# United States Patent [19]

**Ryckman, Jr.**

[11] **3,733,460**

[45] **May 15, 1973**


[54] **APPARATUS FOR HEATING DISPENSED FLOWABLE MATERIAL**


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[73] Assignee: **General Electric Company**, Bridgeport, Conn.



[22] Filed: **Sept. 15, 1971**

[21] Appl. No.: **180,582**

[52] **U.S. Cl.** .....**219/308**, 219/214, 219/301, 219/305, 219/328, 222/146 HA, 337/344, 337/356

[51] **Int. Cl.** .....**H05b 1/02**, B67d 5/62

[58] **Field of Search**.....219/214, 296–309, 219/331, 327, 328; 337/356–359, 366, 344; 222/146 R, 146 HA, 146 HE



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,335,910 | 8/1967 | Rossi | 219/214 UX |
| 2,261,366 | 11/1941 | Grout | 337/356 |
| 3,498,504 | 3/1970 | Wilkins | 222/146 HA |
| 2,291,423 | 7/1942 | Tiscornia | 219/299 UX |
| 3,098,925 | 7/1963 | Fouts et al. | 219/296 X |
| 1,692,869 | 11/1928 | Scanlan | 219/306 UX |
| 1,419,225 | 6/1922 | Colebrook | 219/299 X |
| 3,358,885 | 12/1967 | Flowers | 219/214 UX |
| 3,207,369 | 9/1965 | Rossi | 222/146 HA |



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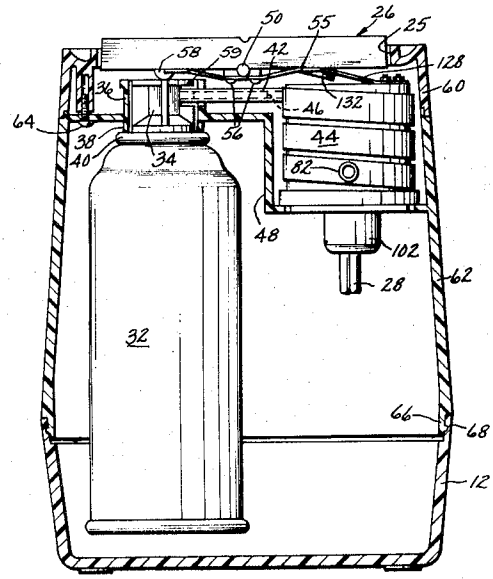
[57] **ABSTRACT**

Apparatus for heating flowable material dispensed from a pressurized container includes a housing to receive the pressurized container and a heat exchanger assembly having a passageway through which the material to be heated flows. Enclosed inside the heat exchanger is an electric heating element and a thermal switch assembly for controlling the heating element. The switch assembly has first and second electric current conducting contact blades resiliently biased in the same direction and supported by insulators at one end in spaced relationship. The switch assembly has a pivotal cam element that cooperatively acts on both blades and there is a stop member movable to prevent the cam element against pivoting in one direction and is released from its stop position by a temperature responsive element set at a predetermined temperature. Operation of the switch is initiated by a two-position actuator.


**10 Claims, 9 Drawing Figures**



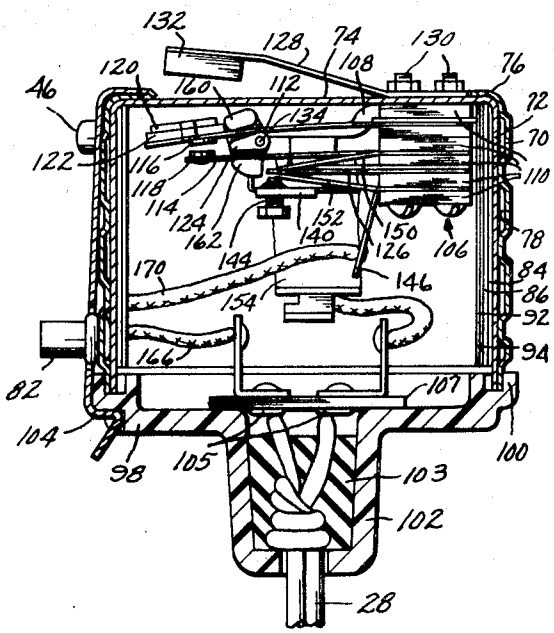



FIG. 1.

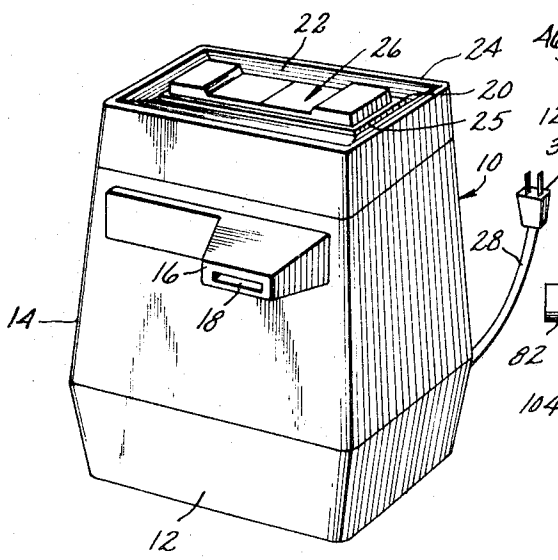



FIG. 3.

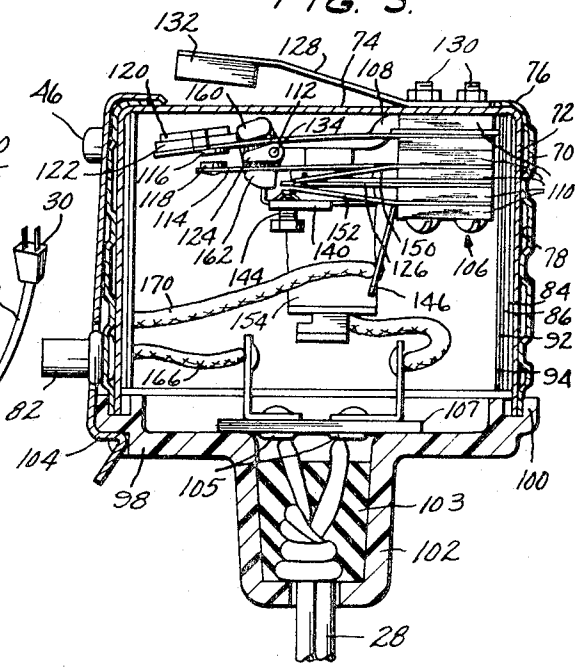



FIG. 2.

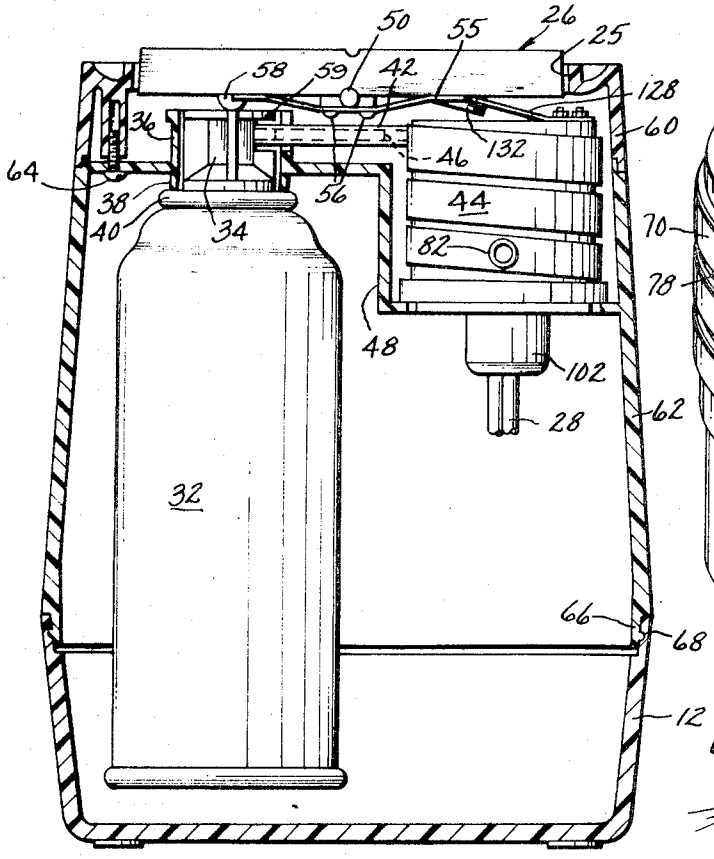



FIG. 4.

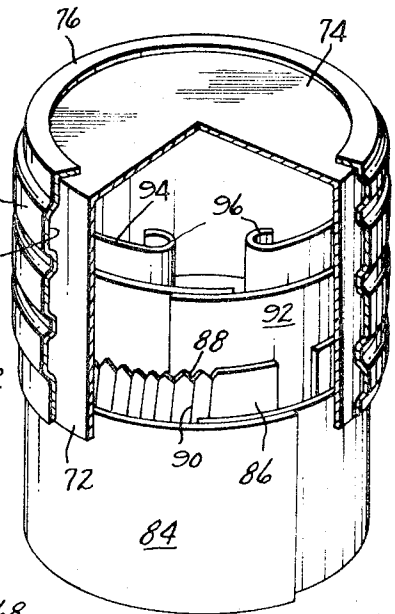



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FIG. 6.

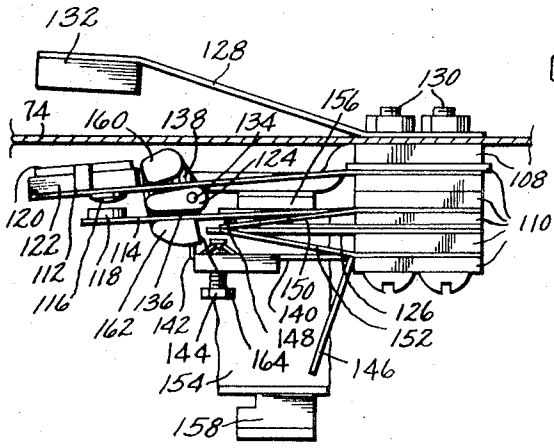



FIG. 5.

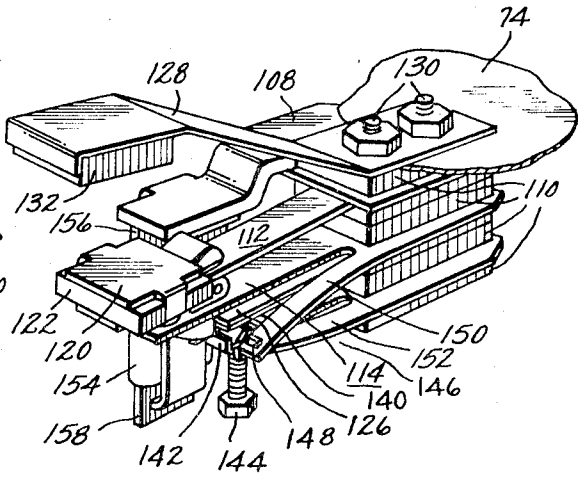



FIG. 7.

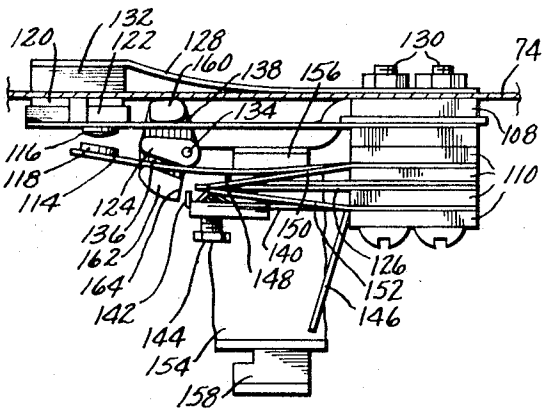



FIG. 9.

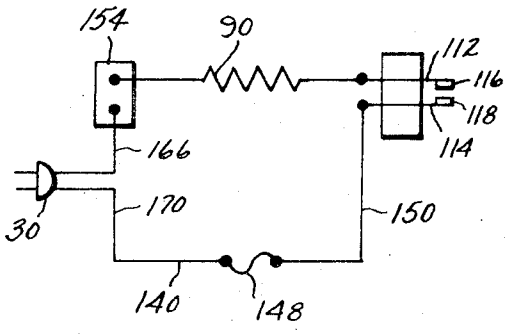
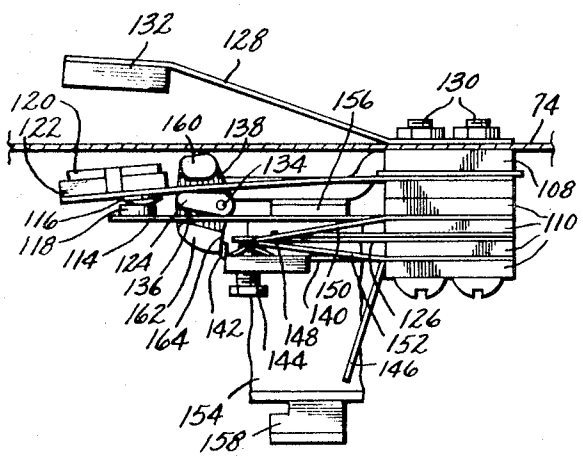



FIG. 8.

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# APPARATUS FOR HEATING DISPENSED FLOWABLE MATERIAL

## BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a switch, and particularly a switch for apparatus used to electrically heat flowable material dispensed from pressurized containers, such as shave cream.

2. Description of the Prior Art

Apparatus for heating shave cream, including shave cream dispensed from pressurized containers, have been known for some time. Conventional pressurized containers use a propellant gas to discharge foam products from the containers. Generally; the propellant gas is dispersed throughout the product under pressure and in liquefied form. Upon release of the discharge outlet of the container, the propellant forces the product out of the container and, simultaneously, expands to form gas bubbles and generate the foam.

Expansion of the propellant from a liquid to a gas, however, has a cooling effect on the foam product. This cooling effect is particularly undesirable in shave cream because cold shave cream foams are not only uncomfortable, but also are slow in softening the beard for the shaving operation. Human hair is more easily shaved when softened by the penetration of moisture from the shave cream, and this softening effect increases with increasing shave cream temperature. For this reason, numerous heating apparatus or devices have been proposed for heating foam shave cream as it is discharged from the containers to increase the ease and effectiveness of shaving.

Some of the previously proposed devices for heating foam shave cream employ an electrical resistance element or wire to supply the necessary heat. Many of those devices utilize a switch operable by the user for energizing and de-energizing the heating element. In the case of heated shave cream dispensers that heat foam from a pressurized container, it is important that the container not be subjected to elevated temperatures which could cause the container to burst. Many of the prior art dispensers do not automatically turn off. While they do have a temperature responsive element that de-energizes the heating element, such an arrangement permits the dispenser to continuously recycle and such recycling can result in a build up of temperature transferable to the pressurized container. In addition, many of the prior art dispensers have the heating element energized by the user depressing a button. Excessive temperature rise could also occur if the actuation of the button was repeated in rapid succession or if an object was placed on the button to keep it depressed for a long period of time. By this invention a switch is provided that eliminates these difficulties and minimizes the chance of excessive temperature build-up.

## SUMMARY OF THE INVENTION

In accordance with this invention, there is provided a switch assembly having first and second electric current conducting contact blades. Both blades are resiliently biased in the same direction and are supported at one end by electric insulating material in spaced relationship and carry contact buttons at the other end. There is a pivotal cam element that cooperatively acts on both blades and a stop member movable to prevent the cam element against pivoting in one direction. The stop member may be released by a temperature responsive element set at a predetermined temperature. Operation of the switch is initiated by a two-position actuator having means, such as a magnet, in the first position to move the first blade in a direction opposite its biased direction and pivot the cam element to force the second blade to move in the same direction as the first blade but out of electrical contact with the first blade. Simultaneously, the lock member is positioned to stop the cam element against pivoting in one direction. Upon release of the actuator the second position is assumed and the moving force, such as the magnet, is released to allow the first blade to move in its biased direction and contact the second blade. When the predetermined set temperature of the temperature responsive element is reached it releases the stop member to allow the cam element to pivot and the contact blades separate to break electrical contact.

It is an object of this invention to provide an improved electrical switch assembly.

It is an object of this invention to provide a switch assembly for apparatus utilizing electric heating means for heating material dispensed from a pressurized container.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an electrically heated shave cream dispenser.

FIG. 2 is a partial cross-sectional view of the heated shave cream dispenser showing the pressurized container and the heat exchanger.

FIG. 3 is a cross-sectional view of the heat exchanger with my switch assembly.

FIG. 4 is a partially cut-away perspective view of the heat exchanger without my switch assembly.

FIG. 5 is a perspective view of my switch assembly.

FIG. 6 is a side elevational view of my switch assembly in its normally off position.

FIG. 7 is a side elevational view of my switch assembly in its first position of actuation.

FIG. 8 is a side elevational view of my switch assembly in its second position of actuation.

FIG. 9 is a circuit diagram showing schematically the electric circuit of the heated shave cream dispenser.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail, FIG. 1 illustrates an electrically heated shave cream dispenser having a plastic molded housing **10**, the base **12** of which is readily detachable from the rest of the housing so that it may be removed for replacement of the pressurized container. The front panel **14** of the housing **10** has molded in it an outlet spout **16** with an opening **18** for discharge of the heated shave cream from the housing. The top **20** of the housing **10** has a recessed area **22** with a surrounding wall **24** and has a central opening **25.** Disposed in the opening **25** is a rocker arm **26** for operating the dispenser. An electric cord **28** and plug **30** are also provided for supplying electrical current to the dispenser when the plug **30** is inserted into a wall receptacle.

FIG. 2 shows the internal arrangement of the heated shave cream dispenser by removing front panel **14.** On the left-hand side of FIG. 2 there is shown a pressurized container **32** containing shave cream with the dispensing outlet thereof inserted into an axially movable valve

actuator 34 retained by a circular internal upstanding wall 36 having a diameter slightly larger than the valve actuator 34. The pressurized container 32 is held in place within the housing 10 by a circular depending wall 38 that engages the inside of a rolled flange 40 of container 32. Wall 38 is slightly resilient so that the container may be readily accepted and easily removed therefrom by the user. Valve actuator 34 has an internal passageway leading from the outlet of the pressurized container 32 to a plastic transfer tube 42 that leads to the right-hand side of the dispenser and is connected to a tubular projection 46 of the heat exchanger assembly 44. Heat exchanger 44 is maintained in its proper location within housing 10 by securing it against an internal support partition 48 integrally molded with the plastic housing 10. Positioned above the heat exchanger and the pressurized container is an elongated rocker arm 26. The rocker arm is pivoted about a pin 50 transverse to the rocker arm and has both ends retained in the side walls of the opening 25 in the top panel 20. Leaf spring 55 secured to the bottom of the top panel 20 by screws 56 acts to retain the rocker arm in its normally horizontal position. The portion of the rocker arm 26 overlying pressurized container 32 has a downwardly directed projection or finger 58 that makes contact with the top 59 of the valve actuator 34 when that side of the rocker arm is pushed and causes the valve actuator 34 to move downwardly in the direction of the pressurized container thereby releasing the contents within the container. The contents flow under pressure up through a passageway in the interior of valve actuator 34 and into the transfer tube 42.

The right-hand side of the rocker arm 26 overlying the heat exchanger 44 functions to actuate the electric heating means within the heat exchanger when depressed downwardly, as will be more fully described later. The plastic housing 10 may be formed in any convenient manner from suitable plastic materials, such as by molding, and in this particular case, the housing is made in three parts, an upper portion 60, a middle portion 62, and the base 12. Upper portion 60 is secured to the middle portion by screws 64 while the base portion 12 is attached to the middle portion 62 by an interfitting lip 66 and held in place by a peripheral bead 68 formed in the middle portion 62 cooperating with a complimentary groove formed in the base portion 12. This permits retention of the base portion 12 to the middle portion 62 but it may be easily removable by grasping with the hand and removing it with some slight force to gain access to the interior of the dispenser to replace the pressurized container.

With reference to FIGS. 3 and 4, the description of the heat exchanger assembly that houses my switch assembly will now be discussed. The heat exchanger is cylindrical in shape and is double walled in that there is an outer shell 70 and an inner shell 72 slightly smaller than the outer shell so that it may fit within the outer shell. The inner shell 72 is cup-shaped in that it is open at one end and closed at the other. The closed end comprises the top wall 74 of the heat exchanger assembly. The outer shell 70 is a cylindrical tube, the top of which has a peripheral inwardly turned flange 76. The side wall of the outer shell 70 has a spiral continuous groove or channel 78 through which shave cream from the pressurized container will flow. To this end, the outer shell 70 is provided with an inlet tube 46 for introducing the shave cream into the heat exchanger and an outlet tube 82 for discharge of the heated shave cream. Within the heat exchanger double-walled construction and positioned adjacent the inner surface of inner shell 72 is a sheet of insulating material 84. Inwardly adjacent the insulating material 84 is an electric heating element board 86 which is provided with sawtooth notches 88 and which has wound around it an electrical resistance wire 90. The wire is retained in its proper spaced relationship from one winding to the other by each turn being positioned in the bottom of the notches 88. Inwardly adjacent heater board 86 is a second sheet 92 of insulating material similar to sheet 84 and then finally there is a C-shaped spring 94 having the ends thereof inwardly turned to form portions 96. Spring 94 maintains structural layers 92, 86 and 84 against each other and urged against the inner wall of inner shell 72. By this arrangement the heating element is retained in good heat transfer relationship with spiral channel 78 through which the shave cream passes. It will be understood that the outer shell 70 and the inner shell 72 are made from good heat conductive material, such as aluminum. The assembly of the heat exchanger elements as described above is then retained by a plastic molded closure or cap 98 having an outside diameter larger than outer shell 70. Cap 98 has an upwardly directed circumferential flange 100 within which is seated the outer and inner shells. The junction between the shells 70 and 72 and the cap 98 is sealed with a suitable waterproofing compound during assembly. Screws 130 through the top wall 74 are also surrounded by waterproofing material. Cap 98 has an open hollow boss 102 through which the line cord 28 may be inserted for making connections 105 on terminal board 107 to supply electrical current to the heating element within the heat exchanger. Again, after assembly this opening is sealed with a waterproof compound 103. Cap 98 and the shells are additionally held together by two spring clips 104, each on opposite sides of the heat exchanger from the other.

Located within the interior of the heat exchanger assembly is my switch assembly 106 for controlling energization of the heating element wire 90. The switch assembly 106, as shown in FIGS. 3, 5–8, includes a support bracket 108 upon which are mounted the various electrical contacts and lead connectors separated by insulator washers 110. The switch assembly includes two contact blades 112 and 114 each of which carry, respectively, contact buttons 116 and 118. Both blades are resiliently biased in the same direction, downwardly as shown in the drawings. At the free outer end of contact blade 112 is mounted a magnetically attractable element 120 separated from the blade by an insulator plate 122.

Positioned to cooperatively act on both contact blades 112 and 114 is cam element 124 that rotates about an axle or pin 134, one end of which is secured, as by welding, to the support bracket 108. The cam element has a lower groove 136 that receives contact blade 114 and an upper groove 138 that receives contact blade 112. Pin 134 about which the cam element pivots, is between the contact blades. Located near the bottom of the switch assembly is stop member 140 that is resiliently biased upwardly in the direction of cam element 124. One end of the stop member is fixed and the opposite free end has an upturned end portion 142 and also carries an adjustment screw 144. Between stop member 140 and contact blade 114 and electrically in-

sulated from blades **112** and **114** is thermally responsive bimetallic blade **126.** When the bimetallic blade is subjected to heat, the difference in coefficient of expansion of the two laminated metals from which blade **126** is made causes the blade to bend. When the temperature is elevated the bimetallic blade **126** bends gradually and with the metal having the lower coefficient of expansion on the side toward the stop member **140,** the bimetallic blade **126** bends sufficiently to contact an adjustment screw **144** and exert enough force thereagainst to move the stop member **140** downwardly opposite its biased direction.

Interposed between contact blade **114** and terminal lead **146** is an over-temperature solder fuse connection **148.** The connection is made between two oppositely spring-biased arms joined at one end by solder chosen to melt at a predetermined temperature and allow the arms to spring apart thereby breaking any electric circuit through the switch assembly. One spring arm **150** is formed as part of contact blade **114** and the other spring arm **152** is formed as part of the stop member **140.**

A small magnetic buzzer **154** is carried by projection **156** formed as part of support bracket **108.** The buzzer is electrically wired in series with the rest of the dispenser circuit and serves to give the user an audible indication that the heating cycle is in progress.

The entire switch assembly is held together by bolts **130** that pass through the center of insulator washers **110,** contact blades **112** and **114,** bimetallic blade **126** and one end of support bracket **108.** Also secured by screws **130** to top wall **74** of inner shell **72** but outside the heat exchanger is the spring member **128.** Spring member **128** is resiliently biased upwardly away from the switch assembly and has at its free end a permanent magnet **132.** It should be noted that between the magnet **132** and the magnetically attractable element **120** carried by contact blade **112** is the aluminum top panel **74** of the inner shell **72.** This panel prevents actual touching of the magnet **132** and the magnetically attractable element **120.**

For a detailed discussion of the operation of the heated shave cream dispenser and the operation of my switch assembly described above to control the dispenser, reference may be had primarily to FIGS. **2, 3, 5–8** of the drawings. With the power plug **30** inserted into a proper outlet for providing electric current, and it is desired to heat the shaving lather, the right-hand portion of the rocker arm **26** located above the heat exchanger is depressed to contact spring member **128.** As the downward movement of the rocker arm progresses the spring bias of member **128** is overcome resulting in the magnet **132** being moved down against the top wall **74** of the inner shell **72.** This position is shown in FIG. **7** of the drawings. At this time the magnet **132** attracts the magnetically attractable element **120** within the interior of the heat exchanger assembly. The magnetic attraction overcomes the spring bias of contact blade **112** causing that blade to move upwardly whereupon it bears against an upper cam projection **160** and causes the cam element to pivot or rotate clockwise, as viewed in FIG. **7.** In doing so the lower cam projection **162** bears against contact blade **114** to force that blade to also move in the same direction as contact blade **112,** against its resiliently biased direction, but out of electrical contact with contact blade **112.** Contact buttons **116** and **118** are still not closed. Simultaneously, the stop member **140** is permitted due to its biased condition to spring upwardly behind rear cam surface **164** of the cam element **124.** The stop member being now positioned to prevent counterclockwise rotation of the cam element as rear cam surface **164** abuts upwardly turned end portion **142** to prevent such cam element movement. The second position of actuation is when the rocker arm **26** is released. At this time the spring bias of member **128** being greater than the magnetic attraction between the magnet **132** and magnetically attractable element **120,** the magnet springs upwardly to remove its influence on the element **120** and contact blade **112** thereby allowing contact blade **112** to move downwardly in the direction it is biased. Since stop member **140** prevents rotation of the cam element **124,** contact blade **114** is maintained stationary by a groove **136** in the cam element and contact buttons **116** and **118** make contact. This second actuation position is shown in FIG. **8** of the drawings. The electrical circuit of the dispenser is now complete and with reference to FIG. **9,** the electrical circuit is completed from slug **30** through lead **166,** buzzer **154,** heating wire **90,** contact blade **112** carrying button **116,** to contact blade **114** via button **118,** arm **150** of blade **114,** fuse connection **148,** stop member arm **140,** to power lead **170** back to plug **30.** The electrical connection between contact blades **112** and **114** is maintained until the bimetal blade **126** bends responsive to a predetermined temperature sufficiently to bear against adjustment screw **144** to force the stop member **140** downwardly to disengage it from the cam element thus allowing the cam element to pivot about its axle and the contact blades **112** and **114** to separate breaking the electrical circuit. This position is as shown in FIG. **6** of the drawings. At this time the dispenser is ready to heat the shave cream by passing it through the heated heat exchanger. To this end the left-hand portion, as viewed in FIG. **2,** of the rocker arm **26** above the pressurized container **32** is depressed so that finger **58** pushes the valve actuator **34** downwardly permitting the contents of the pressurized container to be ejected therefrom under pressure and pass through the valve actuator **34** into the transfer tube **42** and into the heat exchanger via the inlet tube **46.** The force of the shave cream being ejected from the pressurized container causes the cream to be forced spirally around the heat exchanger within channel **78** between the inner shell **72** and the outer shell **70.** As the shave cream is traveling in this manner from the inlet to the outlet the heated heat exchanger transfers heat to the shave cream so that upon its being expelled out through opening **118** in the housing the shave cream has been heated. It will be appreciated that as long as the left-hand portion of the rocker arm is pressed down shave cream will continue to be expelled through the system and out the opening **118.**

The foregoing is a description of the preferred embodiment of the invention and variations may be made to the apparatus without departing from the spirit of the invention, as claimed in the appended claims.

I claim:

**1.** Apparatus for heating flowable material dispensed therefrom comprising:

a. a housing adapted to receive a pressurized container,

b. a heat exchanger assembly having an inlet and outlet including:

1. passageway means for conducting discharged contents of the pressurized container from the inlet to the outlet,
2. electric heating means in heat transfer relationship with said passageway,

c. control means for said electric heating means including;

1. a switch assembly comprising;
   aa. first and second current conducting contact blades, both blades being biased in the same direction and supported at one end in a fixed spaced relationship by insulating material,
   bb. a pivotal cam element cooperating with both of said blades,
   cc. a stop member movable to stop the cam element against pivoting in one direction,
   dd. means to move the stop member to allow the cam element to pivot in said one direction, and
2. a two-position actuator, said actuator in the first position having means to move the first blade in a direction opposite its biased direction and thereby pivot the cam element to force the second blade to move in the same direction as the first blade but out of electrical contact therewith, and also thereby permitting the stop member to stop the cam against pivoting in said one direction, and said actuator in the second position having means to release the moving force on the first blade and allow it to move into contact with the second blade, and

d. means from the outlet of said pressurized container to the inlet of the heat exchanger for conducting the dispensed material.

**2.** The apparatus of claim **1** wherein the heat exchanger is double-walled and the passageway is between the double walls.

**3.** The apparatus of claim **2** wherein the inner wall of the heat exchanger is a cup having one open end sealed with a closure and the cup is hermetically sealed.

**4.** The apparatus of claim **1** wherein an electrically operated sound producing device is included to indicate that the apparatus is in a heating mode.

**5.** The apparatus of claim **1** wherein the housing has an outlet for discharge of contents therefrom and said apparatus has means for conducting the dispensed material from the heat exchanger to the housing outlet.

**6.** The apparatus of claim **1** wherein the means to move the stop member to allow the cam element to pivot in said one direction is responsive to a predetermined temperature.

**7.** The apparatus of claim **6** wherein the temperature responsive means is a bimetallic blade.

**8.** Apparatus for heating shave cream dispensed from a pressurized container comprising:

a. a housing adapted to receive the pressurized container and having an outlet for discharge of shave cream therefrom,

b. a hollow heat exchanger assembly having an inlet and outlet including;

1. passageway means for conducting the shave cream of the pressurized container from the inlet to the outlet,
2. electric heating means in heat transfer relationship with said passageway,

c. control means for said electric heating means including;

1. a switch assembly comprising;
   aa. first and second current conducting contact blades, both blades being biased in the same direction and supported at one end in a fixed spaced relationship by insulating material,
   bb. A pivotal cam element cooperating with said blades,
   cc. a stop member movable to stop the cam element against pivoting in one direction,
   dd. a temperature responsive element that moves the stop member to allow the cam element to pivot in said one direction at a predetermined temperature to open the first and second contact blades,
2. a two-position actuator, said actuator in the first position having means to move the first blade in a direction opposite its biased direction and thereby pivot the cam element to force the second blade to move in the same direction as the first blade but out of electrical contact therewith, and also thereby permitting the stop member to stop the cam against pivoting in said one direction, and said actuator in the second position having means to release the moving force on the first blade and allow it to move into contact with the second blade,

d. means from the outlet of said pressurized container to the inlet of the heat exchanger for conducting the shave cream, and

e. means for conducting the shave cream from the heat exchanger outlet to the housing outlet.

**9.** The apparatus of claim **8** wherein the switch assembly is located within the heat exchanger assembly.

**10.** The apparatus of claim **8** wherein the heat exchanger is double-walled with the passageway between the double walls and the inner wall is a cup having one open end sealed with a waterproof closure.

* * * * *