June 14, 1949. A. W. GARDES 2,472,818

TIMING AND CONTROL DEVICE

Filed Oct. 16, 1943 3 Sheets-Sheet 1

Fig. 1

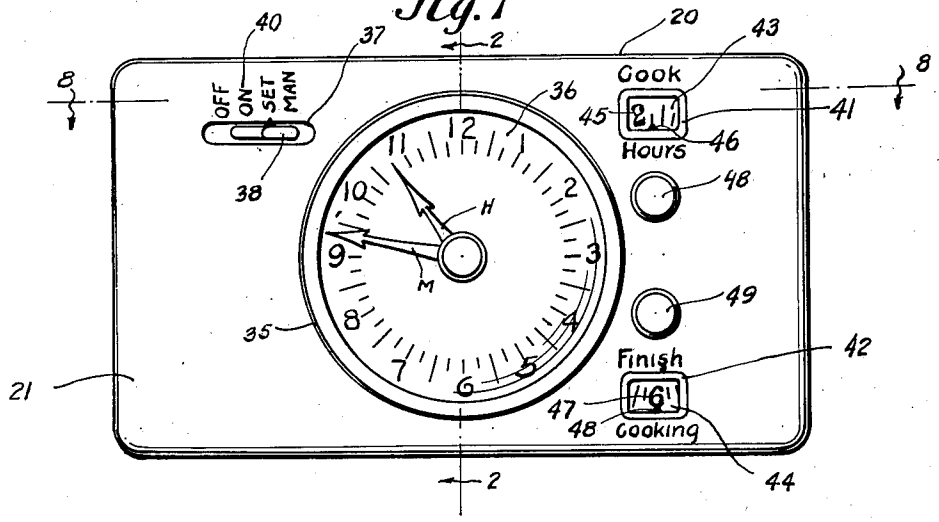


Fig. 2

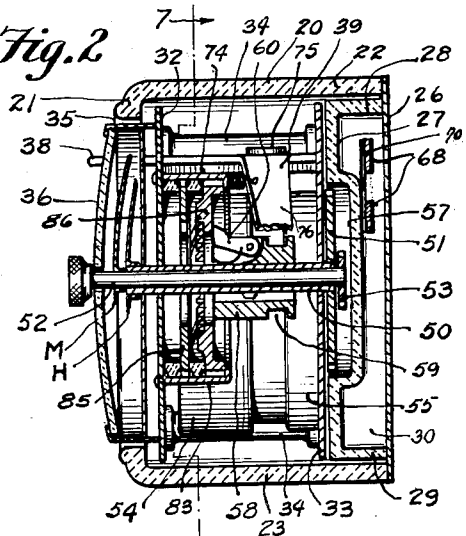


Fig. 3

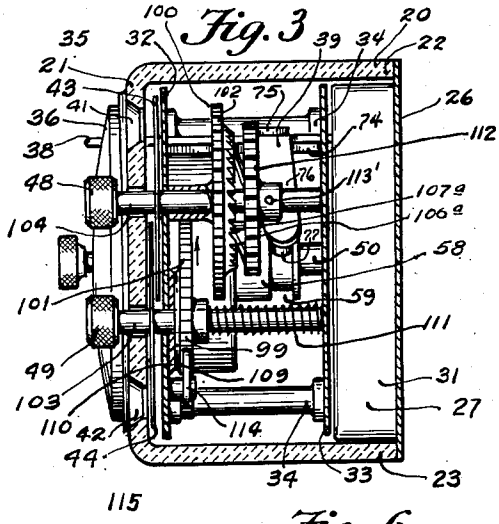


Fig. 4

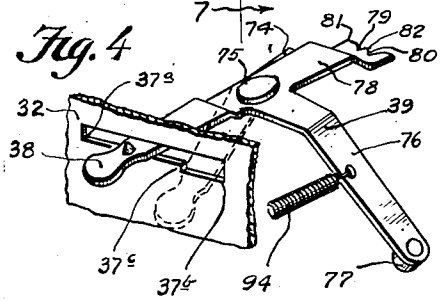


Fig. 5

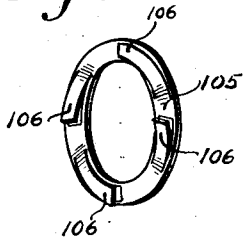
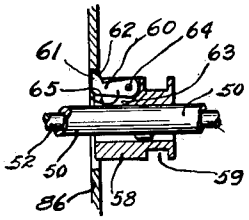


Fig. 6



INVENTOR.
Alfred W. Gardes
BY Edwin J. Balluff
His Attorney

June 14, 1949. A. W. GARDES 2,472,818

TIMING AND CONTROL DEVICE

Filed Oct. 16, 1943 3 Sheets-Sheet 2

Fig. 7

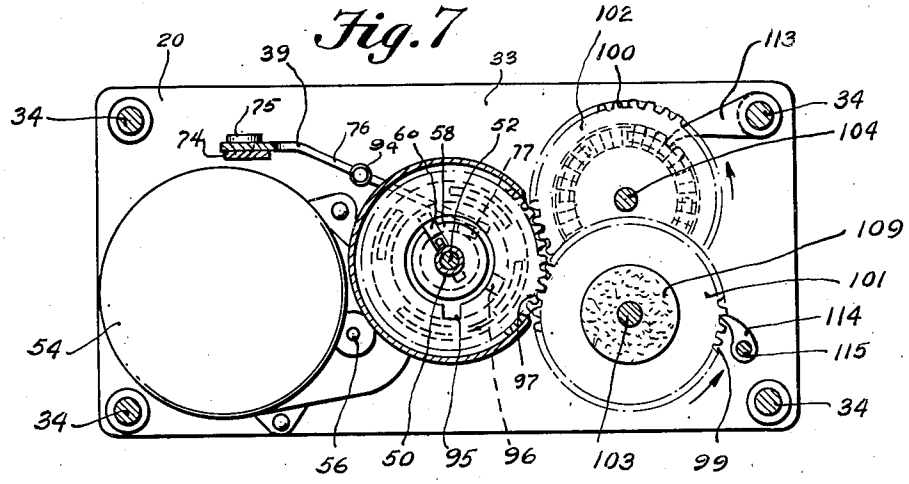
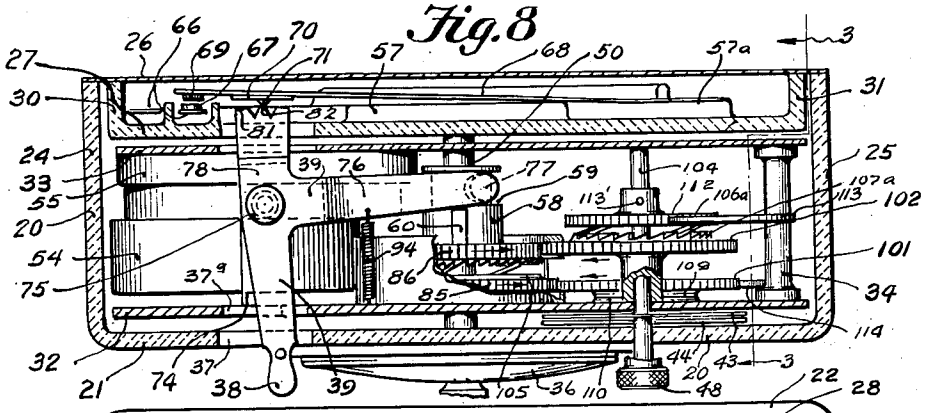


Fig. 8



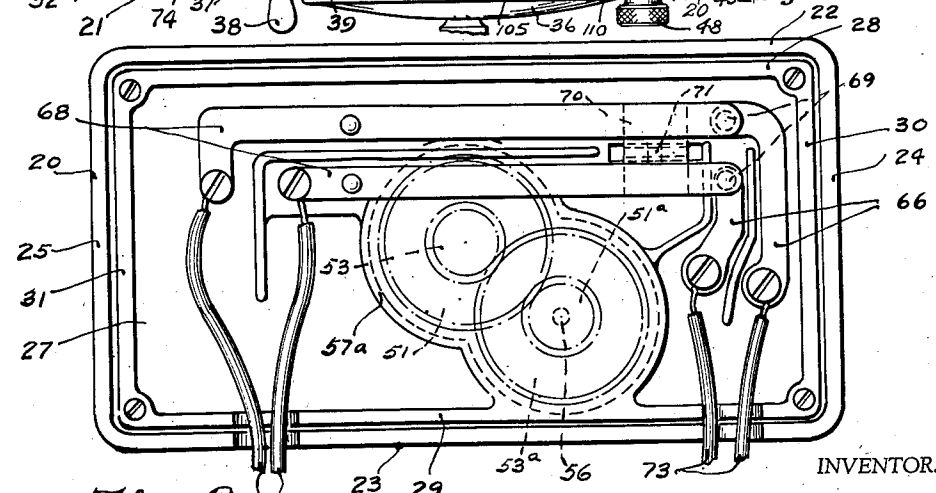


Fig. 9

72

INVENTOR.

BY Alfred W. Gardes

Edwin J. Balluff

His Attorney.

June 14, 1949. A. W. GARDES 2,472,818

TIMING AND CONTROL DEVICE

Filed Oct. 16, 1943 3 Sheets-Sheet 3

Fig. 10

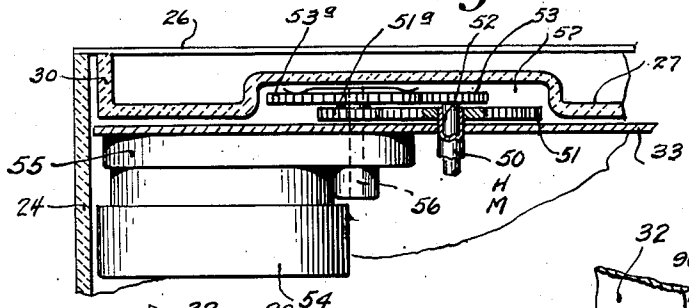


Fig. 11

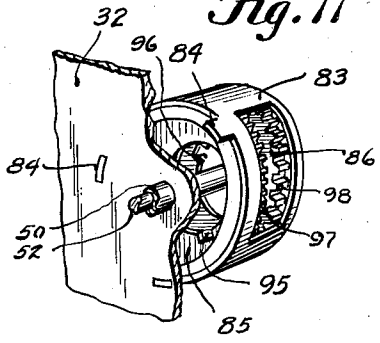


Fig. 12

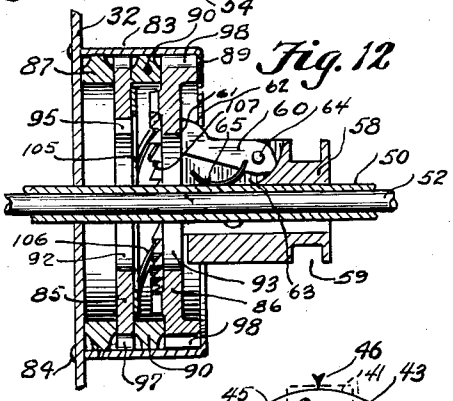


Fig. 13

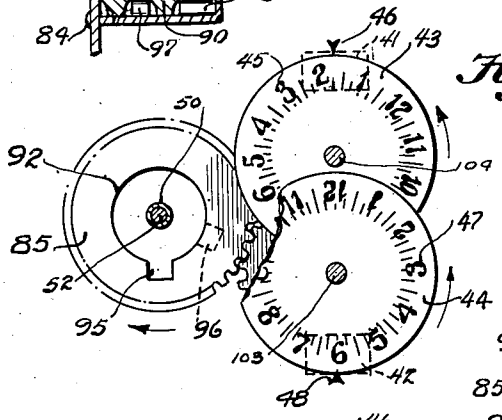


Fig. 15

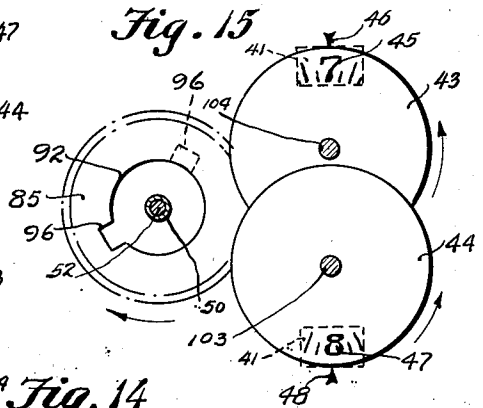
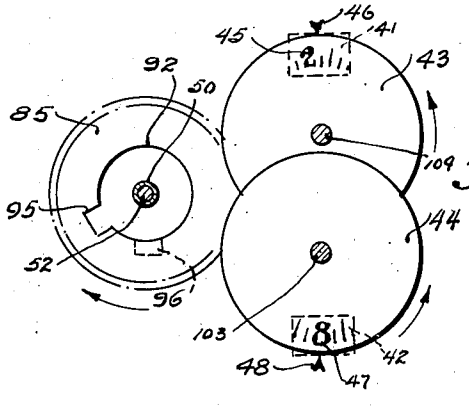


Fig. 14



INVENTOR.
Alfred W. Gardes
BY Edwin J. Balluff
His Attorney.

Patented June 14, 1949 2,472,818

UNITED STATES PATENT OFFICE

2,472,818

TIMING AND CONTROL DEVICE

Alfred W. Gardes, Detroit, Mich.

Application October 16, 1943, Serial No. 506,615

14 Claims. (Cl. 161—1)

1

This invention relates, in general, to a timing and control device and, more particularly, to a timing and control device which is especially adapted for use in conjunction with electric stoves or ranges for setting the heating unit or units of an electric stove or range to operate for a predetermined period of time and for automatically stopping the operation of the heating unit or units of an electric stove or range after the stove has been in operation for a desired and preselected period of time.

Timing and control devices for electric stoves or ranges known and used heretofore have certain objectionable or disadvantageous features incidental to their use, and among these are that they have not provided for a simple and easily ascertained and direct reading, by the housewife or user, of both the finish time, or the time at which the electric current to the heating unit or units of the electric range is to be cut off, and the cooking or elapsed time, that is to say, the time during which the operating current to the heating unit or units of the electric stove or range is to remain on, and that such prior art timing devices have either not been easy to read or have required indirect readings of either the cooking or elapsed time or of the finish time or both, or have employed in making such computations or readings devices such, for example, as a vernier scale, which are difficult for a housewife to employ and read.

Accordingly, an object of the present invention is to provide a timing and control device for an electric stove or range in the use of which both the finish time and the cooking or elapsed time may be readily, easily and directly read and ascertained by an inspection of dials or indicators on the face of the new timing and control device and without the necessity for making any difficult computation or the necessity for reading or interpreting any vernier scale or other like scale or instrument.

Another object of the invention is to provide a timing and control device for electric stoves and ranges which is relatively simpler to adjust and set for both finish time and the cooking or elapsed time than the prior art timing and control devices and which is so simple to adjust for both finish time and cooking or elapsed time that it may be easily so adjusted by any housewife or other person possessed of no mechanical skill or aptitude.

An additional object of the invention is to provide a timing and control device for electric stoves or ranges which is so constructed and arranged

2

that the timing and control devices for both the finish time and the cooking or elapsed time may be set and adjusted and operated without interfering with the time clock which is embodied in the device or changing the usual and customary position of the dial or face of the time clock as has been required in certain of the prior art timing and control devices.

A further object of the invention is to construct the new timing and control device in such a manner that the timing and control devices for both the finish time and the cooking or elapsed time are so related to each other that they may be set and adjusted and operated at any time of the day or night and will automatically set the electric stove or range, which is controlled thereby, in operation and shut it off after the preselected cooking time has elapsed and when the preselected finish time has been reached.

Some of the prior art timing and control devices for electric stoves or ranges may provide a direct reading of the cooking or elapsed time but, in all of such devices with which I am familiar, the reading thereon changes during the operation of the device, that is, as the cooking time progresses, so that after the operation of the timing and control device has started it is impossible for the housewife to check to see if she originally set the cooking time correctly.

Another disadvantage in the use of such prior art timing and control devices is the fact that the direct reading of the cooking or elapsed time in such devices appears at different positions on the dial, within vernier-type scales, so that for different settings of the scales the direct reading appears at different points, and to check any given setting the housewife must search or look for the particular position of the direct reading, and it is apparent that such features are obviously undesirable and disadvantageous.

Accordingly, another object of my invention is to afford a timing and control device wherein the direct reading of both the finish time and the elapsed or cooking time appear at a permanently fixed point on my device, and wherein the direct reading of the finish time and of the elapsed time remain the same throughout a complete cycle of operations of the new timing and control device.

Another object of the invention is to construct and arrange the new timing and control device in such a manner that the elapsed or cooking time indicating dial and the finish time indicating dial may be readily set into any desired positions and relationship, relative to each other, and when once set remain stationary throughout a com-

plete cycle of operations of the new timing and control device, and do not change position, as in the prior art devices, as the cooking time progresses or elapses, so that housewife using an electric stove or range with which the new timing and control device is associated may at any time during the cooking operation readily ascertain by an inspection and direct reading of the dials whether or not they were originally or initially set in the proper and desired positions.

An additional object of my invention is to provide a timing and control device for an electric stove or range embodying the novel combination and arrangement of parts and the novel features herein shown and described.

Other and further objects of the present invention will be apparent from the following description and claims and will be understood by reference to the accompanying drawings which, by way of illustration, show preferred embodiments and the principles thereof and what I now consider to be the best mode in which I have contemplated applying those principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings,

Fig. 1 is a front elevational view of my novel timing and control device;

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken substantially along the staggered line 3—3 of Fig. 8;

Fig. 4 is a detail view showing a switch lever and a portion of the front plate embodied in the device;

Fig. 5 is a detail view of a clutch spring used in my device;

Fig. 6 is a detail view of a stop block used in my device;

Fig. 7 is a sectional view taken substantially along the staggered line 7—7 of Fig. 2;

Fig. 8 is a sectional view taken substantially along the line 8—8 of Fig. 1;

Fig. 9 is a rear elevational view of my device with the back cover removed;

Fig. 10 is a detail view showing the gear connection between the motor and the clock embodied in my timing device;

Fig. 11 is a detail view of the stop plates used in my device;

Fig. 12 is a sectional detail view of the stop plates and stop block used in my device, in substantially the same position as shown in Fig. 2;

Fig. 13 is a diagrammatic illustration of the relative position of the stop plates and the dials for the dial setting shown in Fig. 1;

Fig. 14 is a diagrammatic illustration of the relative position of the stop plates and the dials after the "off" dial has been reset from the position shown in Fig. 13; and

Fig. 15 is a diagrammatic illustration similar to Figs. 12 and 13 showing the relative position of the stop plates and dials after the dial bearing the legend "cook hours" has been reset from the position shown in Fig. 13.

A preferred form of my novel timing and control device, as it would appear when associated with a conventional or typical electric stove or range, is illustrated in the drawings and includes a casing 20, having a front wall 21, a top wall 22, a bottom wall 23, side walls 24 and 25, and a removable rear wall or cover 26 which may be secured in closed position by any suitable means such as screws or the like.

A partition 27 having a top flange 28, a bottom flange 29, and side flanges 30 and 31 is positioned within the casing 20 and supported by the removable rear cover 26 thereof.

Vertically extending front and rear supporting plates 32 and 33, respectively, which are spaced apart by suitable spacing means such as spacing studs 34, are suitably secured within the casing 20 between the front wall 21 and the partition 27. These supporting plates 32 and 33 form the principal supporting members for the operating mechanism of the new timing and control device as will be more fully described hereinafter.

The front wall 21 of the casing 20 has an opening 35 formed therein, within which a clock 36 is so positioned that the dial or face thereof is clearly visible from in front of the casing 20.

A slot or opening 37 is provided in the front wall 21 of the casing 20 and a corresponding slot or opening 37*a* is provided in the front supporting plate 32, and a control arm 38 of a switch control lever 39 extends forwardly through the slots 37 and 37*a*. The control arm 38 of the switch lever 39 is movable within the slots or openings 37 and 37*a* into any one of four positions, which are indicated by the indicia 40 on the front face of the front wall 21 of the casing, namely, "off," "on," "set" and "man." or "manual." It will be noted that when the control arm 38 is in "man." or manual position, as shown in dotted lines in Fig. 4, that it engages and is held by an edge or wall 37*c* of a notch 37*b* which is formed in the supporting plate 32 adjacent to one end portion of the slot 37*a*.

The front wall 21 of the casing 20 also has sight openings 41 and 42 provided therein, through which are visible "elapsed or cooking time" and "finish time" indicator dials 43 and 44, respectively.

The "elapsed time" dial 43 has indicia 45 thereon, the relative position of which with respect to a fixed pointer or indicator 46 on a portion of the front wall 21 of the casing, adjacent the sight opening 41, indicates the length of time during which my novel timing and control device will maintain an electric stove, motor, or other device or apparatus with which it may be used, in operation. Inasmuch as I have chosen to illustrate the new timing and control device as it would appear when used with an electric stove, it will be noted that the "elapsed time" sight opening 41, as illustrated in Fig. 1, is labeled "cook hours," and in accordance with the terminology employed in the art, the time represented by a setting of dial 43 will be hereinafter called "cooking time" or "elapsed time."

The "finish time" dial 44 has indicia 47 thereon, the relative position of which with respect to a fixed pointer or indicator 48 on the front wall 21 of the casing, adjacent the sight opening 42, indicates the time at which my novel timing device will automatically shut off an electric stove, motor or similar device with which it is used. However, since I have chosen to illustrate the new timing and control device as it would appear when used with an electric stove, it will be noted that the "finish time" sight opening 42 (Fig. 1) is labeled "finish cooking" and in accordance with the terminology employed in the art, the time represented by a setting of the dial 44 will be hereinafter called "finish time."

Extending forwardly of the front wall 21 of the

casing 20, are operating knobs 48 and 49 by which the dials 43 and 44, respectively, may be manually set as will be more fully explained hereinafter.

The clock 36 has a standard hour hand H and minute hand M, as best illustrated in Figs. 2 and 1. The hour hand H is secured to a hollow shaft or hour tube 50 so as to revolve therewith, in a conventional manner. The hour tube 50 is journaled in supporting plates 32 and 33 and has a rear end portion extending behind the rear supporting plate 33 and on which a gear 51 is secured. The minute hand M is secured, in a like manner, to a rod or shaft 52 which is journaled within the hour tube 50 and has a rear end portion extending behind the gear 51 and to which a small gear 53 is secured. The gears 51 and 53 are positioned in a recess 57 which is formed in the front wall of the partition 27 and is, therefore, inaccessible from the rear of the casing 20 unless and until the partition 27 is removed.

The power means or unit by which I prefer to drive the clock 36 in my novel timing and control device is a conventional self-starting synchronous electric motor 54 having a suitable reducing gear mechanism 55 (Fig. 10) associated therewith. A drive shaft 56, which is associated with the reducing gear mechanism 55 and driven thereby, extends rearwardly through the rear supporting plate 33 and has a gear assembly composed of gears 51*a* and 53*a*, which turn as a unit, frictionally secured to the rear end portion of shaft 56 so as to be driven thereby. The gears 51*a* and 53*a* are in mesh or driving engagement with the gears 51 and 53, respectively, and are housed in the lower portion of that part of the partition or wall 27 which defines the recess 57, and the gear ratio therebetween is such that the hour and minute hands of the clock 36 are driven at proper speed to keep accurate time.

A sliding sleeve or follower 58 is mounted on and keyed to the hour tube 50 for rotation therewith and is slidable axially thereon between the supporting plates 32 and 33. The sleeve 58 has an annular groove 59 formed therein on the rear end portion thereof, and a latch 60, having a straight front face 61 and a beveled rear face 62, is pivoted by suitable means such as a pin 64, in a slot 63 which is formed in the front end portion of the sleeve or follower 58. A flat spring 65 is positioned beneath the latch 60, within the slot 63, and urges the front end portion of the latch 60 outwardly from or relative to the slot 63. The latch 60 is limited in its outward pivotal movement by suitable means such, for example, as an ear formed on the rear end portion thereof which is engageable with the rear wall of the slot 63.

As best illustrated in Fig. 9, a pair of switch blades 66, each having a contact 67 thereon, are fastened to the partition 27, and a pair of switch blades 68, each having a contact 69 arranged in juxtaposition to one of the contacts 67, are fastened to the partition 27. A plate 70 is fastened to the front faces of switch blades 68 and has a projection or tooth 71 formed thereon (Fig. 8).

Line wires or conductors 72, which lead from a suitable source of electrical energy such as an electric wall outlet or the like, are fastened to the switch blades 68, and lead wires 73 are fastened to the switch blades 66 and form the master line to which are connected, in parallel, all of the heating units of the electric stove with which the new timing and control device is associated. Each of the separate heating units, for example, each of the burners and the oven, of the electric stove with which the new timing and control device is

associated, has a conventional individual control switch (not shown) by which the parallel circuit between each separate heating unit and the lead wires or conductors 73 may be manually opened or closed as desired.

As best shown in Figs. 2 and 8, the switch arm 39 is pivotally connected by means of pin 75 to a supporting member 74, which extends between and is secured to the front and rear supporting plates 32 and 33, and in such a manner that the control arm 38 presses relatively tightly against the lower edge portion of the slot 37*a* which is formed in the front supporting plate 32.

The switch lever 39 has a laterally extending arm 76 and this arm 76 has a pin 77 on its outer end portion which engages with the groove 59 which is formed in the sleeve 58. The switch lever 39 also includes a rearwardly extending arm 78 which has two notches 79 and 80 formed in the rear edge portion thereof. These two notches 79 and 80 are complementary to and are engageable with, that is, they are adapted to receive selectively the tooth 71 which is formed on the plate 70.

It will be noted that when the tooth 71 on the plate 70 is in engagement with either of the notches 79 or 80 on the rearwardly extending arm 78 of the switch lever 39 that the electrical contacts 69 on both of the switch blades 68 are in engagement with the electrical contacts 67 on the corresponding switch blades 66, and that, therefore, the lead wires or conductors 73 are electrically connected to the line wires 72.

It will also be noted, in this connection, that when the rear arm 78 of the switch lever 39 is so positioned that the tooth 71 on the plate 70 is engaged in one of the notches 79 and 80, the front arm 38 of the switch lever 39 is at register with either the "on" or "man." (manual) positions, respectively, within the slot 37, as is indicated by the indicia 40 (Fig. 1).

It will be noted, in this connection, that raised portions 81 and 82 are provided on the rearwardly extending arm 78 of the switch lever 39, to the left of notches 79 and 80, as viewed in Figs. 4 and 8, and it will be apparent that when the front arm 38 of the switch lever 39 is in register with the "off" and "set" positions in the slot 37, the rear arm 78 of the switch lever 39 will be so positioned that the raised portions 81 and 82 thereof will be engaged with the tooth 71 on plate 70 and hence the electrical contacts 69 on switch blades 68 will be raised out of contact with the electrical contacts 67 on switch blades 66 and the electrical connection between the lead wires 73 and line wires 72 will be broken. Hence, it will be seen that the switch lever 39 affords an effective means for opening and closing the electrical connection between line wires 72 and lead wires 73 and thereby controlling the transmission of electrical energy to the electric stove with which the new timing and control device is used.

A tension spring 96 has one end attached to the laterally extending side arm 76 of the switch control lever 39 and the other end of the spring 94 is attached to the front supporting plate 32. Hence, it will be seen that the pin 77 on the laterally extending or side arm 76 of the switch control lever 39, and therefore the sleeve 58 which is engaged therewith, is constantly urged forwardly by the spring 94. However, the sleeve 58 and the pin 77 are restrained from moving forward, except at selected times, by means which will presently be described.

A substantially cylindrical collar or housing

83 is attached, as by ears 84, to the rear face of vertically extending supporting member 32, the collar 83 being disposed concentrically relative to, and enclosing, the hour tube 50 and shaft 52, as best seen in Figs. 2 and 11. Within the collar or housing 83 are mounted two stop plates or discs 85 and 86, which are freely rotatable therein. The stop plate 85 is spaced from the supporting member 32 by annular spacer 87. The stop plate 86 engages the inner surface of a flange 89 which is formed on the rear edge portion of the collar 83, and is spaced from the other stop plate 85 by annular spacer 90.

The center portions of the stop plates 85 and 86 are cut away to afford substantially circular-shaped passages or openings 92 and 93, respectively. The passages or openings 92 and 93 are of sufficient size that the body of the sleeve 58 would be urged forwardly therethrough, by the spring 94, were it not for the restraining latch 60 which is urged radially outwardly by the spring 65. However, the latch 60 being normally urged into its outward position, as shown in Fig. 12, the front face 61 thereof is adapted to engage that portion of the rear wall of the stop plate 86 which defines the marginal edge of the passage 93 (Fig. 12), and thus prevent the sleeve 58 from passing forwardly therethrough.

When the switch arm 39 is in "set" position, the action of the spring 94 on the laterally extending arm 76 urges the pin 77 and the sleeve 58 forwardly and presses the front face 61 of the latch 60 into engagement with that portion of the stop plate 86 which defines the opening 93, so that, as previously set forth, the sleeve 58 is prevented from passing through the opening 93.

However, since it is necessary and desirable that the sleeve or follower 58 be permitted to slide forwardly through the passages 92 and 93, at certain stages in the operation of the new device, slots or notches 95 and 96 are provided in the stop plates 85 and 86, respectively, adjacent to the passages or openings 92 and 93, respectively, as best shown in Figs. 7, 12, 13 and 14. These slots 95 and 96 are of such size that when they are in register with the latch 60 sufficient clearance is afforded the latch 60 so that the sleeve 58 may pass forwardly through the openings 92 and 93 in the stop plates 85 and 86, respectively.

It will be apparent that inasmuch as the sleeve or follower 58 is keyed to the hollow shaft or hour tube 50 and turns therewith, the stop plates 85 and 86, and the slots 95 and 96, respectively, therein, may be selectively positioned so as to afford effective means for controlling the movement of the sleeve or follower 58 and, therefore, for controlling the movement of the switch control arm 39 and the switch blades 68 which are associated therewith, as will be more fully explained hereinafter.

The stop plates or discs 85 and 86 have gear teeth 97 and 98, respectively, formed on the outer periphery thereof. These teeth 97 and 98, through openings formed in the collar 83, are adapted to engage with teeth 99 and 100 on gears 101 and 102, respectively, which are mounted on shafts 103 and 104 which are journaled in front and rear supporting plates 32 and 33 and on the forward end portion of which the knobs 49 and 48, respectively, are mounted (see Fig. 3).

A spring clutch member 105 (Fig. 5) is secured to the rear face of the stop plate 85 and this clutch member 105 has spring arms 106 which are engageable with ratchet teeth 107 which are formed on the face of stop plate 86. When stop plate 85 is rotated in a clockwise direction arms 106 engage teeth 107 and cause plate 86 to turn with it. If plate 85 was turned counterclockwise arms 106 would ratchet over teeth 107 and have no effect on plate 86.

The gear 101 is pinned or otherwise made fast to the shaft 103 to turn therewith and has a disc 109 of abrasive or other material secured thereto. The abrasive material of which the disc 109 is formed has a high coefficient of friction and, when the gear 101 is in normal position, the disc 109 engages a disc 110, of similar abrasive material, which is attached to the front supporting member 32. The shaft 103 is so journaled in the supporting plates or members 32 and 33 that it is slightly movable in a direction axially thereof, and a coil spring 111, which is mounted on the shaft 103 between the gear 101 and the rear supporting plate 33, yieldingly maintains the discs 109 and 110 in contact with each other and thus affords an effective friction brake to yieldingly hold the gear 101 in a given position. However, the braking action between the discs 109 and 110 may be released by pressing inwardly on the shaft 103 and thereby disengaging the disc 109 from the disc 110 whenever it is desired to turn the gear 101.

The gear 102 is loosely mounted on the shaft 104 so that it is freely revolvable with respect thereto. A clutch plate 112 is secured, as by a pin 113, to the shaft 104 rearwardly of but adjacent to the gear 102. The clutch plate 112 has, on the front face thereof, spring arms 106a, which are similar to the spring arms 106 on the spring control plate 105, and which will drivingly engage ratchet teeth 107a which are formed on the rear face of the gear 102, only when the movement of the clutch plate 112 is in a counterclockwise direction, but which will slip over the ratchet teeth 107a when the movement of the gear 102 is in a counterclockwise direction, as seen in Fig. 8.

As best seen in Fig. 7, a pawl or latch 113 is pivotally attached to one of the spacing studs 34 and engages the teeth of the clutch plate 112 to prevent clockwise rotation of the shaft 104. Similarly, a pawl or latch 114 is pivotally connected to the front supporting plate 32, by a pin 115, and engages the teeth 99 to prevent clockwise rotation of the gear 101, as seen in Figs. 2 and 7.

It will be apparent from the foregoing description of my invention that when the switch control lever 39 is so positioned that the forwardly extending arm 38 thereof is in registration with the "man." (manual) position in the slot 37, the forwardly extending arm 38 thereof slips into the notch 37b in the front supporting plate or member 32 and is releasably held therein by the action of the spring 94 which holds the arm 38 against the end wall 37c of the notch 37b. When the switch control lever 39 is so positioned, the tooth 71 on the plate or disc 70 is disposed in alignment with the notch 80 in the rear arm 78 of the switch control lever 39, and the contacts 69 on the switch blades 68 are disposed in contact with the contacts 67 on the switch blades 66; thereby closing the electrical connections between lead wires 73 and line wires 72 and the various heating units of the electric stove or range with which the new timing and control device is associated may be turned "on" or "off" as desired by manual operation of the previously mentioned

individual control switches (not shown) for such heating units.

In order to move the forwardly extending arm 38 of the switch control lever 39 the same may be raised slightly to disengage it from the end wall 37c of the notch 37b, whereupon the spring 94 will cause the switch control lever 39 to pivot about the pin 75 (clockwise as seen in Fig. 4) until it is again stopped in any of the other three positions into which the notch control lever 39 may be moved, namely "off," "on" and "set" positions, as indicated in Fig. 1.

It will be apparent that if the stop plate or disc 86 is so positioned that the slot 96 is not in registration with the latch 60 on the follower or sleeve 58, the front face 61 of the latch 60 will engage the inner peripheral edge portion of the sleeve or follower 86 and the pivotal movement of the switch lever 39 will be arrested in "set" position. When the switch control lever 39 is in this position, the tooth 71 on the plate 70 will be engaged with the raised portion 82 on the rearwardly extending arm 78 of the switch control lever 39, and the electrical connection between the lead wire 73 and the line wire 72 will, therefore, be broken.

It will be noted, however, that if the stop plate 86 is so positioned that the slot 96 therein is disposed in registration with the latch 60, the sliding sleeve or follower 58 will be urged, by the spring 94, to project the sliding sleeve or follower 58 forwardly through the slot 96 in the stop plate 86. Thereafter, if the stop plate 85 is in such position that its slot 95 is disposed out of registration with the latch 60 on the sliding sleeve 58, the front face 61 of the latch 60 will engage the stop plate 85 and thus arrest the pivotal movement of the switch lever 39. When so stopped, the switch control lever 39 is disposed in its "on" position and the tooth 71 is engaged with the notch 79 on the rearwardly extending arm 78 of the switch control lever 39, and the electrical contacts 67 and 69 are again disposed in engagement with each other to close the electrical connection between the lead wires 73 and the line wires 72.

However, if the stop plate 85 is so positioned that the slot 95 therein is disposed in registration with the latch 60 on the sliding sleeve or follower 58, the latter will pass on through the opening 92 in the stop plate 95 and will come to rest against the front supporting plate or member 32, and the switch control lever 39 will have moved into its "off" position. When the switch control lever 39 is so positioned, the toooth 71 on the plate 70 will be engaged with raised portion 81 on the rearwardly extending arm 78 of the control lever 39, and the electrical contacts 67 and 69 will again be separated and the electrical connection between the lead wires 73 and the line wires 72 will again be broken.

Hence, it is apparent that by properly positioning the stop plates 85 and 86, and the slots 95 and 96, therein, respectively, the pivotal movement of the switch control lever 39 may be controlled and arrested in any selected one of the "set," "on" or "off" positions, as desired.

It will also be apparent that inasmuch as the sliding sleeve or follower 58 is keyed to, and turns with, the hour tube 50 it will make a complete revolution with the hour hand of the clock 36, every 12 hours. Hence it will be seen that by positioning the stop plate 86 so that the slot 96 therein will register with the latch 60 at a certain and preselected time of the day, (this operation will be presently described), and by placing the switch control lever 39 in "set" position, with the face 61 of the latch 60 disposed in contact with the stop plate 86, the latch 60 will rotate with the hour hand H and hour tube 50 until it eventually comes into registration with the slot 96, whereupon the sliding sleeve or traveler 58 will automatically move forward, under the action of the spring 94, until its movement is again arrested by the stop plate 85 or the front supporting plate 32, as previously set forth, and therefore the switch control lever 39 will automatically move from "set" position into either "on" or "off" position depending on whether the sliding sleeve or follower 58 comes to rest against the stop plate 85 or the front supporting plate 32, respectively.

Hence, if the stop plate 85 is so disposed that the slot 95 is disposed out of registration with the slot 96 in the plate 86, the sliding sleeve 58 will pass through the opening 93 in the stop plate 86, when the latch 60 has moved into alignment with the slot 96, as previously set forth, but will come to rest with the front face 61 of the latch 60 in engagement with the stop plate 85, where it will remain until the traveler or follower 58 has rotated, with the hour tube 50, into such a position that the latch 60 is disposed in registration with the slot 95 in the stop plate 85, whereupon the sliding sleeve or follower 58 will again move forward into engagement with the rear face of the supporting member 32.

It will be noted that the automatic movement of the switch control lever 39 from "set" to "on" and from "on" to "off" position, at predetermined times, effects automatic turning on and off, respectively, of the current from line wires 72 to lead wires 73. Hence it will be seen that by turning one of the individual heating unit switches, such, for example, as the oven switch, of an electric stove with which the new timing and control device may be associated into "on" position, and thereby electrically connecting the oven heating unit to the lead wires 72, and then adjusting the stop plates 85 and 86 so that the slots 95 and 96, respectively, therein, are disposed in predetermined positions, and then placing the switch control lever 39 in "set" position, said oven may be caused to automatically turn on (when the sliding sleeve or follower 58 passes through the opening 93 in the stop plate 86) at a predetermined time and to automatically turn off (when the sliding sleeve 58 passes through the opening 92 in the stop plate 85) at a predetermined later time.

Having thus described the construction of my new timing and control device, I will now describe the operation of the same.

Operation

Assuming, for example, that it is desired to set an electric stove, with which the new timing and control device is associated, so that food placed in the oven, and which will require an hour and forty-five minutes to cook, will be done at six o'clock, the individual oven control switch (not shown) will be turned on and the new timing and control device will be set so that the parts will be disposed in the position in which they are illustrated in Figs. 1 and 13.

When the parts are disposed in the manner stated immediately above, the dial 44, which is secured to the shaft 103, is so positioned that the numeral "6" is disposed in exact registration with the pointer or indicator 48 which is provided on the edge of the "finish cooking" sight opening 42 (Fig. 7). When the parts are so disposed, the latch 60 is aligned with the hour hand H, and the

stop plate 85 is so disposed that the slot 95 therein is disposed in the position corresponding to the "6" position on the face of the clock 36 (Fig. 1).

It being thus assumed that it is desired to turn said oven on for an hour and three-quarters, the elapsed time dial 43, which is secured to the shaft 104, is so positioned that, as shown in Fig. 1, the "1¾" hours calibration is disposed in exact registration with the pointer or indicator 46 which is provided on the edge of the elapsed time sight opening 43. When the parts are so disposed the stop plate 86, and the slot 96 therein, are disposed in a position corresponding to a position of an hour and three-quarters in advance of the six o'clock "finish time" and the corresponding position of the slot 95 in the stop plate 85, or, in other words, the slot 96 is disposed in a position corresponding to the "4:15" "finish time" position on the face of the clock 36 (Figs. 1 and 13).

Hence it will be seen that when the switch control lever 39 is disposed in "set" position, and the latch 60 and the hour hand H are rotated, with the hour tube 50, into the "4:15" "finish time" position, the latch 60 on the follower 58 will be disposed in registration with the slot 96 and the follower 58 will slide forwardly through the opening 93 in the stop plate 86 and come to rest against the stop plate 85. This causes the switch control lever 39 to move to "on" position and, as previously described, closes the electrical contacts 67 and 69 and completes the circuit from the line wires 72 through the lead wires 73 to the individual oven control switch (not shown), but which has been previously closed, to the oven heating unit.

The heating unit for the oven of the electric stove with which the new timing and control device is associated, will then remain on for an hour and three-quarters (4:15 o'clock to 6:00 o'clock) as set on the "elapsed time" dial 43, and when the latch 60, turning with the hour hand H and the hour tube 50 moves into registration with the "6" position of slot 95 in stop plate 85, the sliding sleeve or follower 58 will move forwardly through the opening 92 in the stop plate 85 and into engagement with the rear face of the supporting member 32. This causes the switch control lever 39 to move, under the action of the spring 94, from "on" to "off" position and, as previously described, thereby causes the electrical contacts 67 and 69 to separate and thus open the electrical circuit between the line wires 72 and the heating unit in the oven, and thereby turns off the oven.

Assuming, however, that the next time the new timing and control device is operated it is desired to have the oven of an electric stove controlled thereby automatically turn on and remain on for seven hours and automatically shut off at eight o'clock, the "elapsed time" and "finish time" dials 43 and 44, respectively, will be set substantially as diagrammatically illustrated in Fig. 15, in a manner which is, in general, as follows:

The operator grasps the knob 49 and presses inwardly thereon to disengage the two braking discs 109 and 110 from engagement with each other. The operator then turns the knob 49, and the shaft 103, and the "finish cooking" time indicating dial 44 in a counterclockwise direction, as seen in Fig 1, until the numeral "8," on the dial 44, comes into exact registration with the pointer or indicator 48 which is provided on the marginal edge of the "finish cooking" time sight opening 42. It will be noted, however, that since the gear 101, like the dial 44, is secured to the shaft 103, the foregoing movement of the "finish cooking" time indicating dial 44 from the "6" to the "8" position causes a corresponding movement of the gear 101, and, since the gear 101 is in driving engagement with the stop plate 85, counterclockwise movement of the gear 101 from the "6" to the "8" position of the dial 44 (Figs. 13 and 14) causes the stop plate 85 to turn in a clockwise direction and move the slot 95 from clock position "6" (Fig. 13) to clock position "8" (Fig. 14), thereby positioning the follower 58 so that it may move forwardly through the opening 92 in the stop plate 85 when the latch 60 has moved to a position corresponding to eight o'clock, that is to say, when the latch 60 is disposed in exact registration with the thus positioned slot 95.

During the above-mentioned clockwise movement of the stop plate 85, the clutch spring 105 thereon drivingly engages the clutch teeth 107 on the stop plate 86 and causes the stop plate 86 to turn therewith and thereby maintains the desired and previously set one and three-quarter hours cooking or elapsed time differential between the slots 95 and 96.

As stated above, the stop plate 86 is drivingly engaged with the gear 102, which is loosely mounted on the shaft 104, so that the foregoing clockwise movement of the stop plate 86 causes the gear 102 to turn in a counterclockwise direction, as seen in Fig. 7. During this counterclockwise rotation of the gear 102, the ratchet teeth 107a thereof slip past the spring arms 106a, which are mounted on the front face of the clutch plate 112, without imparting any movement thereto and, therefore, the clutch plate 112, and the shaft 104, to which the clutch plate 112 is attached, and the elapsed time indicating dial 43, which is attached to the shaft 104, remain stationary. Thus it will be seen that the elapsed time indicating dial 43 retains the previously set elapsed time reading of one and three-quarter hours which represents the time differential maintained between the slots 95 and 96 in the stop plates 85 and 86, respectively, as described hereinbefore.

It will be noted, however, that if the new timing and control device were allowed to retain the settings referred to above, and as shown in Fig. 14, the heating unit for the oven of an electric stove with which the new timing and control device is associated would shut off at eight o'clock, as desired, but it would have been "on" for only an hour and forty-five minutes, commencing at 6:15 o'clock, and, in the example now being considered, it is necessary to provide a cooking or elapsed time of seven hours, or in other words, so set the new timing and control device so that the heating unit for the oven of an electric stove controlled thereby will turn "on" at one o'clock.

To so set the new timing and control device it is merely necessary to re-set the reading on the dial 43 in the elapsed time sight opening 41, from the previous reading of one and three-quarter hours to a reading of seven hours, which may be easily done by simply turning the knob 48 in a counterclockwise direction, as seen in Fig. 1, until the numeral "7" on the elapsed time indicating dial 43, which is secured to the shaft 104, is disposed in exact registration with the fixed indicator 46 which is provided on the marginal edge of the elapsed time sight opening 41.

This rotation of the knob 48, shaft 104, and elapsed time indicating dial 43, in a counter-

clockwise direction (as seen in Fig. 1) from an elapsed or cooking time reading of one and three-quarter hours to an elapsed or cooking time reading of seven hours, causes the clutch collar 112 on the shaft 104 to turn therewith and, since the clutch spring 106a is engaged with the clutch teeth 107a on the gear 102, a corresponding circumferential movement is imparted to the gear 102.

The above-mentioned counterclockwise rotation of the gear 102 from an elapsed or cooking time position of one and three-quarter hours to an elapsed or cooking time position of seven hours (a change in elapsed or cooking time of five and one-quarter hours), moves the stop plate 86, which is engaged with the gear 102, through a similar change of position in a clockwise direction, as seen in Fig. 1, that is, the stop plate 86 is turned so that the slot 96 therein is rotated from its "6:15" finish time position, to which it had previously moved upon setting of the finish time indicating dial 44 (Fig. 14), to its new finish time position of one o'clock (also a change of five and one-quarter hours), as is diagrammatically illustrated in Fig. 15.

It will be noted that during the above-mentioned clock-wise rotation of stop plate 86, by the gear 102, the spring arms 106 of the clutch spring 105 which are provided on the rear face of the stop plate 85, slip over the teeth 107 on the front face of the stop plate 86, so that the stop plate 85 and the gear 101 engaged therewith, remain stationary. The braking discs 109 and 110 on the gear 101 and the front supporting plate 32, respectively, afford friction braking means which hold the stop plate 85 and the gear 101 from changing position under any "drag" which might be occasioned by the aforesaid movement.

After setting the elapsed or cooking time and the finish time on the new device, as explained above, the switch control lever 39 may be reset from the "off" position, to which it will have moved at the end of the previously described cycle of operations, to the "set" position from which the cycle of operations of the new device starts.

It will be noted, in this connection, that the switch control lever 39 may be reset and the follower 58 moved rearwardly through the openings 92 and 93 even though the slots 95 and 96 are not disposed in registration with the latch 60, for the reason that during such movement of the follower 58 the beveled face 62 of the latch 60 engages the stop plates 85 and 86 and the latch 60 is thereby depressed into the slot 63, against the action of the spring 65.

From the foregoing description, it will be apparent that when the finish time indicating dial 44 is set at "8" and the elapsed or cooking time indicating dial 43 is set at "7," the slots 95 and 96 are so positioned that the switch control lever 39 will automatically move forward into "on" position at one o'clock and will automatically move forward into "off" position seven hours later, that is, at eight o'clock. However, throughout the entire cycle of operations the settings of the elapsed or cooking time dial 43 and of the finish time dial 44 will remain stationary so that by observing these dials at any time it may be readily ascertained how these dials were originally set and whether or not they were originally set correctly, and it will be appreciated that this represents a distinct advantage over the prior art timing and control device wherein the readings of the elapsed or cooking time indicating and the finish time indicating dials constantly changed during a cycle of operations of timing and control device with which such dials were associated.

It will be noted that whereas in describing the setting of the new timing and control device I have described the setting of the finish time indicating dial 44 first, to be followed by the setting of the elapsed or cooking time indicating dial 43, this has been done merely for convenience and in the use of the new timing and control device the order in which these two dials 43 and 44 are set may be reversed, if desired.

Since the new timing and control device is intended primarily for use in conjunction with household electric stoves and ranges, and since housewives who use such electric stoves or ranges have, as a rule, little or no mechanical knowledge or skill, it is desirable that such devices be simple to operate. The present invention affords a simply operated timing and control device in the use of which it is merely necessary for the operator to "turn on" the individual heating unit switch (not shown), set the direct reading finish time indicating dial 44 to the desired time, set the direct reading elapsed or cooking time indicating dial 43 to the desired time, and set the switch control lever 38—39 to the proper position, as indicated in Fig. 1, and when so set, both dials 43 and 44 remain stationary until reset by the operator and do not change readings as the cooking time progresses, as in the prior art timing and control devices.

Hence it will be seen from the foregoing description of the present invention, taken in conjunction with the accompanying drawings, that the present invention affords a novel, efficient timing and control device which is intended primarily for use with electric stoves and ranges and in the use of which the "elapsed time" and the "finish time" may both be readily and directly set on easily and directly readable dials.

It will likewise be seen, from the foregoing description, taken in conjunction with the accompanying drawings, that the present invention affords a simple and compact timing and control device in the use of which the elapsed time indicating dial 43 and finish time indicating dial 44 may be easily and readily set by a housewife by merely turning knobs which are arranged on the front face of the casing in which the device is arranged and in the use of which said dials, when once set, remain stationary during the complete cycle of operations of the new timing and control device.

It will also be seen from the foregoing description, taken in conjunction with the accompanying drawings, that the present invention realizes and accomplishes its intended objects, including those which have been specifically set forth hereinabove, as well as those which are apparent from the foregoing description considered in conjunction with the accompanying drawings.

While I have illustrated and described a preferred embodiment of my invention it is understood that this is capable of variation and modification and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. A timing and control device adapted for use in conjunction with an electrically operated unit comprising the combination of, a switch for controlling a current supply circuit to said unit, a

manually settable switch control member settable to control the operation of said switch, timing means including a clock face having hands associated therewith, a time responsive device coacting with said timing means and with said manually settable switch control member for automatically closing and opening said switch at predetermined times, a finish time-indicating device arranged in non-driven relationship with said timing means, and separate and apart from said clock face and hands, manually operable control means for setting said finish time-indicating device into position to indicate a preselected finish time, a cooking time-indicating device arranged in non-driven relationship with said timing means, said cooking time indicating device being separate and apart from said clock face and hands and from said finish time indicating device, manually operable control means, independent of said timing means, for setting said cooking time-indicating device into position to indicate a preselected cooking time, and means under the control of and coacting with both of the said manually operable control means for said cooking and finish time-indicating devices for setting the said time responsive device for a preselected cooking time and a preselected finish time.

2. A timing and control device comprising the combination of, timing means, a switch, spring-urged means coacting with said timing means for opening and closing said switch, adjustable means having a portion operative, and another portion inoperative, to restrain said spring-urged means from closing said switch, a second adjustable means having a portion operative, and another portion inoperative, to restrain said spring-urged means from opening said switch, means for setting the said inoperative portion of said first-named adjustable means to render said first-named adjustable means inoperative to restrain said spring-urged means from closing said switch at a predetermined time, means for setting the said inoperative portion of said second-named adjustable means to render said second-named adjustable means inoperative to restrain said spring-urged means from opening said switch at a predetermined time, and means indicating the time at which said first-named adjustable means and said second-named adjustable means are inoperative to restrain said spring-urged means from closing and opening said switch, respectively, said indicating means remaining stationary between the time said first-named adjustable means is inoperative to restrain said spring-urged means from closing said switch and the time said second-named adjustable means is inoperative to restrain said spring-urged means from opening said switch, each of said setting means comprising a manually rotatable shaft, said indicating means comprising two dials separate from each other and from said timing means, one of said dials being operatively connected to one of said shafts and the other of said dials being operatively connected to the other of said shafts, one of said dials having indicia thereon constructed so as to directly indicate the time at which said second-named adjustable means is inoperative to restrain said spring-urged means from opening said switch and the other of said dials having indicia thereon constructed so as to directly indicate the difference in the times at which said first-named adjustable means and the said second-named adjustable means are inoperative to restrain said spring-urged means from closing and opening said switch, respectively.

3. A timing and control device comprising the combination of, timing means, a switch, spring-urged means coacting with said timing means for opening and closing said switch, adjustable means having a portion operative, and another portion inoperative, to restrain said spring-urged means from closing said switch, a second adjustable means having a portion operative, and another portion inoperative, to restrain said spring-urged means from opening said switch, means for setting the said inoperative portion of said first-named adjustable means to render said first-named adjustable means inoperative to restrain said spring-urged means from closing said switch at a predetermined time, means for setting the said inoperative portion of said second-named adjustable means to render said second-named adjustable means inoperative to restrain said spring-urged means from opening said switch at a predetermined time, and means directly indicating the difference in the times at which the said first-named adjustable means and the second-named adjustable means are inoperative to restrain said spring-urged means from closing and opening said switch, respectively, said indicating means maintaining the same time indication between the time said first-named adjustable means is inoperative to restrain said spring-urged means from closing said switch and the time said second-named adjustable means is inoperative to restrain said spring-urged means from opening said switch, said first-named adjustable means and said second-named adjustable means each comprising a plate having an opening extending through the center portion thereof and each of said plates having a slot extending therethrough adjacent the said opening therein, said spring-urged means comprising a stop member including a main body portion having a latch member on the outer peripheral surface thereof, said main body portion of said stop member being adapted to abut against either of said plates when said latch member is disposed out of registration with the said slot therein, said main body portion of said stop member being adapted to pass through the said opening in the said plate which is embodied in said first-named adjustable means and thereby allows said spring-urged means to close said switch when the said latch member is disposed in registration with the said slot in the said plate which is embodied in the said first-named adjustable means, said main body portion of said stop member being adapted to pass through the said opening in the said plate which is embodied in the said second-named adjustable means and thereby allows said spring-urged means to open said switch when the said latch member is disposed in registration with the said slot in the said plate which is embodied in the said second-named adjustable means.

4. In a timing and control device for controlling the supply of energy to an operating unit, the combination of, a clock mechanism, an elapsed time-indicating device, a finish time-indicating device, a mechanism operable for controlling the supply of energy to said unit, means for manually setting said elapsed time-indicating device to indicate a preselected period of time during which energy is to be supplied to said unit, means for manually setting said finish time-indicating device, to indicate a preselected time at which it is desired to terminate the supply of energy to said unit, and means including a time responsive device coacting with and under the control of said clock mechanism and settable, by the con-

trol of the said means for normally setting the said elapsed time-indicating device and the said finish time-indicating device, for effecting operation of said mechanism at a preselected time in advance of said finish time and for maintaining said mechanism operable during a preselected period of time, as indicated by the setting of said elapsed time-indicating device, and for discontinuing the operation of said mechanism at a prescribed finish time, without moving said elapsed time-indicating device from the position into which it is initially set to indicate a preselected elapsed time, said timing and control device including a casing, said elapsed time-indicating device including a dial movably mounted in said casing and having numerical time-indicating indicia thereon for directly indicating the said elapsed time, said finish time-indicating device including a second dial movably mounted in said casing and having numerical time-indicating indicia thereon for directly indicating the said finished time, said casing being constructed and arranged relative to said dials so that said indicia indicating said elapsed time and said indicia indicating said finish time are visible from the front of said casing.

5. In a timing and control device for an electric circuit, a clock mechanism, an elapsed time-indicating device arranged in non-driven relationship with said clock mechanism and separate and apart from said clock mechanism, a finish time-indicating device arranged in non-driven relationship with said clock mechanism and separate and apart from said clock mechanism and from said elapsed time-indicating device, a switch for controlling said circuit, means for manually setting said elapsed time-indicating device to indicate a preselected period of time during which said switch is to be closed, means for manually setting said finish time-indicating device to indicate a preselected time at which it is desired to open said switch, means including a time responsive device coacting with and under the control of said clock mechanism and settable, by the control of said means for normally setting the said elapsed time-indicating device and the said finish time-indicating device, for effecting closing of said switch at a preselected time in advance of said finish time and for maintaining said switch closed during a preselected period of time, as indicated by the setting of said elapsed time-indicating device and for opening said switch at a preselected finish time without moving said elapsed time-indicating device from the position into which it was initially set to indicate a preselected elapsed time, a case in which said elapsed time-indicating device is arranged, said means for effecting opening and closing movement of said switch including a movably settable control lever movably mounted in the casing and having a handle projecting through an opening provided in the wall of the casing and accessible from the exterior thereof, said lever being movable upon opening and closing movement of said switch and functioning as an indicator in conjunction with indicia on said casing to indicate the condition of said switch and of said timing and control device.

6. In a device of the character described, the combination of, a normally open switch, a clock mechanism, means including a manually settable time responsive device under the control of and adapted to coact with, said clock mechanism to close said switch and to open the same at preselected times, manually operable means for setting the said time responsive device into position to close said switch at a predetermined time under the control of said clock mechanism, manually operable means for setting the said time responsive device into position to open the said switch at a preselected time under the control of said clock mechanism, and means including a manually settable member bearing numerical hour-indicating indicia, and independent of and unaffected by the progressive movement of said clock mechanism, for directly indicating a period of time selected to elapse between the closing and opening of said switch, and a second manually settable member bearing numerical hour-indicating indicia, and likewise independent of and unaffected by the progressive movement of said clock mechanism for directly indicating a preselected time at which it is desired to have said switch open.

7. A timing and control device adapted for use in conjunction with an electrically operated unit comprising the combination of, a switch for controlling a current supply circuit to said unit, a manually settable switch control member settable to control the operation of said switch, timing means, a time responsive device coacting with said timing means and with said manually settable switch control member for automatically closing and opening said switch at predetermined times, a finish time-indicating device, manually operable control means for setting said finish time-indicating device into position to indicate a preselected finish time, a cooking time-indicating device independent of said timing means, manually operable control means, independent of said timing means, for setting said cooking time-indicating device into position to indicate a preselected cooking time, and means under the control of and coacting with both of the said manually operable control means for said cooking and finish time-indicating devices for setting the said time responsive device for a preselected cooking time and a preselected finish time, said timing means including a rotatably mounted hour hand-bearing shaft, said time responsive device comprising a pair of rotatably mounted discs, each of said discs being operatively connected to one of said manually operable control means, each of said discs having a centrally arranged aperture formed therein, said time responsive device including a slidable member keyed to said hour hand-bearing shaft for rotation therewith, said slidable member being slidably mounted on said hour hand-bearing shaft for movement axially of said shaft into the said apertures, each of said discs having a notch formed therein in communication with but radially outwardly of the said aperture therein, and said slidable member having a stop member movably mounted thereon on the peripheral surface thereof, said stop member being adapted selectively to enter into said notches.

8. A timing and control device adapted for use in conjunction with an electrically operated unit comprising the combination of, a switch for controlling a current supply circuit to said unit, a manually settable switch control member settable to control the operation of said switch, timing means, a time responsive device coacting with said timing means and with said manually settable switch control member for automatically closing and opening said switch at predetermined times, a finish time-indicating device, manually operable control means for setting said finish time-indicating device into position to indicate a preselected finish time, a cooking time-indicating device independent of said timing means, manually oper-

able control means, independent of said timing means, for setting said cooking time-indicating device into position to indicate a preselected cooking time, and means under the control of and coacting with both of the said manually operable control means for said cooking and finish time-indicating devices for setting the said time responsive device for a preselected cooking time and a preselected finish time, said timing means including a rotatably mounted hour hand-bearing shaft, said time responsive device comprising a pair of rotatably mounted discs, each of said discs being operatively connected to one of said manually operable control means, each of said discs having a centrally arranged aperture formed therein, said time responsive device including a slidable member keyed to said hour hand-bearing shaft for rotation therewith, said slidable member being slidably mounted on said hour hand-bearing shaft for movement axially of said shaft into the said apertures, each of said discs having a notch formed therein in communication with but radially outwardly of the said aperture therein, said slidable member having a stop member movably mounted thereon on the peripheral surface thereof, said stop member being adapted selectively to enter into said notches, said timing and control device including a spring acting on said manually settable switch control member to urge said slidable member axially of said hour hand-bearing shaft in a direction to project said stop member thereon into one of said notches.

9. In a device of the character described, the combination of, a normally open switch, a clock mechanism, means including a manually settable time responsive device under the control of and adapted to coact with, said clock mechanism to close said switch and to open the same at preselected times, manually operable means for setting the said time responsive device into position to close said switch at a predetermined time under the control of said clock mechanism, manually operable means for setting the said time responsive device into position to open the said switch at a preselected time under the control of said clock mechanism, and means including a manually settable member bearing numerical hour-indicating indicia, and independent of and unaffected by the progressive movement of said clock mechanism, for directly indicating a period of time selected to elapse between the closing and opening of said switch, said time responsive device including a pair of manually adjustable discs, each of said setting means including a manually rotatable shaft, a gear being freely rotatably mounted on one of said safts and drivingly engaged with one of said discs and having a clutch element mounted on one face thereof, a second clutch element attached to the said one of said shafts to rotate therewith, said second-named clutch element being engageable with the said clutch element on said gear to rotate said gear upon rotation of the said one of said shafts in one direction, a second gear attached to the other of the said shafts to rotate therewith, said second-named gear being drivingly engaged with the other of the said discs and being operable to rotate the said other of said discs upon rotation of the said other of said shafts in one direction.

10. In a device of the character described, the combination of, a normally open switch, a clock mechanism, means including a manually settable time responsive device under the control of and adapted to coact with, said clock mechanism to close said switch and to open the same at preselected times, manually operable means for setting the said time responsive device into position to close said switch at a predetermined time under the control of said clock mechanism, manually operable means for setting the said time responsive device into position to open the said switch at a preselected time under the control of said clock mechanism, and means including a manually settable member bearing numerical hour-indicating indicia, and independent of and unaffected by the progressive movement of said clock mechanism, for directly indicating a period of time selected to elapse between the closing and opening of said switch, said switch comprising a pair of switch blades, one of said switch blades having an electrical contact engageable with a corresponding electrical contact on the other of said switch blades, said switch blades having a raised portion provided thereon, said means for effecting movement of said switch including a manually operable switch control lever having a notch in one end portion thereof and having an edge of said end portion engageable with the said raised portion on the said one of said switch blades, said notch being complementary to and engageable with the said raised portion on the said one of the said switch blades, said manually operable switch control lever being operable to separate said switch blades by engagement of the said edge of the said end portion thereof with the said raised portion of the said switch blade, said electrical contacts being in engagement with each other when the said notch in the said end portion of said manually operable switch control lever is in engagement with the said raised portion on the said switch blade.

11. In a timing and control device for controlling the supply of energy to an operating unit, the combination of, a clock mechanism, an elapsed time-indicating device, a finish time-indicating device, a mechanism operable for controlling the supply of energy to said unit, means for manually setting said elapsed time-indicating device to indicate a preselected period of time during which energy is to be supplied to said unit, means for manually setting said finish time-indicating device, to indicate a preselected time at which it is desired to terminate the supply of energy to said unit, and means including a time responsive device coacting with and under the control of said clock mechanism and settable, by the control of the said means for normally setting the said elapsed time-indicating device and the said finish time-indicating device, for effecting operation of said mechanism at a preselected time in advance of said finish time and for maintaining said mechanism operable during a preselected period of time, as indicated by the setting of said elapsed time-indicating device, and for discontinuing the operation of said mechanism at a prescribed finish time as indicated by the setting of said finish time-indicating device, and means for maintaining the elapsed time period, as indicated by said elapsed time-indicating device, for operation of said mechanism, during operation of said setting means for said finish time-indicating device to indicate the selected time at which it is desired to terminate the supply of energy to said unit.

12. In a timing and control device for controlling the supply of energy to an operating unit, the combination of, a clock mechanism, an elapsed time-indicating device, a finish time-indicating device, a mechanism operable for controlling the supply of energy to said unit, means for manually setting said elapsed time-indicating

device to indicate a preselected period of time during which energy is to be supplied to said unit, means for manually setting said finish time-indicating device, to indicate a preselected time at which it is desired to terminate the supply of energy to said unit, and means including a time responsive device coacting with and under the control of said clock mechanism and settable, by the control of the said means for normally setting the said elapsed time-indicating device and the said finish time-indicating device, for effecting operation of said mechanism at a preselected time in advance of said finish time and for maintaining said mechanism operable during a preselected period of time, as indicated by the setting of said elapsed time-indicating device, and for discontinuing the operation of said mechanism at a prescribed finish time as indicated by the setting of said finish time-indicating device, said setting means for said finish time-indicating device being constructed and arranged so as to be operable to select the time at which it is desired to terminate the supply of energy to said unit without changing the elapsed time period, for operation of said mechanism, as indicated by said elapsed time-indicating device.

13. A timing and control device as defined in claim 4 wherein said casing is provided with two sight openings in addition to a clock face, and wherein said elapsed time indicating device is visible through one of said sight openings and said finish time indicating device is visible through the other of said sight openings.

14. A timing and control device according to claim 6 provided with a casing having two sight openings in addition to the face of said clock mechanism and wherein the indicia of one of said manually settable members is visible through one of said sight openings and the indicia of the other of said manually settable members is visible through the other of said sight openings, and wherein each of said sight openings has a manually operable member adjacent thereto for setting the manually settable member whose indicia is visible through such sight opening.

ALFRED W. GARDES.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,616,120	Franklin	Feb. 1, 1927
2,166,683	Grayson	July 18, 1939
2,259,188	Whitehead	Oct. 14, 1941
2,300,950	Lux	Nov. 3, 1942
2,325,812	Thompson	Aug. 3, 1943