June 14, 1955 J. E. VANCE ET AL 2,710,469

ELECTRIC IRONS

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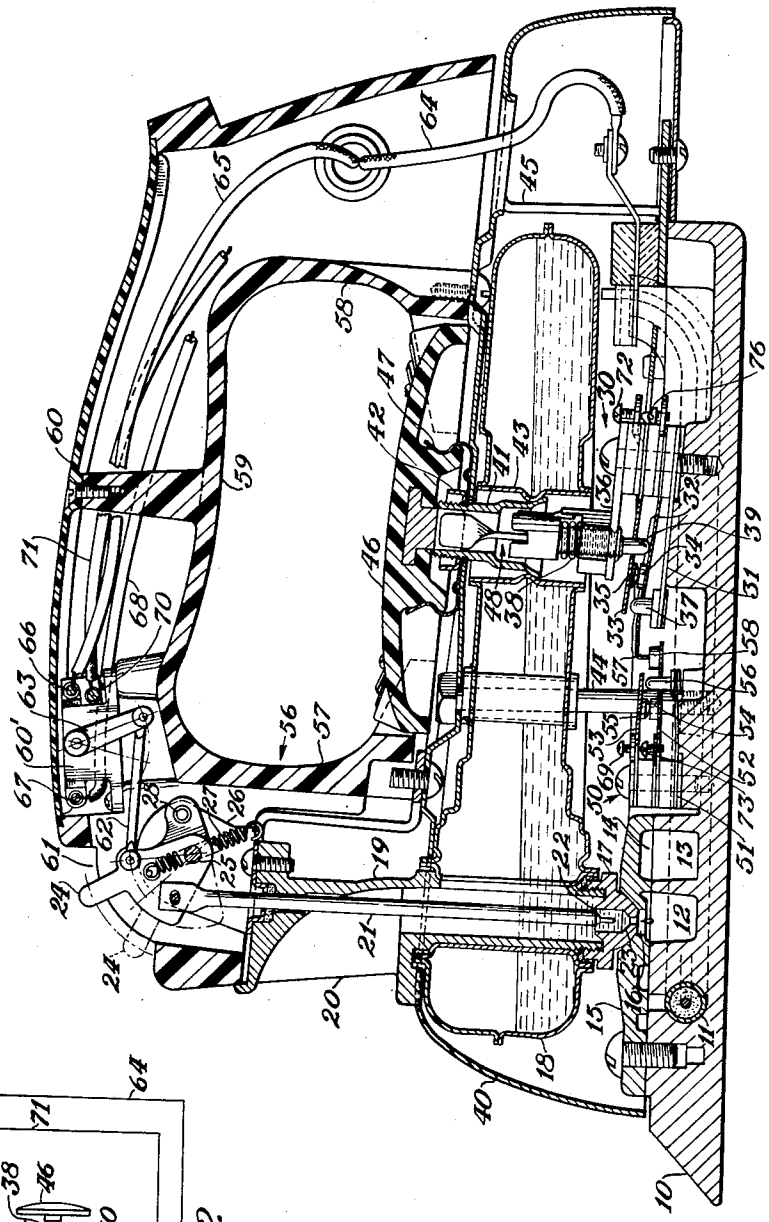


Fig. 1

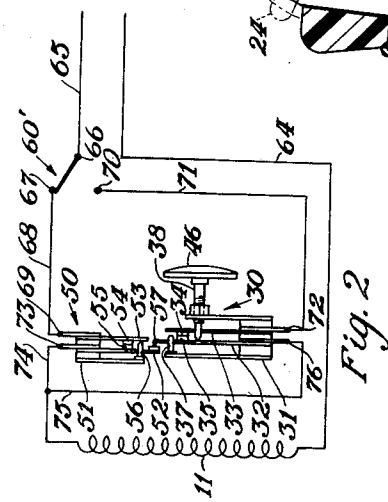


Fig. 2

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ELECTRIC IRONS

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Application January 16, 1952, Serial No. 266,706

15 Claims. (Cl. 38—77)

This invention relates to a steam iron convertible to a dry iron and more particularly to a control therefor in which two thermostatic switches are provided responsive to sole plate temperatures, one for controlling the temperature of the sole plate when the iron is set for steam ironing and the other for controlling the sole plate temperature when the iron is set for dry ironing.

It has been found in practice that the sole plate temperature should be the same for ironing all fabrics when steam ironing and that the sole plate temperature should be variable when dry ironing.

It has also been found that the steam ironing temperature is intermediate the high and low temperature settings for dry ironing.

According to the present invention two thermostatic switches are mounted on the sole plate so as to be responsive to its temperature. One of the switches is set at the factory to maintain the sole plate at a fixed temperature proper for steam ironing with the water valve open. The other switch is manually adjustable so that the proper sole plate temperature can be selected for the particular fabric being ironed when the water valve is closed and the iron is being used as a dry iron. A two-way switch is linked to the water valve actuator so that when the valve is open the first thermostatic switch takes over the control of the sole plate temperature and the second thermostatic switch is out of circuit. When the water valve is closed and the iron is to be used as a dry iron, the first adjustable thermostatic switch is out of circuit.

Other objects and advantages of the present invention will become apparent as the description proceeds when taken in connection with the accompanying drawings in which:

Figure 1 is a vertical cross-sectional view of an iron according to the present invention; and

Figure 2 is a wiring diagram showing how the various elements are electrically connected in circuit.

The iron as such forms no part of the present invention and may be of any suitable construction. The iron shown in the drawings is of the same general construction as that shown and described in an application for United States Letters Patent by John E. Vance, Serial No. 218,046, filed March 28, 1951, now abandoned.

Referring to Fig. 1 of the drawings the iron of the present invention comprises a sole plate **10** heated by a heating element **11**. The sole plate **10** is provided with a steam boiler **12** and steam passages **13** which communicate with the steam passages **14** in a cover plate **15**. The passages **14** communicate with openings extending through the sole plate **10** as disclosed in the application above referred to.

The cover plate **15** is provided with an opening **16** having a female conical seat which coacts with a male conical seat on a lower end of a valve fitting **17** secured to a water tank **18**. A fill tube **19** is secured to the tank **18** and has a forwardly extending fill opening **20** communicating with the interior of the tank **18**.

A valve steam **21** extends upwardly through the fill tube

19. At its lower end the valve stem **21** is provided with a valve **22** which cooperates with a valve seat **23** to close off communication between the interior of the tank **18** and the boiler **12**. At its upper end the valve stem **21** is loosely connected to a valve actuator **24** pivoted at **25** to a bracket **26** suitably secured to the top of the fill tube **19**. An overcenter spring **27** holds the valve in closed position. In the position shown in Fig. 1 the valve is open and the spring **27** is positioned substantially across its dead center position and is held in that position by a detent **28**.

A thermostatic switch generally indicated by the reference numeral **30** is provided for controlling the temperature of the sole plate for dry ironing. The thermostatic switch **30** comprises a bimetal element **31** and two spring switch arms **32** and **33** carrying contacts **34** and **35** respectively. The foregoing elements are supported on the sole plate **10** by an insulating post, to the top of which is secured a rigid arm **36**. An insulating button **37** is carried by the bimetal **31** and extends upwardly through an opening in the spring arm **32** so as to contact spring arm **33** and separate contacts **34** and **35** when the sole plate temperature rises above a set value. An adjusting screw **38** is supported by arm **36** and has an insulating button **39** extending downwardly through an opening in the spring arm **33** so as to contact spring arm **32** to adjust the temperature setting of the switch **30** and to completely open it when turned to its lowermost position.

The tank **18** and the aforementioned parts are enclosed by cover shell **40**. The tank **18** is secured to a cover shell **40** by a hollow member **41** and nut **42**. The member **41** coacts with a tube **43** extending upwardly through the tank **18**. Cover shell **40** and its associated parts are secured to the sole plate by a bolt **44** and support **45**.

A control dial **46** is rotatably supported on the cover shell **40** by a spring clip **47** secured to the cover shell by the nut **42**. The dial **46** is drivingly connected to the shaft **38** by a driving connection **48**. The dial **46** has a plurality of indicia thereon to indicate the proper temperature setting for various fabrics and an "off" position to indicate that the contacts **34** and **35** are separated regardless of the sole plate temperature.

The structure previously described is disclosed in the aforementioned application by Vance. The present invention is combined with the construction shown and described in the Vance application in a novel manner which will now be described.

According to the present invention a second thermostatic switch **50** is provided. The switch **50** comprises a bimetallic element **51** and two spring switch arms **52** and **53** provided with contacts **54** and **55** respectively. An insulating button **56** is carried by the free end of the bimetallic element **51** and passes through an opening in the spring arm **52** so as to contact the spring arm **53** under certain conditions. The spring arm **32** of switch **30** is provided with an extension **57** which contacts an insulating button **58**, so that when the dial **46** is rotated to the "off" position to separate contacts **34** and **35**, contacts **54** and **55** will also be separated.

A manipulating handle generally indicated by the reference numeral **56** is secured to the cover shell **40** in any suitable manner. The handle **56** has hollow front and rear legs **57** and **58** respectively and a hollow hand grip portion **59** closed by a cover plate **60**. The hollow front leg **57** receives the filler tube **19** and the actuator **24** extends upwardly through an opening **61** in the top of the leg **57**. The hollow rear leg **58** and hand grip **59** houses the conductor cord for connecting the various switches to a power line. A two-way switch **60'** is mounted in the front end of the hand grip **59** and is actuated by the valve actuator **24** by a link **62** and arm **63**.

One strand **64** of the conductor cord to the power

line enters through an opening in the side of the leg 58 and is connected to one terminal of the heating element 11. The other strand 65 is connected to a common terminal 66 of the two-way switch 60'. One terminal 67 of switch 60' is connected by conductor 68 to the terminal 69 of switch 50. The terminal 70 of switch 60' is connected by conductor 71 to the terminal 72 of the switch 30. The terminal 73 of the arm 52 is connected by conductor 74 to the other terminal of the heating element 11 and by conductor 75 to the terminal 76 of the spring arm 32.

The cords 65, 68 and 71 are housed within the hollow grip 59 of the handle 56 while all of the cords including 64 are housed within the hollow rear leg 58. For purposes of clarity the entire length of the cords are not shown in Fig. 1 and reference is made to Fig. 2 for the proper wiring arrangement.

The dial 46 is marked with an "off" indicia and with indicia for indicating the proper setting for dry ironing various fabrics. There is no need for marking the dial 46 with an indicia for steam ironing since the switch 30 is cut out of operation by opening the water valve.

Operation

In the position shown in the drawings the iron is set for steam ironing. Valve 22 is open and the switch 60' is in the position shown in Fig. 2. The heater 11 is intermittently energized by the following circuit; conductor 65, terminal 66, switch 60', terminal 67, conductor 68, terminal 69, switch 50, terminal 73, conductor 74, heater 11 and conductor 64. It is to be noted that the switch 30 is completely out of circuit.

If it is desired to use the iron for dry ironing, the valve actuator 24 is moved to the dotted line position of Fig. 1 which closes the valve 22 and operates switch 60' so that the terminal 70 will be in circuit and the terminal 67 will be out of circuit. The dial 46 is rotated to the proper setting for the fabric which is to be ironed.

Under the above conditions the heater 11 will be intermittently energized by the following circuits; conductor 65, terminal 66, switch 60', terminal 70, conductor 71, terminal 72, switch 30, terminal 76, conductors 75 and 74, heater 11 and conductor 64. The switch 50 is completely out of circuit and the switch 30 takes over control of the sole plate temperature.

Whether the valve actuator 24 is in the full line or dotted line positions of Fig. 1 the dial 46 may be rotated to its "off" position and both switches 30 and 50 will be completely deactivated. The button 39 will be moved downwardly to move spring arm 32 downwardly to open contacts 34 and 35 regardless of the sole plate temperature. The extension 57 of the spring arm 32 will contact button 58 and move spring arm 52 downwardly, separate contacts 54 and 55 regardless of the sole plate temperature.

While we have shown but a single modification of our invention it is to be understood that that modification is to be taken as illustrative only and not in a limiting sense. We do not wish to be limited to the particular structure shown and described but to include all equivalent variations thereof except as limited by the scope of the claims.

We claim:

1. In a convertible steam iron, a sole plate, a heater therefor, a first thermostatic switch responsive to the temperature of said sole plate for intermittently energizing said heater to control the temperature of said sole plate, a second thermostatic switch responsive to the temperature of said sole plate for intermittently energizing said heater for controlling the temperature of said sole plate, a boiler formed in said sole plate, a valve for controlling the flow of water to said sole plate, a valve actuator for opening and closing said valve, a two-way switch connected in circuit with said first and second thermostatic switches and means actuated by movement of said valve actuator to valve opening position operable to cut the first of said thermostatic switches out of circuit and the second into circuit.

2. In a steam iron according to claim 1 in which the first of said thermostatic switches is manually adjustable to vary the temperature setting of said sole plate and the second of said thermostatic switches has a fixed temperature setting proper for steam ironing.

3. In a steam iron according to claim 2 in which the fixed temperature setting of said second thermostatic switch is intermediate the adjustable settings of said first thermostatic switch.

4. In a steam iron convertible for dry or steam ironing comprising, a sole plate, a heater therefor, a boiler formed in said sole plate in heat exchange relationship with said heater, a valve controlling the flow of water to said boiler, an actuator for moving said valve to its open or closed positions, a manually adjustable thermostatic switch operable to intermittently energize said heater to maintain a proper sole plate temperature for dry ironing and means actuated by movement of said valve actuator to its valve opening position for cutting said thermostatic switch out of circuit and means actuated by said valve actuator to its valve opening position for energizing said heater independently of said manually adjustable switch.

5. In a steam iron having a sole plate, a heater therefor, a boiler for converting water into steam, a valve for controlling the flow of water to said boiler, a valve actuator for moving said valve to its open or closed positions and a manually adjustable switch responsive to sole plate temperature for intermittently energizing said heater; that improvement which comprises; a second thermostatic switch responsive to sole plate temperature for intermittently energizing said heater; a two-way switch selectively actuatable to cut either of said thermostatic switches out of circuit and actuating means connected between said valve actuator and said two-way switch and operable to cut said manually adjustable thermostatic switch out of circuit and to place said second thermostatic switch into circuit when said valve actuator is moved to its valve opening position.

6. In a steam iron according to claim 5 in which said actuating means and said valve actuator are operable to cut said second thermostatic switch out of circuit and to place said manually adjustable thermostatic switch into circuit when said valve actuator is moved to its valve closing position.

7. In a steam iron according to claim 5 including a dial for controlling the temperature setting of said manually adjustable thermostatic switch, said dial having an "off" position in which said manually adjustable thermostatic switch is open circuited regardless of the temperature of said sole plate and means actuated by movement of said dial to its "off" position for open circuiting said second thermostatic switch regardless of the sole plate temperature.

8. A steam iron comprising, a sole plate, a heater therefor, a water tank associated with said sole plate, a boiler formed in said sole plate for converting water into steam, a valve for controlling the flow of water from said tank to said boiler, a valve actuator for moving said valve to its open or closed positions, a manually adjustable thermostatic switch mounted on said sole plate for intermittently energizing said heater, a rotatable dial for adjusting the temperature setting of said manually adjustable thermostatic switch, a second thermostatic switch mounted on said sole plate for intermittently energizing said heater, a two-way switch selectively operable to cut either thermostatic switch out of circuit and to place the other switch into circuit and actuating means connected between said valve actuator and said two-way switch and operable to cut said manually adjustable thermostatic switch out of circuit and to place said second thermostatic switch into circuit when said valve actuator is moved to its valve opening position.

9. A steam iron according to claim 8 in which said

dial has an "off" position in which said manually adjustable thermostatic switch is open circuited regardless of the sole plate temperature and means actuated by movement of said dial to its "off" position for open circuiting said second thermostatic switch regardless of the sole plate temperature.

10. In a steam iron according to claim 8 in which said actuating means and said valve actuator are operable to cut said second thermostatic switch out of circuit and to place said manually adjustable thermostatic switch into circuit when said valve actuator is moved to its valve closing position.

11. In a steam iron according to claim 10 in which said dial has an "off" position in which said manually adjustable thermostatic switch is open circuited regardless of the sole plate temperature and means actuated by movement of said dial to its "off" position for open circuiting a second thermostatic switch regardless of the sole plate temperature.

12. In a steam iron having a sole plate, a heater therefor, a boiler for converting water to steam, a manually adjustable thermostatic switch for intermittently energizing said heater for maintaining the sole plate at a plurality of preselected temperatures when the iron is used for dry ironing and being movable to an open circuiting position regardless of the sole plate temperature; that improvement which comprises; a second thermostatic switch having a fixed temperature setting mounted on

said sole plate for intermittently energizing said heater to maintain said sole plate at a single preselected temperature when the iron is to be used for steam ironing and means for selectively cutting said manually adjustable switch out of circuit with said heater and for placing said second switch in circuit with said heater.

13. In a steam iron according to claim 12 including means actuated by movement of said manually adjustable thermostatic switch to open circuiting position for open circuiting said second thermostatic switch regardless of sole plate temperature.

14. In a steam iron according to claim 12 including manually actuable means selectively operable to cut one of said thermostatic switches out of circuit and to place the other into circuit.

15. In a steam iron according to claim 14 including means actuated by movement of said manually adjustable thermostatic switch to open circuiting position for open circuiting said second thermostatic switch regardless of sole plate temperature.

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