Nov. 13, 1945. G. C. PEARCE 2,388,702

DOMESTIC APPLIANCE

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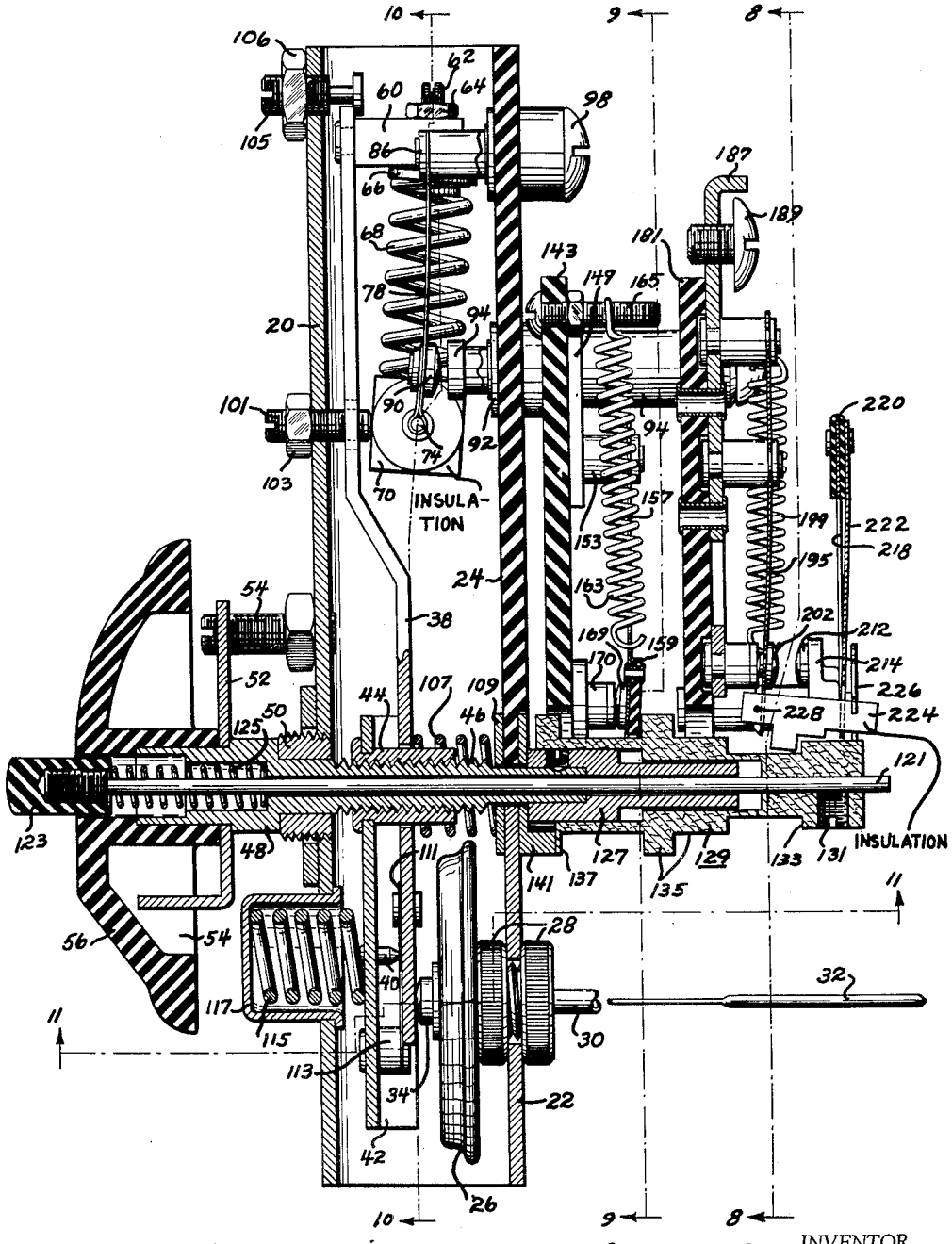



Fig. 1

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DOMESTIC APPLIANCE

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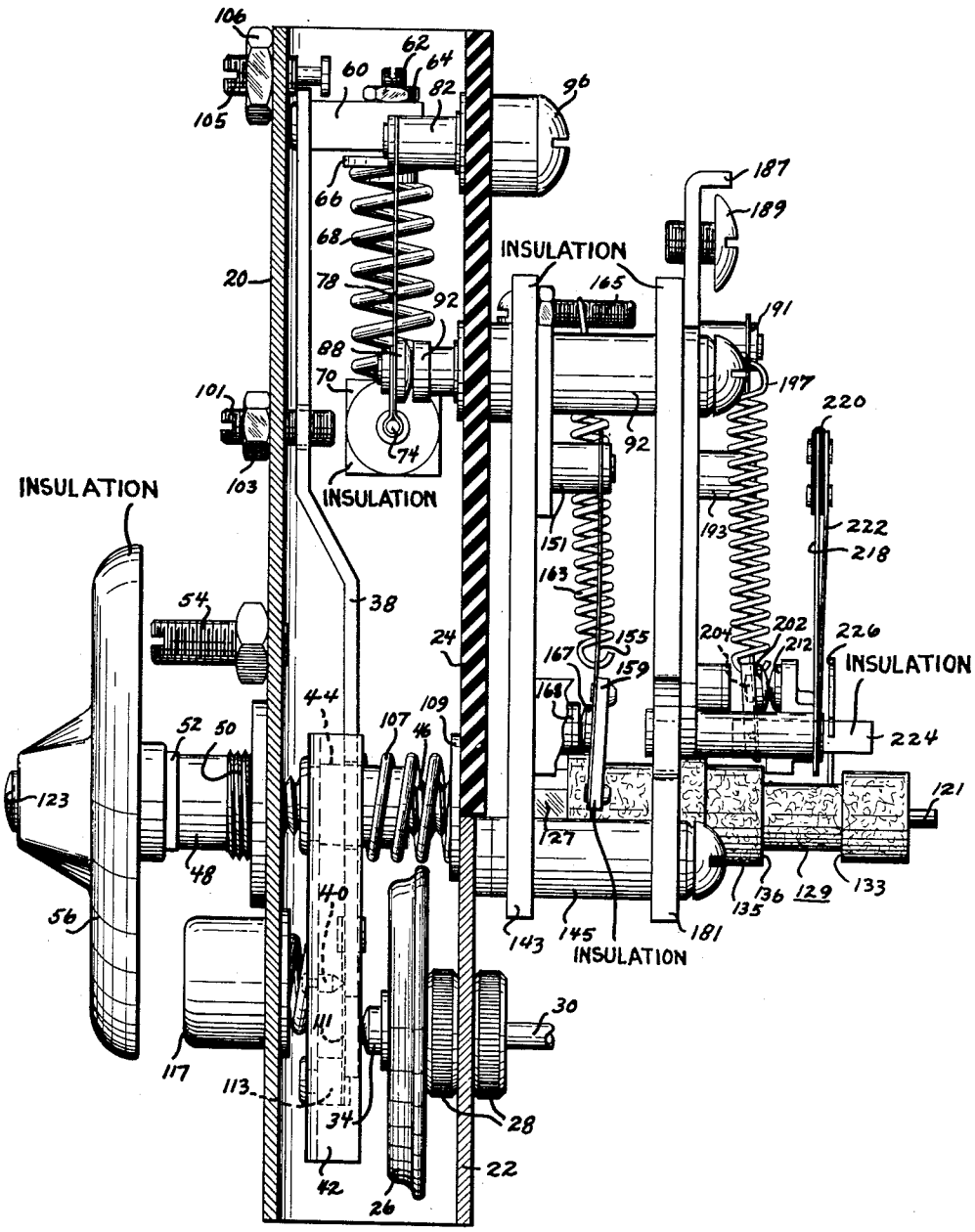



Fig. 2

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DOMESTIC APPLIANCE

Filed Dec. 30, 1939 10 Sheets-Sheet 3

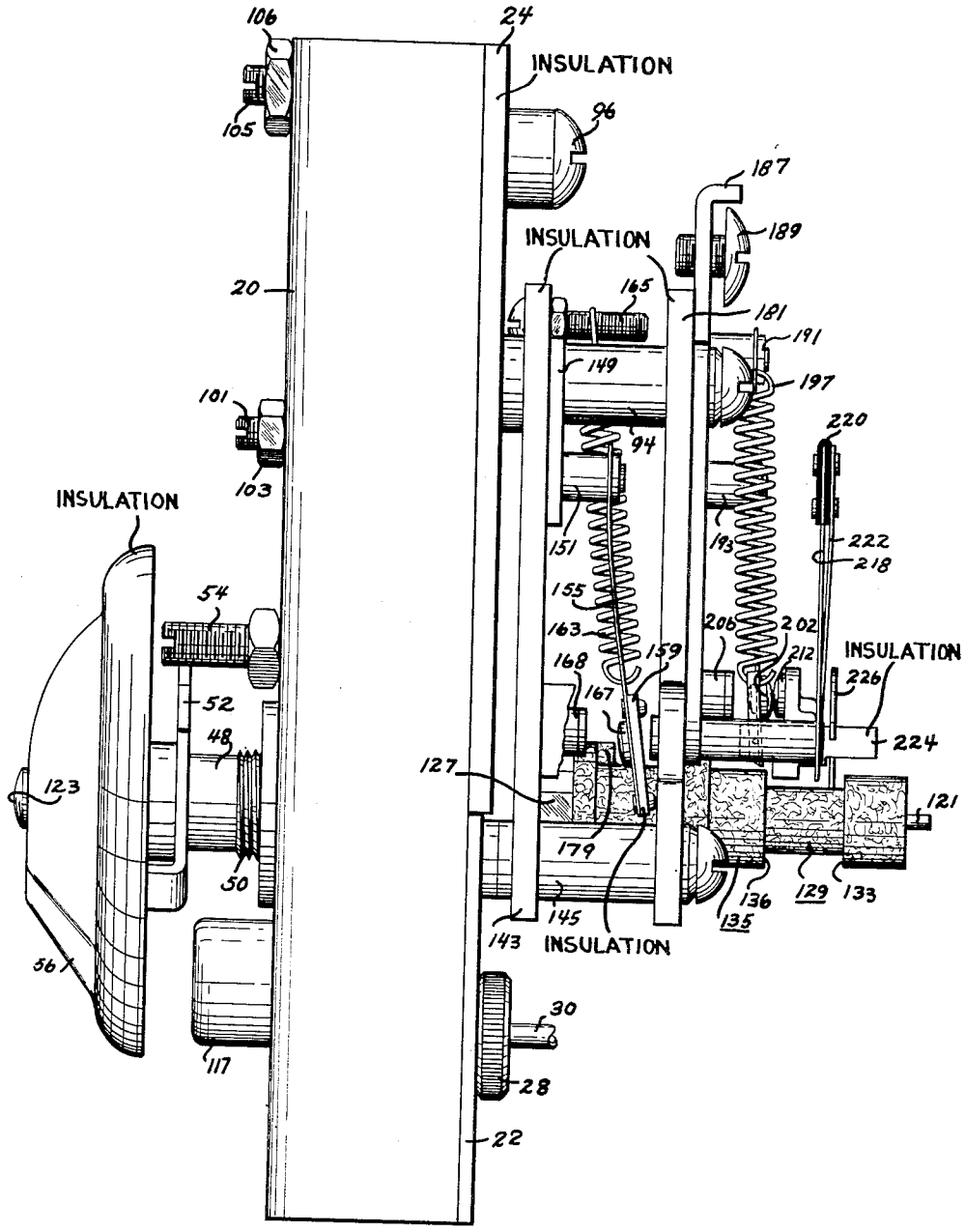



Fig. 3

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DOMESTIC APPLIANCE

Filed Dec. 30, 1939 10 Sheets-Sheet 4

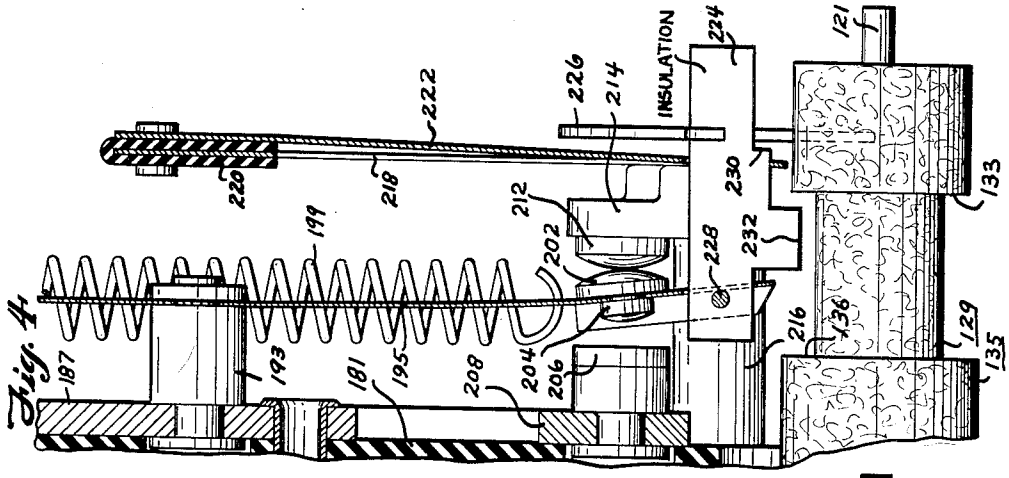



Fig. 4

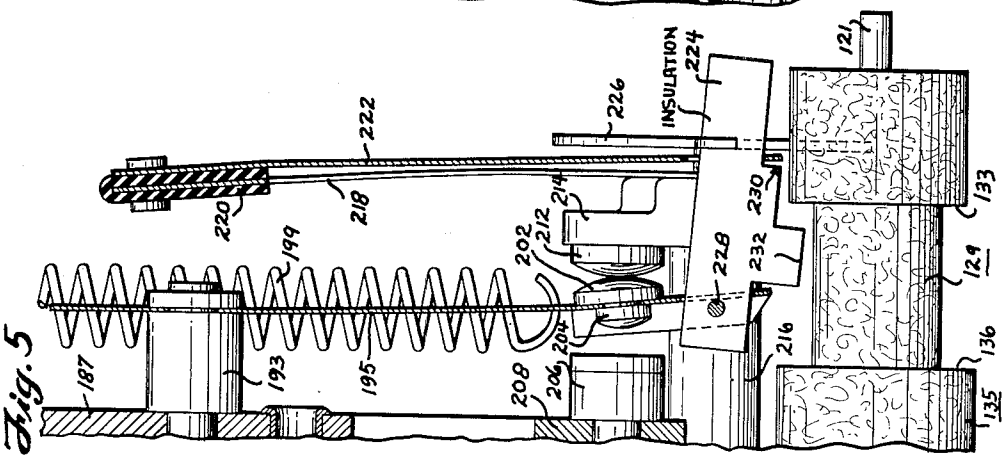



Fig. 5

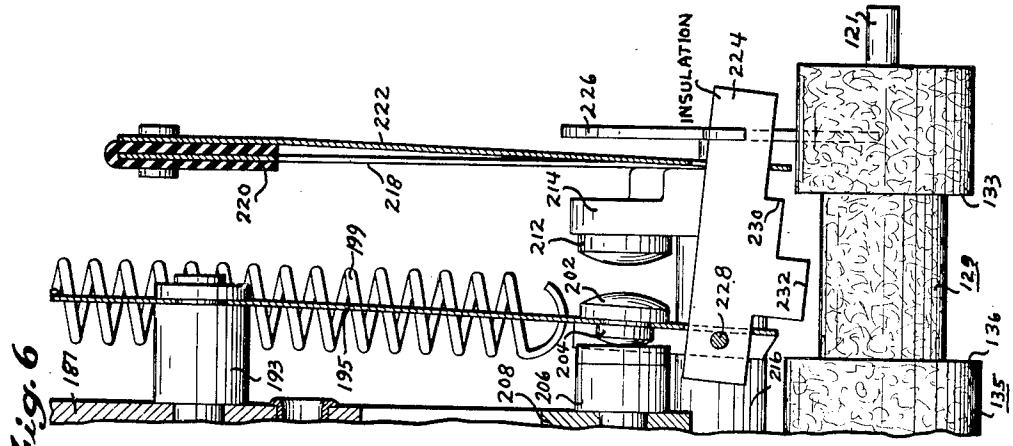



Fig. 6

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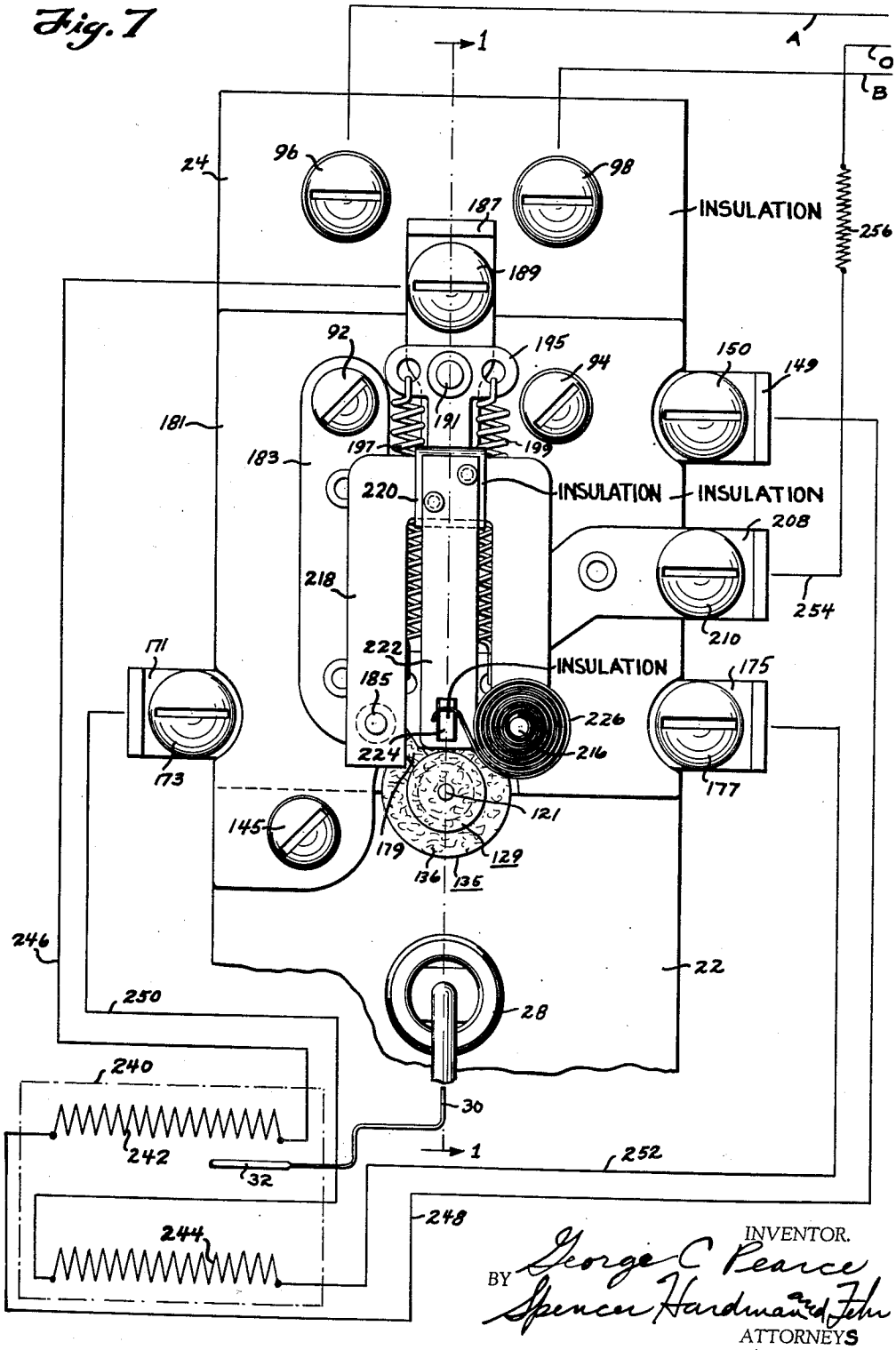
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DOMESTIC APPLIANCE

Filed Dec. 30, 1939 10 Sheets-Sheet 5

Fig. 7




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Nov. 13, 1945. G. C. PEARCE 2,388,702

DOMESTIC APPLIANCE

Filed Dec. 30, 1939 10 Sheets-Sheet 6

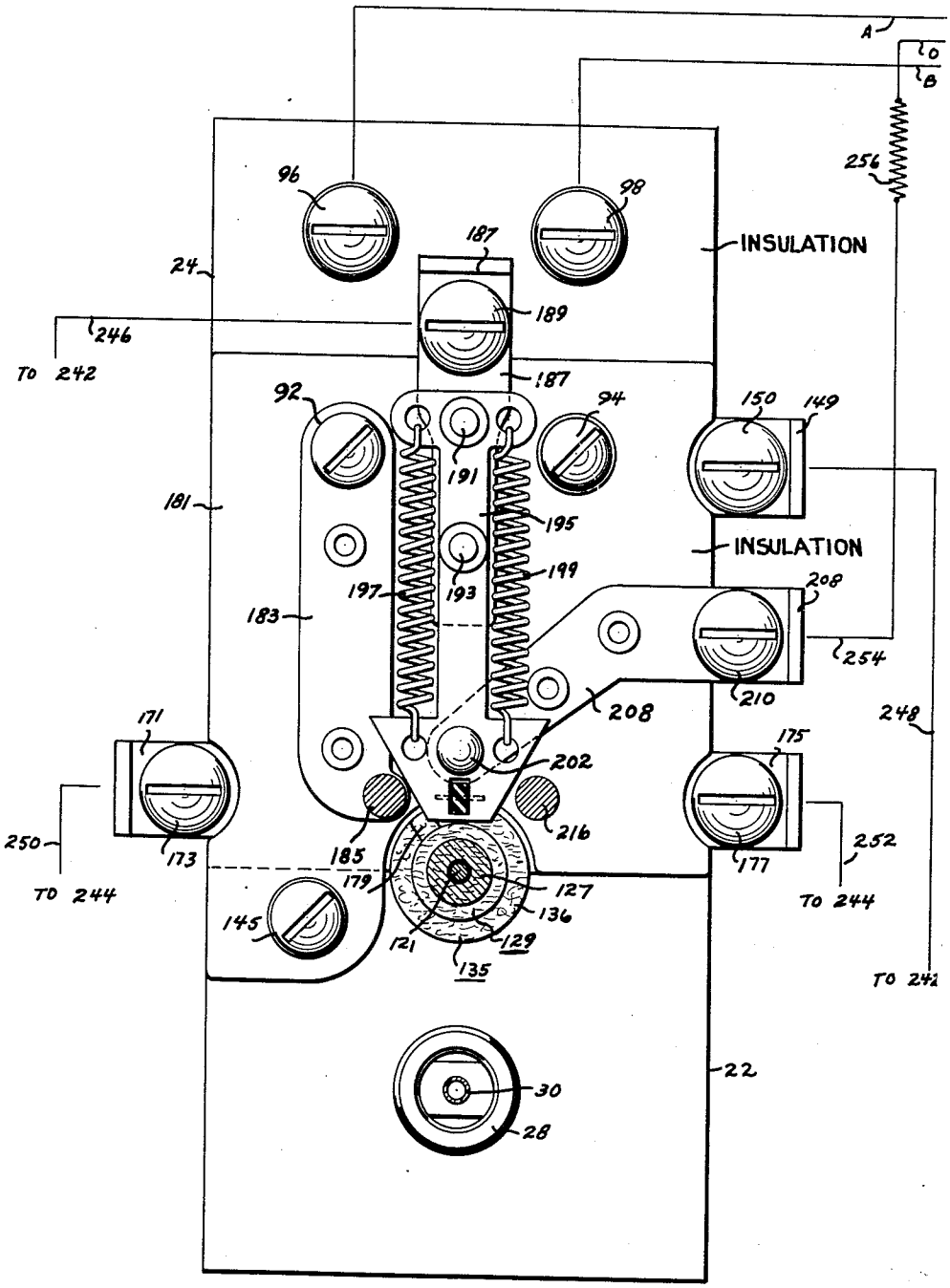



Fig. 8

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DOMESTIC APPLIANCE

Filed Dec. 30, 1939 10 Sheets-Sheet 7

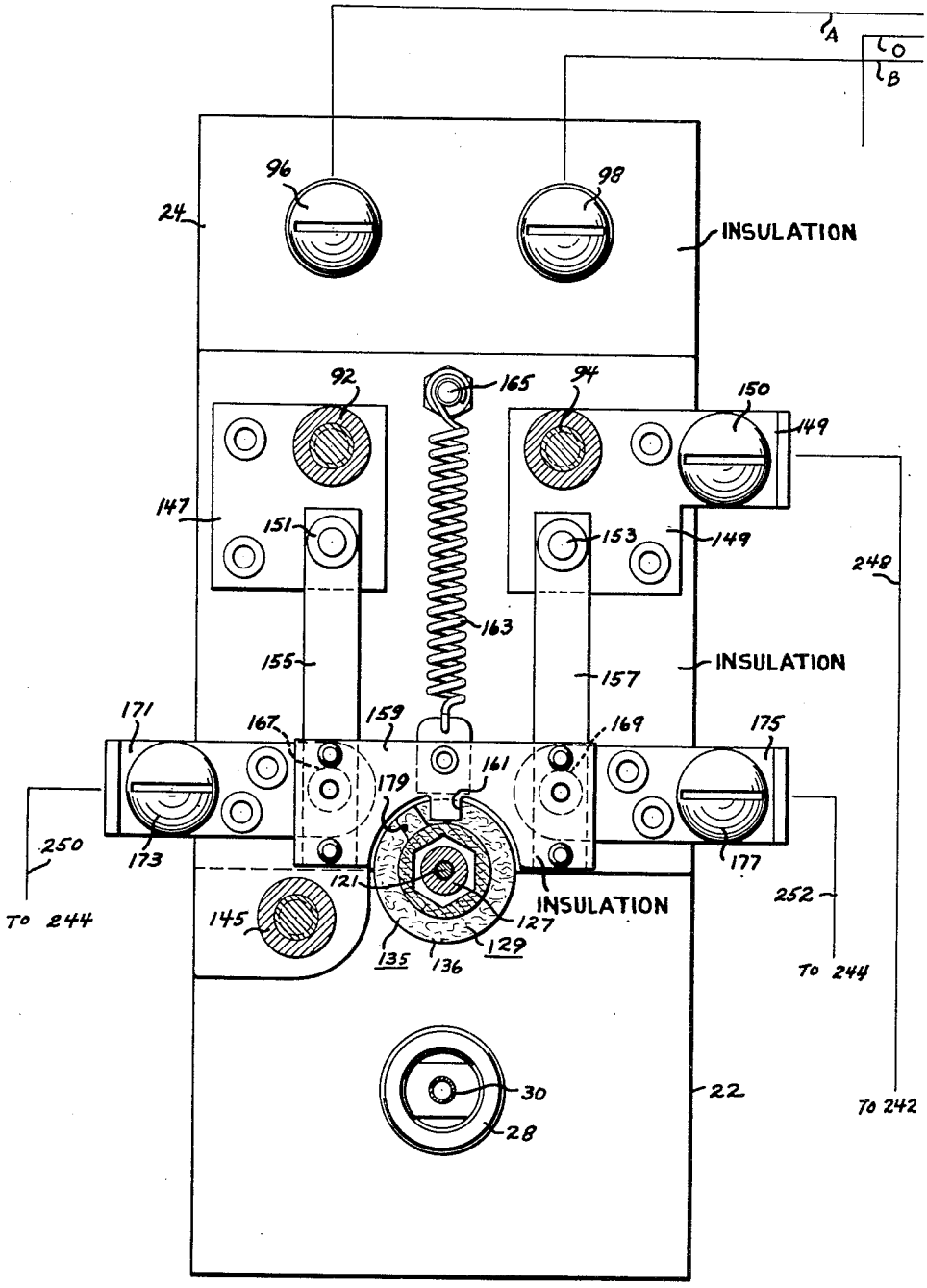



Fig. 9

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DOMESTIC APPLIANCE

Filed Dec. 30, 1939 10 Sheets-Sheet 8

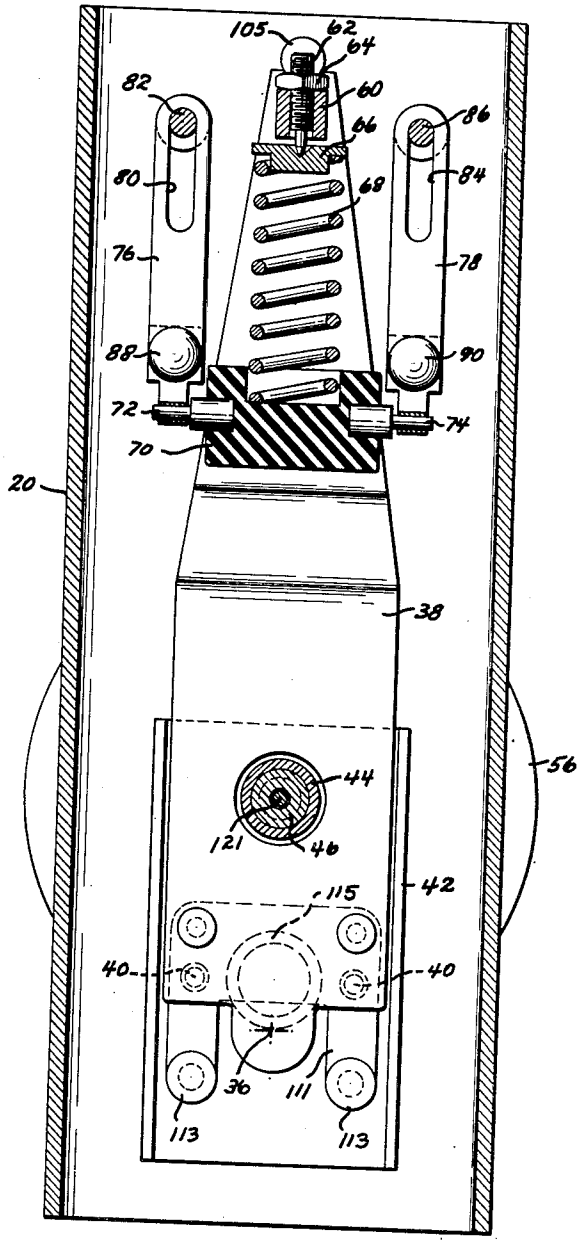



Fig. 10

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DOMESTIC APPLIANCE

Filed Dec. 30, 1939 10 Sheets-Sheet 9

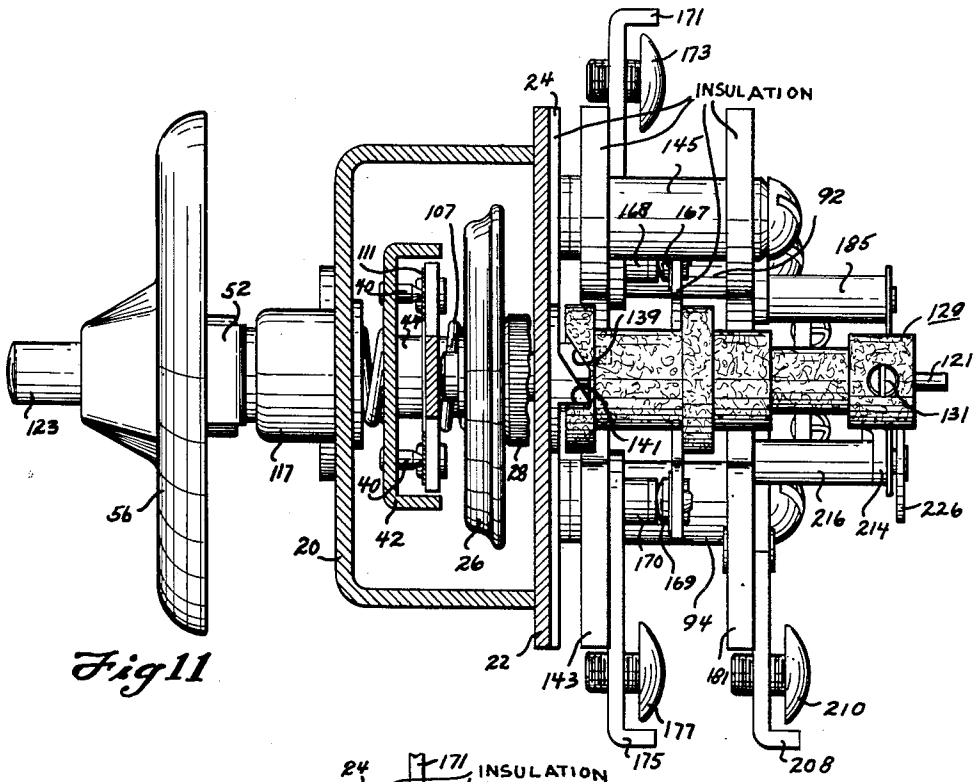



Fig 11

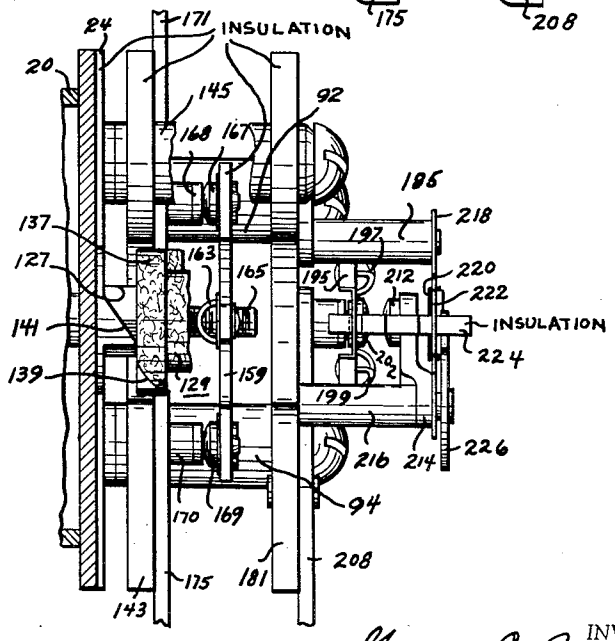



Fig. 12

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DOMESTIC APPLIANCE

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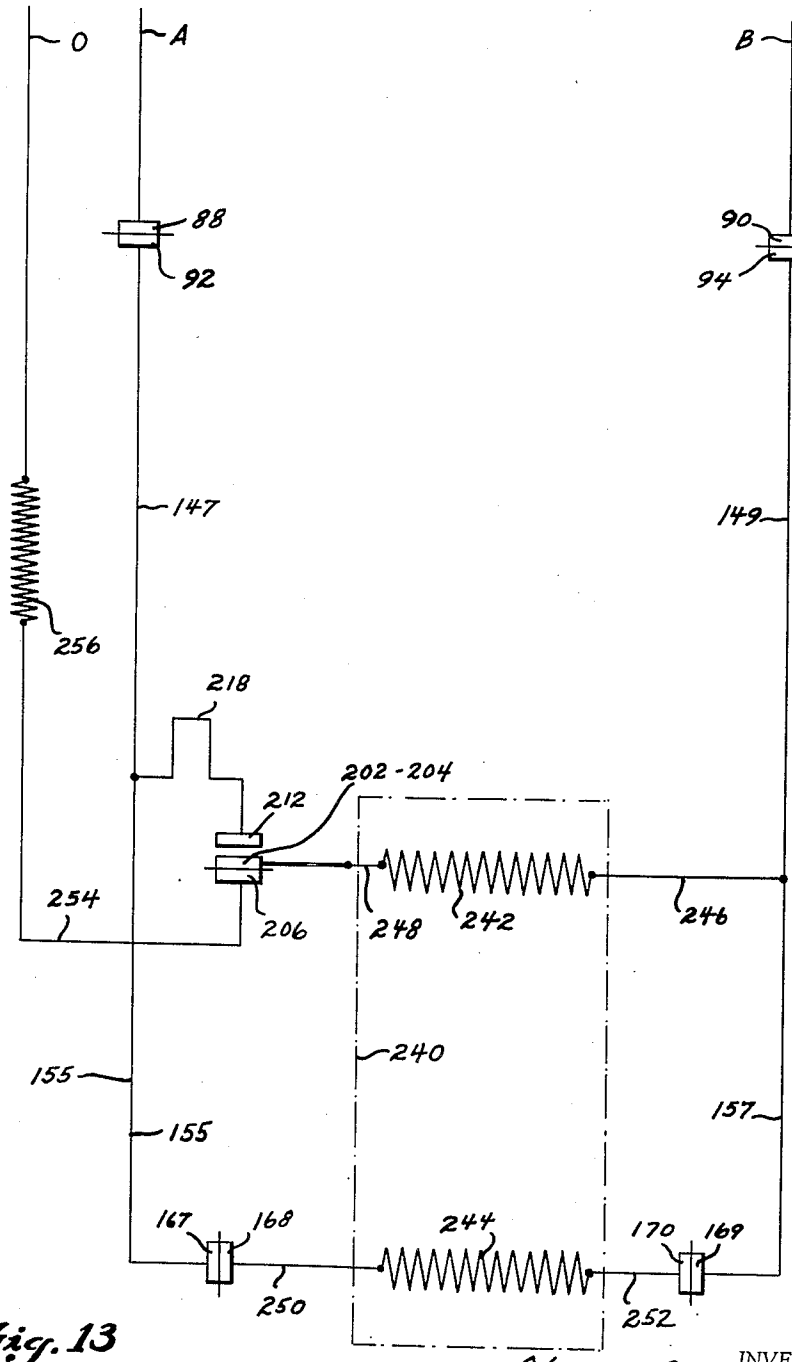



Fig. 13

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Patented Nov. 13, 1945

2,388,702

# UNITED STATES PATENT OFFICE

2,388,702

## DOMESTIC APPLIANCE

George C. Pearce, Dayton, Ohio, assignor to General Motors Corporation, Dayton, Ohio, a corporation of Delaware

Application December 30, 1939, Serial No. 311,900

9 Claims. (Cl. 219—20)

This invention relates to a domestic appliance and more particularly to heating arrangements in two-unit electric ovens and controls therefor.

It has been proposed to provide an oven switch mechanism capable of starting on either preheat circuit arrangement or bake circuit arrangement and provided with an automatic means for changing from the preheat to the bake arrangement when the oven reaches a certain temperature. Such a control has been provided with a single control knob. It has been found, however, that there is difficulty in making the user understand the necessary operation of such a knob in selecting preheat and baking circuit arrangements.

It is an object of my invention to provide a simple readily understood knob arrangement for an oven thermostat and switch providing an automatic change in circuit arrangements.

It is another object of my invention to provide a quiet dependable means for changing automatically from preheat circuit arrangement to bake circuit arrangement without detrimentally affecting the accuracy of operation of the oven thermostat.

It is another object of my invention to provide electro-thermal means for controlling the change from preheat to bake circuit arrangement.

Another object of my invention is to provide accurate inexpensive control for controlling oven temperatures and for providing an automatic change from preheat circuit arrangement to bake circuit arrangement during the "off" cycle of the oven heating means.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a sectional view through the entire mechanism taken along the line 1—1 of Fig. 7, showing the control knob in the "off" position with all parts at room temperature;

Fig. 2 is a view somewhat similar to Fig. 1 but showing only the thermostat proper in section with the temperature control knob set in a baking temperature position and with the push button in setting position to initiate a preheat cycle, while the electro-thermal element has not been heated;

Fig. 3 is a view in elevation of the switch mechanism with the knob in broil position, the push button in setting position and the electro-thermal control element heated;

Fig. 4 is a fragmentary sectional view similar to the right portion of Fig. 1 showing the preheat switch and control mechanism set in preheat position with the push button released and the electro-thermal element cold;

Fig. 5 is a view similar to Fig. 4 with the preheat switch in preheat position, the push button released and the electro-thermal element heated and in a latching position;

Fig. 6 is a view similar to Figs. 4 and 5 showing the parts at the end of the preheat cycle with the electro-thermal element cool and with the preheat switch reset in bake position;

Fig. 7 is a right side view of the switch together with a diagrammatic representation of the oven and the electrical connecting circuits;

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

Fig. 9 is a sectional view taken along the line 9—9 of Fig. 1;

Fig. 10 is a sectional view of the thermostat proper taken along the line 10—10 of Fig. 1;

Fig. 11 is a bottom sectional view taken along the line 11—11 of Fig. 1 with the knob in "off" position;

Fig. 12 is a view similar to Fig. 11 with the knob in bake position; and

Fig. 13 is a simple wiring diagram of the oven and electrical circuits.

### *Brief description*

Briefly, I have shown an automatic switch for a two-unit electric oven having a rotatable knob for setting the thermostat and an axially movable push button within the center of the knob for setting the control mechanism in preheat or broil circuit arrangement. The preheating is accomplished by pushing the push button, thereby setting a switch in preheat position which connects the upper heating unit of the oven to the source at maximum voltage. A bimetal element is placed in series with this switch and is heated as long as this switch is in preheat position. When the thermostat deenergizes all electric circuits supplying electric energy to the oven heating units, the bimetal element cools and engages a shoulder upon a link and upon further movement moves the preheat switch to bake position in which the upper heating unit is supplied with electric energy at less than maximum voltage.

The preheat switch is set in preheat position and the link properly set by the push button for broiling purposes as well as for preheat purposes. However, for broiling purposes the thermostat knob operates with the push button control to provide an opening of an additional switch providing for disconnecting the lower heating unit

from the source of electric energy. The thermostat is provided with a novel lever arrangement, temperature adjustment arrangement and a snap acting mechanism which cooperates both structurally and functionally with the preheat and broil control mechanism.

*Construction of thermostat proper*

Referring now to the drawings there is shown a thermostat frame member 20 made of heavy sheet steel formed into a channel shape. Extending between the edges of the flanges of the channel-shape frame member 20 is a sheet metal plate 22 and an insulating plate 24. These parts are held together by riveting or other suitable means, not shown. The plate 22 is provided with an aperture which receives the neck portion of a pancake-shaped diaphragm 26 which is fastened to the plate 22 by knurled nuts 28 threaded onto the neck portion of the diaphragm 26 and are located on either side of the plate member 22. A passage extends through the neck portion communicating with the interior of the diaphragm 26 and with the tubing 30 which connects with the thermostat bulb 32 located within or in heat exchange relation with the interior of the electric oven.

The pancake type diaphragm is provided with a button-shaped follower 34 which presses against the point 36 (see Fig. 10) of the main lever 38. The main lever 38 is pivoted upon a conically pointed pin 40 which is riveted to an adjustable channel-shaped carrier plate 42 provided at one end with a sleeve 44 which is threaded onto the threaded portion 46 of a control shaft 48. This control shaft is rotatable mounted in a bearing member 50 which is threaded into a threaded aperture in the frame member 20. The control shaft 48 has fixed to it an L-shaped double ended arm 52, the straight end of which serves as a stop member in connection with the stop pin 54 extending from the frame member 20. The bent end of the arm 52 extends into a notch 54 within the control knob 56 which is made of insulating material. The turning of the knob 56 through the threaded engagement of the control shaft 48 with the threaded sleeve 44 moves the carriage member 42 toward or away from the button 34 of the diaphragm 26 in order to adjust the temperature at which the thermostat operates.

The extreme end of the primary lever 38 has a post 60 riveted to it. This post 60 is provided with a set-screw 62, locked by a lock-nut 64 and having a conical point which extends into a conical-shaped depression in a spring retainer 66 provided at one end of the compression type toggle spring 68. The other end of the compression type toggle spring 68 is held within a recess of a block 70 of electrical insulating material. This block 70 is provided with inserted pins 72 and 74 which extend like arms from either side of the block 70. A flexible contact carrying strip 76 has its reduced portion wrapped around the extending portion of the pin 72 and another contact strip 78 on the other side also has a reduced portion wrapped around the extended portion of the pin 74. Each of these strips are formed of a flexible metal, such as spring bronze, and the strip 76 is provided with a slot 80 which receives at its extreme end the contact post 82 to which this end of the strip is firmly fastened. Likewise the strip 78 is provided with a slot 84 which has at its extreme end a contact post 86 to which that end of the strip is firmly fastened. The elongater slots in each of these strips are provided in order to provide more flexibility adjacent their anchoring portions. The strip 76 has a contact 88 riveted to it, while the strip 78 has a contact 90 riveted to it. These contacts engage the contact posts 92 and 94 respectively. The anchoring posts 82 and 86 are fastened to the insulating sheet 24 and on the opposite side are provided with binding posts and screws 96 and 98.

The differential of the toggle mechanism provided by the compression spring 68 and the flexible brass strips 76 and 78 are controlled by an adjusting screw 101 which limits the movement of the insulating block 70 and the contacts 88 and 90 away from the contact posts 92 and 94. This set-screw is provided with a lock-nut 103. The extreme end of the main lever is provided with a set-screw 105 which limits its range of movement in either direction. This set-screw is provided with a notch or grooved portion between which the extreme end of the main lever 38 moves. The set-screw is so adjusted that the main lever moves an equal distance upon either side of the center line of the toggle. The set-screw 105 is locked in this position by a lock-nut 106. The action of the toggle mechanism causes the lever 38 to snap from one extreme position to the other. In so doing, the other end of the toggle mechanism, where the contacts are located, also snaps from one extreme position to the other. This provides an excellent snap acting mechanism with a low differential and a relatively high contact pressure with high current-carrying capacity.

The main lever 38 is provided with an aperture which receives the set-screw 101 and a second aperture which receives the threaded sleeve 44. A compression spring 107 extends between a washer 109 resting upon the sheet metal plate 22 and the insulating sheet 24 and extends into engagement with the main lever 38 to normally hold the main lever in contact with the button 34 and the conical pivot pin 40. The lower end of the main lever 38 is laterally held in position by a thin flexible connecting member 111 of spring bronze having arms riveted to the posts 113 provided upon a carriage plate member 42 and having another portion riveted to the lever 38 so as to provide a flexible anchorage for this end of the lever which will prevent any misalignment and provide a connection which cannot be disrupted by jarring or vibration.

A compression spring 115 is provided within a thimble 117 which is riveted within a recess in the frame member 20 and is held by a flange provided at its mouth. This compression spring 115 bears against the carriage member 42 and serves to hold the shoulder of the shaft 48 against the adjacent end and the threaded bushing 50 during normal operating conditions. The spring 115 has a force which exerts pressure above the resilient force of the diaphragm 26 but below stresses sufficient to permanently distort diaphragm 26. This arrangement allows the shaft 48 to move to the left away from the shoulder in the bushing 50 to allow for expansion of the diaphragm 26 when the knob 56 is set to temperatures below the existing temperature of the thermostat 32. For example, this commonly occurs when the oven has been heated to the desired temperature for the desired length of time and then the knob 56 is turned to the "off" position or to a lower temperature setting. Thus under such conditions the diaphragm 26 remains expanded and this expansion is accompanied by

the movement of the shoulder of the shaft 48 away from the threaded bushing 58 against the tension of the spring 115.

*Construction of preheat and broil control*

In order to provide a control which may be manually set to a preheat circuit arrangement and which will thereafter provide an automatic change from preheat to baking arrangement as well as a broiling arrangement, I have provided an additional control mechanism operated by a push button and having a built-in connection with the thermostat for this purpose. The shaft 48 is hollow and through it passes a thin rod 121. At the left end of the thin rod 121 there is provided a push button 123 located in the center of the knob 56 which is provided with a recess for receiving this knob. The shaft 48 is also provided with a recess which receives a light compression type spring 125 which tends to push the push button outwardly. At the other end the shaft 125 there is provided a hexagonal guide member 127 which is fastened to the shaft by a set-screw.

*Construction of the cam*

Surrounding this guide member 127 at the right end of the thin rod 121 is a cam member 129, formed of insulating material, which slidably receives the guide member 127 in a hexagonal recess and which is fixed to the rod 121 by the set-screw 131. This cam member 129 is provided with an annular projection 133 at its outer end, a double second annular projection 135 at its mid-portion and a third annular projection 137 at its left end. This projection 137, as better shown in Figs. 11 and 12, is provided with a notch 139 which is adapted to receive a cam 141 provided with an inclined lifting face which extends from the plate 22 of the thermostat. When the knob 56 is in the "off" position, as in Figs. 1 and 11, the cam 141 is received within the notch 139. However, when the knob 56 is turned away from the "off" position as in Fig. 12, then the cam 141 will coact with the inclined surface of the notch and the adjacent face of the annular projection 137 to cam the cam member 129 to the right. The cam member 129 will always be moved at least this distance to the right whenever the knob 56 is turned away from the "off" position to any baking temperature position.

*Construction of switch for disconnecting lower unit*

Spaced from the insulating sheet 24 of the thermostat is a platform 143 of insulating material which is supported by the two contact posts 92 and 94 as well as an additional post 145 located at the other end of platform 143. The platform 143 is spaced from the insulating sheet 24 by collars upon the three posts. The insulating platform 143 on its right face is provided with a square copper or brass conductor plate 147 which surrounds the post 92 and a conductor plate 149 which surrounds the post 94. These plates are also riveted to the platform 143. The conductor plate 149 has an extension provided with a binding screw 150. The plate 147 is provided with a post 151 to which is connected one end of a spring brass strip 155 while the plate 149 is provided with a post 153 to which is connected one end of a spring brass strip 157. As is better shown in Fig. 9 the other ends of the spring brass strips 155 and 157 are joined by a connecting insulating member 159 having a semi-circular recess provided with a tongue 161. A toggle spring 163 is hooked to a connector riveted to the insulating member 159 in order to provide a toggle action for the free end of the brass strips 155 and 157. At its other end the toggle spring 163 is anchored to an adjusting screw 165 which may be turned to move the anchored end of toggle spring 163 to the left or the right as desired.

The free end of each of the strips 155 and 157 is provided with a switch contact, these contacts being designated by reference characters 167 and 169 respectively. A cooperating contact 168 is formed on the inner end of a copper or brass plate 171 which is riveted to insulating platform 143 and is provided with a terminal binding screw 173. A cooperating contact 170 is formed at the end of the post which is mounted upon the inner end of a copper and brass plate 175 also riveted to the platform 143 and provided with a terminal binding screw 177. The cam member 129 is provided with a projection 179 which is adapted to register with the tongue 161 when the knob 56 is turned to the broil position so that when the push button 123 is depressed, contacts 167 and 169 will be separated from the contacts 168 and 170 to deenergize the lower oven heating unit.

*The preheat termination control*

To the right of the platform 143 and spaced therefrom is a second insulating platform 181. This platform is also supported by spacing collars mounted upon contact posts 92 and 94 as well as the supporting post 145. As is better shown in Fig. 8 copper or brass plate 183 is riveted to platform 181 and connects to the contact post 92 and at its other end is provided with a post 185. A copper or brass strip member 187 is also riveted to the center portion of platform 181 and is provided with a terminal binding screw 189. This strip 187 is provided with posts 191 and 193 which support a thin bronze strip 195.

*The preheat-bake switch for upper unit*

This strip member 195 is made in the shape of an I and is provided at opposite ends with suitable anchoring holes for the hooked ends of the twin tension springs 197 and 199 which cause the blade portion of member 195 to move with a snap action. The free end of the member 195 is provided with a large contact 202 upon its right face and a smaller contact 204 upon its left face. The small contact 204 is adapted to engage contact post 206 provided upon the terminal strip 208 which is riveted to the platform 181 and, as viewed in Fig. 8, extends to the right side of the platform where it is provided with a terminal binding screw 210. The large contact 202 is adapted to make contact with contact 212 formed on an overhanging projection 214 which extends from the top of the post 216 extending upwardly from the insulated platform 181.

As is best shown in Fig. 7 the ends of the two legs of a U-shaped bimetal member 218 are fastened to the posts 185 and 216. Fastened to the yoke portion of this U-shaped bimetal member 218 but insulated therefrom by the insulating paper 220, is a single bimetal member 222 of the same material as the bimetal member 218 so that it will compensate for changes in ambient temperature. This member or strip 222 is provided with an opening at one end which receives the latch member 224, formed of insulating material. This latch member 224 is pressed toward the cam member 131 by a watch spring 226 anchored to the upper end of the post 216 and having a

hooked end portion engaging the latch member 224. The latch member 224 is pivotally connected by a pin 228 to the flanged end portion of the spring bronze strip member 195. This strip member 195 is provided with an opening receiving the lower end of the latch member 224. The latch member 224 is provided with a shoulder 230 which is engaged by the bimetal strip 222 as shown in Fig. 5. It is also provided with a projection 232 which is adapted to be engaged by the projection 135 of the cam 129 when the push button 123 is depressed as shown in Figs. 2 and 3.

*The electrical connections between the control and the oven*

In Fig. 7 there is shown diagrammatically an electric oven 240 provided with an upper heating unit 242, primarily for broiling purposes, and a lower heating unit 244 primarily for baking purposes. The thermostat and control as well as the oven is supplied with electrical energy from a three-wire source designated A, O and B. Normally the neutral or middle conductor is designated as O, while the conductors A and B are designated as the live or outside conductors. With this system there is ordinarily provided a potential of 230 volts across the conductors A and B and 115 volts across either O—B or O—A. This is commonly known as the three-wire Edison system.

The conductor A is connected to the binding screw 96 while the conductor B is connected to the binding screw 98. These screws form part of the binding post and connect to the thermostat contact. The upper heating unit 242 is connected by the conductor 246 to the binding screw 189 and also by the conductor 248 to the binding screw 150 formed on the end of the brass or copper plate 149 which connects to the contact post 94. The lower oven heating unit 244 is connected by the conductor 250 to the binding screw 173, and by the conductor 252 to the binding screw 177. The binding screw 210 is connected by the conductor 254 to an external resistance 256 which in turn is connected to the neutral supply conductor O.

*Operation in bake position*

When the oven has not been used and all the parts are room temperature they will be in the position shown in Fig. 1 as long as the knob 56 is in the "off" position. In order to start the baking operation without preheating, the control knob 56 is merely turned to the temperature desired. This will cause movement of the threaded sleeve 44 and the carriage member 42 away from the button 34 of the diaphragm 26, and under this condition the compression spring 107 will move the main lever 38 rapidly to its extreme left position with a snap action as limited by the stop screw 105. The set-screw 62 will thus be moved across the center line of the toggle mechanism formed by the compression spring 68 and the spring bronze strips 76 and 78 to snap the thermostat contacts 88 and 90 to closed position. When the oven comes up to temperature, the thermostat bulb 32 will be heated sufficiently to expand the diaphragm 26 to cause the button 34 to bear against the point 36 of the main lever 38 so as to pivot the main lever 38 about its fulcrum point 40 to return the thermostat toggle mechanism with a snap action to the position shown in Fig. 1. Thus for baking without preheating the thermostat will cycle between the positions shown in Figs. 1 and 2 in order to maintain the oven at the proper temperature.

*Current flow in bake position*

In this baking position, the current flows from the source conductor A to the binding screw 96, thence down through the post 82 and through the strip 76 to the contact 88. From this contact the current flows through the conductor post 92 to the plate 147, through the strip 155 to the contact 167 which is in engagement with the contact 168 from which the current flows through the conductor strip 171 to the binding screw 173 and thence through the conductor 250 to the lower heating unit 244. From the lower unit 244, the current flows through the conductor 252 to the binding screw 177, through the conductor strip 175 to the contact 170 which is in contact with the contact 169. From the contact 169, the current flows through the strip 157 to the plate 149 and thence through the contact post 94 to the contact 90 from which the current flows through the strip 78 to the anchoring post 86 which is provided with a contact screw 98 to which the conductor B is connected.

Current also flows from the plate 149 through the conductor 248 to the upper heating unit 242 from which current flows to the conductor 246 to the binding screw 189 which is formed on the end of the conductor strip 187. From the conductor strip 187 the current flows through the posts 191 and 193 to the bronze strip member 195 which in the baking circuit has its lower contact 204 in contact with the contact post 206, provided upon the end of the conductor strip 208 having a binding screw 210 which connects to the conductor 252 and to the external resistance 256 which in turn connects to the neutral conductor O. Thus as is more clearly shown in the wiring diagram, Fig. 13, the lower oven heating unit is connected across the supply conductors A—B while the upper heating unit is connected in series with the external resistance 256 across the conductors O—B. Thus the lower oven heating unit is supplied with 230 volts while the upper heating unit is supplied with 115 volts diminished by the voltage expended in the external resistance 256.

*Operation of preheat-bake arrangement*

When it is desired to bring the oven more quickly to a desired temperature, the knob 56 is turned to the baking temperature desired and in addition the push button 123 is depressed as shown in Fig. 2. This causes the shoulder 136 of the projection 135 of the cam 129 to engage the projection 232 of the latch member 224 in order to pivot the latch member 224 in a counter-clockwise direction about its pin 228 so that the shoulder 230 of the latch member 224 will pass through the opening in the compensating bimetal member 222. This movement of the latch member 224 will also move the bronze strip with a snap action produced by the toggle springs 197 and 199 to lift the contact 204 away from its contact post 206 and to cause the upper contact 202 to make contact with the contact 212. The toggle snap action provided by the toggle springs 197 and 199 will hold the contacts in this position so that the push button 123 can then be released thus allowing the cam member 129 to return to the position shown in Fig. 12 in which the cam member 129 rests upon the top of cam 141.

*Current flow in preheat arrangement*

In this position of the control mechanism, the

electric current will pass through the lower oven heating unit 224 the same as before. However, current will also be supplied to the upper oven heating unit 242 at the same voltage, 230 volts, instead of 115 volts in order to provide more than four times its heat output provided in the baking circuit arrangement. Thus, the current for the upper oven heating unit flows from the supply conductor A through the binding post 96, through the thermostat contacts 88 and 92 along with the current to the lower oven heating unit. The current then flows through the binding post 92 to the contact strip 183 thence through the post 185 to the U-shaped bimetal member 218, thence the current passes through the U-shaped bimetal member 218 to the opposite post 216 which is provided with the overhanging contact support 214 for supporting the contact 212 which is now in engagement with the contact 202 upon the free end of the bronze strip 195. The current then passes through the bronze strip 195 to the conductor strip 187 which is provided with binding screw 189 connecting it with the conductor 246 which in turn connects to the upper oven heating unit 242 which is also connected to the conductor 248 connecting to the binding screw 150 upon the copper or brass conductor plate 149 which connects to the conductor post 94 making contact with thermostat contact 90 for connection through the bronze strip 78 and through the anchoring post 86 and the binding screw 98 to the conductor 80.

*Operation of the bimetal*

The current flowing through the U-shaped bimetal 218 will heat this member, starting from the position shown in Fig. 4 and causing it to gradually move upwardly to the position shown in Fig. 5 where the free end of the compensating strip 222 is shown as having passed over the shoulder 230. However, as long as current continually passes through the U-shaped bimetal member 218, the contacts and the latch will remain in the position shown in Fig. 5. But as soon as the oven comes up to the desired temperature the thermostat contacts 88 and 90 will be open thus stopping the flow of current through the bimetal member 218. This will cause the bimetal member 218 to gradually move the compensating strip downwardly to the position shown in Fig. 6 carrying with it the latch member 224 and the free end of the bronze strip 195 by reason of the engagement of the shoulder 230 with the lower surface of the free end of the compensating strip 222 around the aperture provided for receiving the latch member 224. From this point on, the control will always be connected in bake circuit arrangement until the control is reset.

*Operation for broiling*

For broiling, only the upper oven heating unit 242 is used at 230 volts. In order to broil, the knob 56 is turned to its highest temperature position with the arm 52 against the stop screw 54 as shown in Fig. 3. This brings the projection 179 upon the cam 129 into alignment with the projection 161 upon the insulating connection 159. After this, the push button 123 is depressed as shown in Fig. 3 in order to separate the contacts 167 and 169 from the contact 168 and 170 to deenergize the lower oven heating unit. This movement of the cam member 129 will also move the latch member 224 into the position shown in Fig. 4, as has been described before in connection with the preheat setting, and the push button and cam then released. This allows only the upper oven heating unit 242 to be supplied at 230 volts through the same circuit described for preheating. At this high temperature setting of the thermostat and with only the upper oven heating unit being employed, the thermostat contacts 88 and 90 will remain closed throughout the broiling period because of insufficient oven temperature to open the contacts. When the knob 56 is turned to the "off" position the cam member 129 rides down off the cam 141 into the notch 139 provided for this purpose so that the projection 135 will return the contacts 167 and 169 into engagement with the contact posts 168 and 170 to reconnect the lower oven heating unit while the shoulder 133, upon the cam member 129, will always be in the position to engage the projection 232 of the latch member 224 whenever the latch member 224 is set to the position shown in Figs. 4 and 5 in order to return the latch member 224 and the strip 195 to the position shown in Figs. 1 and 6 where the contact 204 is again in contact with the post 206.

With this mechanism there is no load placed upon the thermostat mechanism for automatically accomplishing the change from preheat circuit arrangement to bake circuit arrangement. The broiling circuit arrangement is accomplished by the push button 123 rather than the temperature control knob 56. The operation of both the thermostat and the preheat, bake control are very quiet. The control has a long life and is free from connections which involve much wear.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An electric heating means for heating a zone to be heated, means for connecting said heating means selectively into a baking circuit arrangement for baking purposes and a preheat circuit arrangement for quick preheating, thermal means effective only when cooling for changing the connecting means to change the preheat circuit arrangement to the bake circuit arrangement, and means for heating the thermal means when the heating means is connected in preheat circuit arrangement, and thermostatic switch means responsive to temperatures of said zone for controlling the connection of the heating means for the zone and the means for heating the thermal means to a source of power.

2. An electric oven comprising upper and lower heating means, means for supplying electric energy so as to obtain a high heat output from the lower heating means and a comparatively small heat output from the upper heating means for normal baking purposes, electrothermal means for increasing the heat output of the upper heating means for a limited period and thereafter returning said upper heating means to the small heat output, and means responsive to oven temperatures for controlling the connection of the upper and lower heating means and the electrothermal means to a source of power.

3. An electric oven comprising upper and lower heating means, means for supplying electric energy so as to obtain a high heat output from the lower heating means and a comparatively small heat output from the upper heating means for normal baking purposes, means for increasing the heat output of the upper heating means, electro-thermal means for returning the upper

heating means to the small heat output, and means responsive to oven temperatures for controlling the connection of the upper and lower heating means and the electro-thermal means to a source of power.

4. An electric heating means for heating a zone to be heated, thermostatic switch means for controlling the connection of the heating means to a power source to regulate the temperatures of said zone as desired, means for connecting said heating means selectively into a baking circuit arrangement and into a preheat circuit arrangement, means including a thermal device operated by current flowing in the preheat arrangement for preparing for a change from preheat circuit arrangement to bake circuit arrangement, said thermal device including means effective upon its reduction in temperature in response to opening of said thermostatic switch means for accomplishing a change from preheat to bake circuit arrangement.

5. An electric heating means for heating a zone to be heated, thermostatic switch means for controlling the connection of the heating means to a power source to regulate the temperatures of said zone as desired, means for connecting said heating means selectively into a baking circuit arrangement and into a preheat circuit arrangement, a movable device, a latching means for latching the movable device to said connecting means when the movable device is operated in one direction, manually operable means for moving the connecting means from the baking circuit arrangement to the preheat circuit arrangement, current operated means operated by the current flowing in the preheat arrangement for moving said movable device in said one direction to provide for the latching of the latch means, said movable device being provided with means for moving it in the opposite direction upon deenergization of said current operated means by the thermostatic switch means for moving the connecting means from the preheat circuit arrangement to the baking circuit arrangement.

6. An electric heating means for heating a zone to be heated, thermostatic switch means for controlling the connection of the heating means to a power source to regulate the temperatures of said zone as desired, means for connecting said heating means selectively into a baking circuit arrangement and into a preheat circuit arrangement, manually operable means for moving said connecting means into the preheat circuit arrangement, and a thermal device rendered effective in response to the opening of said thermostatic switch means for causing the movement of said connecting means from the preheat to the baking circuit arrangement.

7. An electric heating means for heating a zone to be heated, a thermostatic switch means for controlling the connection of the heating means to a power source to regulate the temperatures of the zone as desired, thermally operable connecting means having bake and preheat alternative positions for connecting said heating means selectively into a bake circuit arrangement and into a preheat circuit arrangement, said connecting means including thermal operating means and means dependent upon said switch means for heating said thermal operating means when positioned in the preheat position for the preheat circuit arrangement and for discontinuing the heating when positioned in the bake position for the bake circuit arrangement, said thermal operating means including means effective upon its cooling for moving the connecting means from the preheat to the bake position.

8. An electric heating means for heating a zone to be heated, a power source, a double-throw switch means having one position for connecting one portion of the heating means in parallel circuit arrangement with a second portion of the heating means to the power supply at full voltage and a second position connecting said one portion to the power source at reduced voltage with the second portion remaining connected to the power source at full voltage, said switch means having means for holding itself in either position, a thermal operating means operably connected to said switch means, a small heating means for heating said thermal operating means when said double-throw switch means is in said one position, a thermostatic switch means for controlling the connection of the heating means to the power source to regulate the temperatures of said zone as desired and for deenergizing said small heating means when said zone reaches the desired temperautre, said thermal operating means including means effective upon its reduction in temperature in response to the deenergization of the second heating means for moving said double-throw switch means from said one position to said second position.

9. An electric heating means for heating a zone to be heated, thermostatic switch means for controlling the connection of the heating means to a power source to regulate the temperatures of said zone as desired, means for connecting said heating means selectively into a baking circuit arrangement and into a preheat circuit arrangement, manually operable means for moving said connecting means into the preheat circuit arrangement, and means including an electrical circuit portion controlled by said thermostatic switch means and a current conducting electro-thermal device connected in said circuit portion and rendered effective in response to the opening of said thermostatic switch means for causing the movement of the connecting means from the preheat circuit arrangement to the baking circuit arrangement.

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