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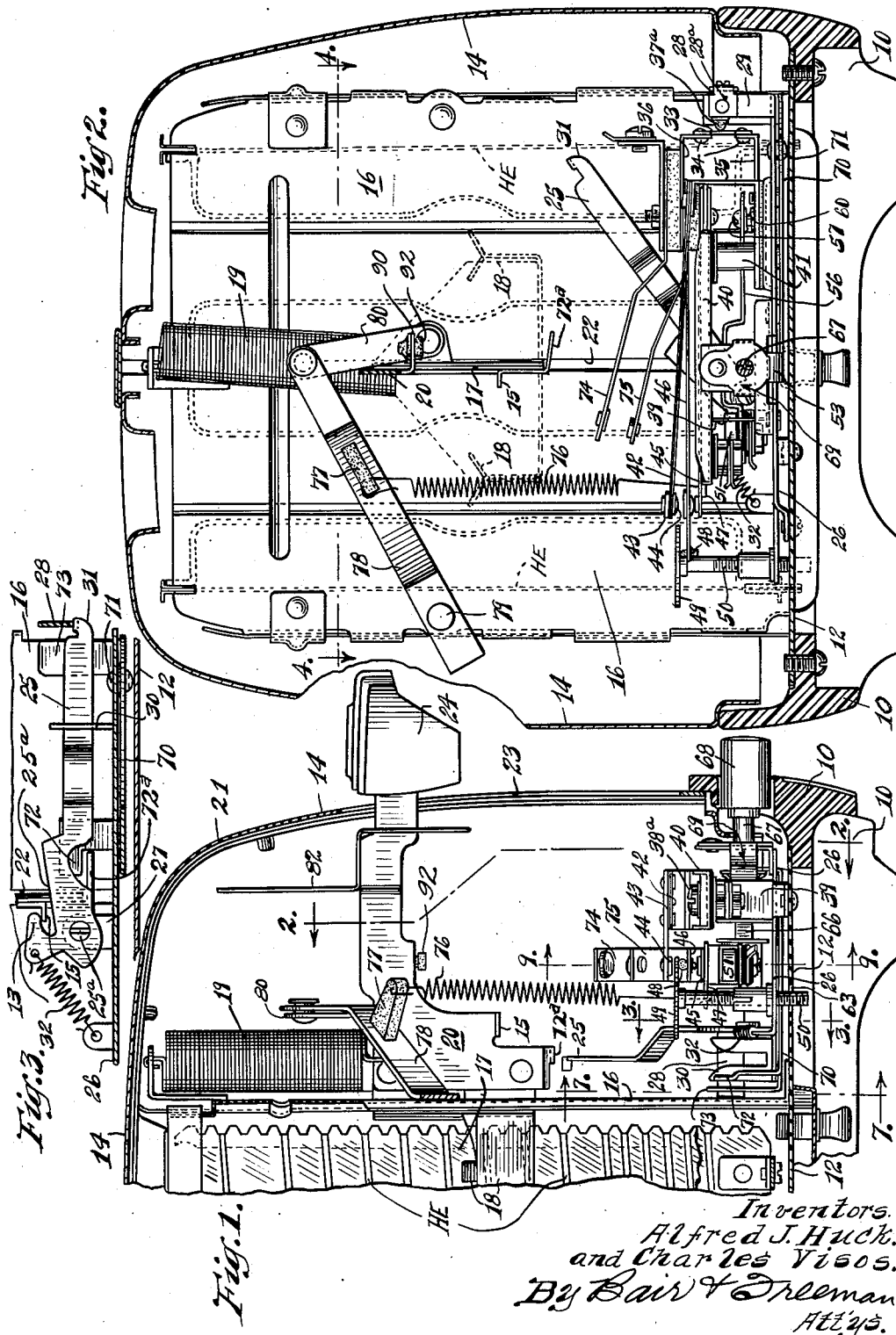
A. J. HUCK ET AL

2,614,481

TIMER FOR TOASTERS OR THE LIKE

Filed Oct. 12, 1948

3 Sheets-Sheet 1



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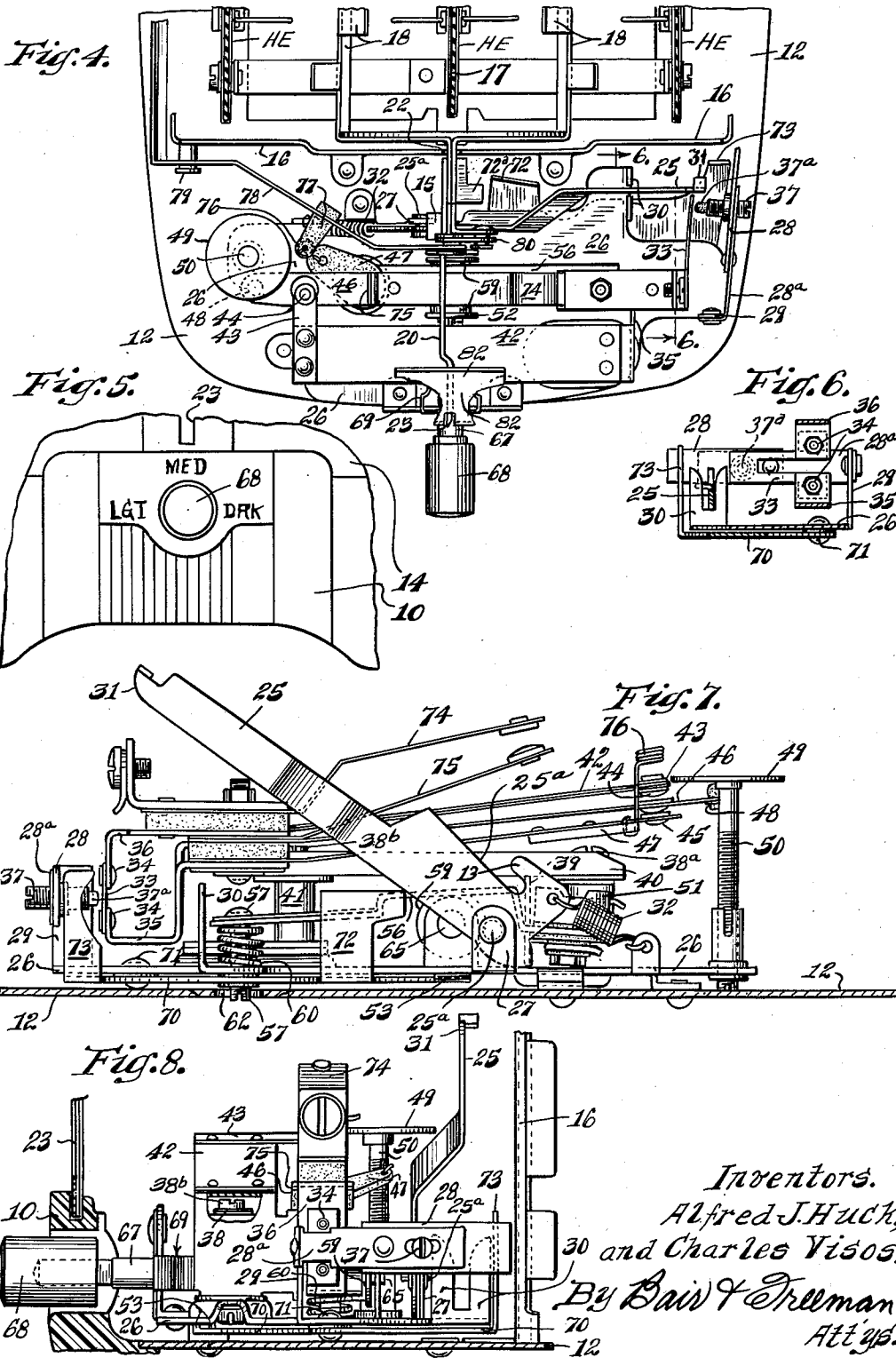
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3 Sheets-Sheet 2



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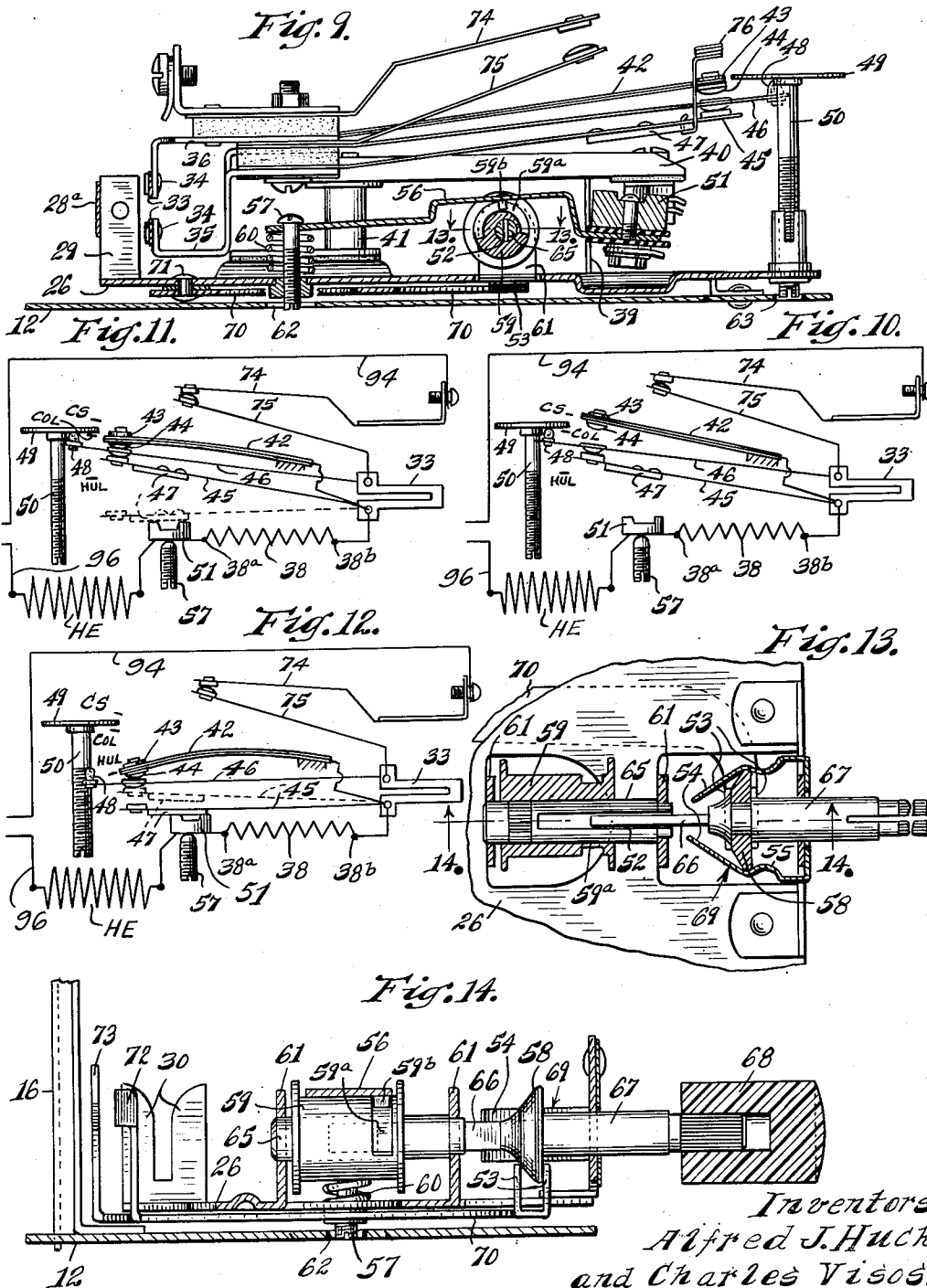
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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TIMER FOR TOASTERS AND THE LIKE

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7 Claims. (Cl. 99-329)

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This invention relates to a thermal control for toasters and the like in which a temperature responsive element is heated by energization of a heating element therefor and warps to a heat-up point whereupon the circuit is conditioned for de-energization of said heating element to permit the temperature responsive element to return to a cool-off point at which point it causes actuation of means to terminate the operating cycle of the appliance.

One object of the invention is to provide a thermal control in which a heater operates at a relatively high temperature and its heat is mainly radiated to a bimetal element for rapid heating thereof, the heater having a very minimum of thermal lag initially due to its very small mass which, combined with its heat radiation characteristics, causes unusually rapid response of the bimetal element in its heat-up and cool-off operations, the bimetal thereby reacting quickly to accurately respond to both heat-up and cool-off conditions of the heater itself and the bimetal element being arranged to warp toward the heater upon increase of temperature whereby its deflection rate increases near the end of the heat-up part of the control cycle and has a subsequent high rate of loss of heat during the cool-off part of the cycle to secure a maximum of control accuracy and reliability of the bimetal action.

Another object is to provide one means for adjusting the control for the desired color of toast on the first toast load or cycle and another means for adjusting for lighter or darker toast on successive toasting operations subsequent to the first cycle, that is adjusted so that successively lighter loads of toast in one continuous run or successively darker loads can be corrected for at the factory and subsequently by the service man without the necessity of opening the toaster to gain access to the adjusting mechanism.

Still another object is to provide a control so designed that a minimum of load is had on the control bimetal by having it arranged to engage only contact springs instead of mechanically operating latches, latch releases or the like which involve friction as from sliding parts and in which the friction load varies over extended periods of time, the contact springs in turn operating a thermal motor that acts as a latch release so that the power afforded by the electric current actuating the thermal motor is utilized to overcome any friction loads that might be present in sliding or pivoting parts.

A further object is to provide a color control

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knob that can be adjusted by the user of the toaster by rotation, the knob being arranged to secure a three-way action in which sliding movement of the knob in one direction manually releases the bread carrier of the toaster independent of the automatic control release, and sliding movement in the other direction prevents complete release of the bread carrier so that it will stay in lowered position to keep the toast warm from the residual heat in the toaster, thus eliminating all but two controls on the toaster, one for depressing the bread carrier and the other being the three-way control knob just referred to.

Still a further object is to provide a contact arrangement in which a permanent magnet holds the contacts in engagement with each other to deenergize the heater for the thermally responsive element and such holding occurs during a cool-off cycle portion with automatic resetting at the end of each complete cycle so that no additional member is required to reposition the magnet-held contacts at either the end or the start of every successive control cycle.

More specifically it is our object to provide a control in which an electric heater heats a bimetal element and it in turn is operable to establish circuits during a heat-up portion of the control cycle and deenergizes the heater when a permanent magnet acts on certain of the contacts so that the bimetal element can then cool off and at the end of a cool-off portion of the cycle a switch shunting a thermal motor type of latch for the bread carrier is opened for the purpose of energizing the latch and causing it to release the bread carrier, the entire toasting cycle then being represented by the heat-up time plus the cool-off time plus the latch operation, the magnet-engaged contacts being returned to their initial position by movement of the bread carrier to its initial position at the end of the toasting cycle.

An additional object is to provide a normal color control in the form of a readily adjustable knob, factory or service adjustments being additionally operable to set the heat-up and cool-off points, these last two adjustments being relatively less accessible than the control knob and inconspicuous by being hidden within the housing of the toaster but nevertheless accessible by the insertion of a small tool through perforations in the housing.

With these and other objects in view, our invention consists in the construction, arrangement and combination of the various parts of our

device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in our claims and illustrated in the accompanying drawings, wherein:

Figure 1 is a vertical sectional view through a housing and one end of a bread toaster showing an end elevation of our control mechanism together with some of the toaster mechanism.

Figure 2 is a front elevation of our control mechanism in the toaster looking toward the left in Figure 1 and with the housing of the toaster shown in section on the line 2—2 of Figure 1.

Figure 3 is a detail sectional view on the line 3—3 of Figure 1 showing a bread carrier latch lever and a latch release element therefor.

Figure 4 is a sectional view on the line 4—4 of Figure 2 and illustrates our control mechanism in plan view.

Figure 5 is a fragmentary view of a portion of the toaster housing and shows a control knob looking toward the left at Figure 1.

Figure 6 is a sectional view on the line 6—6 of Figure 2.

Figure 7 is an elevation of our control mechanism looking from the back or in a direction opposite that for Figure 2 and showing parts of the toaster in section on the line 7—7 of Figure 1.

Figure 8 is an elevation of our control mechanism looking toward the left in Figure 2.

Figure 9 is an elevation of parts of the control looking from the back as in Figure 7 and taken on the line 9—9 of Figure 1.

Figure 10 is a diagrammatic view of the control mechanism showing the parts thereof in normal position at room temperature and when the bread carrier has just been depressed.

Figure 11 shows the thermally responsive element moved by heat of the thermal heater to a position where it engages intermediate contacts with each other and causes them to advance toward a position where heater shunting contacts are held closed by a permanent magnet.

Figure 12 shows the contacts in position where they are held by the permanent magnet and the thermal heater element is deenergized so that the thermal element itself starts back on its cool-off cycle.

Figure 13 is a horizontal detail sectional view on the line 13—13 of Figure 9 and

Figure 14 is a vertical sectional view on the line 13—13 of Figure 14.

On the accompanying drawings I have used the reference numeral 10 to indicate a toaster base frame, 12 a cover plate for the base frame and 14 the housing of the toaster. The toaster may include suitable framework including an end plate 16 and a heating element HE wound on sheet mica or the like 17.

A bread carrier comprising bread supporting bars 18 (see Figure 4) is illustrated and these bars are connected to a bracket 20 which is vertically slidable in a slot 22 of the end plate 16. The housing 14 is also provided with a slot indicated at 23 through which the bracket 20 extends. A handle 24 is mounted on the bracket 20 exterior of the slot 23 for depressing the bread carrier against the action of a spring 19 which normally raises the bread carrier. The bracket 20 is provided with a lug 15 (see Figure 3) with which a locking lug 13 of a bread carrier latch lever 25 is adapted to coact for the purpose of holding the bread carrier in the lowered or toasting position. The latch lever 25 is pivoted

at 25a to an ear 27 extending upwardly from a switch base plate 26.

The latch lever 25 in turn is adapted to be latched in position by a latch blade 28 which is spring biased to the latching position by being mounted on a leaf spring 28a secured to an ear 29 extending upwardly from the base plate 26, a bifurcated bracket 30 also extending upwardly from the switch base plate serving as a guide for the latch lever 25.

The lug 15 engages the top of the latch lever 25 to the right of the lug 13 in Figure 3 for the purpose of swinging the latch lever downwardly when the bread carrier is lowered, thus causing an inclined cam surface 31 on the right hand end of the lever to engage the latch blade 28 and move it toward the right until it snaps over the upper end of the cam 31 to the position shown. This latching action is accomplished in opposition to a spring 32 which tends to rotate the latch lever 25 counterclockwise about the pivot 25a.

For releasing the latch blade 28 I provide a latch release element 33 in the form of a U-shaped bimetal element as shown in Figures 6 and 12 anchored by means of mounting screws 34 on brackets 35 and 36. When electric current flows through the element 33 from one screw 34 to the other it causes the element to warp toward the right in Figures 3 and 4 for engaging an adjusting screw 37 carried by the latch blade 28 to effect its release from the latch lever 25. The mechanism for energizing the latch release 33 will now be described.

The screw 37 is insulated from the element 33 by means of a ceramic tip 37a. A thermal element heater is provided consisting of a resistance ribbon 38 of Nichrome or the like supported on terminal screws 38a and 38b. These screws are supported in and insulated from a channel-shaped housing 40, a portion of which is broken away in Figure 9 to show the heater 38. The housing 40 is supported by a leg 39 depending therefrom and a post 41.

Above the housing 40 is a thermally responsive element 42 in the form of a strip of bimetal anchored at one end to the bracket 35. The opposite end of the bimetal 42 is provided with a lateral extension 43 carrying a contact 44. Contact springs 45 and 46 provided with suitable contacts are normally engaged with each other and spaced from the contact 44 as in Figure 10. The contact springs 45 and 46 are supported between the brackets 35 and 36. The spring 45 has an armature 47 and the spring 46 has an extension provided with an insulating button 48 which is normally engaged against a flange 49 of a cool-down or follow-up adjusting screw 50.

The free end of the bimetal element 42 deflects downwardly upon an increase of heat, such heat being radiated from the heater 38. The deflection is from a cool start position shown at CS in Figure 10 and the bimetal passes through a cool-off point position COP with its termination of movement at a heat-up point position HUP. At the cool-off point the contact 44 engages the contact spring 46. Adjacent the heat-up point the bimetal element 42 brings the armature 47 into close enough proximity to a permanent magnet 51 so that the magnet causes the contact of the spring 45 to leave the contact of the spring 46 and engage the magnet itself which acts as a third contact. The various contacts enumerated are in electrical circuits which will be described later.

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The magnet 51 is mounted on a bracket 56 pivoted against a head of a color adjusting screw 57 and held against a spool-like cam or eccentric 59 by a spring 60 on the screw 57 which attempts to swing the bracket 56 clockwise in Figure 9. The plate 12 is provided with a perforation 62 through which access may be had to the screw 57 by means of a small screw driver. The cover 12 is also provided with a perforation 63 for gaining access to the adjusting screw 50. The perforations 62 and 63 eliminates the necessity of removing the base plate 12 to gain access to the screws 50 and 57 yet access is not readily obvious to the user of the appliance, whereas both the factory employees and service men would be specifically instructed with respect to the adjusting means.

The cam 59 is secured to the shaft 65 journaled in a pair of brackets 61 extending upwardly from the base plate 26. The shaft is slotted at 52 to slidably and non-rotatably receive blade 66 of a shaft 67. A control knob 68 is mounted on the outer end of the shaft. The markings LGT, MED and DRK shown in Figure 5 are provided on the base 10 for cooperation with the knob 68 as will hereinafter appear.

Referring to Figures 13 and 14 a pair of spring fingers 69 have detent portions 55 which coact with a flange 58 on the shaft 67 to normally hold it in the normal position of Figure 13, or positively in a position pulled outwardly past the detents 55 (to the right in this figure). If the shaft is pushed inwardly (to the left in Figure 13) the flange spreads converging fingers 54 of the springs 69 and thereupon the fingers tend to return the flange to the normal position shown. An actuating plate 70 is pivoted on a rivet 71 to the base plate 26 and has a pair of upstanding flanges 53 on opposite sides of the flange 58. It also has a latch releasing extension 73 and a bread carrier hook 72 adapted to coact with an extension 72a on the bracket 20 as shown in Figure 3.

The toaster has one or more of the heating elements HE which are controlled as to energization by a main switch consisting of contact springs 74 and 75 which are normally disengaged due to their resiliency, and the bracket 20 of the bread carrier is adapted to engage the spring 74 for closing the switch as in Figures 10, 11 and 12 when the bread carrier is depressed all the way. These contacts then remain closed while the bread carrier remains lowered for toasting as in Figure 3.

The various elements of our control are connected in electric circuits as shown diagrammatically in Figures 10, 11 and 12.

Means is provided for separating the armature 47 from the magnet 51 when the bread carrier rises and comprises a light spring 76 extending to an insulator 77 carried by a U-shaped equalizing lever 78 pivoted at 79 and connected by links 80 at opposite ends (one end only being illustrated) to the bracket 20 and a corresponding bracket (not shown) at the opposite ends of the bread carriers 18. A light shield 82 covers the slot 23 so the glow of the heater 38 cannot be seen through the slot.

Practical operation

In the operation of our toaster control switch, assuming that the toaster is to be automatically controlled for medium colored toast, the knob 68 is adjusted to the medium position "MED" shown in Figure 5 and the knob is neither pushed

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nor pulled so that it is in the full line position of Figure 13. The handle 24 on the bracket 20 is now pushed downwardly after the carriers 18 are loaded with slices of bread and as the bracket approaches the lower limit of its movement the lug 15 thereon will engage the inclined edge 25a of the latch lever 25 (which lever is inclined upwardly as in Figure 7 before such engagement) and will swing it down to the position of Figure 3, thus latching its cam end 31 under the latch blade 28. During the swinging of the latch lever the lug 13 thereon swings to a position over the lug 15 so that the bread carrier is thereby retained in the lowered position during toasting when the handle 24 is released. The bread carrier will rise slightly but will be held against further rise by the lug 13 engaging the lug 15.

The bracket 20 has an extension 90 shown in Figure 2 which carries a ceramic insert 92. This insert engages the upper main switch blade (74) causing it to be lowered to engagement with the lower main switch blade 75 as in Figure 10 for establishing a circuit from a supply wire 94 through the elements 74, 75, 46, 45, 38, 51 and HE to a second supply wire 96. Thus the heating elements HE of the toaster and the thermal heater 38 are in an established circuit and are the only elements of the control switch therein as the latch bimetal 33 is shunted out of the circuit by the contacts on the switch blades 45 and 46.

The heating elements of the toaster of course radiate heat to the bread slices for toasting them and the thermal heater 38 radiates heat to the control bimetal 42 to cause it to warp from the cold start position CS in Figure 10 toward a heat-up point HUP. After a control period during such warping the bimetal 42 reaches the cool-off point COP which causes the contact 44 to close against the contact of the blade 46 as in Figure 11 without in any way affecting the circuit. The bimetal 42 accordingly warps farther and finally reaches the heat-up point HUP shown in Figure 12 at which time the blade 45 is in the dotted position and sufficiently within the field of the permanent magnet 51 to result in the magnet attracting the armature 47 to the solid line position illustrated.

The armature 47 constitutes a contact and the magnet 51 constitutes another contact which contacts shunt the thermal heater 38 out of the circuit so that it commences to cool off. The cooling action of course removes the source of heat that warped the bimetal element 42 downwardly and accordingly it commences to warp upwardly leaving the armature 47 in contact with the magnet 51.

When the ceramic insert 48 engages the flange 49 of the adjusting screw 50, further upward warping of the bimetal element will separate the contact 44 from the contact of the spring 46. This particular position prior to such separation is illustrated in Figure 11, the armature 47 being still against the magnet 51 as illustrated by dotted lines.

The separation of the contact 44 from the switch blade 46 results in energization of the bimetal element 33 because 45 and 46 are separated from each other due to the fact that the armature 47 is still in contact with the magnet 51. The blades 45 and 46 shunt the bimetal 33 but it can also be said that the contact 44 and the blade 46 shunt this bimetal element which latter condition is a result of the armature 47 remaining in the dotted position of Figure 11.

as the bimetal element 42 cools down. It is therefore obvious that separation of 44 from 46 will result in energization of 33 and within a few seconds unlatching of the blade 28 from the latch lever 25 to permit the spring 32 to swing the lever to the position of Figure 7. This swings the lug 13 off the lug 15 to permit the bread carrier to rise, and in rising the ceramic insert 92 disengages from the main switch blade 74 so that its contact is separated from the contact 75 thereby entirely cutting off the circuit to the toaster and all parts of the control mechanism.

Briefly reviewing the subsequence of the operations: depression of the bread carrier closes the main switch 74—75 to energize the heating element HE and the thermal heater 38. Warpage of the element 42 finally results in the heater 38 being shunted out of the circuit whereupon the timer cools down and at a cool-off point a shunt circuit for the bimetal element 33 is opened to permit the latch to unlatch the bread carrier thereby permitting it to rise and the current to the heating element is turned off.

For securing proper thermal control of a complete toasting cycle the heat-up point HUP is adjustable by two methods either of which provides a variation of the length of the toasting cycle. By lowering the magnet 51 and therefore the heat-up point relative to the bimetal element 42 the cycle is lengthened. The normal method of accomplishing this when the toaster is in use is to lower the right end in Figure 9 by suitable rotation of the knob 68. This normal method is the one practiced by the user of the toaster.

The second method of accomplishing a longer cycle is to raise the left end of the lever 56 by adjusting the screw 57 whereupon the lever pivots around the cam 59 and its right end is thereby lowered. This second method is useful for setting the length of the cycle of the switch at the factory or at the service station without altering the setting of the knob 68.

For securing uniform toast color on successive cycles (or loads of toast) after the toaster has been heated during one toasting cycle the cool-off point COP is adjustable by means of adjusting the screw 50. When it is adjusted to raise the flange 49 and thereby the cool-off point, the successive toasting cycles will provide successively darker toast or by adjusting the flange 49 downwardly the result will be lighter toast. This screw 50 is accessible through the opening 63 so that this adjustment can be made at the factory or at the service station without disassembling the toaster and after such adjustments are made then in order to have all slices darker as desired the control knob 68 is turned in the appropriate direction by the user.

In the event, after the control is set, the user of the toaster wants to release the bread carrier and discontinue the automatic control operation he can do so by pushing inwardly on the knob 68 which causes the disc 58 to swing the plate 70 as the plate is operatively connected with the disc by the fingers 53. This causes the extension 73 on the plate 70 to engage the latch plate 28 and move it toward the right in Figure 4 thereby unlatching it from the latched lever 25 (position shown in Figure 3) thereby permitting the bread carrier to rise under the action of the spring 19. This is a manual release independent of the automatic release of the latch blade 28 by the bimetal element 33 which con-

stitutes a thermal relay or thermal motor for automatically accomplishing the unlatching operation.

In some instances it is desirable to keep the toast warm by permitting the main switch to open but keeping the bread carriers in the lowered position so that the toast will be kept warm and will be further dried out by the residual heat in the toaster. This is accomplished by pulling out on the knob 68 so that the extension 72 then occupies a position overlying the projection 72a of the bracket 20 so that when the thermal latch 33 operates to release the latch lever 25 it will not swing all the way up under the action of the spring 32 but only a slight distance represented by the distance between 72a and 72 in Figure 3. While this is enough movement of the bread carrier to permit the main switch 74—75 to open it does not permit the bread to be raised to the normal visible position as when the knob is in the normal position of Figure 13.

This adjustment of the knob might be termed a "keeps warm" adjustment and must be made each time desired after the bread carrier is depressed. Then when the user of the appliance wishes to use the toast he presses in on the knob 68 to return it to the normal position of Figure 13 which releases 72 from 72a and permits the bread carrier to rise the rest of the way. The detents 55 serve to retain the disc 58 in the forward or "keeps warm" position until such time as the bread carrier is normally released by pressing the knob 68.

We have disclosed a toaster control switch having a number of advantages as outlined in the objects of our specification. While the control has been described specifically for a toaster it can be used in conjunction with other types of electrical appliances where it is possible to perform a control cycle by means of a thermally operated control device. The general plan of a heat-up, cool-down type of control has been combined with a contact arrangement that shunts out the heater for the control bimetal, and a latch is so shunted by a switch operated by the bimetal that efficient operation is had with accurate control in all cycles of the toaster. The elements of the control switch are so arranged and so provided with adjustments that even toasting in successive cycles can be adjusted into any toaster-control combination regardless of normal variations in manufacture or difference in materials. After these adjustments are made the control switch will then produce even coloring of the toast when the toaster is adjusted at the knob 68 for light, medium or dark toast.

Some changes may be made in the construction and arrangements of the parts of our toaster control without departing from the real spirit and purpose of our invention, and it is our intention to cover by our claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim as our invention:

1. In a thermal control for a toaster having a heating element and a bread carrier movable to a position for operating the toaster, a main switch closed by said last element for energizing said heating element, a latch for said bread carrier and said main switch, said thermal control comprising a thermal heater and a thermal latch releasing element in circuit with said heating element, a thermal element affected by the heat from said thermal heater, a series of four con-

tacts, two connected between said thermal heater and one side of said thermal latch releasing element, the third one to the other side of said thermal latch releasing element and the fourth one to the other side of said thermal heater, said thermal element being movable from a cold-start position through a cool-off point where it closes said first and third contacts to a heat-up point where it opens said second and third contacts and closes said second and fourth contacts, said thermal element as it cools down after said thermal heater is deenergized by closure of said second and fourth contacts, opening said first and third contacts at said cool-off point, and adjusting means rotatable for adjusting for toast color by changing the position of the heat-up point, said adjusting means being adapted to be pulled outwardly for holding said bread carrier against rising above a position where it just opens the main switch thereby to keep the toast warm.

2. In a thermal control for a toaster having a heating element and a bread carrier movable to position for operating the appliance, a main switch closed by said bread carrier for energizing said heating element, a latch for said bread carrier and said main switch, said thermal control comprising a thermal latch releasing element and a thermal heater in circuit with said heating element, a thermal element affected by the heat from said thermal heater, a pair of shunt switches for said thermal latch releasing element, one normally closed and the other normally open, a normally open shunt switch for said thermal heater to deenergize it when closed, said thermal element being movable from a cold position through a position where it closes said second shunt switch to final position where it opens said first shunt switch and closes said third shunt switch, said thermal element as it cools down after said heater is deenergized opening said second shunt switch to effect operation of said thermal latch releasing element, a rotating knob for adjusting for range of operation by changing the position of opening of said first switch by said thermal element, said knob being adapted to be pushed inwardly to release said bread carrier independent of said thermal latch releasing element, means to return said knob to its normal position, said knob being adapted to be pulled outwardly for holding said bread carrier against movement beyond a position where it just opens the main switch.

3. In a thermal control for a toaster having a heating element and a bread carrier movable to a position for operating the toaster, a main switch closed by said bread carrier for energizing said heating element, a latch for said bread carrier and said main switch, said thermal control comprising a thermal heater and a normally closed switch in circuit with said heating element, a thermal element affected by the heat from said thermal heater, a thermal latch releasing element shunted by said switch and in circuit with said thermal heater when said switch is open, a second shunting switch for said thermal latch releasing element, a third switch to shunt said thermal heater, said thermal element being movable from a cold-start position through a cool-off point where it closes said second shunting switch to a heat-up point where it opens said first switch and closes said third one, said thermal element as it cools down after said heater is deenergized by closure of said second switch opening said second shunting switch at said cool-off point, and adjusting means rotatable for ad-

justing for toast color by changing the position of the heat-up point, said adjusting means being adapted to be pushed inwardly to release the bread carrier independent of said thermal latch releasing element, and means to return said adjusting means to its normal position.

4. In a thermal control, a manually movable element, means to normally bias said element to an initial position, said element setting the control in operation when said element is moved to a predetermined position from said initial position and against said bias, current responsive latch means for said element in said predetermined position, a heater and a normally closed switch in series circuit with each other, a temperature responsive element affected by the heat from said heater, said current responsive latch means being shunted by said switch, a second shunting switch for said current responsive latch means, a third switch to shunt said heater, said temperature responsive element being movable from a cold-start position to a cool-off point where it closes said second shunting switch, and further movable to a heat-up point where it effects opening of said first switch and closing of said third one, means to hold said first switch open and said third switch closed, said temperature responsive element as it cools down after said heater is de-energized by closure of said third switch, opening said second shunting switch at said cool-off point whereupon the current that was carried by said second shunting switch flows through said current responsive latch means to unlatch the same from said manually movable element, said manually movable element being connected to said first switch to reclose the same as said manually movable element is returned by its bias to its initial position.

5. In a thermal control, an element movable to a position for operating the control, a latch therefor, a main switch closed by said element when so moved and thereupon held closed by said latch, said thermal control comprising a normally closed switch and two normally open switches, a heater and said normally closed switch being initially in circuit with said main switch, a temperature responsive element affected by the heat from said heater, a current responsive element for releasing said latch, said element being shunted by said normally closed switch, one of said normally open switches shunting said heater to de-energize it when the switch closes, magnet and armature means to effect the final closing thereof and to retain the same closed, said temperature responsive element being movable from a cold-start position through a cool-off point where it permits said magnet and armature means to close the other of said normally open switches to a heat-up point where it opens said normally closed switch, a stop for said normally closed switch at said cool-off point, said temperature responsive element as it cools down after said heater is de-energized by closure of said first normally open switch permitting said normally closed switch to engage said stop and thereby permitting said second normally open switch to be opened at said cool-off point by continued movement of said temperature responsive element to permit energization of said current responsive element, and an operative connection between said first element movable for operating the control and said magnet and armature means to render the means inoperative for retaining said first normally open switch closed when said first element is released by operation

of said current responsive element and thereby said latch.

6. In a thermal control, an element movable to a position for operating the control, a latch therefor, a main switch closed by said element when so moved, said latch holding said main switch closed, said thermal control comprising a normally closed switch and two normally open switches, a heater and said normally closed switch being initially in circuit with said main switch, a temperature responsive element affected by the heat from said heater, a current responsive element shunted by said normally closed switch, said element releasing said latch when the element responds to current, one of said normally open switches shunting said heater to de-energize it when the switch closes, magnet and armature means to effect the final closing thereof and to retain the same closed, said temperature responsive element being movable from a cold-start position to a cool-off point where it permits said magnet and armature means to close the other of said normally open switches to a heat-up point where it opens said normally closed switch, a stop for said normally closed switch at said cool-off point, said temperature responsive element as it cools down after said heater is de-energized by closure of said first normally open switch, permitting said normally closed switch to engage said stop and thereby permitting said second normally open switch to be opened at said cool-off point by continued movement of said temperature responsive element to permit energization of said current responsive element, an operative connection between said first element movable for operating the control and said magnet and armature means to render the means inoperative for retaining said first normally open switch closed when said first element is released by operation of said current responsive element, and means for adjusting both the cool-off point and the heat-up point of said temperature responsive element individually.

7. In a thermal control for a toaster having a heating element and a bread carrier movable to a position for operating the toaster, a main switch closed by said bread carrier for energizing said heating element, a latch for said bread carrier and said main switch, said thermal control comprising a normally closed switch and two normally open switches, a heater and said normally closed switch being initially in circuit with said heating element, a thermal element affected by the heat from said heater, a thermal latch re-

leasing element shunted by said normally closed switch and connected between said heating element and said main switch, one of said normally open switches shunting said heater to de-energize it when the switch closes, magnet and armature means to effect the final closing thereof and to retain the same closed, said thermal element being movable from a cold-start position through a cool-off point where it permits said magnet and armature means to close the other of said normally open switches to a heat-up point where it opens said normally closed switch, a stop for said normally closed switch at said cool-off point, said thermal element as it cools down after said heater is de-energized by closure of said first normally open switch permitting said normally closed switch to engage said stop and thereby permitting said second normally open switch to be opened at said cool-off point by continued movement of said temperature responsive element to permit energization of said thermal element, and adjusting means rotatable for adjusting the toast color by changing the position of the heat-up point, said adjusting means being adapted to be pushed inwardly to release the bread carrier independent of said latch, means to return said adjusting means to its normal position, said adjusting being adapted to be pulled outwardly for holding said bread carrier against rising above the position where it just opens the main switch thereby to keep the toast warm.

ALFRED J. HUCK.
CHARLES D. VISOS.

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