June 12, 1956 W. G. SECK 2,749,633

STEAM IRON

Filed Jan. 26, 1955 5 Sheets-Sheet 1

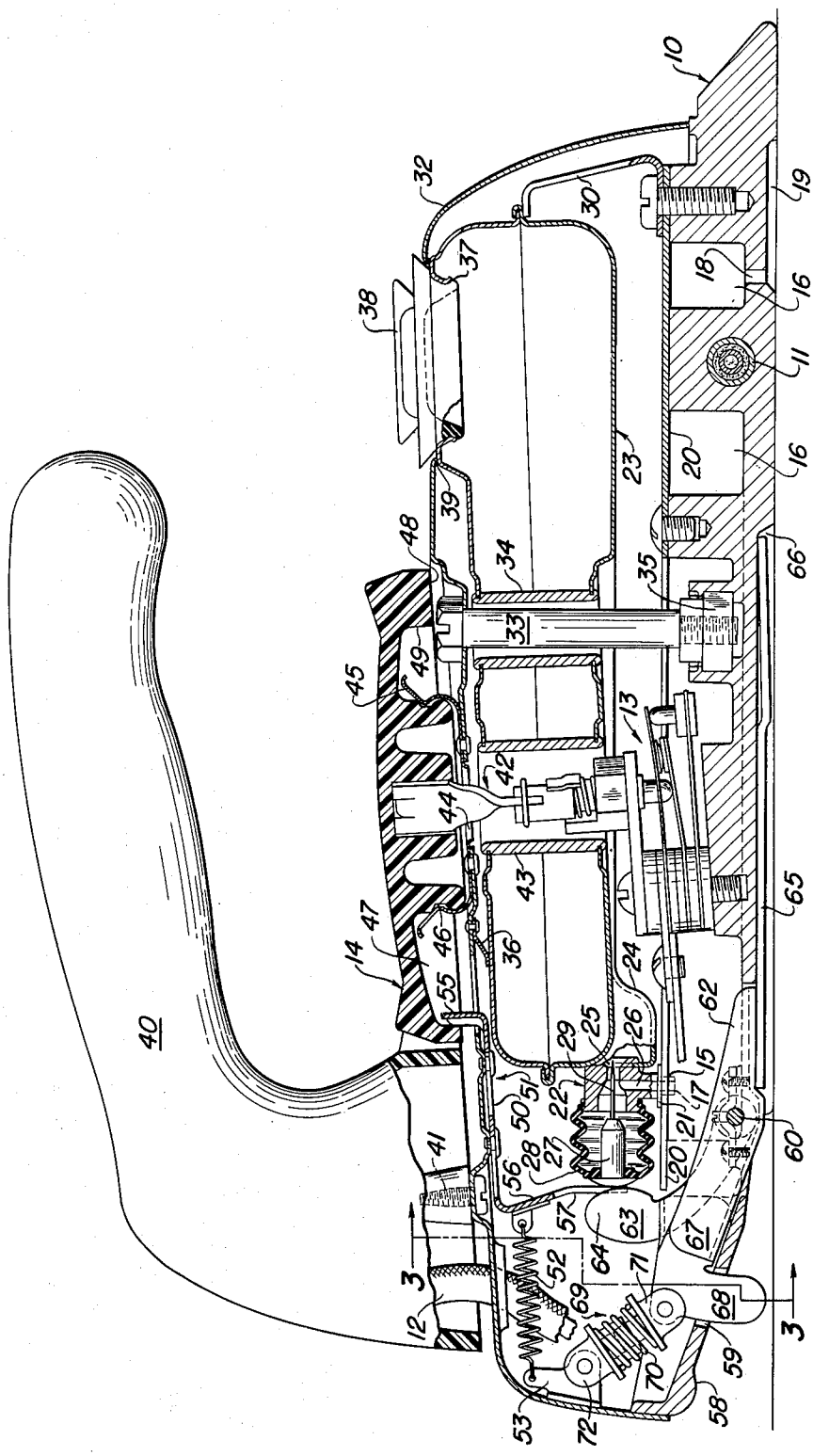


Fig. 1

June 12, 1956 W. G. SECK 2,749,633

STEAM IRON

Filed Jan. 26, 1955 5 Sheets-Sheet 2

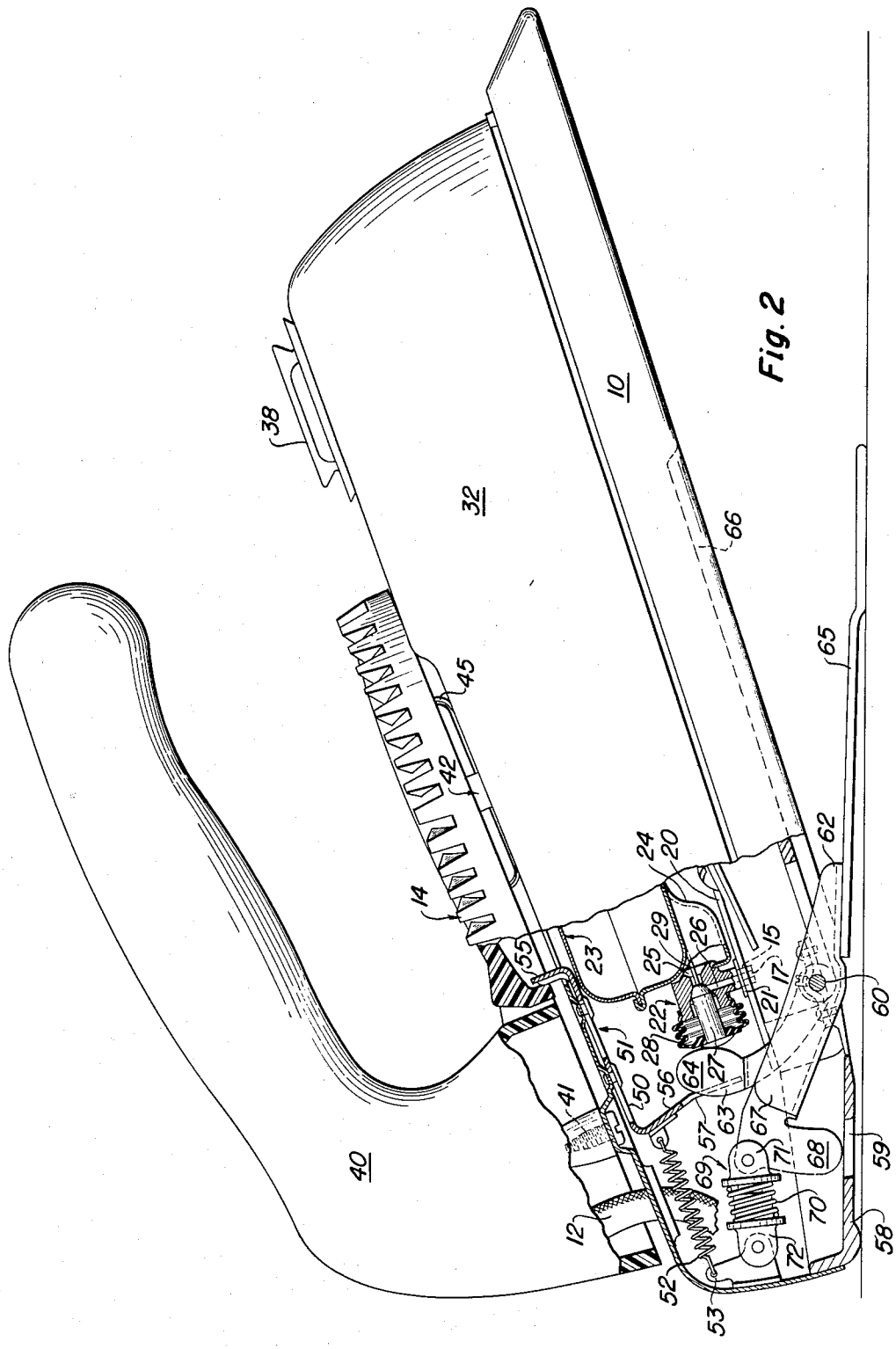


Fig. 2

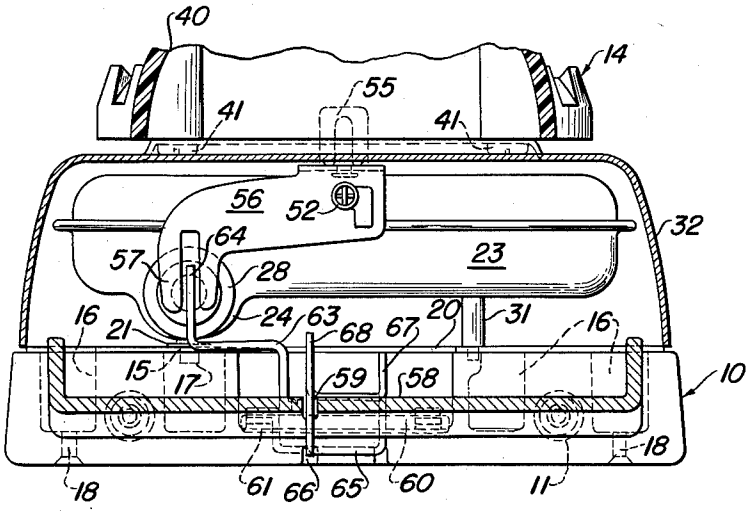

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Fig. 3

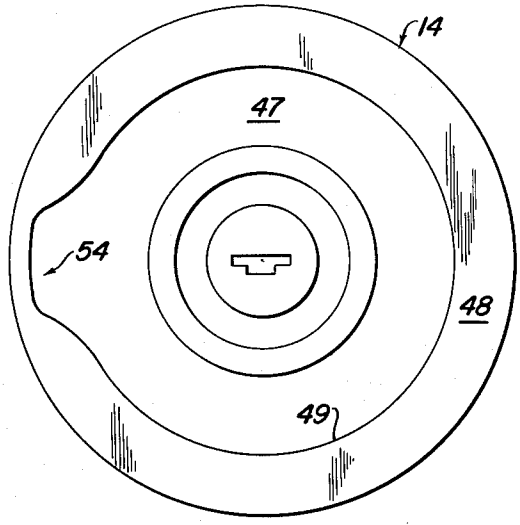

14
47
54
48
49

Fig. 4

June 12, 1956 W. G. SECK 2,749,633

STEAM IRON

Filed Jan. 26, 1955 5 Sheets-Sheet 4

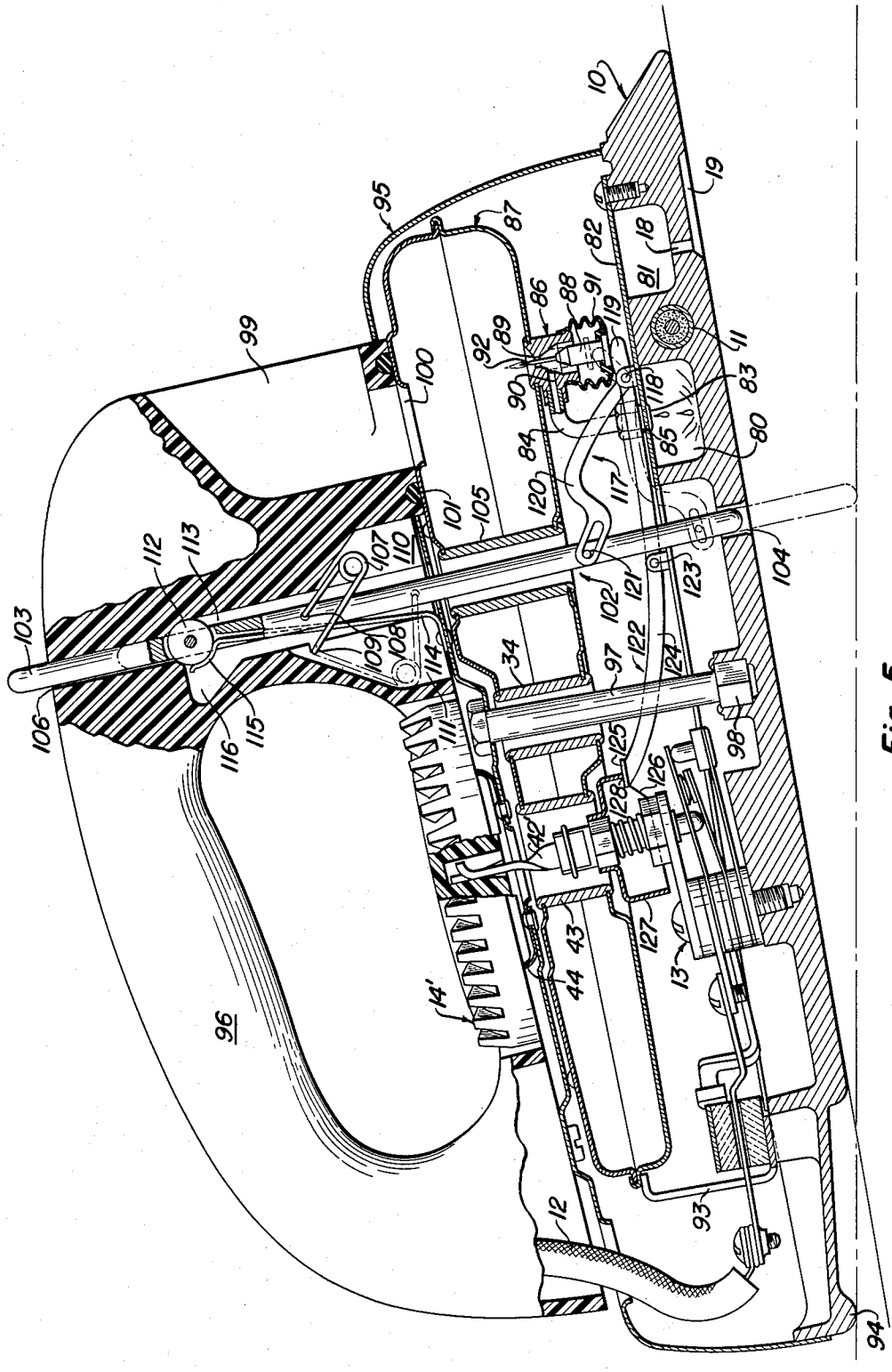


Fig. 5

June 12, 1956 W. G. SECK 2,749,633

STEAM IRON

Filed Jan. 26, 1955 5 Sheets-Sheet 5

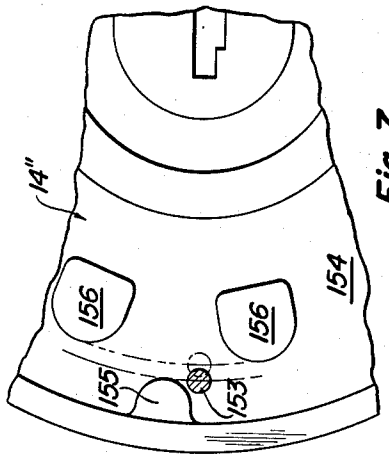


Fig. 7

Fig. 6

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2,749,633

STEAM IRON

Werner G. Seck, Canton, Ohio, assignor to The Hoover Company, North Canton, Ohio, a corporation of Ohio

Application January 26, 1955, Serial No. 484,170
13 Claims. (Cl. 38—77)

The present invention relates to an electric iron which may be readily converted from steam to dry ironing and vice versa and which may be readily supported in an inclined position with the soleplate free of the supporting surface.

Specifically, according to the present invention the control dial which sets the soleplate temperature actuates a valve located between a water reservoir and a flash boiler in the soleplate to open the valve when the dial is turned to its steam setting and to close the valve when the dial is moved away from its steam setting together with an extensible support for supporting the iron in an inclined position with the soleplate free of a supporting surface in which movement of the support to its supporting position also closes the valve should it be open at that time.

An object of the present invention is an arrangement in which movement of an extensible support for the iron to a supporting position operates to close the valve which supplies water to the boiler.

Another object of the present invention is to provide a steam iron including an extensible support and valve actuator therefor in which the iron may be preassembled in three sub-assemblies and those sub-assemblies afterward assembled together to form the complete iron and in which those sub-assemblies are held together by a single bolt.

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:

Fig. 1 is a side view partly in section of an iron according to the present invention showing one form of support in its retracted nonsupporting position,

Fig. 2 is a view of the iron of Fig. 1 showing the parts in the position they take when the support is in its supporting position,

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1 and looking in the direction of the arrows,

Fig. 4 is a bottom view of the control dial of the iron of Fig. 1 showing the valve operating cam,

Fig. 5 is a view similar to Fig. 1 partly in section and showing a second modification of the invention,

Fig. 6 is also a view similar to Fig. 1 partly in section and showing a third modification of the invention and

Fig. 7 is a fragmentary view showing the arrangement of the cams on the control dial for opening and closing the water valve of the iron of Fig. 6.

Construction of Figs. 1 to 4, inclusive

Referring to Figs. 1 to 4, inclusive, the iron includes a cast aluminum soleplate **10** in which is embedded a U-shaped heating element **11** of well known construction. Electric current is supplied to the heating element **11** by a two-strand electric cord **12** through a thermostat **13** which controls the temperature of the soleplate **10** in a manner well known in the art. The temperature setting of the thermostat **13** is controlled by a manually settable dial **14** which has a plurality of temperature settings for dry ironing, a single temperature setting for steam ironing and an "off" position as will be more fully explained hereinafter. The thermostat **13** is of a type well known in the art and need not be described in detail herein except that it is mounted on a soleplate **10** and responds to the temperature thereof.

Formed in the upper surface of the soleplate **10** are a plurality of steam passages **16** in heat exchange relationship with the heating element **11**. The steam passages **16** communicate at one end with a flash boiler also formed in the top surface of the soleplate in heat exchange relationship with the rear end of one leg of the heating element **11** beneath an inlet tube **17** shown in dotted lines in Figs. 1, 2 and 3. The exact contour of the steam passages **16** is not shown but they may extend from the flash boiler on the inner side of one leg of the heating element **11** along the inner side of the other leg of the heating element and then along the outside of the heating element to steam emission openings **18** extending through the soleplate to steam distributing grooves **19** formed in the lower face of the soleplate.

The flash boiler and steam passages **16** are closed by a cover plate **20**. The inlet tube **17** extends through an opening **15**, the tube **17** being provided with a shoulder **21** pressing on top of the plate **20** about the opening **15** for a purpose which will presently appear.

The inlet tube **17** is formed integrally with a valve **22** suitably secured to the rear end of a water reservoir **23**. A downward extension **24** extends downwardly from the reservoir **23** and is in communication with the interior of the reservoir and with the interior of the valve **22** thru a port **25** which in turn communicates with an outlet opening **26** leading downwardly thru the tube **17**. The downward extension **24** is to assure that all of the water in the reservoir **23** will have access to the port **25**.

The ports **25** and **26** are adapted to be closed to shut off the flow of water to the flash boiler by means of a valve stem **27** attached to the valve **22** by a resilient bellows **28** made of a suitable heat resistant material and biased to hold the valve open. The valve stem **27** is provided with an extension **29** extending thru the port **25** which serves to clear that port of lime deposits if hard water should be used. The valve stem **27** is operated in a manner which will be explained hereinafter.

The reservoir **23** is supported on top of the soleplate **10** at three points, two at the rear and one at the front. At its front end the reservoir **23** is supported on a bracket **30** suitably attached to the toe of the soleplate and engaging beneath a bead on the reservoir **23**. At its rear end the reservoir **23** is supported by the flange **21** of tube **17** and by a post **31** (Fig. 3) screwed into the plate **20** and contacting the bottom wall of the reservoir **23**.

The reservoir **23** and the soleplate assembly are encased in a decorative cover shell **32**, which is clamped to the soleplate by a single bolt **33** extending downwardly thru the reservoir **23** by way of a sleeve **34**, being screw threaded into a captive nut **35** staked or otherwise secured to the soleplate **10**. A leaf spring **36** attached to the underside of the cover shell **32** has its free end engaging the top of the reservoir **23** to press it downwardly against its supports and to form a seal between the flange **21** and plate **20**. The spring **36** also serves to compensate for variations in manufacturing tolerances.

At its forward end the reservoir **23** is provided with a fill opening **37** which may be closed by a rubber plug **38**. About the opening **37** the cover shell **32** is provided with a downwardly extending annular flange **39** which contacts the top of the reservoir **23** and serves to hold the front end of the reservoir against its front support **30**.

A handle **40** is secured at its rear end to the cover shell **32** by means of screws **41** and with the cover shell forms a unitary assembly which may be removed from the remainder of the iron by the removal of bolt **33**.

A control shaft **42** extends between the control dial **14** and the thermostat **13** thru a sleeve **43** extending thru the reservoir **23**. The dial **14** is secured to the cover shell **32**

by a plate 44 having spring fingers 45 engaging in a groove 46 in a flange extending downwardly from the dial 14. The dial 14 is readily removable to expose the head of bolt 33 whereby the handle-cover shell assembly and the reservoir-valve assembly may be readily removed from the remainder of the iron.

The underside of dial 14 is provided with an undercut recess 47 formed by a downwardly extending peripheral flange 48 on the underside of dial 14. The inner periphery of the flange forms a cam surface 49 which coacts with a slidable valve actuator 50 in a manner which will presently appear.

The valve actuator 50 is slidably mounted on the underside of the cover shell 32 by means of a pin-and-slot connection 51 and is normally biased rearwardly by a tension spring 52 attached at its forward end to the actuator 50 and at its rear end to a bracket 53 attached to the rear end of the cover shell 32.

The cam surface 49 is recessed at 54 (Fig. 4) at the steam setting position of the dial 14 and coacts with a lug 55 carried by the forward end of valve actuator 50, the lug 55 extending upwardly thru a suitable slot in the cover shell 32 and into the recess 47 in the underside of dial 14 and is held in contact with the cam surface 49 by the spring 52.

The valve actuator 50 is provided with a sidewardly and downwardly extension 56 (Fig. 3) having a forked lower end 57 which normally contacts the rear end of valve stem 27. When the dial 14 is moved to its steam setting position the lug 55 will be moved into the recess 54 on cam surface 49 by the spring 52, which will also cause the forked end 57 of actuator 50 to move rearwardly and the valve 22 will be opened by the bias of bellows 28.

The soleplate 10 is provided with an integral extension 58 provided with an opening 59 to accommodate a part of a support as will presently appear.

A shaft 60 is journaled on the extension 58 in bearing 61 (Fig. 3). Rigidly secured to the shaft 60 is a support generally indicated by the reference numeral 62 and a second valve actuator 63 having its upper end 64 normally in contact with the rear end of valve stem 27 and extending between the legs of the forked end 57 of the valve actuator 50.

The support 62 includes a pair of legs, one shown at 65, normally lying in recesses 66 extending forwardly along the sides of the soleplate 10 from the rear toward the toe thereof and a support actuator 67 positioned within the space below the rear end of the cover shell 32 and having a lug or extension 68 extending downwardly thru opening 59 in the soleplate extension 58.

A snap-acting mechanism generally indicated by the reference numeral 69 operates to move the support 62 to its retracted position of Fig. 1 or to its iron supporting position of Fig. 2. It comprises a compression spring 70 compressed between shoulders on a pair of telescoping links 71 and 72 pivoted to the rear end of actuator 67 and to the bracket 53, respectively.

Assembly of Figs. 1 to 4, inclusive

The iron of Figs. 1 to 4, inclusive, comprises three main assemblies, the soleplate assembly, the reservoir-valve assembly and the handle-cover shell assembly.

The soleplate assembly includes the soleplate 10, the cover plate 20 therefor, the thermostat 13 and its control shaft 42, the captive nut 35, the reservoir supports 30 and 31 and the support 62 including the valve actuator 63, the support actuator 67, the link 71 and spring 70, the latter being temporarily taped to link 71.

The reservoir-valve assembly includes the reservoir 23 proper, the valve 22 including the tube 17, valve stem 27 and bellows 28.

The cover shell-handle assembly includes the cover shell 32, handle 40, valve actuator 50, spring 52, bracket 53 and link 72.

The parts of each of the sub-assemblies as above outlined are separately assembled. The reservoir-valve assembly is then placed on the soleplate support assembly with the tube 17 extending thru the opening 15 in the cover plate 20 with the flange 21 engaging the top of plate 20 about the opening 15, with the bottom of reservoir 23 resting on the supporting pin 31 and the bead at the front of the reservoir resting on top of the bracket 30. The handle-cover shell assembly is then placed over the reservoir-valve and soleplate assemblies, care being taken that the links 71 and 72 are telescoped with the spring 70 surrounding their telescoped ends. The bolt 33 is then screwed into the captive nut 35 which will secure the three sub-assemblies together. The control shaft 42 may then be turned to its steam setting and the dial 14 applied with the lug 55 extending upwardly into the steam setting recess 54 on the underside of dial 14. The dial 14 will be held in position by the spring fingers 45 and will cover the bolt 33 which forms the sole removable means for holding the three sub-assemblies together. Thus it is a simple procedure to disassemble the iron for cleaning or repair. All that is necessary is the removal of dial 14 and bolt 33 and the three sub-assemblies will practically fall apart.

Operation of Figs. 1 to 4, inclusive

If it is desired to use the iron as a dry iron, the dial 14 is turned from its "off" position to the proper dry setting and the iron used in the normal manner for dry ironing. Even if there should be water in the reservoir 23, the valve 22 will be closed by the cam surface 49 acting against the lug 55 to move the valve actuator 50 to the right as viewed in Fig. 1 to thereby move the valve stem 27 to its closed position against the bias of bellows 28.

If it is desired to support the soleplate out of contact with the ironing board it is only necessary to tip the iron rearwardly to bring the lug 68 into contact with the ironing board. The support actuator 67 will move upwardly and the legs 65 downwardly relative to the soleplate until the snap-action mechanism 69 moves past its dead-center position. The supporting legs 65 will then be moved downwardly into the position shown in Fig. 2 and the iron will be supported in that position with the soleplate 10 clear of the ironing board except for the rearward extension 58 which is removed from the heating element 11 and will be comparatively cool. The valve actuator 63 will have no effect on the valve 22 since it has been already closed by the actuation of the dial 14 to a dry ironing setting.

When it is again desired to use the iron it is merely necessary to push the front of the iron downwardly until the snap-acting mechanism 69 moves past its dead-center position in the reverse direction and the supporting legs 65 will be drawn upwardly into the recesses 66 above the ironing surface.

If there is no water in the reservoir 23 and it is desired to use the iron as a steam iron it is preferable that the reservoir 23 be filled while in its supported position of Fig. 2.

Prior to the filling operation the dial 14 should be turned to a steam setting so that the soleplate will be at its proper temperature for steam ironing by the time the reservoir is filled. As the dial 14 is turned to a steam setting the lug 55 will move into the recessed portion 54 of the cam surface 49 under the action of spring 52, move the forked end 57 of the valve actuator 50 out of contact with the end of the valve stem 27 and permit it to move to the left under the bias of bellows 28 and thus open the valve 22.

The iron may then be turned rearwardly as above described to move the support 62 to its supporting position of Fig. 2. During such movement the valve actuator 63 will move clockwise and move the valve stem 27 to the right against the bias of bellows 28 to close the valve 22. The closure 38 may then be removed and water poured into the reservoir 23 thru the fill opening 37.

By the time the reservoir is filled the soleplate will be at proper temperature for steam ironing and the iron may be returned to the position of Fig. 1 as above described.

As the support 62 moves to its retracted position the valve actuator 63 will move counterclockwise away from the valve stem 27 and permit it to move to the left under the bias of bellows 28 to open the valve 22, it being noted that the valve actuator 50 is already in its valve opening position.

The iron may then be used in the usual way for steam ironing. If it is desired to stop ironing temporarily it is merely necessary to tip the iron rearwardly and it will be supported in an inclined position with soleplate 10 above the ironing surface as previously described. During movement of the support to its supporting position of Fig. 2 the valve 22 will be automatically closed as previously described and when the iron is returned to its operative position of Fig. 1 the valve will be automatically reopened.

Construction of Fig. 5

The iron of Fig. 5 is similar to that of the first modification and where the parts are the same they have been given the same reference numerals.

Soleplate 10 is provided with a U-shaped heating element 11 with a thermostat 13 for controlling the soleplate temperature and with a control dial 14' connected to the thermostat 13 by shaft 42' for adjusting the thermostat 13 to various temperature settings including a plurality of settings for dry ironing, a steam setting and "off" position.

In the modification of Fig. 5 the flash boiler 80 is located to the rear of the bight of the heating element 11. Flash boiler 80 is in communication with steam passages 81 leading backwardly along the inside of the legs of the heating element 11, about their rear ends, and forwardly along their outsides to the steam emission openings 18 adjacent the toe of the soleplate 10.

The flash boiler 80 and steam passages 81 are closed by a closure plate 82 having an inlet opening 83 immediately above the flash boiler 80. A tube 84 has a shoulder 85 which rests upon the closure plate 82 and leads to a valve 86 staked to the bottom wall of a water reservoir 87. The valve includes a valve stem 88 and ports 89 and 90 leading respectively to the interior of the reservoir 87 and to the tube 84. The valve stem is secured to the valve 86 by a bellows 91 biased to hold the stem 88 downwardly with the ports 89 and 90 open. An extension 92 of the stem 88 serves to remove lime deposits.

The reservoir 87 is supported at its rear end on a pair of laterally spaced brackets 93, secured to the rear end of the soleplate 10 and at its forward end is supported on the flange 85 of the tube 84.

The soleplate 10 including the rearward extension 94 and the reservoir 87 are enclosed within a cover shell 95 having a handle 96 secured thereto in any suitable manner. The handle 96 and cover shell 95 are secured to the soleplate 10 by a single bolt 97, screwed into a captive nut 98 staked to the central portion of the soleplate 10. The underside of the cover shell 95 presses against the top of the reservoir 87 to hold it against its supports and to form a seal between the shoulder 85 and the cover plate 82 about the opening 83.

A fill opening 99 is formed in the front leg of the handle 96 and communicates with an opening 100 in the top wall of reservoir 87, a sealing gasket 101 extending about the opening 100 to form a seal between the handle front leg and the interior of reservoir 87 and to press the reservoir 87 downwardly to form a seal between the flange 85 and the cover plate 82.

Soleplate 10 is adapted to be supported in the inclined position shown, by the rearward extension 94 and by an extensible support generally indicated by the reference numeral 102.

The support 102 includes a reciprocal rod 103 adapted to be projected thru an opening 104 extended thru the soleplate 10 and when in retracted position having its lower end slightly above the lower face of the soleplate 10 as shown. The rod 103 extends upwardly thru a sleeve 105 extending thru the reservoir 87 and extends upwardly thru a bore 106 extending thru the top of handle 96, the top end of the rod 103 being accessible from the top of the handle 96 when in retracted position.

The rod 103 is secured within the bore 106 by a double arm U-shaped spring 107 having one pair of legs pivotally secured to rod 103 at 108 and its other pair of legs pivotally secured to the handle in a slot as shown at 109, the bore 106 being widened at 110 and 111 to provide room for the spring 107 as it oscillates as will presently appear. A guide roller and stop 112 is mounted in the rod 103, a guiding groove 113 being formed in the handle 96 to provide for reciprocatory movement of the rod 103 and the guide roller 112. The upper end of groove 113 forms a stop to limit upper movement of the rod 103.

A spring guide arm 114 is secured to the cover shell 95 and it extends upwardly thru the bore 106 and has a curved portion 115 in contact with the roller 112 to hold the rod 103 in its retracted position and to move it to that position as will hereinafter appear. The bore 106 is enlarged at 116 to provide for movement of the spring arm as the rod 103 is extended.

A valve actuator 117 is pivoted to the cover plate 82 at 118 and includes an arm 119 which normaly contacts the lower end of valve stem 88 and an arm 120 having a pin-and-slot connection 121 with the rod 103 near its lower end.

A second valve actuator 122 is provided to the cover plate 82 at 123 and includes an arm 124, the end of which is also normally in contact with the lower end of valve stem 88. The actuator 122 includes a shoe 125 which contacts the cam surface 126 of a cam member 127 rigidly secured to the control shaft 42'. The cam surface 126 includes a depressed portion 128 at the steam setting of the dial 14' for a purpose which will presently appear.

The spring 107 is biased so that its ends will move apart when free to do so a distance greater than that shown in dotted lines, so that it will support the iron in an inclined position when the support 102 is in its extended position.

Assembly of Fig. 5

As in the first modification the iron of Fig. 5 includes three sub-assemblies, the soleplate assembly, the reservoir-valve assembly and the handle-cover shell assembly.

The soleplate assembly includes the soleplate proper, the cover plate 82, the supports 93, the valve actuators 117 and 122, the thermostat 13, the captive nut 98, the cam 127, the shaft 42' and the supporting rod 103.

The reservoir-valve assembly includes the reservoir 87, the valve 86 and the tube 84.

The handle-cover shell sub-assembly includes the handle 96, the springs 107 and 114 and the cover shell 95. The spring 114 is secured to the cover shell in the position shown, one end of spring 107 is slid upwardly into the enlargement 111 of bore 106 and hooked into the pivot slot 109 and the cover shell 95 is secured to the bottom of the handle in any suitable manner.

The soleplate may then be placed on a supporting surface, the lower end of rod 103 inserted into opening 104 and attached to the end of the valve actuator 117 by the pin-and-slot connection 121.

The reservoir-valve assembly may then be assembled by inserting the upper end of the rod 103 into the sleeve 105 and lowering it so that the shaft 42' will pass through the sleeve 43. The end of tube 84 below the flange 85 will enter the opening 83 in the cover plate 82 to support the front end of the reservoir 87 and the bead at the rear end of reservoir 87 will contact the supports 93 to form a three-point support for the reservoir 87. At the same time the cam surface 126 on the lower edge of cam 127 will engage the shoe 125 of valve actuator 122 and move the end of arm 124 against the lower end of valve stem 88.

The handle-cover shell sub-assembly as above described may then be assembled over the reservoir and soleplate.

First the upper end of rod 103 is inserted into the enlarged lower end of bore 106 and the assembly lowered until the other end of spring 107 can be inserted into the pivot 108 on rod 103. The handle-cover shell assembly may then be lowered into contact with the reservoir 87 and soleplate 10 and the spring 107 will take the position shown by the full lines of Fig. 5. The bolt 97 may then be passed downwardly through the sleeve 34 and screwed into the captive nut 98 to hold the three sub-assemblies together, it being noted that the gasket 101 will form a seal between the fill opening 99 and the interior of the reservoir 87 as well as to press downwardly on the front of reservoir 87 to hold the flange 85 of tube 84 in sealing engagement with the cover plate 82 about the opening 83.

Operation of Fig. 5

The operation of the iron of Fig. 5 is similar to that of the first modification, it being noted that the water valve is open when the dial is turned to a steam setting and automatically closed when the iron is supported in inclined position with the soleplate free of the supporting surface. It is also to be noted that when the dial is turned to its dry ironing setting or to its "off" position the water valve is closed and the operation of supporting the iron in its inclined position will then have no effect on the water valve since it is already closed. In other words, in both modifications the water valve is closed either when the iron is set for dry ironing or when the iron is supported on its inclined position so that the iron may be used for dry ironing whether or not there is water in the reservoir.

In the position shown in Fig. 5 the dial 14' is at its steam setting and the shoe 125 of valve actuator 122 is in the recess 128 of cam 127 so that the valve stem 88 will tend to move downwardly under the bias of bellows 91 to open the valve 86. The support 102 is shown retracted by the full lines and shown in extended position by the dotted lines.

If the reservoir 87 is empty and it is desired to use the iron for steam ironing the dial 14' is moved to a steam setting as shown in Fig. 5, so that the soleplate 10 will be brought up to the proper temperature for steam ironing. However, with the support 102 retracted as shown in full lines, the valve 86 is open and if the reservoir 87 should be filled in that position water would immediately flow into the flash boiler 80 and steam passages 81 before the soleplate is up to steaming temperature. Consequently, it would flow through the emission openings 18 in the form of water.

In order to close the valve 86 with the dial 14' at its steam setting as shown, it is necessary that the support 102 be moved to its extended position as shown in dotted lines. In order to do that, pressure is applied to the top of rod 103, it being noted that the bottom of the rod 103 is slightly above the lower face of the soleplate 10. Movement of the rod 103 downwardly will cause the pivot point 108 of the spring 107 to move below the pivot point 109. The spring 107 being biased to move to its dotted line position will then force the rod 103 downwardly and raise the front end of the iron to its inclined supported position as shown.

Downward movement of the rod 103 will also cause the valve actuator 117 to move counterclockwise by means of a pin-and-slot connection 121 causing its end 119 to move the valve stem 88 upwardly against the bias of bellows 91 and close the valve 86.

Water may then be poured into the fill opening 99 until the reservoir is filled up to the level of opening 100.

After the soleplate 10 has been raised to the proper temperature for steam ironing, the support 102 may be returned to its retracted position to open valve 86. That may be done by pressing downwardly on the front of the handle 96 to force the rod 103 upwardly against the bias of spring 107. When the lower end of rod 103 reaches the bottom face of the soleplate 10, the pivot points 108 and 109 will be almost at the dead-center position so that it will require but little force to move them past that position. The spring 114 will then come into operation by the engagement of the cam 115 with the roller 112. The force of the spring 114 and the camming action of the cam 115 against the roller 112 will cause the pivot points 108 and 109 to move past their center position and raise the rod 103 to its fully retracted position with its lower end above the lower face of soleplate 10.

Movement of the rod 103 to its retracted position will move the valve actuator 117 clockwise and permit the valve stem 88 to move downwardly under the bias of bellows 91 and open the valve 86. The iron may then be used in the usual manner as a steam iron. If during the ironing process it is desired to stop ironing temporarily it is merely necessary to again move the support 102 to its extended position as described above and the valve 86 will be closed.

If at any time it is desired to use the iron as a dry iron, the dial 14' is moved to the proper dry ironing setting. In moving the dial 14' from the steam setting shown, cam surface 126 will coact with the shoe 125 and move the valve actuator 122 counterclockwise to move the valve stem 88 upwardly and close the valve 86. The iron may then be used as a dry iron in the usual manner. If the support is then actuated to its extended position it will have no effect on the valve 86 since it is already closed.

To convert to steam ironing it is merely necessary to return the dial 14' to its steam setting which will open the valve 86 provided the support 102 is in its retracted position. The support 102 will then take over the control of valve 86 as previously described.

Construction of Figs. 6 and 7

The iron of Figs. 6 and 7 is similar to that of the first modification; where the parts are the same they have been given the same reference numerals.

The main difference between the modification of Fig. 6 over that of the first modification is the simplification of the valve actuators and of the arrangement of the reservoir.

The reservoir 130 may be supported on the soleplate 10 in the same manner as in the first modification except that one side of the rear thereof is suported on the valve 131 which also forms a seal about an opening 132 in a plate 133 staked or otherwise secured to the cover 134 of the soleplate 10. The plate 133 may be made of stainless steel or other poor heat conducting material. The mating surfaces between the plate 133 and the valve 131 are semi-spherical and are separated by an asbestos gasket 135.

A flash boiler 136 is formed in the upper surface of the soleplate 10 and communicates with steam passages 137. The flash boiler 136 is positioned to be in heat exchange relationship to one rear leg of the heating element as in the first modification and the steam passages 136 extend about the heating element and communicate with steam emission openings as described in connection with the first modification.

Valve stem 137' is reciprocably mounted on the top wall of reservoir 130 by means of an elastic seal 138 and is provided with a needle-like extension 139 which extends thru a port 140 leading to the flash boiler 136 and serves to keep the port 100 clear of lime deposits should hard water be used, as well as to guide the valve stem 137' in its reciprocatory movement.

Valve stem 137' may be moved upwardly and downwardly to open and close the port 140 by means of either one of a pair of valve actuators 141 or 142, the former being actuated by the control dial 14'' and the latter by the support 62.

The valve actuator 141 includes a lever arm 143 having a forked end 144 which straddles the upper end 145 of valve stem 137' and lies between spaced pins 146 extending thru the upper end 145 of stem 137'. The oppo-

site end of arm **143** rests in a knife-edge bearing **147** in a bracket **148** secured to the top wall of the reservoir **130**. One end of a tension spring **149** is attached to bracket **148** at **150**, its opposite end being attached to the forked end **144** of lever arm **143** at **151**. A spring arm **152** is attached to the lever arm **143** midway of its ends and includes an upwardly extending knob **153** which extends upwardly into recess **154** formed in the lower surface of dial **14''**. On either side of cam **155** are a pair of lugs or cams **156** extending downwardly from the lower surface of dial **14''** and being inwardly spaced from the cam **155** for a purpose which will presently become apparent.

The valve actuator **142** includes an actuating arm **157** pivoted at **158**, intermediate its ends on a bracket **159** secured at the top wall of reservoir **130**. The actuating arm includes a shoe **160** which normally rests on top of the upper end **145** of valve stem **137'**.

The upper end of a link **161** is pivoted to the opposite end of arm **157** and its lower end is pivoted at **162** to an extension **163** of a support actuator **164** which extends thru an opening **165** in the extension **58** of the soleplate **10**.

As in the first modification the support **62** is pivoted at **60** to the rear of soleplate **10** and includes the legs **65** which normally lie in grooves **66** formed in the side edges of soleplate **10** and extending forwardly from the rear edge thereof, the support actuator **164** being attached to the rear end of the support **62**.

The over-center mechanism **69** for the support **62** is the same as in the first modification and includes a pair of telescoping links **71** and **72** surrounded by a compression spring **70**. The lower end of link **71** is pivoted to the rear of the support actuator **164**, and the upper end of link **72** is pivoted to a bracket **176** attached to the rear of a cover shell **32**. The cover shell **32** is provided with an opening **167** thru which the bracket **159** and link **161** extend.

Assembly of Fig. 6

As in the first modification, the modification of Fig. 6 includes three sub-assemblies, the soleplate assembly, the reservoir-valve assembly and the handle-cover shell assembly, which may be assembled independently and then assembled to each other to form the completed iron.

The soleplate sub-assembly includes the soleplate proper, the thermostat **13** and its control shaft, the supports for the reservoir and the support **62** including the legs **65**, the support actuator **164**, link **71** and the spring **70** which may be temporarily attached to link **71** for assembly purposes.

The reservoir-valve sub-assembly includes the reservoir **130**, the valve **131**, the valve stem **137'**, the valve actuator **141**, the bracket **159**, the lever arm **167** and link **161**.

The handle-cover shell sub-assembly includes the handle **40**, the cover shell **32**, the bracket **176** and the link **72**.

Each of the foregoing sub-assemblies are assembled separately in an obvious manner. The soleplate sub-assembly may then be placed on a supporting surface and the reservoir-valve assembly placed on top thereof with the complemental spherical surfaces of the valve **131** and plate **133** meeting with each other and with the asbestos gasket **135** between them. The handle-cover shell assembly may then be assembled by first pivoting the lever arm **157** counterclockwise to move the lower end of link **161** downwardly so that the pivot pin at **162** may be inserted. The assembly may be lowered, care being taken that the link **72** is telescoped inside the spring **70** and over the end of link **71**. The attaching bolt of the first modification may then be applied to attach the three sub-assemblies together. The dial **14''** may then be applied as in the other modifications.

Operation of Figs. 6 and 7

The operation of the iron of Fig. 6 is similar to that of the other modifications in that the control dial may be turned to its dry setting or to its "off" position and the water valve will be closed and it may be turned to a steam setting and the valve will be open until the iron is supported in its inclined position in which case the valve will be closed. During the steam ironing operation when it is necessary to cease ironing momentarily the iron may be easily supported in an inclined position with the soleplate free of the supporting surface and the water valve will be thereby automatically closed.

In the position shown in Fig. 6 the dial **14''** is at its steam setting and the valve is open. If it is desired to use the iron as a steam iron and the reservoir **130** is empty, the dial **14''** may be left at its steam setting to keep the soleplate **10** at its steam temperature. The iron is then turned backwardly slightly to bring the support actuator **164** into contact with the supporting surface. Continued rearward movement of the iron will move the support actuator **164** upwardly relative to the soleplate **10** and the supporting legs **65** downwardly until the over-center link **69** moves past its dead-center position at which time it will move to its dotted line position of Fig. 6 and support the soleplate **10** in an inclined position above the supporting surface.

During the above movement of the support actuator **164** the link **161** will be moved upwardly and the lever arm **157** pivoted clockwise to press downwardly on the top of the valve stem **137'** to close the valve **131**.

During downward movement of the valve stem **137'** the rear end of arm **143** will also move downwardly past its dead-center position which will flex the spring arm **152** placing it under a stress tending to return the arm **143** to its upward position. Since the angle of movement of the arm **143** is only about 15°, the distance the spring arm **152** is flexed is not great.

The plug **38** may then be removed and the reservoir **130** filled with water without fear of water flowing into the flash boiler **136** during the filling operation.

The iron may then be returned to steam ironing position by merely pressing downwardly on its front end which will return the parts to their full-line position of Fig. 6 with the supporting legs **65** positioned in the recesses **66** above the lower face of the soleplate **10**.

When downward pressure on the valve stem is released by the upward movement of arm **157**, spring arm **152** will move the arm **143** upwardly past its dead-center position whereby the spring **149** will raise the arm **143** to its full-line position and open the valve **131** whereby the iron may be used in the usual manner for steam ironing.

Control dial **14''** could, of course, be moved to a steam setting if the iron is supported in its inclined position in which case the arm **143** would be held in its downward position and the cam **155** would stretch the spring arm **152** so that it would open the valve **131** when the iron is returned to its ironing position.

If it is desired to cease ironing temporarily it is merely necessary to turn the iron rearwardly as above described to support the iron in an inclined position and to close the valve **131** so that steam will not be produced when the iron is not in use. To again begin steam ironing it is merely necessary to press forwardly on the iron as above described to open the valve and resume steam ironing.

If it should be desired to convert the iron to dry ironing, it is only necessary to rotate the dial **14''** in either direction from its steam setting as shown in Fig. 6 whereby the cam **155** will ride free of the lug **153** and be engaged by one of the cams **156** (Fig. 7) and press the lug **153** in the opposite direction which will cause the arm **143** to be moved downwardly past its dead-center position and close the valve **131**. The same would apply when the dial **14''** is moved to its "off" position.

If the iron should have to be supported in its inclined position as above described, the resulting movement of the arm 157 would have no effect on the valve 131 since it has already been closed by the downward movement of the arm 143.

From the foregoing description it can be seen that each of the modifications of the iron of the present invention provides an arrangement by which the iron may be supported in an inclined position and in which movement of the iron automatically closes the water valve should it be open and in which movement of the control dial to its steam setting position automatically opens the water valve and movement of the control dial away from the steam setting automatically closes the water valve.

It can also be seen that each modification provides an arrangement in which three sub-assemblies may be pre-assembled and afterward assembled to each other and held in assembled relationship by a single bolt.

While I have shown and described but three embodiments of my invention, it is to be understood that those embodiments are to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the particular structures shown and described but wish to include all equivalent variations thereof except as limited by the scope of the claims.

I claim:

1. In a steam iron, a soleplate, a flash boiler formed therein for converting water into steam, a water reservoir overlying said soleplate, a valve for controlling the flow of water from said reservoir to said flash boiler, a support for supporting said soleplate in an inclined position with said soleplate free of the supporting surface, means for mounting said support on said iron, said support and mounting means being constructed to provide for movement of said support from a retracted nonsupporting position within the body of the iron to an extended position below the surface of said soleplate in which said soleplate is supported in an inclined position above the supporting surface and valve control means connected between said support and said valve and operative to close said valve when said support is moved to its extended position and to open said valve when said support is moved to its retracted position.

2. In a steam iron according to claim 1 in which said mounting means includes a spring biased over-center mechanism which is constructed to hold said support both in its extended and retracted positions.

3. In a steam iron according to claim 2 in which said support is pivoted to the rear of said soleplate with supporting legs extending forwardly and in which said over-center mechanism acts between the rear end of said support and the rear of a cover shell for the iron.

4. In a steam iron according to claim 2 in which said support is in the form of a reciprocating rod mounted for reciprocation thru an opening in said soleplate toward the forward end thereof and when in its retracted position, its lower end is positioned above the ironing face of the soleplate and said snap-acting mechanism, comprises a U-shaped spring one leg of which is pivotally attached to said rod and the other to said iron so that when said rod is retracted the attachment point between said spring and rod is above that between said spring and the iron whereby downward movement of said rod will move the first mentioned attachment point below the second and project said rod downwardly below the ironing surface so as to support said soleplate in an inclined position.

5. In a steam iron according to claim 1 including a thermostat mounted on said soleplate to control the temperature thereof, a control dial for controlling the temperature setting of said thermostat including a steam setting and a second valve actuator connected between said dial and said valve operative to open said valve when said dial is moved to a steam setting and to close said valve when said dial is moved away from its steam setting.

6. In a steam iron according to claim 5 in which said first mentioned valve actuator is superimposed upon said second valve actuator in such a manner that said first mentioned valve actuator is operative to close said valve when said support is moved to its extended position only when said second valve actuator has been operated to open said valve.

7. A steam iron comprising; a soleplate; a heater therefor; a thermostat responsive to the temperature of said soleplate for controlling the energization of said heater; a control dial for controlling the temperature setting of said thermostat; a flash boiler formed in the upper surface of said soleplate; a water reservoir; a valve for controlling the flow of water from said reservoir to said flash boiler; said control dial having a steam setting, a plurality of dry ironing settings and an "off" setting; first valve actuating means connected between said dial and said valve operative to open said valve when said dial is moved to its steam setting and to close said valve when moved to its dry ironing or "off" settings, a retractable and extensible support for said iron movable from a retracted position within said iron to an extended position in which said iron is supported in an inclined position with the soleplate free of its supporting surface, a second valve actuator connected between said support and valve and operative to close said valve when said support is moved to its extended iron supporting position.

8. In a steam iron according to claim 7 in which said support includes a snap-acting mechanism for holding said support both in its retracted and extended positions.

9. In a steam iron including a soleplate sub-assembly; a reservoir-valve assembly and a handle-cover shell assembly; said soleplate assembly including a soleplate, a flash boiler and steam passages formed therein, a cover plate for said flash boiler and steam passages, a thermostat for controlling the temperature of said soleplate, an extensible and retractable support movable from a retractable position to an extended position in which said soleplate is supported in inclined position free of its supporting surface, said support including a valve actuator; said reservoir-valve assembly including a water reservoir supported over said soleplate and a valve for controlling the flow of water from said reservoir to said flash boiler, said valve being positioned to be actuated by said valve actuator; said handle-cover shell assembly including a cover shell overlying and substantially enclosing said reservoir-valve assembly and said soleplate assembly and a handle attached to said cover shell; said assemblies being secured together by a single bolt extending thru said cover shell and reservoir and anchored to said soleplate.

10. In a steam iron according to claim 9 including a control dial for controlling the temperature setting of said thermostat, said control dial having a steam setting and a second valve actuator connected between said control dial and said valve and operative to open said valve when said dial is moved to its steam setting.

11. In a steam iron according to claim 10 in which said second valve actuator forms a part of said handle-cover shell assembly.

12. In a steam iron according to claim 10 in which said second valve actuator forms a part of said soleplate assembly.

13. In a steam iron according to claim 10 in which said first mentioned valve actuator is superimposed upon said second valve actuator and is operable to close said valve only when said second valve actuator is positioned to open said valve.

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