Sept. 15, 1959 J. C. DEIST 2,904,667

AUTOMATIC COFFEE PERCOLATOR

Filed March 12, 1958 4 Sheets-Sheet 1

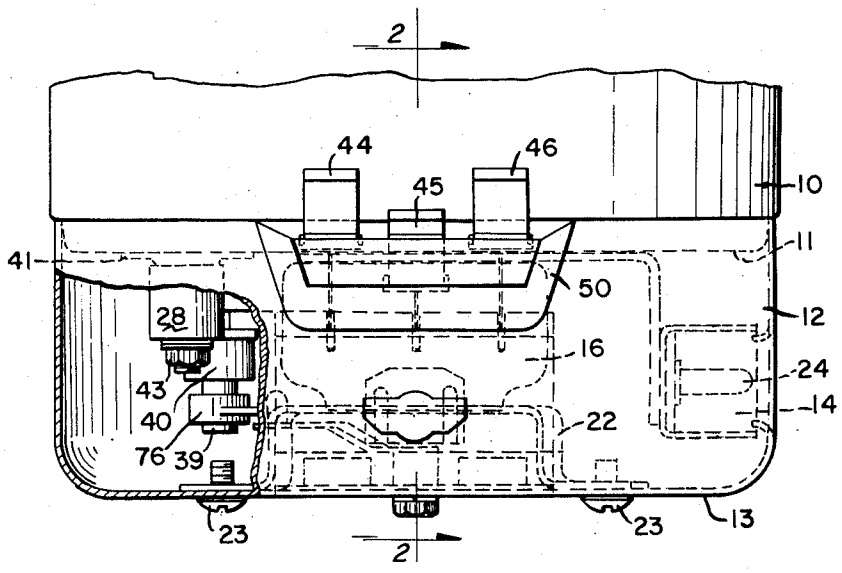

FIG. 1.

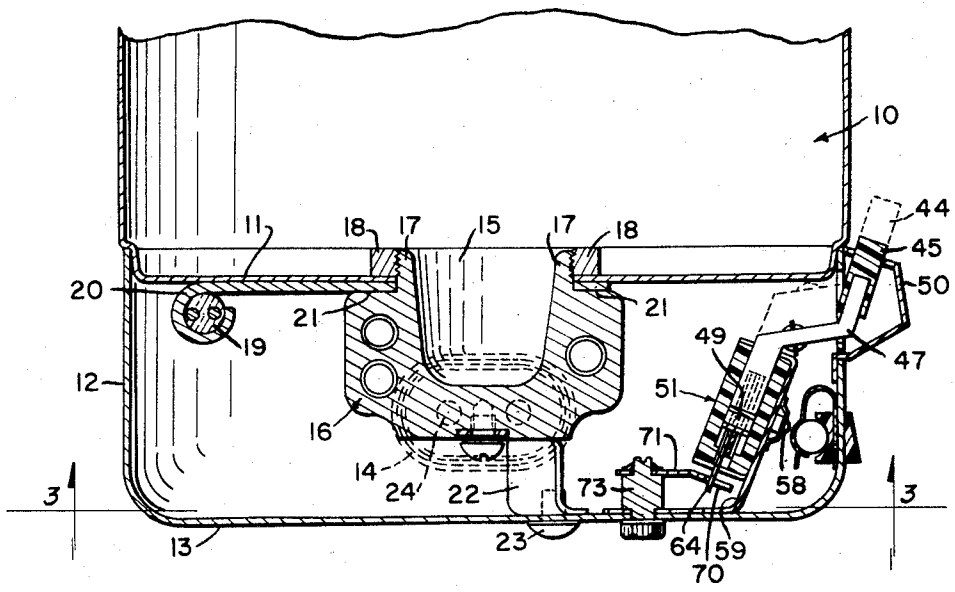

FIG. 2.

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AUTOMATIC COFFEE PERCOLATOR

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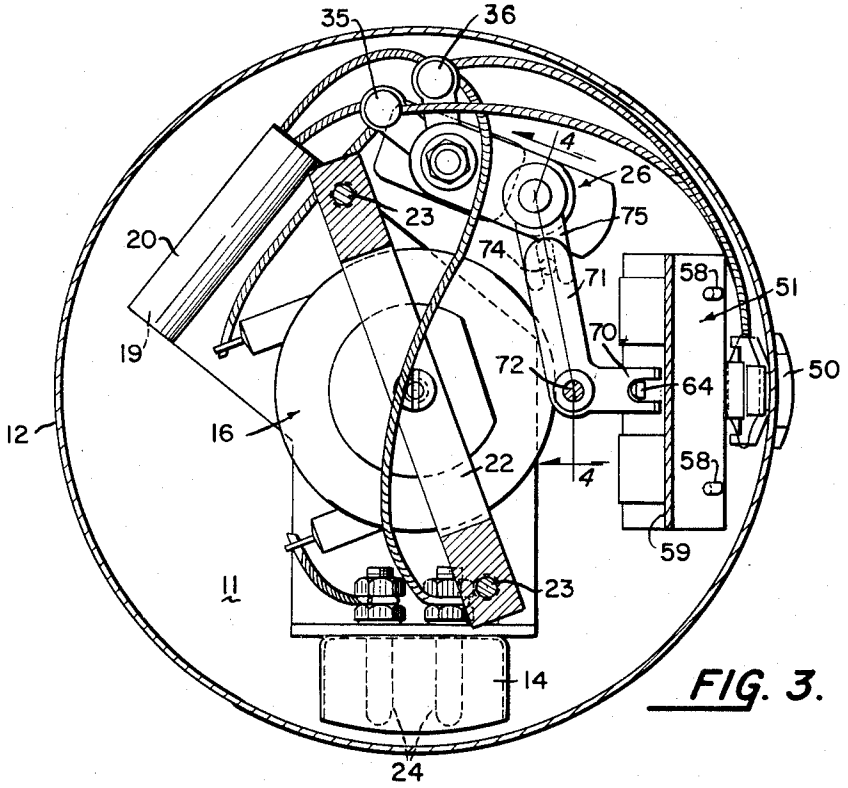

FIG. 3.

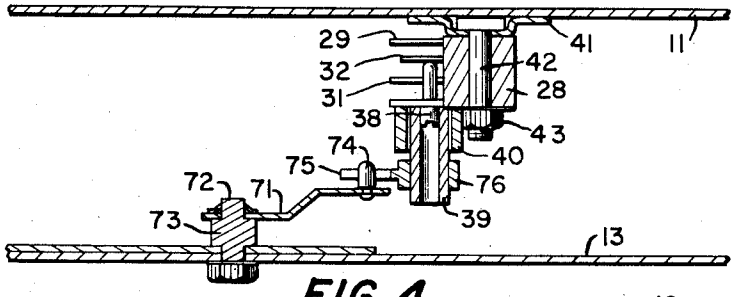

FIG. 4.

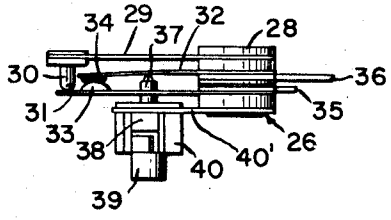

FIG. 5.

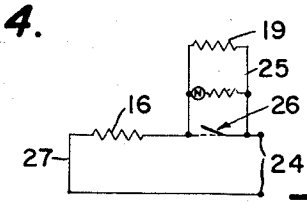

FIG. 6.

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AUTOMATIC COFFEE PERCOLATOR

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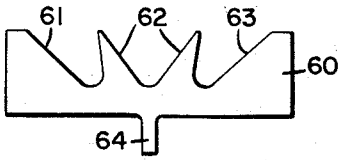

FIG. 7.

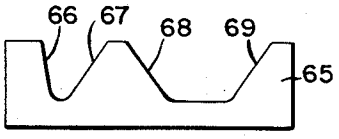

FIG. 8.

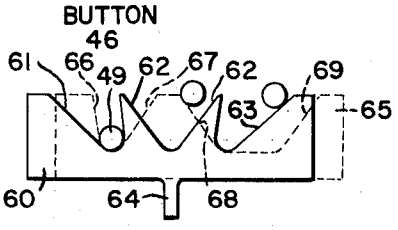

FIG. 9.

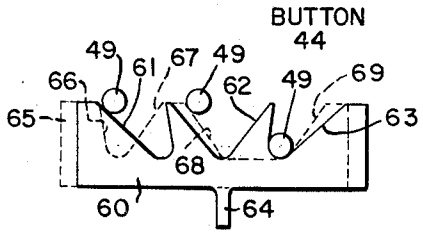

FIG. 10.

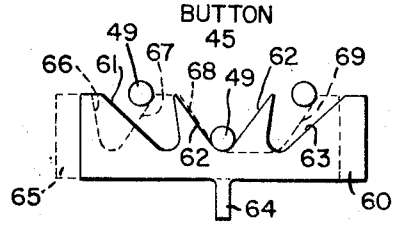

FIG. 11.

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AUTOMATIC COFFEE PERCOLATOR

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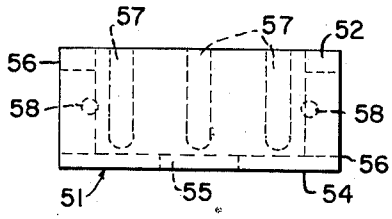

FIG. 12.

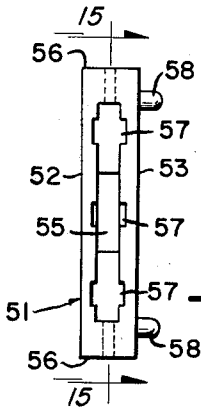

FIG. 13.

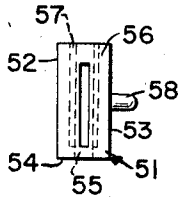

FIG. 14.

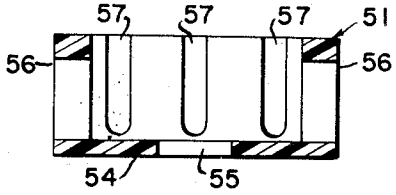

FIG. 15.

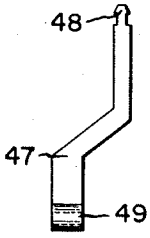

FIG. 16

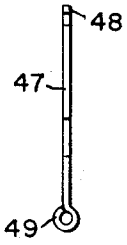

FIG. 17.

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United States Patent Office 2,904,667 Patented Sept. 15, 1959

2,904,667

AUTOMATIC COFFEE PERCOLATOR

James Charles Deist, Racine, Wis., assignor to Scovill Manufacturing Company, Waterbury, Conn., a corporation of Connecticut

Application March 12, 1958, Serial No. 720,989

10 Claims. (Cl. 219—44)

This invention relates to electrically heated coffee makers of the percolator type, thermostatically controlled for automatic operation whereby coffee may be brewed to desired strength and maintained at serving temperature.

As is known in the art, percolator type coffee makers embody a main vessel for holding water used in making coffee, provided with a pump located in the bottom of the vessel, having a tube rising to and communicating with a basket designed to hold ground coffee. Water is heated and caused to flow upwardly through the pump and tube to the basket, through the ground coffee, and back to the vessel for repeated circulation. Heating elements, one of high wattage and the other of low wattage, are located in a chamber beneath the main vessel. A thermostatic switch is connected in the high wattage circuit to automatically break the circuit and stop percolation of the coffee in the main vessel at desired temperatures for producing the selected type of coffee: 140 to 160° F. for mild coffee, 160° to 180° F. for medium strength, and 180 to 206° F. for strong coffee.

I have also provided means for automatically maintaining the brewed contents, upon completion of the percolating period, at serving temperature as long as the coffee maker is connected to the electrical supply circuit. For this purpose, a low wattage heating element is directly connected to the inlet terminals and is in circuit at all times while the device is connected to the circuit.

Coffee makers have been provided with turn knobs and slide levers for adjusting thermostatically controlled switches for the purpose of making coffee of predetermined strength. Such knobs and levers are objectionable because they are not positive in action, and because the temperature indicia thereon frequently are difficult to read due to the size and form of the devices on which they appear. The turn knobs and slide levers employed in prior art devices also are objectionable because they protrude laterally from the containers on which they are mounted, to the detriment of the contour of the vessels as well as the reading and handling of the adjustment devices.

The main object of my invention is to produce an improved coffee maker provided with positively acting adjustment means including push buttons for adjusting a thermostatically controlled switch which is part of the mechanism whereby coffee of selected strength is produced and maintained at serving temperature. The push buttons which are part of my improved adjustment means are mounted for operation in substantially vertical directions, being depressible by pressure applied to the upper surfaces of the buttons mounted in a housing which merges with the container side wall in such manner that the buttons do not protrude laterally from their housing or from the container wall.

Another object of the invention is to provide simple and efficient mechanism operatively connecting the push buttons of my adjustment means with the thermostatic switch which controls the operation of the high wattage heating element. Push button actuated switches heretofore have been connected in electrical circuits merely to make and break the circuits by manipulation of off and on buttons. In my improved automatically operable coffee maker, the push buttons are not connected to any part of an electrical circuit, but are operatively connected to mechanism which positively moves and thereby adjusts the position of one of two flexible contact carrying switch arms, and thereby varies the opening of a normally closed switch by the action of a thermally responsive arm mounted above and bearing on one of the two switch arms.

By this positive mechanical action, imparted by depressing a selected one of the push buttons of my construction, the contacting tendency of the switch arms is predetermined, and the thermally responsive arm must be subjected to a predetermined temperature gained from the contents of the coffee maker in order to attain the capacity to exert required pressure on one of the two flexible switch arms and to thereby separate said arms to break the circuit.

Another feature of my invention is the provision of a high wattage heating element located beneath and around the lower part of the pump, whereby water in the main vessel is heated very quickly to start percolation and to bring the contents of the container to the selected temperature range, whereupon the thermostat functions to break the flow of current.

Other objects and advantages of my invention will be apparent from the following description and the drawings.

In the drawings:

Fig. 1 is a vertical sectional view, partly in elevation, of the lower part of an automatic electric coffee percolator embodying my invention.

Fig. 2 is a vertical sectional view, partly in elevation, the section being at right angles to that of Fig. 1.

Fig. 3 is a horizontal sectional view taken in the plane of the line 3—3 of Fig. 2, looking upwardly as indicated by the arrows.

Fig. 4 is a vertical sectional view of part of the thermostat adjusting mechanism, in the plane indicated by the line 4—4 of Fig. 3.

Fig. 5 is an elevational view of the thermostat unit detached from the rest of the mechanism.

Fig. 6 is a diagrammatic view showing the electrical circuit used in my percolator.

Fig. 7 is an elevational view of the main slide member, which is part of the thermostat adjusting mechanism, detached.

Fig. 8 is an elevational view of the auxiliary slide member, which is also part of the thermostat adjusting mechanism, detached.

Figs. 9, 10 and 11 are elevational views of the main and auxiliary slide members, showing their relative positions when the control means are set for making strong, mild and medium strength coffee, respectively.

Fig. 12 is an elevational view of one side of the button arm guide.

Fig. 13 is a top plan view of the button arm guide.

Fig. 14 is an elevational end view of the same.

Fig. 15 is a sectional view in the plane of the line 15—15 of Fig. 13.

Fig. 16 is an elevational side view of one of the push button arms, detached, and Fig. 17 is an elevation edge view of the same.

In that embodiment of the invention shown in the drawings, 10 indicates the main vessel in which the coffee is brewed, having a bottom 11 connected to and mounted on a lower housing 12 with base 13 which contains the heating elements and mechanism for controlling same. A conventional electric plug receptacle box is indicated

at 14. A pump housing 15 in the vessel 10 depends from the bottom 11 of the vessel into the lower chamber, where it is surrounded by a heating element 16 which has an upper threaded collar portion 17 engaged by the nut 18 resting on the bottom 11 whereby the upper portion of the heating element 16 is held firmly in position. An auxiliary heating element 19 is mounted in a bracket 20 which underlies the bottom 11 and is retained between it and a shoulder 21 on the main heating element 16. A base mounting bracket 22 comprises a central flat strap having downturned end members secured by any suitable means 23 to the base 13, and serves to support the heating element 16 and wiring associated therewith.

Referring first to the electrical circuit shown in Fig. 6, 24 indicates the terminals located in the receptacle 14, leading to the low wattage element 19, the receptacle 14, leading to the thermostatic switch 26 which is normally closed and leads to the high wattage element 16 in circuit 27. Thus the main or high wattage heating element 16 is energized at all times when the terminals 24 are connected to a source of electrical power, but the wattage input to element 16 is greatly reduced when the thermostatic switch 26 is open, causing current to flow through circuit 25 connecting heating elements 19 and 16 in series and energizing both elements.

The thermostatic switch 26, shown detached in Fig. 5, comprises a support 28 in which is mounted one end of a bimetallic flexible arm 29 on the free end of which is mounted the depending pin 30 which contacts the free end of the lower switch arm 31 of the pair of flexible switch arms 31, 32 also mounted at one end in the support 28 and insulated from each other. The lower switch arm 31 has a contact 33 on its upper face and the upper switch arm 32 has a contact 34 on its lower face. The arms 31, 32 are connected to the electrical circuit 27 by means of the connector arms 35, 36, shown in Figs. 3 and 5. The switch arm 32 is biased toward the lower arm 31 and the contacts 33, 34, are normally closed. Under influence of heat, the bimetallic thermally responsive arm 29 is flexed downwardly so that the depending pin 30 forces the lower switch arm 31 to move downwardly and break the contact, as will be explained more fully hereinafter.

The contacting tendency of the switch arms is varied by a pin 37 mounted on a cam shaft 38 which cooperates with a rotatable cam shaft 39. A collar 40 in which the shaft 38 is mounted is connected to the thermostat support 28 by a plate 40'. As shown in Figs. 4 and 5, the pin 37 bears against the under side of the upper switch arm 32. Raising or lowering of the pin 37, as will be explained hereinafter, results in varying the position of the arm 32 and the tendency of the switch arms to maintain or break contact.

The thermostatic switch assembly indicated as a whole at 26 is mounted on the lower surface of the bottom 11 of the coffee vessel by a bracket 41 (Figs. 1 and 4), a bolt 42 passing through the support 28 and bracket for this purpose. A nut 43 on the end of the bolt retains the parts in position. When thus mounted, the thermally responsive arm 29 is located closely beneath the container bottom and is influenced by the temperature of the container contents.

The manually operable adjustable mechanism for varying the position of the pin 37 and thereby controlling the tendency of the switch arms 31, 32 to maintain or break contact now will be explained. As best shown in Figs. 1 and 2, three push buttons 44, 45, 46, are each mounted on the upper end of a push button arm 47 having upper and lower parallel portions connected by an inclined intermediate portion as shown in Figs. 2 and 16, the arm as a whole being substantially vertical but tilted slightly so that its upper end is located externally of the side wall 12 and the lower end interiorly of the chamber enclosed by the walls 11, 12 and 13. The shape of the push button arms is shown in Figs. 16 and 17, where the upper button engaging end is indicated at 48 and the lower rounded end at 49.

The upper parts of the arms 47 and the lower portions of the buttons 44, 45, 46 are enclosed in a housing 50 secured to the wall 12, the buttons projecting upwardly through the top of the housing 50. They are depressible by applying pressure to the top of the button in a downward direction, whereby the arm 47 on which the depressed button is mounted is moved downwardly in a direction parallel to the longitudinal side surfaces of the lower part of the arm.

Said lower portions of the arms 47 are mounted in an arm guide, preferably made of molded material, shown in detail in Figs. 12 to 15, inclusive, and in transverse section in Fig. 2 where it is indicated as a whole at 51. The arm guide comprises parallel side walls 52, 53, a bottom 54 having an opening 55, and vertically slotted end walls 56. The channels 57 formed between the side walls 52, 53 are shaped to receive the lower portions of the push button arms 47. The arm guide 51 as a whole is connected by means of the projections 58 to a guide arm frame 59. The frame 59 has a member parallel with and connected to the floor 13 and an upwardly inclined member parallel to the side wall 53 of the arm guide to which it is connected as shown in Fig. 2. The disposition of the arm guide 51 is such that the lower portions of the arms 47 are slidable in the channels 57 when the buttons mounted thereon are depressed.

The lower rounded ends 49 of the arms 47 contact a pair of slide members which are located in the lower portion of the arm guide 51 between the walls 52, 53, and below the ends 49 of the arms. The slide members are shown in Figs. 7 to 11, inclusive, where the main slide is indicated at 60. It has cam surfaces 61, 62 and 63, and a depending finger 64. An auxiliary slide member 65 has cam surfaces 66, 67, 68, 69. The slide members 60, 65, are thin flat plates, arranged in the guide 51 with their proximate side surfaces contacting each other. They have relative sliding movement in a longitudinal direction between the ends 56 of the guide 51, imparted by the ends 49 of the arms 47 contacting cam surfaces of the slides 60, 65.

In Figs. 9, 10, and 11, are shown the relative positions of the slides after they have been actuated by successive depression of the push buttons, the main slide 60 being shown in solid lines and the auxiliary slide 65 in dotted lines. In these figures, the circles 49 indicate the lower rounded ends of the push button arms 47.

In Fig. 9, the depression of the push button 46 has caused the rounded end 49 of its arm 47 to engage cam surfaces 61 or 67 (depending on the previous position of the slides) and to move downwardly while forcing the slides to move longitudinally in opposite directions to the point where the lowermost portion of said cam surfaces 61 and 67 coincide. This action has caused movement of the main slide member to the left, so that the depending finger 64 is at the left of the longitudinal center of the guide 51. In this position, the finger 64 will operate in cooperation with other parts to adjust the switch mechanism to produce "strong" coffee, as will be explained hereinafter.

In Fig. 10, the depression of the push button 44 has caused the rounded end 49 of its arm 47 to engage cam surfaces 63 or 69 (depending on the previous position of the slides) and to move downwardly while forcing the slides to move longitudinally to the point where the lowermost portions of said cam surfaces 63 and 69 coincide. This action has caused movement of the main slide to the right and of the auxiliary slide to the left, as compared with Fig. 9, with the depending finger 64 at the right of the longitudinal center of the guide 51. In this position the finger 64 will operate to adjust the switch mechanism to produce "mild" coffee.

In Fig. 11, the depression of the push button 45 has caused the rounded end 49 of its arm 47 to engage cam

surfaces 62 or 68 (depending on the previous position of the slides) and to move downwardly while forcing the slides to move longitudinally to the point where the lowermost portions of said cam surfaces 62 and 68 coincide. This action has caused movement of the main side slightly to the left of that position shown in Fig. 10, and movement of the auxiliary slide slightly to the right, so the finger 64 is in the center position, where it will operate to adjust the switch mechanism to produce "medium" coffee.

Each of the described movements caused by depression of one of the three buttons has the effect of raising a previously depressed arm 47 and the button mounted thereon. For example, after button 46 has been depressed to produce the slide positions shown in Fig. 9, depression of button 44 will cause the previously depressed button 46 to be raised to the position shown at the left of Fig. 10, and then depression of button 45 will cause the previously depressed button 44 to be raised to the position shown at the right of Fig. 11.

From the foregoing it will be apparent that the position of the depending finger 64 of the main slide member 60 is controlled by the actuation of a selected button 44, 45 or 46. The said finger 64 engages the forked end 70 of a bell crank lever 71 pivotally mounted at 72 on a stud 73 fixed to the base 13. At its other end the bell crank lever 71 has on its upper surface a pin 74 which engages the forked end of a thermostat arm 75 integral with the hub 76 fixed to the rotatable cam shaft 39 of the thermostatic switch unit heretofore described.

In describing the invention, reference has been made to a particular example embodying the same, but I wish it to be understood that the invention is not limited to the construction shown in the drawing and that various changes may be made in the construction and general arrangement of parts without departing from the invention.

As an example of changes which may be made, the invention is not limited to a specific number of push buttons for producing different strengths of coffee. Additional push buttons and associated mechanism of the character described for adjusting the relative positions of the switch arms may be employed without departing from the invention. For this purpose, additional cam surfaces on the slide members 60, 65, or an additional cam-surfaced slide member may be employed, the operation being the same as that herein described. Regardless of the number of push buttons which may be embodied in the percolator structure, the depression of one button will actuate the slide members and not only adjust the switch, but will cause a previously depressed button to be raised by the slide members so that the user of the percolator can observe, by the depressed button, the chosen adjustment for the type of coffee being brewed.

I claim:

1. An electrically heated automatic coffee maker comprising a main vessel, a control chamber housing beneath the vessel, a heating element in the chamber housing, a thermostatically controlled electric switch unit including a pair of contact carrying switch arms mounted in the chamber housing, an electric circuit connecting the heating element and switch arms to a source of electrical energy, a push button casing located externally on the chamber housing, a plurality of push buttons depressibly mounted in the button casing, push button arms each having an outer end in the button casing connected to a push button and an inner end extending into the control chamber, and button actuated operative connections between the button arms and one of the switch arms, said operative connections comprising a pair of parallel longitudinally movable slide members provided on their upper edges with cam surfaces having depressed areas and adjacent inclined areas, said slide members being simultaneously movable in opposite directions by engagement between a depressed button arm and the inclined cam surfaces until a depressed area of one slide member cam surface coincides with a depressed area of the other slide member cam surface and the depressed button arm becomes seated therein.

2. In an electrically heated automatic coffee maker having a main vessel, a control chamber housing connected thereto, and a thermostatically controlled electric switch including a pair of contact carrying switch arms mounted in the chamber housing, that improvement which consists of push button actuated means for controlling the operation of the switch arms, comprising a button casing located externally on the side of the control chamber housing, a plurality of individually depressible push buttons projecting from the top of the button casing, push button arms each having an upper end connected to a push button in the button casing and a lower end extending into the control chamber, and operative connections between the button arms and one of the switch arms for varying the tendency of the switch arms to maintain contact, said operative connections comprising a pair of parallel longitudinally movable slide members provided on their upper edges with cam surfaces having depressed areas and adjacent inclined areas, said slide members being simultaneously movable in opposite directions by engagement between a depressed button arm and the inclined cam surfaces until a depressed area of one slide member cam surface coincides with a depressed area of the other slide member cam surface and the depressed button arm becomes seated therein.

3. An electrically heated automatic coffee maker comprising a main vessel, a control chamber housing beneath the vessel, a heating element in the chamber housing, a thermostatically controlled electric switch unit including a pair of contact carrying switch arms mounted in the chamber housing, an electric circuit connecting the heating element and switch arms to a source of electrical energy, a push button casing located externally on the chamber housing, a plurality of push buttons depressibly mounted in the button casing, push button arms each having an upwardly and outwardly slightly inclined upper portion located in the button casing and connected to a push button, a downwardly and inwardly inclined lower portion parallel to said upper portion located in the control chamber housing, and an intermediate inclined portion extending from the button casing into the chamber housing and connecting the upper and lower arm portions, and button actuated operative connections between the lower ends of the button arms and one of the switch arms varying the tendency of the switch arms to maintain contact, said operative connections comprising a pair of parallel slide members longitudinally movable in opposite directions and provided with cam surfaces engaged by said button arms.

4. In an electrically heated automatic coffee maker having a main vessel, a control chamber housing connected thereto, and a thermostatically controlled electric switch including a pair of contact carrying switch arms mounted in the chamber housing, that improvement which consists of push button actuated means for controlling the operation of the switch arms, comprising a button casing located externally on the side of the control chamber housing, a plurality of individually depressible push buttons projecting from the top of the button casing, push button arms each having an upwardly and outwardly slightly inclined upper portion located in the button casing and connected to a push button, a downwardly and inwardly inclined lower portion parallel to said upper portion located in the control chamber housing and an intermediate inclined portion extending from the button casing into the chamber housing and connecting the upper and lower arm portions, and button actuated operative connections between the lower ends of the button arms and one of the switch arms varying the tendency of the switch arms to maintain contact, said operative connections comprising a pair of parallel slide mem-

bers longitudinally movable in opposite directions and provided with cam surfaces engaged by said button arms.

5. An electrically heated automatic coffee maker comprising a main vessel, a control chamber housing beneath the vessel, a heating element in the chamber housing, a thermostatically controlled electric switch unit including a pair of contact carrying switch arms mounted in the chamber housing, an electric circuit connecting the heating element and switch arms to a source of electrical energy, a push button casing located externally on the chamber housing, a plurality of push buttons depressibly mounted in the button casing, push button arms each having an outer end in the button casing connected to a push button and an inner end extending into the control chamber, and button actuated operative connections between the button arms and one of the switch arms, said operative connections comprising slide members each having a plurality of cam surfaces on one edge in contact with the push button arms, a guide in which the slide members are slidably retained, a bell crank lever pivotally mounted in the control chamber having an end engaged by one of the slide members, cam actuated means bearing on one of the switch arms, and connections between the bell crank lever and said cam actuated means operable by pivotal action of the lever imparted thereto by said slide member.

6. In an electrically heated automatic coffee maker having a main vessel, a control chamber housing connected thereto, and a thermostatically controlled electric switch including a pair of contact carrying switch arms mounted in the chamber housing, that improvement which consists of push button actuated means for controlling the operation of the switch arms, comprising a button casing located externally on the side of the control chamber housing, a plurality of individually depressible push buttons projecting from the top of the button casing, push button arms each having an upper end connected to a push button in the button casing and a lower end extending into the control chamber, and operative connections between the button arms and one of the switch arms for varying the tendency of the switch arms to maintain contact, said operative connections comprising slide members each having a plurality of cam surfaces on one edge in contact with the push button arms, a guide in which the slide members are slidably retained, a bell crank lever pivotally mounted in the control chamber having an end engaged by one of the slide members, cam actuated means bearing on one of the switch arms, and connections between the bell crank lever and said cam actuated means operable by pivotal action of the lever imparted thereto by said slide member.

7. An electrically heated automatic coffee maker comprising a main vessel, a control chamber housing beneath the vessel, a heating element in the chamber housing, a thermostatically controlled electric switch unit including a pair of contact carrying switch arms mounted in the chamber housing, an electric circuit connecting the heating element and switch arms to a source of electrical energy, a push button casing located externally on the chamber housing, a plurality of push buttons depressibly mounted in the button casing, push button arms each having an outer end in the button casing connected to a push button and an inner end extending into the control chamber, and button actuated operative connections between the button arms and one of the switch arms, said operative connections comprising a pair of slide members each having a plurality of cam surfaces on one edge in contact with the push button arms, a guide in which the slide members are slidably retained, a bell crank lever pivotally mounted in the control chamber having an end engaged by one of the slide members, cam actuated means bearing on one of the switch arms, and connections between the bell crank lever and said cam actuated means operable by pivotal action of the lever imparted thereto by said slide member, said connections comprising an upwardly directed pin on the bell crank lever, a thermostat arm having a forked end engaged by the pin on the bell crank lever, and a hub integral with the thermostat arm fixed to the cam actuated means, pivotal movement of the bell crank lever transmitting rotary motion to said thermostat arm and hub whereby the cam actuated means is raised or lowered.

8. An electrically heated automatic coffee maker comprising a main vessel having vertical side walls and a bottom wall, a control chamber housing including side walls aligned with the main vessel vertical walls and having a base spaced from the bottom of the main vessel, an electric heating element in the chamber housing adjacent the vessel bottom, a thermostatically controlled electric switch unit comprising a support mounted in the top of the control chamber, upper and lower contact carrying flexible switch arms mounted in the support, a thermally responsive arm mounted in the support above the switch arms having a free depending end bearing on one of the switch arms, an electric circuit connecting said heating element and switch to a source of electrical energy, a plurality of push buttons depressibly mounted on the control chamber housing, a vertically adjustable member bearing on one of the switch arms, an axially vertical stud rising from the base of the chamber housing, a bell crank lever pivotally mounted on said stud, and movable in a horizontal plane between the stud and vertically adjustable member, and operative connections between said lever and the push buttons.

9. The coffee maker defined by claim 8, in which the operative connections between said lever and the push buttons comprise a plurality of button arms each having its upper end connected to a push button and its lower end being rounded, a guide, a pair of flat slide members longitudinally movable in the guide, the lower ends of the arms being movable in the guides in directions at right angles to the movement of the slide members, cam surfaces on the slide members in contact with the rounded ends of the button arms, and a finger depending from one of the slidable members engaging the lever and moving it pivotally about said vertical stud.

10. An electrically heated automatic coffee maker comprising a main vessel having a bottom wall, a control chamber housing connected to the main vessel and having a base spaced from the vessel bottom, an electric heating element in the chamber housing adjacent the bottom of the vessel, a thermostatically controlled electric switch unit comprising a pair of contact arms in different horizontal planes and a thermally responsive arm located between the upper contact arm and the bottom of the main vessel, vertically adjustable means varying the position of one of the contact arms, a push button housing mounted laterally externally of the control chamber housing, a plurality of push button arms having upper ends in the push button housing, intermediate portions extending from the push button housing into the control chamber housing and lower ends terminating in a plane below said switch unit, and operative connections between the lower ends of the push button arms and the vertically adjustable means including an axially vertical stud rising from the base of the chamber housing and a bell crank lever pivotally mounted on said stud and movable in a horizontal plane between the ends of the push button arms and the vertically adjustable means.

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