

March 3, 1970

W. E. DAVIDSON

3,497,974

STEAM IRON SPRAY VALVE STRUCTURE

Filed June 24, 1968

Fig. 1.

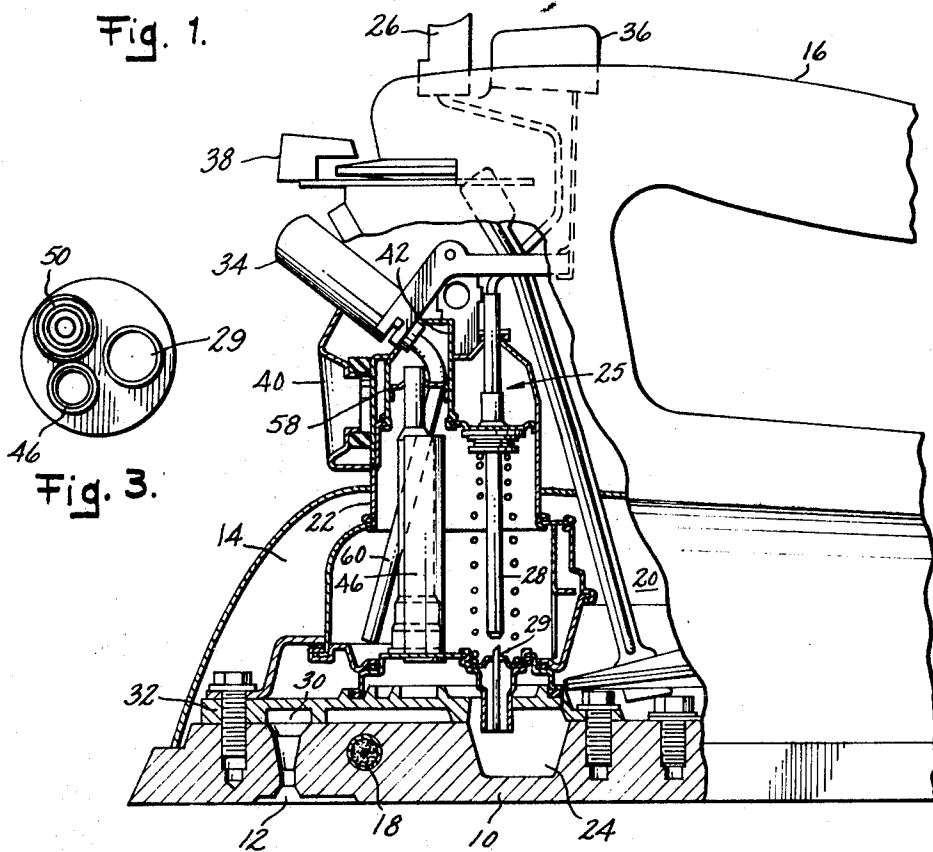


Fig. 2.

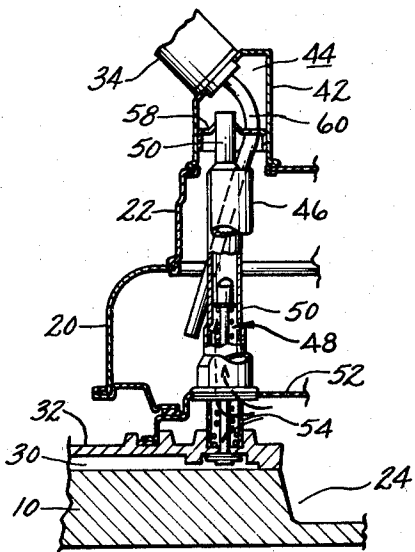
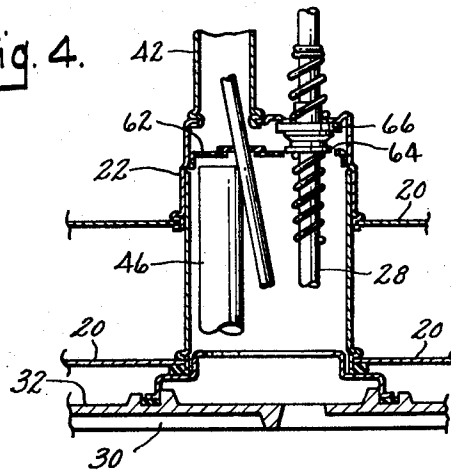


Fig. 4.



Inventor:  
William E. Davidson  
by *John F. Gullen*  
Attorney

1

2

3,497,974

**STEAM IRON SPRAY VALVE STRUCTURE**  
William E. Davidson, Ontario, Calif., assignor to General  
Electric Company, a corporation of New York  
Filed June 24, 1968, Ser. No. 739,537  
Int. Cl. D06f 75/06, 75/10, 75/22  
U.S. Cl. 38—77.5 21 Claims

## ABSTRACT OF THE DISCLOSURE

The invention discloses a steam iron spray valve structure and steam system to permit use of tap water for steam generating and spray valve purposes. The spray valve structure is designed to screen the steam used on the fabric for steaming or spraying and is primarily directed to an anti-fouling spray structure. The screening is achieved by a baffling structure through which all steam must pass before admission to the fine fluid ports and passages.

## BACKGROUND OF THE INVENTION

### Field of the invention

The invention herein pertains to a steam iron and, more particularly to a spray steam iron which employs a novel anti-fouling sprayer structure to prevent clogging of the sprayer and/or soleplate steam passages by residual flakes generated by the use of available tap water in the steam iron.

### Description of the prior art

With the advent of irons using water for either steam or spray purposes or both, it is customary to provide a water tank in the iron above the soleplate and to use water valve structure to provide controlled water drippage into a steam boiler where it is evaporated and directed out steam holes in the soleplate to steam the article. Additionally, powered spray attachments, either steam or manual, have been added to such irons to supply a fine spray from the water tank to spray onto the garment. Generally, it has been preferable to use distilled water in such steam irons because of the fineness of the various water passages and orifices which are subject to clogging due to the mineral deposits from the water, which vary from one locality to another. Distilled water is easily handled by steam irons since deposits are not plated out of the water onto the metal parts and no generation of flakes occurs to clog the fine passages. In the hostile hard water localities, the tap water contains minerals which produce loose flakes and deposits that plate out on the iron components and can clog the fine passages in the spray attachment. These deposits are quite variable from the water in various areas of the country and generally consist of lime or calcium carbonate as well as other chemicals that are in solution in the water or may be in relatively large flake form in the water. It has been known to provide screens to prevent such deposits or flakes from clogging the steam passage through the soleplate. However, prior art constructions have not provided a design that keeps the floating or suspended flakes away from the small orifices and passages in the spray structure during draining of the iron while, at the same time, providing a direct screened steam path to the sprayer structure for rapid start of the spray on actuation of the spray button during operation.

## SUMMARY OF THE INVENTION

Briefly described, the present invention is directed to a normally horizontal spray-steam iron that has an enclosed water tank and a fill opening with a heated soleplate at the bottom onto which water is dripped through an orifice to generate steam in a boiler in the soleplate. An on-off

water valve structure is provided to start and stop the water flow from the bottom of the tank to the soleplate and the iron is provided with a powered sprayer that has a spray orifice relatively high on the iron front and has a tube connecting the orifice structure to the tank. The invention is described in connection with a steam powered sprayer but is equally applicable to a manually powered sprayer. In the general combination, the invention adds the improvement of anti-fouling sprayer structure that uses an outer vertical tube means connected to and extending above the forward end of the water tank. An additional riser duct is disposed on the top of and opens into the vertical tube means. A baffle that, in one modification, may be in the form of a screen is disposed below the sprayer and forms a chamber in the riser duct. Pressure balancing means is provided in the outer tube to connect the steam boiler and the tank to equalize pressures therebetween. The baffle is provided in another modification as a solid plate and, in both modifications, has an opening means through the baffle for the passage of steam into the upper chamber to operate the power sprayer in the valve-on position. In turn the baffle blocks passage of any floating flakes to the chamber and the sprayer structure in the valve-off position such as during draining of the iron. The water tube, which connects the sprayer and the inner portion of the water tank to carry water to the sprayer, is directed through and sealed to the baffle so no flakes can pass. In the solid plate baffle modification, quick spraying is provided by a straight tube through the baffle to feed steam directly from the boiler to the spray head. Thus, the main object of the invention is to provide improved anti-fouling spray structure preventing passage of flakes at any time into the spray structure and, additionally, providing screening whereby all steam generated in the iron is screened before leaving the iron either to the soleplate or power spray.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an elevational view, partially in section and broken away, showing general parts of an iron and illustrating a preferred form of the invention;

FIG. 2 is an enlarged view of the preferred modification generally shown in FIG. 1;

FIG. 3 is a top view of FIG. 2 arranged only to show the side by side orientation of the various tubes and omitting the water tube for clarity; and

FIG. 4 is a partial cross-sectional view of one modification of the anti-fouling structure usable in an iron of the general type shown in FIG. 1.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, there is shown an electric spray-steam iron that includes a steam powered spray attachment, although, as noted, the invention is applicable to a manual spray. The iron includes a soleplate 10 having a plurality of steam ports 12 and an outer shell 14 connected in any suitable manner to handle 16 all in known fashion. In accordance with conventional practice, soleplate 10 may be case from a suitable material such as aluminum with an electrical heating element 18 cast in position. This heating element preferably is of the sheath type and, with the electrical resistance element, extends through an outer tubular protective sheath with the heating element separated from the outer sheath by an insulating compound resistant to heat such as granulated and compressed magnesium oxide. The heating element generally extends in a loop beginning at the rear of the iron and along one side to the forward end and then rearwardly along the other side. Thus, substantially uniform

heat distribution is provided when the iron is plugged in and activated.

The iron includes means for generating steam by providing water tank 20 which may have a vertical outer tube means 22 in the forward portion for housing various operating mechanisms. Outer tube means 22 generally is cylindrical but may be any suitable shape. For steam, soleplate 10 has a steam generator cavity or boiler 24 into which, under control of a water valve structure generally indicated at 25 and including a button 26 and connected spring biased vertical stem 28 which is preferably located in tube 22, water may be dropped through orifice 29 from tank 20 onto the heated soleplate, the resulting steam being distributed through passages 30, under cover 32 and out ports 12 onto the fabric being ironed. An additional steam power spray attachment 34 with a conventional orifice may be operated by control button 36. A typical power spray is shown in U.S. Patent 3,041,757 of common assignment. Temperature control 38 operates to thermostatically control the heat generated in the soleplate in a known manner. In order to supply water to the tank 20 for steam and/or spray power, fill opening 40 is provided with direct communication to the tank. Depending on the particular design of the iron, the control knobs may be in various locations and the fill opening is below the spray orifice which is located relatively high on the front of the iron, preferably between 50%-70% of the iron height for best angularity and penetration. Generally steam irons of the type described preferably use distilled water for best operation because of the purity of such water. Many operators simply do not use distilled water but use common available tap waters and in time, depending on the locality, the various water passages become clogged. Some irons use various clean-out structures to remove scale that accumulates in the water valve passages of the metering orifice and a particular design is the subject of co-pending application Ser. No. 739,536 filed June 24, 1968 of common assignment. Impure water or flakes may also collect in the spray attachment 34 when the iron is turned upside down to drain tank 20, and, in operation, the flakes may be carried by the water or the steam to spray attachment 34. The present invention is directed to the improvement of anti-fouling spray structure involving the mechanism between the sprayer 34 and steam boiler 24 to prevent flakes reaching the sprayer structure to foul or clog it. All steam that is generated is screened before being used and any water that might carry flakes is blocked from the spray structure or is screened before reaching the spray structure.

To achieve the screening function and prevent flakes from clogging the orifice structure, a preferred sprayer structure is shown in FIG. 2 on an enlarged scale where there is provided any suitable connection between the tank and sprayer as exemplified in outer vertical tube means 22 at the forward end of tank 20 which may be provided with a riser duct 42 that is disposed on and opens into outer tube means 22. Riser duct 42 partially forms a chamber 44 immediately adjacent sprayer 34 for operation of the sprayer.

In order for the water in tank 20 to be able to drip into steam boiler 24 when water valve 25 is in the on-position, it is necessary to equalize the steam pressure in boiler 24 and water tank 20 and, to this end, it is customary to provide a pressure balancing means in the form of a vertical balance tube 46 that is open at its upper end to the upper portion of tank 20 and open at its bottom end to boiler 24 as shown by the arrow in FIG. 2. Thus, the steam pressure is equalized on both sides of water valve 25 so that water will drip for steam generation. For controlling steam pressure before entering passages 30 to be sure that only steam is carried into ports 12, a suitable steam pressure valve generally indicated at 48 and of generally known construction per se, may be provided at the lower end of a separate open-

ended tube means 50 adjacent balance tube 46 as seen in FIG. 3, which tube means is open at its lower end similar to balance tube 46 and is also open at its other end adjacent the sprayer as seen in FIG. 2 to provide a direct and straight steam path to the sprayer for fast start of the spray operation. Tube means 50, like balance tube 46, may be brought into a lower domed portion 52 separate or formed in the bottom of tank 20 to provide a steam dome with direct access to steam boiler 24. Thus, steam from boiler 24 may pass directly down into the soleplate as indicated by the arrow when steam pressure opens valve 48 and may also pass directly up balance tube 46 as well as adjacent tube means 50 where it subsequently enters chamber 44 for power operation of spray 34. In order to screen all steam leaving the iron, suitable screen means 54 may be disposed in the path of the steam entering tube means 50 as shown by the dotted arrow so that steam directed to upper chamber 44 as well as steam entering passages 30 is screened of any flakes thereby requiring all steam leaving the iron to be screened. Additionally, cleaning structure similar to co-pending application supra Ser. No. 739,536 may be employed.

During draining of the iron, when it is turned nose down about 180° from the position of FIG. 1, when water passes out fill opening 40, it is desired that no flakes be allowed to reach the delicate sprayer structure and to this end, a baffle means is disposed between steam boiler 24 and sprayer 34. For example, a baffle 58 is disposed below sprayer 34 conveniently in the riser duct to define, with the duct, the remaining wall of chamber 44 and, as shown in FIG. 2, the baffle is a solid plate effectively sealed to the adjacent structure around its periphery to form the chamber wall. The outer periphery of tube means 50 is also sealed to the baffle so the only entrance to chamber 44 is through tube 50. Generally speaking, the tubular parts described such as 48, 50 and 54 are cylindrical and concentric for ease of manufacture and operation although they are not limited to such shapes. In tube 50, the progressively smaller diameter, FIG. 2, is not essential but is desired to provide the larger portion of the tube in the water in tank 20 for condensation of the steam in the tube when the iron is not in operation or water in the tank is cool. The baffle 58 thus effectively blocks or seals against any passage of flakes into sprayer chamber 44 when the iron is emptied. Water for sprayer 34 is supplied through connecting tube 60 sealed to baffle 58 and extending between sprayer 34 and the bottom of tank 20 where the likelihood of any flakes passing through the tube is rare.

The provision of baffle 58 permits balance tube 46 to terminate below the baffle and equalize the pressures in boiler 24 and water tank 20 while also allowing tube means 50 to penetrate the baffle to provide opening means through the baffle for the passage of steam into chamber 44. Screened steam is thus admitted when button 26 is in the upper or valve-on steam generating position. In operation, it will be seen that the valve on-position permits all steam to be screened by 54, to then pass through tube means 50 for sprayer 34, and through passages 30 to steam ports 12 when pressure valve 48 is opened under steam pressure. In the valve off-position or when draining the iron, baffle 58 prevents flakes in the water from reaching the sensitive spray structure 34 so that the flakes are kept in water tank 20 to be drained with the water out fill opening 40.

In a modification shown in FIG. 4, the baffle means may comprise a screen 62 disposed below the sprayer not shown to block and seal against the passage of flakes in the water and to screen steam to chamber 44. For passage of steam to chamber 44 in valve on-position, opening 64 is provided directly in the screen. This opening may be controlled directly by a washer means 66 mounted on stem 28 so that the opening is controlled by operation of the water valve 25. Again, the entire structure may be housed in the outer tube 22 which is preferably formed

5

of sheet metal and attached to water tank 20 in a known manner. This modification includes an indirect passage of steam into chamber 44 through opening 64 and may cause a slight delay in spray operation. Thus, the direct path modification of FIG. 2 is faster but both modifications prevent the passage of flakes into chamber 44 and thus the sensitive spray structure at all times. Screening means similar to 54 is omitted for clarity in FIG. 4 but would be supplied and performs the same function of screening all steam that leaves the iron.

Thus, it will be seen that the anti-fouling structure of the modifications described performs several important functions. It screens and cleans all steam leaving the iron for spray purposes, it blocks flakes from the fine steam or water passages, and maintains a pressure balance for drip free operation.

While there have been described preferred forms of the invention, obvious equivalent variations are possible in light of the above teachings without departing from the invention.

I claim:

1. In a normally horizontal spray-steam iron having an enclosed water tank with a fill opening thereto and having a steam generating soleplate with an on-off water valve to meter water to a soleplate steam boiler, and a powered sprayer having a water inlet to said tank, the improvement of anti-fouling sprayer structure comprising:

outer vertical tube means connecting said tank and sprayer,

baffle means below said sprayer between said steam boiler and sprayer,

said baffle being sealed around its periphery to the adjacent structure, and blocking passage of flakes to said sprayer, and

said water inlet passing through and being sealed to said baffle.

2. In a normally horizontal spray-steam iron having an enclosed water tank with a fill opening thereto and having a steam generating soleplate with an on-off water valve to meter water to a soleplate steam boiler, and a powered sprayer having a water inlet to said tank, the improvement of anti-fouling sprayer structure comprising;

outer vertical tube means connecting said tank and sprayer,

baffle means disposed below said sprayer, said baffle being sealed around its periphery to the adjacent structure,

said water inlet passing through and being sealed to said baffle,

pressure balancing means in said outer tube connecting said boiler and tank and,

opening means through said baffle for steam passage to said sprayer in valve on-position,

said baffle blocking passage of flakes to said sprayer in valve off-position.

3. Apparatus as described in claim 2 wherein said outer tube encloses said water valve, and

said pressure balancing means is a vertical balance tube open at one end to said tank and at the other end to said boiler.

4. Apparatus as described in claim 2 wherein said baffle means comprises a screen preventing passage of flakes therethrough.

5. Apparatus as described in claim 2 having separate open-ended tube means extending through said baffle at one end adjacent said sprayer and connected with said boiler and having a screened inlet at the other end thereto.

6. Apparatus as described in claim 3 wherein said water inlet from said sprayer is a tube passing through and sealed to said baffle and connecting said tank.

7. Apparatus as described in claim 4 wherein said open-

6

ing means through said baffle is controlled by the water valve.

8. Apparatus as described in claim 5 wherein said baffle is a solid plate and said tube means is sealed thereto.

9. Apparatus as described in claim 5 wherein said tube is substantially cylindrical and said screened inlet includes a tubular screen concentric with said tube, and

valve means concentric with said tube and screen to control steam to said soleplate whereby said steam to the sprayer and soleplate is screened.

10. Apparatus as described in claim 7 wherein said water valve includes a vertical stem disposed in said outer tube,

said stem having means thereon sealing said opening means in valve-off position.

11. Apparatus as described in claim 8 wherein said tube is a straight tube from the connection with said boiler to adjacent said sprayer for quick start of said sprayer.

12. In a normally horizontal spray-steam iron having an enclosed water tank with a fill opening thereto and having a steam generating soleplate boiler with an on-off water valve to meter water to the boiler, and a steam powered sprayer having an orifice relatively high on the iron front and tube-connected to said tank, the improvement of anti-fouling sprayer structure comprising:

outer vertical tube means at the forward end of and connecting with said tank and extending thereabove, a riser duct disposed on and opening into said tube means,

a baffle below said sprayer,

said baffle being sealed around its periphery to said riser duct and defining therewith a chamber in said riser,

said tube connection passing through and being sealed to said baffle,

pressure balancing means in said outer tube connecting said boiler and tank, and

opening means through said baffle for steam passage into said chamber and sprayer in valve on-position,

said baffle blocking passage of flakes to said chamber and sprayer in valve off-position.

13. Apparatus as described in claim 12 wherein said outer tube encloses said water valve and

said pressure balancing means is a vertical balance tube open at one end to said tank below said baffle and at the other end to said boiler.

14. Apparatus as described in claim 12 wherein said baffle comprises a screen preventing passage of flakes therethrough.

15. Apparatus as described in claim 12 having separate open-ended tube means extending through said baffle at one end adjacent said sprayer and connected with said boiler and having a screened inlet at the other end thereto.

16. Apparatus as described in claim 13 wherein said tube connecting said sprayer and tank passes through and is sealed to said baffle.

17. Apparatus as described in claim 14 wherein said opening means through said baffle is controlled by the water valve.

18. Apparatus as described in claim 15 wherein said baffle is a solid plate and said tube means is sealed thereto.

19. Apparatus as described in claim 15 wherein said tube is substantially cylindrical and said screened inlet includes a tubular screen concentric with said tube, and

valve means concentric with said tube and screen to control steam to said soleplate whereby said steam to the sprayer and soleplate is screened.

20. Apparatus as described in claim 17 wherein said water valve includes a vertical stem through said outer tube,

said stem having means thereon sealing said opening means in valve off-position.

21. Apparatus as described in claim 18 wherein said tube

is a straight tube from the connection with said boiler to adjacent said sprayer for quick start of said sprayer.

3,161,971	12/1964	Swenson	-----	38—77
3,183,610	5/1965	Finlayson et al.	-----	38—77
3,201,880	8/1965	Denton	-----	38—77

References Cited

UNITED STATES PATENTS

3,041,757 7/1962 Swenson et al. ----- 38—77

5 PATRICK D. LAWSON, Primary Examiner