitudinal movement within the shell and provides an additional safety means to effect release of the contents of the aerosol-type containers should overheating occur for any reason. The present design provides a thermostatically controlled switch means which warms the heat exchanger to the desired temperature in a matter of seconds and thereafter maintains it in a heated condition throughout the dispensing function. A modified form of the invention provides means for maintaining the aerosol container and heat exchanger spaced prior to dispensing to prevent any heat transfer to the aerosol container. A better understanding of the salient features of the present invention may be had by a consideration of the objects and attendant detailed description.

It is a principal object of this invention to provide a dispensing device having an electrically heated heat exchange means which warms the contents released from an aerosol-type container.

A further object of this invention is to provide a new and improved dispensing arrangement which is adapted for use with aerosol-type containers of substantially conventional design and which is economically manufactured.

It is a further object of this invention to provide a new and improved dispensing arrangement for dispensing a heated product from aerosol-type containers and having novel safety features to prevent container rupture in the event of accidental overheating.

Additional objects other than those specifically stated will become apparent on consideration of the drawings and when considered in conjunction with the specification and claims.

In the drawings:

FIG. 1 is an exploded perspective view of the dispensing arrangement of the present invention;

FIG. 2 is an enlarged cross sectional view of the dispensing arrangement of FIG. 1 with the aerosol-type container base, heat exchanger, and heating means illustrated in full elevation;

FIG. 3 is an enlarged cross sectional view similar to FIG. 2 illustrating the aerosol-type container and heat exchanger in cross section;

FIG. 4 is an enlarged exploded perspective view of the heating means;

FIG. 5 is a top plan view of the dispensing arrangement of FIG. 2;

FIG. 6 is a side elevational view of one of the shell sections;

FIG. 7 is an enlarged cross sectional view taken through the housing illustrating the heat exchanger in full elevation and the mounting ring and heating means in cross section;

FIG. 8 is a bottom plan view of the dispensing arrangement shown in FIG. 2 with the aerosol-type container omitted;

FIG. 9 is a fragmentary cross sectional view taken through the housing generally along the lines **9—9** of FIG. 2 illustrating the magnetically operated switch;

FIG. 10 is a cross sectional view taken generally along the lines **10—10** of FIG. 9;

FIG. 11 is a view similar to FIG. 2 of a modified form of dispensing arrangement having a means to maintain the aerosol-type container spaced from the heat exchanger;

FIG. 12 is a view similar to FIG. 11 with the aerosol-type container in the dispensing position; and

FIG. 13 is a fragmentary cross sectional view of a modified form of container base.

The basic arrangement of elements forming the dispensing arrangement of the present invention is illustrated in the exploded perspective view of FIG. 1. A pair of molded shell sections **11** and **12** are shown to the immediate left and right of an aerosol-type container **13** having an annular container base **14** adapted to be disposed around the bottom of the aerosol-type container **13**. A housing or hood **15** is adapted to be interfitted within the molded shell sections **11** and **12** and serves to mount a heating means **16** through a mounting ring **17**. A heat exchanger **18** is also joined to the mounting ring **17** by mounting brackets **20** and **21** and co-operating fasteners **22** and **23**. A back flow seal **30** seals the heat exchanger to the shells **11** and **12** when they are assembled.

A magnet **24**, adapted to be positioned in a recess in the top of the housing or hood **15**, is covered by a switch lever **25** which in turn is covered by a switch cover plate **26** having a central opening **27**. A lens or window **28** is adapted for positioning within the opening **27** and is formed of transparent material to permit viewing of an indicating means which informs the user that the appropriate temperature has been reached and dispensing may commence.

The molded shell sections **11** and **12** form a generally cylindrical bore **31** closed off at one end by the housing **15**. The aerosol-type container **13** may be loosely positioned within the bore **31**, being locked to the shells by the container base **14**.

Referring now to FIGS. 1 and 6, it can be observed that the shells **11** and **12** are substantially identical except for minor changes along their longitudinal margins to facilitate joining as will be seen. Each shell section may be formed of plastic by conventional molding techniques and may include one half of the nozzle **32** with the other or co-operating identical half of the nozzle **32** being formed on the other molded shell section. A radially opening groove **33** is formed adjacent the top of the shell **11** while the shell **12** is provided with a similar or corresponding groove **35** both of which serve to mount the housing **15** when assembled. Each of the grooves may be interrupted as shown in the groove **35** at **36** to prevent

rotation of the housing **15** within the groove after it is assembled to the shell sections **11** and **12**.

As seen in FIGS. 1, 6 and 8, the molded shell section **12** is provided with a cord opening **37** in the rear wall communicating with a longitudinally extending groove **38** which opens at the base of the shell **12**. This facilitates the reception and positioning of the cord which conducts current to operate the electrical heating element **16**. Half of the nozzle **32** carried on the shell section **12** is provided with an opening **40** which is of semi-circular cross section and opens into an annular seal mounting area **41**. The other half of the nozzle **32**, on the shell **11**, is provided with an interior construction which is identical so that the two form an annular seal mounting area and annular passage-way **40** in the nozzle **32**.

The open side of cord groove **38** on the shell section **12** is closed off by upstanding rib **42** (FIG. 8) which is molded integral with the shell section **11**. Ribs **43** and **44** are formed on the inner wall midway between the longitudinal margins of the shell **12** and project inwardly to form guides to center the container **13**. Similar ribs **45** and **46** are formed on the shell section **11** for the same purpose.

The lower end of the shell section **12** is provided with a radially inwardly extending flange **50** which is interrupted by equally spaced inclined grooves **51** and **52**. Similar grooves **53** and **54** are provided in the radially inwardly extending flange **55** formed on the base of the body of the shell section **11**. Flanges **50** and **55** are substantially continuous when the shell sections **11** and **12** are assembled, being interrupted only by the equally spaced grooves **51–54**.

As seen in FIGS. 1, 2 and 6, the container base **14** includes a circumferential body portion **56** provided with lug **57–60** adjacent one end. At the opposite end is formed a radially inwardly projecting flange **61** which serves to support the base of the container **13**. An annular groove **62** is formed in the inner circumferential portion at the junction of the body portion **56** and flange **61**. A raised head formed by the roll seam **63** on the container **13** at the junction of the concave bottom wall and side wall of the container **13** is snapped into the groove **62** effectively to lock the container **13** and base **14** together. A stop **64** is formed coextensive with the inner periphery of the flange on the bottom of the shells **11** and **12** and serves to guide the circumferential portion **56** of the base during longitudinal relative movement between the assembled shells and container **13**. In addition, the stop **64** serves to limit the rotational movement of the base **14** relative to the shells **11** and **12** inasmuch as it engages one of the radially projecting lugs **57–60**.

As seen in FIG. 2, the aerosol-type container **13** is embraced by the shell **12** and has a nozzle portion **65** which projects upwardly for co-operation with the heat exchanger **18**. The base **14** is interlocked within the flanges **50** and **55** of the molded shell sections **12** and **11** respectively, to permit the entire dispensing arrangement to be transported as a unit.

The relation of the heat exchanger **18** and heating means is best understood by reference to FIGS. 3–7. The heat exchanger **18** may be of any suitable type with the one shown being of the type described in the copending application, Ser. No. 393,566, now U.S. Patent 3,292,823, entitled Dispenser with Heat Exchanger at its Discharge Outlet and includes an outer shell **70** which is shaped to a cup-like design having a central inlet opening **71** for receiving the nozzle **65** on the container **13**. A laterally extending outlet portion **72** fluid-tightly mounts one end of a tubular conduit **73** while the opposite end projects into the nozzle **32** having the outer peripheral portion sealed within the nozzle **32** by means of the back flow sealing member **30**. When the contents are released through the heat exchanger **18**, they flow out through the opening **40** and may not escape into the chamber **31**.

A metal heat transfer strip **74** is formed substantially equal to the depth of the cup **70** and is wound into a spiral configuration with tabs **75** forming spaces to space the outer strips from the preceding strip. Winding of the heat transfer strip is initiated by starting at the opening **71** and continuously winding the strip upon itself so that fluid admitted at the inlet opening **71** will wind spirally around the strip **75** being ultimately released in the outlet opening **72** where it is forced out the opening **40**. The spirally wound heat transfer strip **75** has substantial thermal mass and is formed of good heat conducting material which readily absorbs heat from the heating means for release to the fluid passing across the heat transfer surfaces. The details of the heat exchanger construction and function may be found in the application alluded to above.

Crimped around the edges and covering the top margin of the body **70** to form a chamber is a cover **76** which has the center panel portion in intimate engagement with the top edges of the spirally wound strip **74**. The cover **76** forms the top half of the lateral opening **72** which mounts the conduit **73**. The joint formed by the crimped edges of the cover **76** and the body **70** of the heat exchanger **18** defines an outwardly projecting flange which is received in abutting engagement within an opening **77** in the mounting ring **17**. The opening **77** also provides a mounting area for the heater **16** which is disposed in intimate heat transferring relation with the heat exchanger **18**.

As best seen in the exploded perspective view of FIG. 4, the heater **16** includes a cup-shaped shell **80′** which may be formed of a suitable conducting metal such as aluminum or the like, and may be of generally circular form having a flat chord portion formed along one side to provide a shape which will overlie and contact the top cover **76** of the heat exchanger. The flat chord portion is formed to fit around the raised outlet **72**. A layer of mica **81**, shaped to the same general configuration as the shell **80′**, is positioned at the bottom of the heater body **80**. A heating element **82** formed of high resistance wire **83** wound on a mica base **84** or the equivalent is disposed on the mica layer **81** and a second mica layer **85** containing terminals **86** and **87** overlies the heating element **82** to form a sandwich with the layer of mica **81** to electrically insulate the heating element **82**. The terminals **86** and **87** are joined to the free ends of the high resistance wire **83** to facilitate connection to a power source.

A thermal switch **88** of conventional design is provided with a specially shaped pressure plate **89** which is fastened to the thermal switch **88** and positioned over the layer of mica **85**. Cutaway portions are provided on the pressure plate **89** to permit the terminals **86** and **87** to extend upwardly to facilitate wiring. The sandwich containing the heating element **82** and pressure plate **89** of the thermal switch **88** is positioned in the heater body **80** and tabs **90**, **91**, **92** and **93** are then rolled or bent inwardly to clamp the elements in the stacked relation shown in FIG. 7. The concave shape of the bottom of the heater cup **80′** assists in clamping or pinching the heating element **82** for good heat transfer. Positioning lugs **94**, **95** and **96** on the body **80** remain axially directed to position the heating means **16** in the housing **15** through engagement with upstanding posts (only **121** and **122** shown in FIG. 7) in the housing **15**.

As seen in FIGS. 1, 3 and 4, the thermal switch **88** is of conventional design being available on the open market and includes a bi-metallic element **98** having a ceramic button **99** at one end. Switch blade members **100** and **101** are provided with electrical contacts **102** and **103** respectively, and are serially connected in one side of the power line being mounted on a common mounting post **104** which also serves to clamp an adjusting leaf **105** having a threaded fastener **106**. A non-conducting or insulating portion **107** is carried on the tip of the fastener **106** projecting through blade **101** to engage blade **102** thereby permitting the degree of contact of the conducting portions **102** and **103** to be adjusted.

As the bi-metallic element **98** is heated, the tip of the ceramic button **99** engages the blade **101** to separate the electrical contacts **102** and **103**. The fastener **106** precludes upward movement of the contact **102**. When the bi-metallic element **98** cools, as occurs during release of shaving cream through the heat exchanger **18**, the bi-metallic element straightens and the contacts **102** and **103** move to the closed position and heating of the heat exchanger is resumed. A neon lamp **110** of conventional design is wired in parallel with the contacts **102** and **103** and is illuminated when contacts **102** and **103** separate thereby indicating to the user that the heat exchanger has reached the operating temperature.

The mounting ring **17** may be formed of heat resistant plastic and is provided with a central opening **77** which is shaped to receive the heating means **16**. A radially projecting groove **111** accommodates the laterally extending bi-metallic element **98** providing adequate freedom for it to flex in response to heating and cooling. An upstanding post **112** is formed at the rear of the mounting ring **17** to elevate and position the cord from the heating means **16**. One side of the cord **113** is wired directly to the terminal post **114** on the thermal switch while the other wire is connected to the input terminal **115** on the off-on switch.

As seen in FIGS. 1–3, 7 and 8, the housing **15** is generally cup-shaped, having a bore **120** which houses the heating means **16**. The bore **120** is provided with a plurality of axially extending post members **121** and **122** which engage the positioning lugs **95** and **96** respectively. A third post member (not shown) engages the positioning lug **94** so that the heating element is clamped against the posts by the heat exchanger **18** and mounting ring **17**. The axially extending posts project from an end wall **123** of the housing **15** having a central opening **124** which is surrounded on the outward side by an axially projecting flange **125**. The wall **123** serves as a mount for the switch plate **25** and the switch contacts operated thereby which control the energizing of the heater coil.

The outer side of the end wall **123** is provided with a depression or well **127** which houses the magnet **24**. A switch blade **128** has one end fastened to the inner side of the wall **123** with the terminal **115** by fastener **134**. The opposite end of the switch blade **128** is free to move and is provided with a button or contact **130** adapted for engagement with a contact **131** carried on a fixed terminal **132** mounted on the wall **123** by means of a threaded fastener **133**. Intermediate the button **130** and the threaded fastener **134** is mounted a second button **135** formed of magnetically attractable material.

When the switch blade **128** is in the position shown in FIG. 10, the magnetically attractable button **135**, engages the underside of the bottom wall portion **136** in the well **127**, due to the attraction of the magnet **24** which is shown in solid lines positioned directly over the button **135**. When the magnet is moved angularly to the position shown in phantom lines, the switch blade **128**, due to its natural resilience, moves to the position shown in phantom lines, separating the contacts **130** and **131** to interrupt the circuit between the terminals **115** and **132** and the flow of power applied to the heating means **16**.

Suitable means is provided to shift the magnet **24** between the "off" and "on" positions which positions may be labeled by means of suitable indicia. The switch lever **25** is provided with downwardly struck tabs **140** and **141** which engage opposite sides of the magnet **24** for shifting it in the well **127** in response to rotation of the switch plate **25**. Total angular movement of the switch lever **25** is limited by the magnet engaging opposite end walls of the well **127**. On the outward facing part of the end wall **123**, the axially projecting flange **125** is received in an opening **142** in the switch plate to provide a bearing or guide surface around which the switch plate rotates between the "on" and "off" positions.

The switch cover plate **26** has an axially projecting flange **143** which is interfitted within and adhesively joined to the axially directed flange **125** and serves to align the opening **27** in the cover plate with the opening **124** in the center of the wall **123**. When the clear plastic lens **28** is inserted, it is aligned with the lamp **110** which is positioned in alignment with the opening **124** where it may be easily seen through the lens **28**. The lamp **110** is joined to the housing **15** by a waterproofing cap **110'** which seals the opening **124**.

The mounting ring **17** supporting the heat exchanger and the heating means is positioned in the housing **15** after the necessary electrical connections are made. The power cord **113** is brought over the post **112** and the mounting ring **17**, is brought into abutment with a shoulder **144** which extends around the lower margins of the side walls of the housing **15**. Threaded fasteners **146, 147** and **148** extend through the mounting ring **17** into posts **150, 151** and **152** formed integral with the housing **15** and having the upper end disposed at the same elevation as the shoulder **144**. The mounting posts **150, 151** and **152** are shown in dotted lines in FIG. 8 and may be of any desired construction.

The housing sub-assembly, consisting of the assembled switch, heating means, cover plate, lens, water proofing cap, and heat exchanger mounted in the housing **15**, is then inserted into the shells with the annular rib **34** on the housing **15** receive the grooves **33** and **35** in each of the shells **11** and **12**. The shells may be secured by mechanical means or an adhesive after the cord is properly positioned in the cord groove **38**. The aerosol container **13** having the base **14** assembled thereon may then be inserted within the bore **31** and locked in place and the unit is ready for use.

In operation, the switch plate **25** is rotated so that the pointer is axially aligned with the "on" indicia where the magnet **24** is disposed over the button **135** where it draws the switch contacts **130** and **131** into engagement as shown in FIGS. 9 and 10. Since the bi-metallic element in the thermal switch is cold, the heater contacts **102** and **103** are in the engaged or conducting condition shown in FIG. 3, completing the circuit through the resistance element **83** and causing it to heat. Heat from the shell **80** is transferred to the heat exchanger **18** through the cover plate **76** to the individual spirals on the heat exchange element **74** to elevate the temperature. As soon as the operating temperature is reached, the contacts **102** and **103** are automatically broken by the button **99** on the bi-metallic element on the thermal switch and the indicating lamp **110** will be illuminated and dispensing may commence. Light downward force may be applied to the cover plate **26** causing the nozzle **65** to move inwardly of the aerosol container **13** to release the contents.

As shown in FIG. 3, the valve arrangement of the container **13** consists of a plunger element **160** formed integral with the nozzle **65**. A biasing spring **161** urges the plunger **160** to seat against the top wall **162** to preclude the passage of fluid out the nozzle **65**, however, when the nozzle **65** is depressed, a lateral opening **163** formed in the tubular nozzle **65** is moved past the fixed valve seat **162** permitting communication through the flexible hose **164** which extends to the bottom **165** of the container **13**. Fluid may then pass through the hose **164**, the spring **161**, around the plunger **160** and out the opening **163** into the heat exchanger, where it is expanded into a foam which is continuously forced around the spirally wound heat exchange element to take on heat. As more fluid is released, the heated foam is continuously emitted from the outlet opening through the nozzle **40** where it may be applied to the shaver's face in a known manner.

One important feature of the invention in addition to those described, is the relationship of the container to the bore **31** in the shells **11** and **12** which embraces the same. Sufficient axial movement between the container and shells **11** and **12** is available so that the nozzle **65** may be depressed releasing the contents from the container **13**. Should overheating of the container **13** occur for any cause, such as, for example, failure of the thermal switch, the valve nozzle **65** and integral plunger **160** are of plastic material which will melt at 500–700° F. This temperature will be reached by the valve well in advance of overheating of the container inasmuch as the nozzle **65** actually touches the heat exchanger. As the nozzle **65** melts the entire dispenser will drop, continue its downward travel until the ends of the guides **43–46** and an inwardly projecting ledge **47** at the junction of the shells **11** and **12** engage the top of the container base **14**. If the melting has caused failure of the valve the pressurized product will be released from the container. In the absence of the stops or the failure to engage the base to arrest downward movement to maintain the container **13** and heat exchanger separated, the valve housing **167** in the container being disposed above the outer rim **168** engages the heat exchanger **18** as the nozzle **65** melts to cause further melting of the valve plunger **160** releasing the pressurized product and alleviating any danger.

Referring now to FIG. 11, a modified form of the invention is illustrated with portions of the shell broken away to show the aerosol-type container and attached base in full elevation. The construction shown in FIGS. 11 and 12 is similar to the dispensing arrangement shown previously and the housing **200**, switch **201**, switch plate **202**, and lens **303** may be identical to those previously described. The housing **200** contains a heating means (not shown) and heat exchanger **204** mounted by a bracket **220'** to a mounting ring **205**. The mounting ring **205** is substantially identical to the mounting ring shown in the embodiment of FIGS. 1–10 with the exception that it is formed with an axially facing spring seat shoulder **206** on the underside portion. The shell sections **211** and **212** are also similar to the shell sections **11** and **12** except that each is provided with an inwardly projecting flange **207** forming a stop for an annular washer **208** in addition to being slightly greater in over-all length. A coil spring **210** has one end received around the circumferential spring guide flange **221** and is bottomed against the spring seat shoulder **206**. The opposite end of the spring **210** is in engagement with the washer **208** and includes a centering flange **222**.

The radial flange **207** retains the spring **210** and washer **208** within the shell **211** and **212** when aerosol-type container **213** is withdrawn by unlocking the base **214** from the shells in the manner described previously. The washer **208** has an inside diameter **215** which is greater than the diameter of the upper neck **216** of the aerosol-type container but less than the over-all diameter of the body so that the washer seats on the frusto-conical surface **217** joining the upper neck **216** and the main body of the aerosol-type container **213**. The force developed by the spring **210** is sufficient to maintain the nozzle **218** on the aerosol-type container spaced from the heat exchanger **204** in the absence of external force thus preventing any heat transfer through the nozzle to the container proper. It is contemplated that the thermostatically operated heating unit will be set for a maximum temperature which will be suitable for shaving but well below the upper design limits of the aerosol-type container **213** so heat transfer normally is not a problem, however, the spaced arrangement protects against this.

To effect dispensing in the embodiment of FIG. 11, downward force is applied to the switch plate **202** causing the nozzle **218** to enter an opening **220** in the heat exchanger **204**. The downward force must be of sufficient magnitude to overcome the combined force effects on the spring **210** and the valve spring (not shown) which is carried internally of the aerosol-type container. When the force is released, the spring **210** returns the dispenser and aerosol-type container to the relative condition shown in FIG. 11, and the valve spring cuts off product flow in a well known manner.

It is to be appreciated that the spacing between the heat exchanger **204** and the nozzle **218** of the aerosol-type container **213** is sufficient to prevent heat transfer to the latter. Since the only available heat path is through the shoulder **206**, spring **210** and inner diameter of the washer **208**, direct heating of the container **213** is possible. Should heat transfer through the spring present a problem, a second flange may be formed integral with the shells **211** and **212** above the flange **207** to provide a longer heat path. In such event, the mounting ring **17** of FIG. 1 may be used in the embodiment of FIGS. 11 and 12.

When the aerosol-type container **213** is removed by unlocking the base **214** from the shells **211** and **212**, the shoulder **207** arrests the downward travel of the washer **208** maintaining the spring tensioned slightly. When a fresh container is inserted, the frusto-conical surface **217** is centered within the washer and assists in aligning the nozzle **218** with the inlet opening **220** and the heat exchanger **204**.

Referring now to FIG. 13, a modified form of container base **230** is illustrated in cross section having upstanding side walls **231** and a bottom wall **232**. The inner construction of the container base **13** is similar to that illustrated in FIG. 3, having flanges **233** and **234** for interlocking wtih the flange **240** the shell sections **241** embracing the aerosol container **235**. The container **235** is provided with a concave bottom **236** like that illustrated in the embodiment of FIG. 3, however, the bottom of the container base **230** in FIG. 13 is thickened to engage the concave bottom **236**. With this container base construction, should over-heating of the container occur for any cause, the concave bottom **236** will assume a convex shape prior to failure of the container. This change in shape is sufficient to increase the over-all dimension of the container **13** so that the lugs **233** and **234** engage the lower flange **240** on the shell sections **241** and the now convex bottom **236** reacts against the base **230** to press the nozzle against the heat exchanger (not shown). As the bottom **236** assumes a convex shape, the seam at the margin of the can slides upwardly in the groove **242** and the nozzle of the container **235** is depressed to release the pressurized product and eliminate the hazard.

After considering the foregoing, it can be appreciated that the dispenser of the present invention avoids the problems and disadvantages of the prior art. In addition, an attractive compact dispenser is provided which is economical to produce and sufficiently rugged to endure the expected abuse. Changing of the aerosol-type container may be accomplished with unequaled ease by merely twisting the base about one-fourth of a turn to permit the lugs **57–60** to travel down the slots **51–54**. The aerosol-type container does not need any special adapter since the conventional nozzle normally supplied with each is fluidtightly received in the opening **70** in the heat exchanger.

Upon a consideration of the foregoing, it will become obvious to those skilled in the art that various modifications may be made without departing from the invention embodied herein. Therefore, only such limitations should be imposed as are indicated by the spirit and scope of the appended claims.

I claim:

1. In combination, an aerosol container and a dispensing arrangement for use in dispensing a pressurized product from said aerosol container in a heated condition,

said aerosol container having a depressible nozzle portion which operates a valve to release the product from said container, said dispensing arrangement including a hollow shell closed off at one end by a housing portion, said shell enveloping at least a part of said aerosol container, electrical heating means mounted in said housing portion of said shell in engagement with a heat exchanger, said heat exchanger having an inlet and an outlet and being mounted between said electrical heating means and said aerosol container, said inlet being adapted to receive the nozzle on said aerosol container for releasing said product for passage through said heat exchanger whereby said product will be warmed before leaving said outlet, [and] means mounted on said aerosol container and engaging said hollow shell [to permit limited longitudinal movement] when assembled thereto to maintain it [loosely and] removably positioned within said shell with said nozzle located in axial alignment with said inlet on said heat exchanger, *and means operatively associated with said housing portion for depressing said nozzle.*

2. The dispensing arrangement of claim **1** wherein said aerosol container has a portion thereof which houses said nozzle disposed above the remaining portion of said aerosol container whereby failure of said heating means causing overheating will result in melting said nozzle within said portion of said aerosol container to continuously release said product.

3. The combination of claim **1** wherein said means mounted on said aerosol container to maintain it [loosely and] removably joined to said shell comprises a continuous annular base joined to said aerosol container and locked into said shell for relative movement between defined limits to permit dispensing.

4. The dispensing arrangement of claim **3** wherein said aerosol container is provided with a bowed bottom wall portion and means is provided on said base for engagement by said bowed position when distorted by excessive internal pressure in said container to move said container relative to said shell and said base thereby initiating dispensing to relieve the excessive internal pressure.

5. The dispensing arrangement of claim **1** including means to maintain said heat exchanger spaced from said aerosol container during periods of non-dispensing.

References Cited

The following references, cited by the Examiner, are of record in the patented file of this patent or the original patent.

UNITED STATES PATENTS

3,338,476	8/1967	Marcoux	222—146 HA
2,914,222	11/1959	Meshberg	222—162
3,302,834	2/1967	Alsop	222—183 X
3,347,423	10/1967	Rahn et al.	222—183
3,487,979	1/1970	Altounyan et al.	222—183
888,488	5/1908	Gurley	222—54
2,148,986	2/1939	Hoyt	239—75
2,822,961	2/1958	Seaquist	222—397
2,914,222	11/1959	Meshberg	222—162
2,966,283	12/1960	Darvie	222—162 X
3,098,925	7/1963	Fouts et al.	222—146 X
3,134,191	5/1964	Davis	222—146 X
3,144,174	8/1964	Abplanalp	222—146
3,292,823	12/1966	Weidman et al.	222—394 X

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