Nov. 19, 1946. R. I. FELVER 2,411,199

STEAM IRON

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FIG. 1.

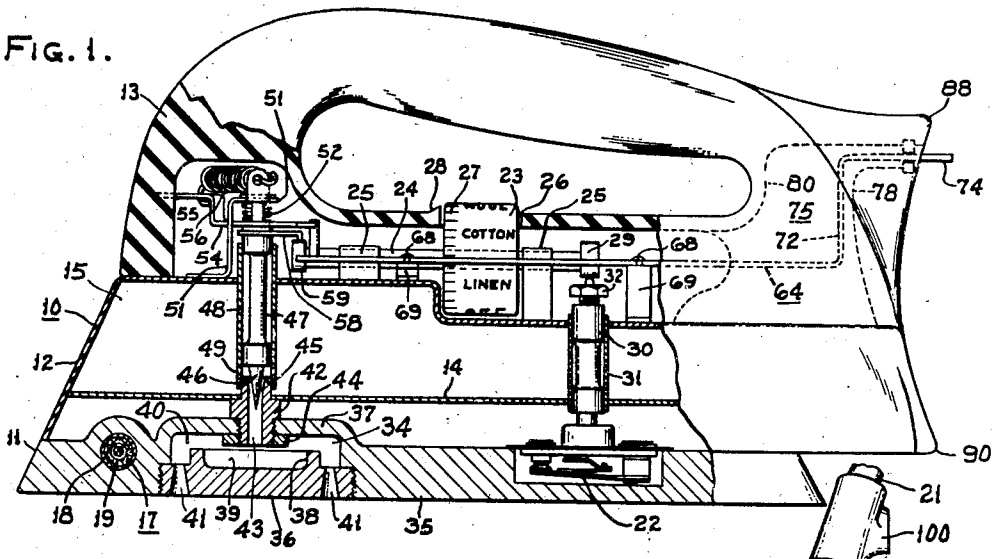


FIG. 2.

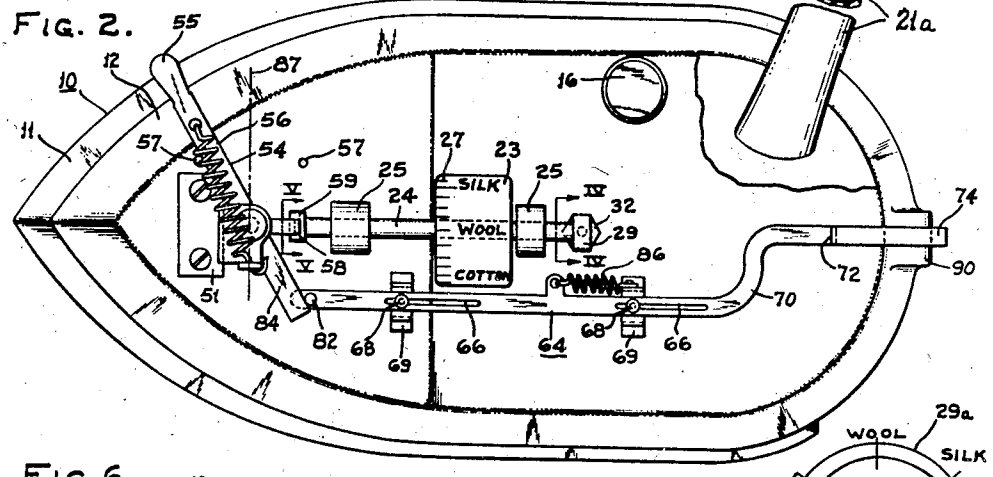


FIG. 6.

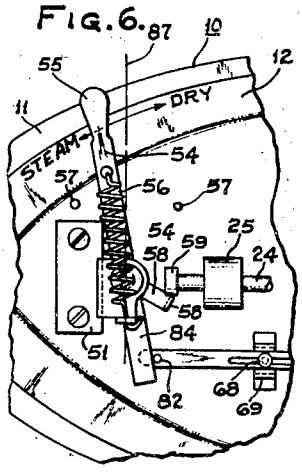


FIG. 3.

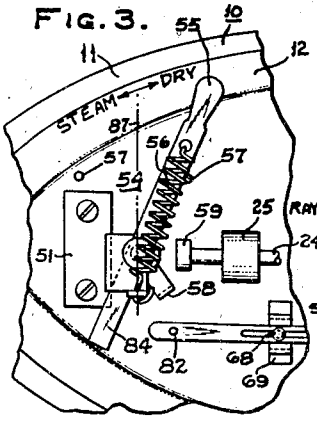


FIG. 5.

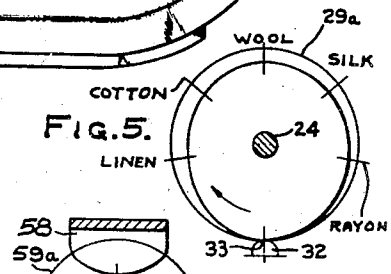
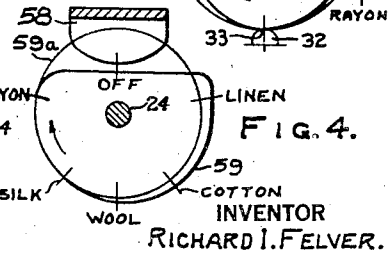


FIG. 4.



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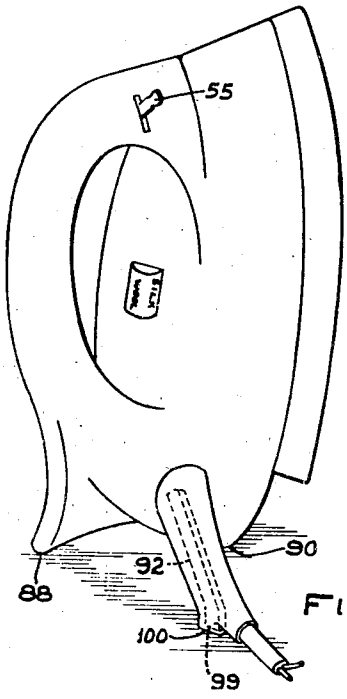


FIG. 8.

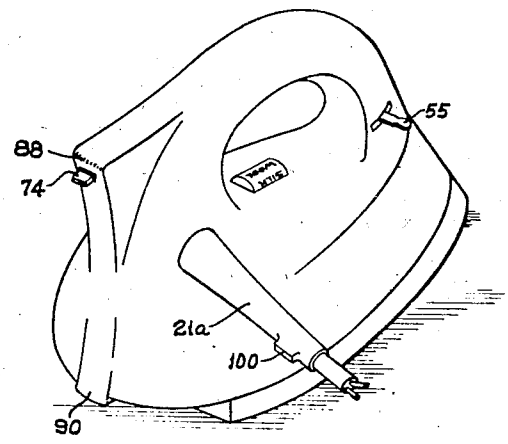


FIG. 7.

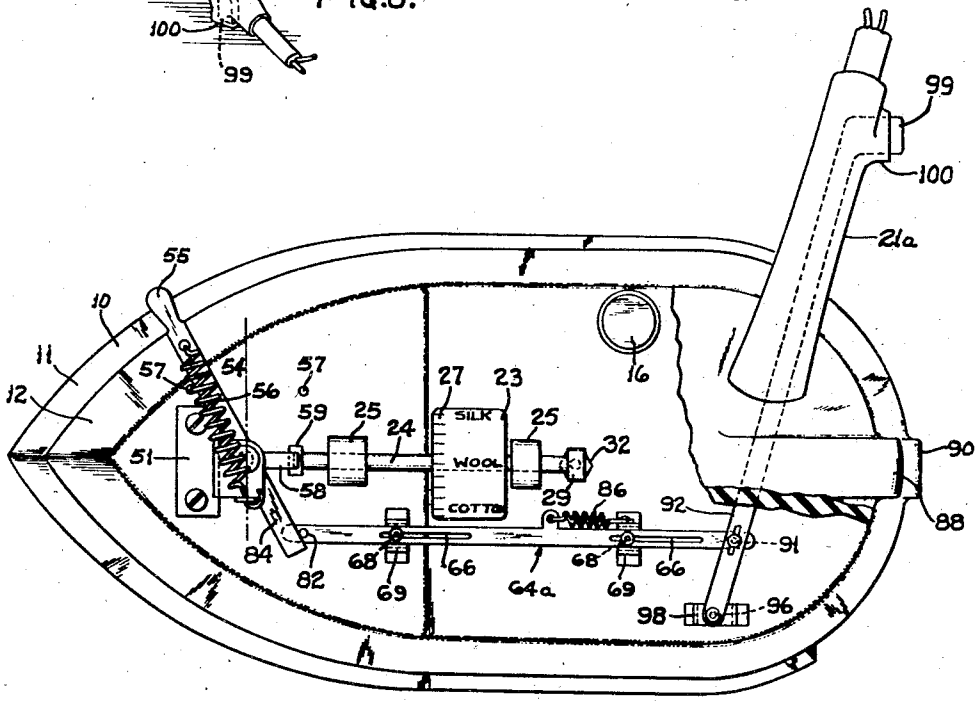


FIG. 9.

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UNITED STATES PATENT OFFICE

2,411,199

STEAM IRON

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Application August 19, 1943, Serial No. 499,207

3 Claims. (Cl. 38—77)

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My invention relates to a steam iron, and more particularly to the type of steam iron which includes means for supplying water at a regulated rate to a steam generator provided within the iron, and has for an object to produce an improved iron of the type set forth.

A further object of my invention is to produce a steam iron of the type set forth which includes means for automatically shutting off the water supply from the steam generator when said iron is placed upon, or in abutment with, a support, during temporary interruption of the ironing operation and for restoring the water supply upon removal of said iron from said support for resumption of the ironing operation.

A further object of my invention is to produce a steam iron of the type set forth in which the means for shutting off and restoring the water supply is operable independently of and without affecting the adjustment of the water supply or the adjustment of the temperature control of such iron.

A still further object of my invention is to produce a steam iron embodying the improvements set forth, which will be simple and inexpensive to produce.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in accordance with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a view partly in vertical section and partly in elevation, showing a steam iron embodying my invention;

Fig. 2 is a top plan view of the iron illustrated in Fig. 1, with the handle removed and with the water supply regulating valve open;

Fig. 3 is a fragmentary view, showing the left-hand portion of Fig. 2 with the regulating valve closed;

Figs. 4 and 5 are fragmentary sectional views on lines IV—IV and V—V of Fig. 2, respectively;

Fig. 6 is a view similar to Fig. 3, showing the regulating valve closed during temporary interruption of the ironing operation;

Fig. 7 is a perspective view of the iron shown in Figs. 1 and 2;

Fig. 8 is a perspective view of a steam iron embodying a modified form of my invention; and,

Fig. 9 is a view similar to Fig. 2, showing details of the modified form of invention.

Referring first to the embodiment of the invention illustrated in Figs. 1 to 6, inclusive, there is shown a steam iron 10 comprising a soleplate 11, a cover member 12, and a handle 13, which are

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suitably secured together. The interior of the cover 12 is provided with a suitable partition 14, which, together with the side and top walls of the cover, defines a liquid reservoir 15. Water, or other liquid suitable for dampening clothes, is introduced into the reservoir 15 through an opening provided in the top of the cover 12 and normally closed by a removable plug 16 (Fig. 2). The reservoir 15 may be vented in any desired manner.

The soleplate 11 may be of conventional outline and is heated by a heating element 17 embedded therein. The heating element 17 may be of any well-known construction and comprises an outer sheath 18 having a resistance element 19 supported in spaced, insulated relation thereto in any well-known manner, and energized by conductors 21 which are sheathed in a sleeve 21a.

The heating element 17 is connected to the conductors 21 in series with a manually-adjusted thermostat 22 which is carried by and is responsive to the temperature of the soleplate 11.

The thermostat 22 is adjusted by means of a knob 23 fixed to a shaft 24, journaled in bearings 25 fixed to the top of the cover 12. The knob 23 is arranged so that the upper portion thereof projects through a window 26 provided in the top of the cover 12. The knob 23 is provided with a scale 27, adapted to be read in conjunction with an index 28 fixed to the iron adjacent the window 26 for indicating the selected ironing temperature.

The rear end of the rod 24 is provided with a cam 29 which engages the upper end of a rod 30 operatively connected to the thermostat 22. The rod 30 is slidable in a vertical sleeve 31, which extends through the reservoir 15 and is secured in fluidtight manner to the upper and lower walls thereof.

As the shaft 24 is rotated by means of the knob 23, the cam 29 raises or lowers the rod 30 to adjust the thermostat to maintain the soleplate at any desired temperature. The rod 30 is spring-biased upwardly to maintain the same in engagement with the cam 29, and is provided with an adjusting screw 32, the head of which engages the cam 29 to aid in calibrating the thermostat. The thermostat and its adjusting mechanism is preferably arranged so that the high point 33 (Fig. 5) of the cam maintains the thermostat continuously open regardless of the temperature of the soleplate, to provide an "off" position for the iron.

The heating element 17 is preferably U-shaped, and the soleplate is provided with a recess 34

located within the bight of the U-shaped heating element and opening on the ironing surface 35 of the soleplate. The lower end of this recess is closed by a removable plug 36 which is spaced from the wall 37 of the soleplate, overlying the recess 34, to define a steam-generating space within the soleplate. The plug 36 is provided with a raised annular rib or baffle 38, which divides the space within the soleplate into two communicating compartments 39 and 40. When water from the reservoir 15 is supplied to the compartment 39, it is instantly flashed into steam. The steam thus formed flows over the annular rib 38 into the compartment 40, from which it is discharged, through ports 41 provided in the plug 36, to the material to be pressed.

The reservoir 15 and the steam-generating space are connected by a passage 43 formed in a bushing 42, which is disposed between and secured in fluidtight relation to the lower wall 14 of the reservoir and the upper wall 37 of the soleplate.

The upper end of the passage 43 is flared outwardly to provide a valve seat 45 for the lower, tapered end 46 of a valve stem 47 to close the passage. The valve stem extends through and is guided for vertical movement by a sleeve 48 secured in fluidtight relation to the upper wall of the reservoir 15 and telescoped over the reduced upper end of the bushing 42. The sleeve 48 is provided with suitable apertures 49 which permit water in the reservoir chamber 15 to enter the passage 43 when the valve is open.

The upper end of the valve stem 47 extends through an opening in a bracket 51 which is fixed to the iron and which serves as an abutment for the upper end of a compression spring 52 coiled about the upper end of the valve stem 47. The lower end of the compression spring 52 rests upon a lever 54, which is suitably secured to the valve stem 47. The spring 52 normally biases the valve stem 47 downwardly toward valve-closing position.

The lever 54 includes an offset handle portion 55 which extends beyond the side of the handle 13, through a slot formed therein. An angularly-disposed arm 58 is secured to the valve stem 47 in fixed relation to and movable with the lever 54. An over-center spring 56 is secured at one end thereof to the handle 55 of the lever 54, and is secured at its other end to the bracket 51 on the centerline 87. The spring 56 constitutes a snap-acting or toggle mechanism which serves to urge and retain the lever 54 in position to either side of the centerline 87. Suitable stops 57 prevent the movement of the lever 54 beyond the two positions.

The arm 58 is adapted to ride on, or to assume a position clear of, a cam 59 carried on the forward end of the rotatable rod 24, depending on the position of the lever 54. Thus, in the position of the lever 54 shown in Fig. 3, the arm 58 is clear of the cam 59 and the spring 52 maintains the water valve closed. This position of the lever is identified by the legend "Dry" on the iron. By moving the lever 54 to the position shown in Fig. 2, the arm 58 rides on the cam 59 and, depending upon the position of the cam, is raised thereby to raise the valve stem 47 and open the water valve. This position of the lever may be termed the steam position and is so identified by the legend "Steam."

The cam 59 is of such contour as to close, or partly or fully to open, the water valve, depending upon the temperature adjustment of the thermostat, so as to provide a rate of water flow to the steam generator which will supply the correct amount of steam for the type of material to be pressed. Thus, the cams 29 and 59 are correlated so that for each temperature setting of the thermostat effected by the cam 29, the cam 59 will open the water valve a certain amount to provide the correct rate of wate flow to the steam generator. It is also to be noted that the valve may be opened (Fig. 2) or closed (Fig. 3 without changing the adjustment of the cams 29 and 59. Therefore, the iron remains at the desired temperature and when the valve is opened the supply of water will be at the rate to which it had been previously set.

In Figs. 4 and 5, the cams 59 and 29 are shown on an enlarged scale in the position they assume when the knob 23 is set at "Off." In these figures, the parts of the cams which respectively engage the lever 58 and adjusting screws 32 when the knob is adjusted for a particular temperature setting are identified by the same legends appearing on the knob itself. Thus, when the knob 23 is turned to bring the legend "linen" opposite the index 28, the point on the cam 29 identified by the legend "linen" in Fig. 5 will overlie the screw head 32 and adjust the thermostat 22 to maintain the soleplate at a temperature suitable for ironing linen. Similarly, this setting of the knob 23 will bring the point of the cam 59 identified by the legend "linen" beneath the arm 58 to raise the valve stem sufficiently to provide a rate of water flow to the steam generator sufficient to correctly dampen linen.

Also, in Figs. 4 and 5, reference circles 59*a* and 29*a*, respectively, are provided to show the extent to which the valve stem 47 is raised by the cam 59 as the knob 23 is turned from "rayon" to "linen," and the amount the thermostat adjusting rod 30 is permitted to rise as the knob 23 is turned from the "off" position to the "linen" or maximum temperature position. In these figures, curved arrows indicate the direction of rotation of the cams as the knob is turned throughout the range of adjustment from "off" position through progressively higher temperature settings up to maximum temperature position.

During an ironing period there are frequent interruptions during which the iron is temporarily idle. These interruptions occur when a new piece of work is being prepared for ironing, when a piece of work being iron has to be moved or folded, or when a finished piece of work is put away, etc.

In order automatically to shut off the water supply when the ironing operation is thus temporarily interrupted and in order to leave the valve in position automatically to open as soon as the ironing operation is resumed, I provide a rod 64 which is slotted at 66 to engage guide pins 68 carried by brackets 69 which, in turn, are carried by a suitable portion of the body of the iron, such as the top of the cover 12. The rod 64 is bent to form an elbow 70 and a vertical portion 72 which terminates in a horizontal extension 74 projecting beyond the rear end of the handle 13 as clearly shown in Figs. 1 and 2. The vertical portion 72 of the rod 64 is movable in a space 75 provided within the handle 13 and defined by walls 78 and 80. At its inner end, the rod 64 is provided with a pin 82, which, in the inner position of the rod 64, is adapted to engage an arm 84 fixed to the valve stem 47. The rod 64, as a

whole, is biased to the right in Figs. 1 and 2 by a spring 86.

Operation—Figs. 1 and 2

During the actual ironing, the rod 64 is entirely ineffective, and the iron may be turned on or off or adjusted as to water supply and temperature, in the manner above set forth. When the ironing operation is momentarily interrupted, the iron is usually stood on its end (Fig. 8). In this position, the extension 74 of the rod 64 comes in contact with the ironing board or other support, and, under the weight of the iron the rod 64 moves inwardly relative to the body of the iron and against the action of the spring 86. The iron now rests on the tip 88 of the handle 13, the rear boss 90 of the cover 12 and the boss 100 formed on the side and near the end of the sleeve 21a. The movement of the rod 64 inwardly, or to the left in Figs. 1 and 2, causes the pin 82 to engage the arm 84 of the lever 54 and thus rotate the valve stem 47 in clockwise direction in Fig. 2. The arm 58 now moves from the position shown in Fig. 2 in which the arm 58 rides on the cam 59 and the water supply regulating valve is open, to the position shown in Fig. 6 in which the arm 58 is out of engagement with the cam 59 and the valve is closed. It will be noted that, in this position, the lever 54 remains to the left of the centreline 87. Therefore, as soon as the iron is lifted and the pressure on the rod 64 is relieved, the spring 86 biases the rod 64 to the right and withdraws the pin 82 out of the path of movement of the end 84 of the lever 54. The spring 56 now automatically moves the lever arm 54 back to the position shown in Fig. 2, in which the water supply regulating valve is again open to whatever extent it may have been previously adjusted. As above pointed out, if it is desired to use the iron dry, the lever 54 is moved manually to the right of the centerline 87 and is urged to and maintained in the position shown in Fig. 3 by the spring 56. In this position, the water supply regulating valve is closed and the rod 64 is entirely ineffective whether the iron is in actual use or is momentarily idle.

In Figs. 8 and 9, I show an alternate construction in which the elbow 70, the vertical portion 72 and the extension 74 of the rod 64 are omitted. In this construction, the rod 64a is pivoted at 91 to a lever 92, the inner end of which is pivoted at 96 to a bracket or the like 98 carried by, or forming part of, the top of the cover 12. The lever 92 extends, and is movable within an opening in the sleeve 21a and the finger 99 formed at the outer end of the lever 92 projects through an opening in the boss 100.

The operation of the embodiment of Figs. 8 and 9 is identical with that of the embodiment first described except that when the iron is stood on its end, as shown in Fig. 8, the extension of the lever 92 is pushed inwardly through the hollow boss 100 and sleeve 21a to actuate the rod 64a.

It will be noted that, in both embodiments, the movement of the lever 54 and arm 58 from the position shown in Fig. 2 to the position shown in Fig. 3 or 6 does not in any way affect the adjustment of the thermostat or water supply regulating valve.

Also, while in the embodiments illustrated, the end 74 of the rod 64 and the end 99 of the lever 90 both project in a generally rearward direction so as to be operable when the iron is stood up on its rear end, it is within the scope of my invention to so construct the actuating levers that

the end 74 or 99 will project through a side or some other portion on which the iron may be rested while temporarily idle. Also, it is pointed out that the invention may be applied to the ordinary, heel rest type of iron in which the bosses 90 and 100 may be omitted.

While I have shown my invention in several forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. The combination with a steam iron comprising a soleplate, heating means for said soleplate, a thermostat for controlling said heating means, a steam generator carried by said soleplate, valve means including a valve stem and a spring biasing said valve stem downwardly to valve closing position, to shut off the supply of water to said steam generator, means for concomitantly adjusting said thermostat and said valve to vary the temperature of said soleplate and the rate of flow of water to said steam generator, said means including a shaft, a first cam carried by said shaft and operatively associated with said thermostat, a second cam carried by said shaft and disposed near said valve means, a lever secured to said valve stem and movable to a first position and to a second position, an arm movable with said lever to ride on said second cam to raise said valve stem against the action of said spring thereby to open said valve means, said arm being adapted, in the second position of said lever, to clear said second cam thereby to permit said spring to bias said valve stem to close said valve means, and a toggle mechanism for retaining said lever in either of said positions, of means for closing said valve, without changing the adjustment of said valve or said thermostat, including a movable member carried by said iron and having one end thereof projecting through a surface of the iron other than the soleplate thereof, with the other end of said member disposed adjacent to, and adapted to engage one end of said lever, and a spring biasing said member outwardly or in a direction away from said lever, said member being so constructed and arranged that when said iron is placed on a support, with said surface thereof in contact with said support, said member actuates said lever to said second position, but not past the dead center of said toggle mechanism, whereby said toggle mechanism automatically returns said lever to said first position when said iron is lifted off said support.

2. A steam iron including a steam generator carried by said iron, a valve for supplying water to said steam generator, valve control means including a member adapted to be manually positioned to close the valve or to permit opening of the valve, said control means further including an element adapted to be engaged by a support on which the iron is placed in non-ironing position, said control means being operative, when said manually-positioned member is positioned to permit opening of the valve, to close said valve upon said element engaging said support, and to open said valve upon said element disengaging said support, said control means being operative to close said valve independently of the position of said element when said manually-positioned member is positioned for closing the valve.

3. A steam iron including a steam generator, a

valve for supplying water to said steam generator, means for controlling operation of said valve, said means including a valve-actuating lever movable into a first position, in which said valve is closed, and into a second position, in which said valve is open and from which position said lever may be moved in valve-closing direction sufficiently to close said valve without said lever moving into said first position, an overcenter spring operative when said lever is moved in either direction past dead center of said spring to bias said lever to said first or said second position, and a movable member carried by said iron and having one end thereof disposed outside the body of said iron and the other end thereof adapted to engage said lever, said movable member being so constructed and arranged in relation to said lever that, when said iron is placed in a non-ironing position on a support and said one end of said movable member engages said support while said lever is in said second position, said other end of said movable member will engage and move said lever in valve-closing direction sufficiently to close said valve, but not past the dead center of said spring, whereby, when said iron is lifted off said support and said one end of said movable member is disengaged from said support, said movable member is biased away from said lever, and said spring returns said lever to said second position to reopen said valve.

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