Aug. 13, 1957 A. C. HOECKER 2,802,289

STEAM IRON

Original Filed March 31, 1948

Fig. 1.

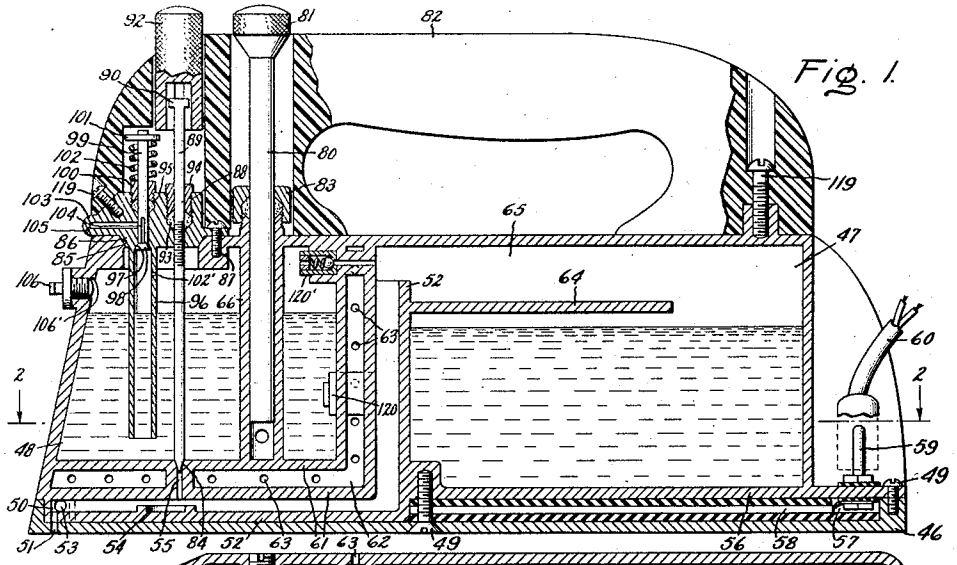


Fig. 2.

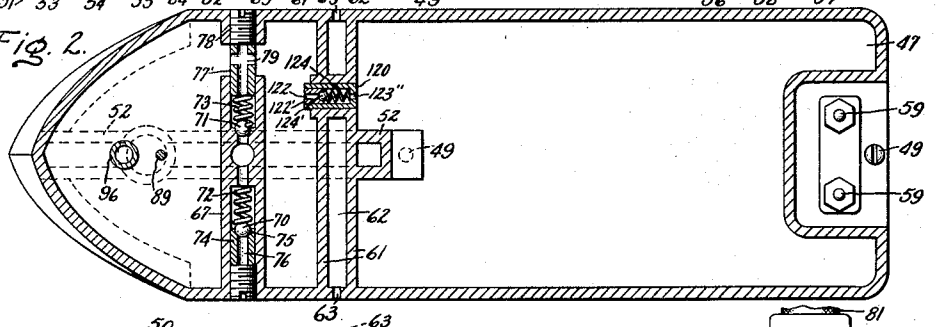


Fig. 3.

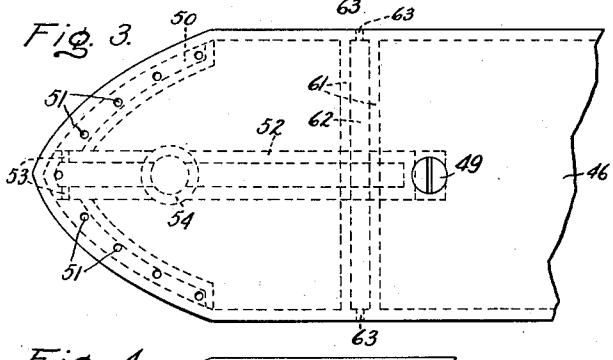


Fig. 4.

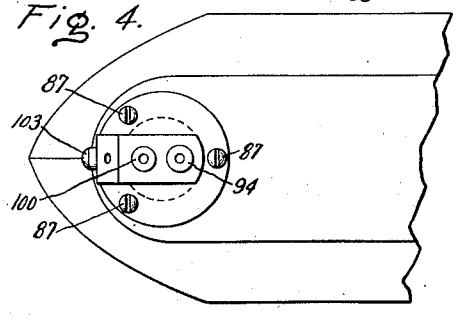
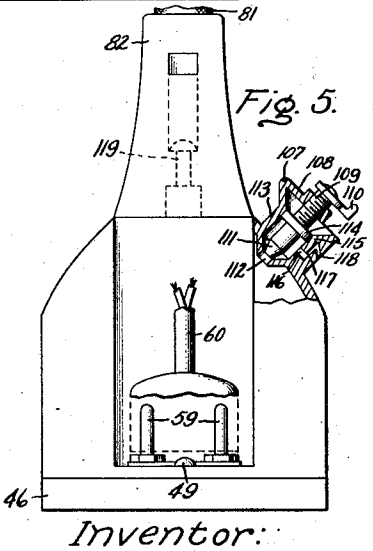


Fig. 5.



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STEAM IRON

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Original application March 31, 1948, Serial No. 18,091, now Patent No. 2,716,297, dated August 30, 1955. Divided and this application January 25, 1955, Serial No. 483,894

8 Claims. (Cl. 38—77)

This invention relates to steam irons and more particularly to steam and dampening irons.

This invention is a division of my copending application Serial No. 18,091, filed March 31, 1948, now Patent No. 2,716,297, issued August 30, 1955.

The primary object of the invention is to provide a steam iron boiler from which steam can be conducted to the material to be ironed direct from the boiler and in which water can be directed to the heated sole plate so that steam can be quickly generated.

Another object of the invention is to provide an iron with a pumping system which can be operated by depressing a button on the handle of the iron and in which only sufficient water will be injected into the boiler to keep the boiler in operation with a limited interference with the steam pressure in the boiler.

A further object of the invention is to provide a water container formed in the shell of the iron in which air is pumped and means communicating with the air and water spaces for conducting a mixture of air and water to the material to be ironed.

A still further object of the invention is to provide an iron with a pumping system for conducting atomized water to the material to be ironed and in which the mechanical parts of the system are mostly enclosed within the shell of the iron so as to provide a streamline effect.

Another object of the invention is to provide a pressing iron with a water container, insulated from the sole plate, and a pump communicating with the water in said container and with an atomizing nozzle for forcing the water through said atomizing nozzle to atomize the water.

A further object of the invention is to provide novel means for filling the boiler and water container with water.

A still further object of the invention is to provide a steam and dampening iron with a water container and steam boiler, the water container being insulated from the boiler to prevent the steam from the boiler converting the water in the water container into steam.

Another object of the invention is to provide a steam iron boiler with means for atomizing a mixture of steam and water and for conducting the atomized mixture of steam and water to the material to be ironed.

An additional object of the invention is to provide a pressing iron with a sole plate or hot plate and a water container having an opening communicating with said hot plate and means for regulating the water passing through said opening including means for creating pressure in said container to force the water through said opening onto said hot plate and thereby increase the steam discharged from said hot plate.

Other and further objects will appear in the specification and specifically pointed out in the appended claims, reference being had to the accompanying drawings exemplifying the invention and in which:

Fig. 1 is a central longitudinal sectional view of the iron.

Fig. 2 is a cross-sectional plan view taken on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary bottom view of the iron shown in Fig. 1;

Fig. 4 is a fragmentary top view of the iron shown by Fig. 1; and

Fig. 5 is a rear view of the iron shown by Fig. 1.

Referring to the accompanying drawing, the iron includes a sole plate 46, a steam boiler 47 and a water container 48, said sole plate being secured to the boiler by screws 49. The forward end of the sole plate 46 is provided with a V-shaped distributing channel 50 on its top surface and communicating with said channel are perforations 51 providing discharge outlets to the under side of the sole plate 46 for conducting steam to the material being ironed. The boiler 47 is provided with a member 52 which communicates with the steam space in the boiler and with the channel 50, through openings 53 in the side of the member 52, thereby conducting steam from the boiler to the channel 50. Obviously the member 52 is hollow and may be cast as an integral part of the boiler to extend along the heated sole plate 46 to the channel 50 and the toe of the iron. Cast as an integral part of the member 52 is a cup shaped member 54 which communicates with an opening 55 in the lower wall of the container 48. This cup 54 catches the water dropping from the opening 55, before the water enters the main path in the member 52, so that in the event the valve opening 55 (which will be described later) is opened further than necessary, the water in the cup 54 which is in direct contact with the heated sole plate 46 will be converted to steam, before entering the main opening of the member 52, thereby preventing water stains in the material ironed caused by drops of water that would be carried with the steam.

Disposed between the lower wall 56 of the boiler 47 and in a depression 57 in the upper surface of the sole plate 46 is an electrical heating element 58 with the conventional terminals 59, which extend through the lower wall 56 of the boiler and are connected to a conductor 60, which conducts electrical energy from a source of electrical supply to the heating element 58.

The forward portion of the iron is provided with a water container 48 having double walls 61 so as to provide an air space 62 between this container and the sole plate 46 and boiler 47, thereby insulating container 48 from the heat of the iron. Extending through the side walls of the iron and communicating with the air space 62 are perforations 63 providing air inlets to the air space 62. The steam boiler 47 is provided with a partition 64 which extends from side wall to side wall of the boiler so as to provide a steam chamber 65 and to prevent the water in the boiler from entering the steam outlet in the member 52.

Cast as an integral part of the water container 48 is a pump cylinder having its upper end extending through the upper wall of the water container 48. The lower end of the pump cylinder 66 is provided with a transverse hollow member 67 which is cast as an integral part of the pump cylinder 66 and upper wall of the double walls 61, said hollow member communicating with the pump cylinder 66 and water container 48 and also with the atmosphere, through valves, which will be described later. The air inlet of the transverse member is cast as an integral part of the side wall of the water container 48. The opening in the hollow members 67 is enlarged so as to provide a shoulder adapted to be engaged by a spring 72, said spring also engaging a ball air inlet valve 70 for holding the valve on its seat 75, said seat being a part of

a tubular member 74 which is screw-threaded through the outer wall of the container 48 and into the hollow member 67. Thus it will be observed that when the plunger 80 is pulled upwardly a vacuum will be created in the cylinder thereby causing the valve 70 to be lifted off its seat 75 and air to enter the cylinder 66 through the passageway 76 in the tubular member 74 and side wall of the water container 48. The other end of the hollow transverse member 67 communicates with the interior of the water container 48. The opening in the hollow member is enlarged to form a valve seat for the ball discharge valve 71 and engaging the ball valve 71 is a spring 73 which also engages the end of a tubular member 77' for holding the ball discharge valve on its seat. The outer end of the tubular member 77' is closed by a threaded plug 78 which is screw-threaded in the side wall of the container 48. In the tubular member 77' and communicating with the interior of the container and cylinder is a discharge outlet 79 through which the air from the cylinder is pumped into the water container 48. The valve assembly can be replaced and repaired by removing the plug 78. The plunger 80 is provided with a knob 81 which extends through the handle 82, so the operator of the iron can grasp the knob and reciprocate the plunger in the cylinder 66. Surrounding the plunger 80 is a ring of packing, held in position by a gland 83 which is screw-threaded on the cylinder 66.

From the foregoing it will be observed that if the operator of the iron grasps the knob 81 and pulls the plunger upwardly air will enter the cylinder 66, as previously mentioned, and when the plunger 80 is forced downwardly the air in the cylinder will overcome the tension of the spring 73 and force the air past the ball discharge valve 71 and through the discharge outlet 79 into the container 48.

Extending through the double walls 61 and in alignment with the cup 54 is an opening 55 having a tapered part 84. In the top wall of the container 48 is a tapered opening 85 and in said opening is a correspondingly tapered plug 86, held in said opening by screws 87. Cast as an integral part of the plug 86 is a stuffing box 88 screw-threaded for the reception of a screw-threaded valve stem 89 having its lower end tapered and adapted to cooperate with the tapered opening 55, and its upper end provided with a T-shaped head 90 to receive the knob 92 for adjusting the tapered end of the valve stem 89 in the tapered opening 55. Surrounding the valve stem 89 is a packing ring 93 and screw-threaded in the stuffing box 88 is a packing gland 94 for adjusting the packing.

Cast as an integral part of the plug 86 is a second stuffing box 95 and tube 96 and in the tube 96 is a tapered valve seat 97, for receiving a correspondingly tapered valve 98 of a valve stem 99. The valve stem 99 extends through the stuffing box 95, and surrounding the valve stem 99 is a packing ring, which is adjusted by a packing gland 100. The upper end of the valve stem 99 is provided with a washer 101, which is tightly pressed on the stem 99, so that when the knob 92, which is slidably mounted on the valve stem, is moved downwardly the end of the knob will engage the washer 101 and thereby force the valve 98 off its seat 97. Surrounding the valve stem 99 is a spring 102 which engages the washer 101 and packing gland 100 for holding the tapered valve 98 on the tapered valve seat 97. The tube 96 which extends into the water in the container 48 is provided with an air inlet 102'. Also cast as an integral part of the plug 86 is a nozzle 103 which communicates with the container 48 through a slot 104 in the valve stem 99. The slot 104 in the valve stem conducts the dampening fluid from the valve 98 to the nozzle 103, from which the dampening fluid is conducted to the material to be ironed through the atomizing discharge outlet 105. A filler plug 106 is screw-threaded in the opening 106' for introducing water into the container 48.

The rear end of the boiler is provided with a filler device comprising a funnel 107 having a member 108 which extends approximately to the center of the funnel, and in this member 108 are screw-threads for the reception of a screw-threaded rod 109. The upper end of the rod 109 is provided with a handle 110 for rotating the rod in the threaded part of the member 108 and the lower end of the rod has a tapered part 111 which is normally seated in the opening 112 in the bottom part of the cylindrical part 113, which is part of the funnel 107. In the cylindrical part 113 of the funnel and pressed on the rod 109 is a collar 114, which is adapted to reciprocate in the cylindrical part 113, so that any steam which may be in the boiler 47, when introducing water in the boiler, will not injure the operator of the iron. In the side wall 115 of cylindrical part 113 is an opening 116 which communicates with a longitudinal slot 117 formed in a thickened part of the wall and the slot 117 also communicates with a discharge outlet 118 for conducting the steam downwardly from the funnel 107 and to the atmosphere, thereby preventing the exhaust steam from injuring the operator of the iron, when the handle 110 is being manipulated for introducing water into the boiler. In Fig. 5 it will be noted that the tapered part 111 is out of the opening 112 and the collar 114 is in the upper part of the cylindrical part 113, thereby permitting any steam that may be in the boiler to exhaust through the outlet 118. After the steam is all out of the boiler the handle 110 is turned to the left until the collar 114 is out of the cylindrical part 113 sufficiently to allow the water poured into the funnel 107, when filling the boiler, to bypass the collar and enter the boiler through the opening 112. After the boiler is filled with water the handle 110 is turned to the right until the tapered part 111 closes the opening 112, thereby sealing the boiler.

The handle 82 is secured to the iron by screws 119.

The operation of the iron is as follows:

Assuming now that the iron has been in operation and there is a small amount of steam in the boiler and the operator of the iron desires refilling the boiler with water, it is only necessary to turn the handle to the position illustrated in Fig. 5. In the position shown, any steam that may be in the boiler 47 will escape into the cylindrical part 113 through the opening 112 and exhaust through the opening 116 into the slot 117 and out the opening 118 to the atmosphere. Further turning of the handle 110 to the left will cause the collar 114 to rise above the cylindrical part 113 of the funnel 107, so that water introduced into the funned will flow into the boiler 47 through the opening 112. After the boiler is filled to approximately one inch from the partition 64, the handle 110 is turned to the right until the tapered part 111 is seated in the opening 112, sealing the boiler.

After the boiler is sealed, the plug 106 is removed from the container 48 and water introduced into the container until the water is in alignment with the filler plug 106, the plug is then replaced, sealing the container 48. Air is then pumped into the container 48 by grasping the knob 81 and pulling the plunger 80 upwardly, causing the air to rush into the cylinder 66, through passage 67 from the side wall of the iron, as shown by Figs. 1 and 2. Forcing the plunger 80 downwardly will cause the air in the cylinder to force the discharge valve 71 off the valve seat, forcing the air through the opening 79 into the container 48. A few strokes of the plunger 80 will force sufficient air into the container 48 to force the water through the opening 55 and through the atomizing discharge outlet 105. The operation of the atomizer and valve will be described later. Electrical connection may now be made between the conductor 60 and a source of electrical energy. This will result in the heating element 58 giving off heat which will heat the sole plate 46 of the iron and will also heat the walls of the boiler 47 so as to convert the water therein into steam. The steam so produced will pass upwardly into the steam chamber 65 and move downwardly through the steam conducting member 52 and openings 53 into the steam distributing channel 50 from which the steam will discharge onto the

material ironed through the perforations **51** in the sole plate. The steam can be dampened by rotating the knob **92** to the left, thereby retracting the tapered end of the valve stem **89** from the tapered opening **84** admitting water into the cup **54**, the water being atomized by the steam passing through the steam conducting member **52**. The material ironed may also be dampened by depressing the knob **92**, the edge of the knob **92** engaging the washer **101** on the valve stem **99** forcing the valve off its seat **97**, causing the air which was pumped into the container **48** to enter the opening **102'** in the tube **96** and pass through the slots **104** in the valve stem **99** into the nozzle **103** for discharge through the atomizing discharge outlet **105** to the material being ironed. It will be noted that when the air from the container is discharged through the discharge outlet **105**, the water in the container **48** will be supplied through the tube **96** and be mixed with the air passing through the atomizing discharge outlet **105**, thereby providing a fine spray of dampening fluid for dampening the material being ironed.

Note also that the iron is actually two irons and that either one may be operated independently of the other. The boiler **47** may be utilized as a steam iron without the co-operation of the container **48** and the container **48** may be operated as a steam iron by manipulating the knob **92** as previously described and admitting water into the cup **54** wherein the water will be converted to steam by the heat of the sole plate. From the cup **54** the steam will be discharged through the perforations **51** to the material to be ironed. The material ironed may be dampened by depressing the knob **92** as previously described.

The water in the container **48** may be forced into the boiler **47** through a valve **120** by increasing the air pressure in the container **48** above the steam pressure in the boiler **47**.

In order to limit pressure of steam in the boiler **47**, the iron is provided with a second valve **120'** (Fig. 1) of the same construction as the valve **120**, but adapted to operate just the reverse of the valve **120**. Hence, only one of these valves will be described in detail. The valve **120** consists of a casing **123** which extends through one of the double walls **61** and into the second wall **61**, with a small opening in said wall communicating with the casing **123** and the boiler **47**. Since the small opening **123''** is smaller than the opening in the casing **123** a shoulder is provided for the engagement of one end of a spring **124**, the other end of the spring engaging a ball valve **124'** which engages a tubular member **122'**, said member having a passageway **122**.

The valve **120** is clearly shown in section in Fig. 2. As shown, the air pressure in container **48** forces water through passageway **122** and forces ball valve **124'** off its seat thus admitting water from the container **48** into the boiler. This cools the water in the boiler **47**, decreasing the steam pressure and thereby conserving steam that would otherwise be exhausted in the atmosphere. While the valve shown in Fig. 2 admits air or water from the container **48** into the boiler **47** to cool the water in the boiler **47** to prevent the steam in the boiler from exceeding a predetermined pressure and thereby conserving steam, it is obvious that if the valve structure is reversed, as shown for valve **120'** in Fig. 1, the steam pressure in the boiler will force the valve off its seat and admit steam from the boiler into the water in the container **48** thereby preventing excessive steam pressure in the boiler.

This arrangement of dual check valves between the water container and boiler conserves steam, permits addition of water into the boiler without interfering with the normal operation of the iron, and discharges steam in case of excessive pressure in a manner which will not injure the operator of the iron or cause objectionable noise.

Having thus described the invention what I claim as new and desire to secure by United States Letters Patent is:

1. A steam and dampening iron comprising a water container having a water space and an air space and a steam boiler having a steam space and a water space, a sole plate secured to said boiler and means for heating said sole plate and the water in said boiler to generate steam, means communicating with said boiler and having a discharge outlet for conducting steam from said boiler to the material to be ironed, pumping means for pumping air into said container, fluid conducting means communicating with the water space in said container and having an air inlet and an atomizing discharge outlet for directing atomized water from said water space in said container to the material to be ironed to supply moisture thereto.

2. The combination of claim 1, including a control valve in the fluid conducting means for controlling the mixture of air and water discharged through said atomizing discharge outlet.

3. A steam iron comprising a sole plate, a steam boiler and an independent water container disposed above and connected to said sole plate, an air space between the boiler and container and between the container and sole plate, and a safety valve communicating with said container and said boiler to discharge steam from said boiler into said container upon occurrence of excessive pressure said container being spaced from the sole plate to provide air circulation to prevent the water from being heated so the water will condense the steam entering the container.

4. A steam iron comprising a sole plate, a steam boiler and an independent water container disposed above and connected to said sole plate, a safety valve communicating between said container and said boiler to discharge steam from said boiler into said container upon occurrence of excessive pressure, and means thermally insulating said container from said sole plate and from said boiler whereby steam entering said container is condensed.

5. In a steam iron including a sole plate and heating means therefor, a steam boiler disposed above and connected to said sole plate to receive heat therefrom, an independent water container including means thermally insulating said container from said sole plate and boiler, pressure relief valve means communicating between said boiler and said container to discharge steam from said boiler into said container upon occurrence of an excessive boiler pressure, exhausted steam thereby condensing within said relatively cool container, liquid valve means communicating between said container and boiler to supply liquid to said boiler when pressure in said container exceeds boiler pressure, and auxiliary means for increasing the pressure in said container.

6. A combined steam and dampening iron comprising a housing and sole plate including an operating handle and means for securing the housing, handle and sole plate together, said housing being provided with outer walls and a partition dividing the housing into a water container having a water space and an air space and a boiler having a steam space and a water space, means communicating with said steam space for conducting steam from said steam space over said sole plate to the material to be ironed for steaming the material, a discharge outlet communicating with said container and sole plate through which water from said container is dropped on a heated part of said sole plate to convert quickly the water into steam while the water in said boiler is being converted to steam to augment steam supplied from said boiler, means for heating said sole plate and the water in said boiler to produce steam, and pumping means having an air inlet for admitting air into said pumping means and a discharge outlet through which the air from said pumping means is pumped into said container, so the air pressure within said container will force the water out of said container onto the sole plate of the iron, thereby overcoming

the steam pressure generated by the heat of the sole plate and producing a greater amount of steam.

7. A dampening and pressing iron comprising a sole plate, a container disposed above and connected to said sole plate and having an air space and a water space therein, fluid conducting means communicating with said air and water spaces to mix the air with the water therein, a discharge outlet for said fluid conducting means directed toward the material to be ironed, pumping means communicating with said container for pumping air into said container for forcing the mixture of air and water through said discharge outlet, a water discharge outlet communicating with a part of the heated sole plate for discharging small quantities of water onto said sole plate to convert quickly the water into steam, and means communicating with the sole plate for conducting the steam to the material to be ironed.

8. A dampening and pressing iron comprising a sole plate, a water and air container disposed above and connected to said sole plate, means for compressing air into said container, means for heating said sole plate, fluid conducting means including an atomizing discharge outlet, said fluid conducting means communicating with the water space in said container to said discharge outlet, an air inlet in said fluid conducting means communicating with the air space in said container, air from said container entering said air inlet into said fluid conducting means to atomize the water and to conduct a mixture of air and water from said container to the material to be ironed.

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