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2,515,776

RESERVOIR AND LIQUID SUPPLY SYSTEM FOR STEAM IRONS

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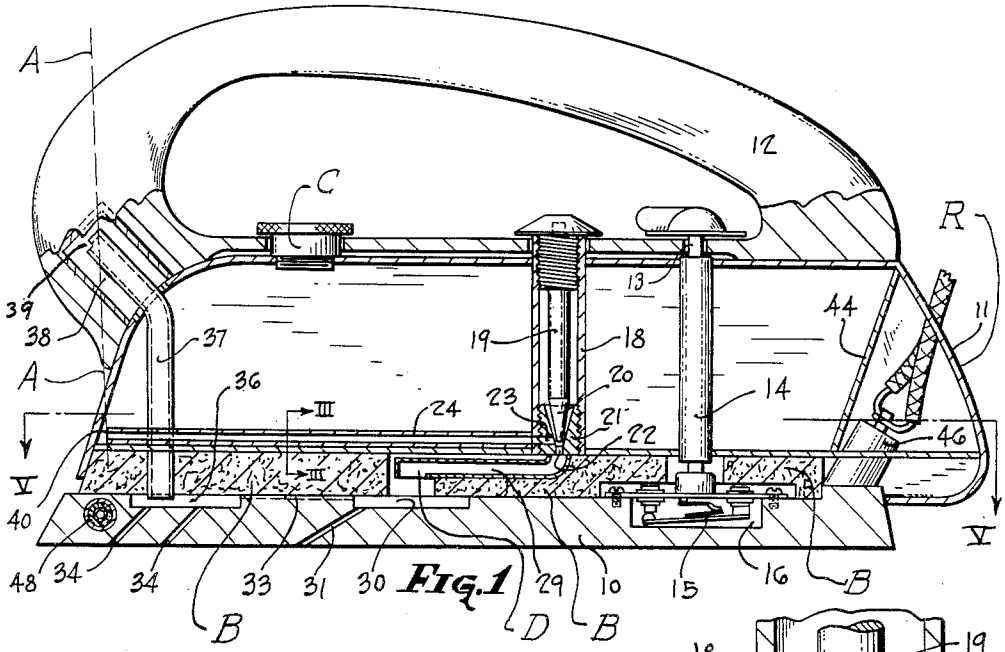


FIG. 1

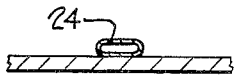


FIG. 3

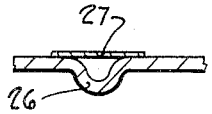


FIG. 4

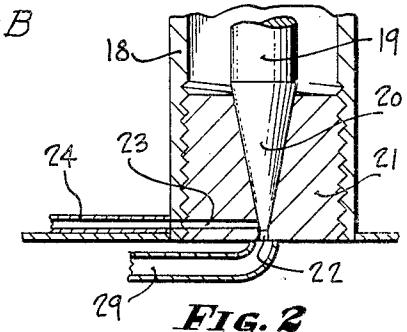


FIG. 2

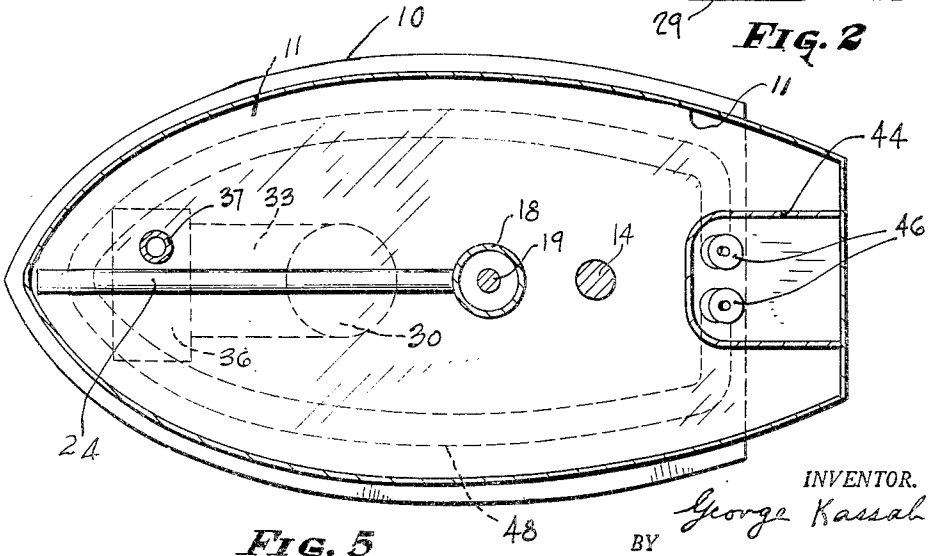


FIG. 5

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RESERVOIR AND LIQUID SUPPLY SYSTEM FOR STEAM IRONS

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6 Claims. (Cl. 38—77)

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My invention relates to a steam iron of the type which includes a water reservoir, a steam-generating chamber and a valve for controlling the flow of water from said reservoir to said steam generator, where the water is flashed into steam which is discharged onto the fabric being ironed. This type of iron is exemplified by such prior Patents as No. 2,322,593, issued to F. E. Finlayson on June 22, 1943, and No. 2,387,281, issued to E. O. Morton on October 23, 1945.

One object of the invention is to produce an improved iron of the type set forth.

When an iron of the type described is in use, the valve controlling the flow of water from the reservoir is adjusted to an open position which will deliver more or less water to the steam-generating chamber according to the degree of heat at which the iron is maintained, which, in turn, is varied according to the type of fabric being ironed. For example, in ironing linen, the iron is maintained at a higher temperature and more water is used than when some synthetic fabric such as "rayon" is being ironed.

During any ironing operation, there are frequent interruptions, as when the piece being ironed is folded, when a finished piece is put away and a new piece to be ironed is spread on the ironing board, or when the operator is momentarily called away. During these short interruptions the electrical energy is not shut off and, in order to guard against scorching, the iron is upended or stood on a rest provided at its rear end. In this position, the plane of the soleplate is substantially normal to the plane of the ironing board and the nose of the iron is elevated. It is undesirable to permit continued generation of steam while the iron is so upended, because wasted steam represents wasted electrical energy, and because continued generation of steam, when the iron is upended, rapidly depletes the supply of water in the reservoir, the capacity of which is limited to begin with. This necessitates more frequent refilling of the reservoir and thus detracts from the merits of the iron. An iron in which the valve must be closed prior to each interruption, and in which the valve must be reopened and reset upon resumption of the ironing operation, is so impractical as to be altogether useless as a steam iron.

In order to overcome this difficulty, it has been proposed to place the valve at, or near, the nose of the iron and to provide means for preventing the reservoir from being filled to capacity so that, when the iron is upended, the water level in the reservoir will be below the valve orifice

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and water will cease to flow into the steam-generating chamber, even though the valve be left open. This arrangement prevents the generation of steam when the iron is upended without having to close the valve, but it is disadvantageous in that it reduces the amount of water that may be introduced into the reservoir, thus necessitating more frequent refilling of the reservoir. When the limited capacity of the reservoir is remembered, it will be seen that any reduction in its capacity will seriously handicap the utility of the iron.

It is, therefore, a further object of the invention to devise an improved iron construction whereby the reservoir may be filled to its full capacity and whereby, when the iron is upended, no water will flow from the reservoir to the steam generator, thus conserving the limited supply of water which it is possible to put in the reservoir so as to prolong the period of use of the iron before it is again necessary to refill the reservoir.

Steam irons, regardless of their other specific characteristics, are also handicapped in that the valved orifice through which water is delivered to the steam generator is exposed to direct, radiant or conductive heat from the soleplate so that salts precipitate from water which evaporates in and around the orifice and, in more or less time, the orifice is partly or wholly clogged. This necessitates servicing by expert mechanics with attendant expense and inconvenience.

It is, therefore, a still further object of the invention to provide an improved structure in which the valved orifice is so located as to be adequately shielded from the heat of the soleplate, thereby greatly retarding the deposit of precipitates on the valve orifice and reducing the frequency of servicing on this account.

These and other objects are attained by my invention as set forth in the following specification and illustrated in the accompanying drawings, in which:

Fig. 1 is a view, partly in vertical section and partly in elevation, of a flash-type steam iron embodying my invention.

Fig. 2 is a fragmentary enlargement of the valved orifice and its adjuncts.

Fig. 3 is an enlarged, fragmentary section on line 3—3 of Fig. 1.

Fig. 4 is a view similar to Fig. 3, showing a slight modification.

Fig. 5 is a view on line 5—5 of Fig. 1.

In Fig. 1, there is shown an iron including a conventional soleplate 10, a water reservoir 11, and a handle 12. The reservoir may have a

finished or polished exterior, or an auxiliary cover can be interposed between, and secured to, the soleplate and the handle in any well-known, conventional manner. A stem 13 passes through a sleeve 14, carried by the top and bottom of the reservoir, for adjusting or setting a thermostat 15 disposed in a cavity or recess 16 in the upper surface of the soleplate. Another sleeve 18, similarly mounted, encloses a stem 19 for adjusting a needle valve 20 which reciprocates in a tapered bore formed in a bushing 21. The bushing 21 is provided with a bottom orifice 22 and a communicating lateral bore 23 which forms a continuation of a tube 24. The tube 24 may be made as a separate member and secured to the bottom of the tank, as shown in Fig. 3, or it may be provided by making a groove 26 in the bottom of the reservoir and welding a strip 27 to close the top of the groove, as shown in Fig. 4. In either structure, the end of the tube adjacent the nose end of the reservoir is open.

The orifice 22 empties into one end of an enlarged pipe 29, the other end of which empties into a steam-generating recess or chamber formed in the soleplate 10. The steam generator 30 may have one or more openings 31 leading directly to the under side of the soleplate or it may be connected by a passage 33 to a distributing chamber 36, from which openings 34 lead to the under side of the soleplate. The manner in which steam is conducted from the chamber 30 to the cloth being ironed is optional as it forms no part of the present invention.

In order to equalize the pressure, a vent pipe 37 leads from the chamber 36 to a dome 38 which communicates with the water reservoir. At this point, attention is called to the fact that, when the iron shown in Fig. 1 is upended so as to rest on its heel, the opening 39 in the upper end of the vent pipe 37 will be above the level of water in the nose or upper end of the reservoir and the adjacent portion of the dome 38, even though the reservoir is filled to its full capacity. This is shown by the broken line A in Fig. 1. Except for this requirement, the structure and arrangement of the vent pipe 37 and dome 38 may be altered at will.

Between the soleplate and the bottom of the reservoir is a thick layer of insulating material B which effectively shields the reservoir, and particularly the orifice 22, and a major portion of the pipe 29 from the heat of the soleplate. The chambers 16, 30 and 36 and the passage 33 may be covered by the insulating material B or they may have a separate cover, if so desired.

The soleplate is heated by means of a heating element 48, the nature and shape of which may be conventional except that, according to this invention, the terminals 46 of the heating element are segregated in a compartment 44 which is made as small as possible so as to take up as little as possible of the volumetric capacity of the reservoir. Again, except for this requirement, the terminals 46 may be disposed or arranged in any convenient manner.

Operation

The reservoir is filled to complete capacity through a suitable fill opening which is normally closed by a plug C. The fill opening and the plug C may be conventional as long as they are so located and arranged as to permit filling of the tank to its full capacity.

The thermostat is then adjusted to maintain the soleplate at the desired temperature value, and when the iron is to be used as a steam iron, the valve is adjusted to permit the flow of the desired amount of water from the reservoir to the steam generator 30. If desired, the thermostat-adjusting stem and the water valve can be connected in tandem for concomitant adjustment in any desired manner such, for example, as the manner illustrated in Patent No. 2,342,653, issued to R. H. Edwards on February 29, 1944.

When the iron is in its ironing position, with the soleplate thereof resting on the ironing board, water will enter the tube 24 through its open nose end 40 and will flow out through the inner end of the bore 23 and the orifice 22 to the pipe 29, from the open end D of which the water will drop into the steam generator 30 to be flashed into steam.

It will be noted that a hole is cut through the insulation, in registration with the opening D, so as to permit passage of water from the pipe 29 to the steam generator, while at the same time shielding all but the opening D of the pipe from the heat of the soleplate. Due to this heavy insulation and because the orifice 22 is out of registration with the steam-generating chamber, the orifice is kept relatively cool and water evaporation in and around the orifice is eliminated or greatly reduced. This prevents or greatly retards sedimentation and, therefore, retards the clogging of the orifice. As for the pipe 29, it will be noted that, due to its large diameter, and due to the fact that it is insulated from heat, it will take a very long time before it will be clogged up by sedimentation. The opening D is also so big that it will take a very long time to clog. Furthermore, the pipe 29 may be readily cleaned by merely detaching the reservoir from the soleplate or by forming the steam generator in a plug which is threaded into an opening in the soleplate, as shown, for example, in the Morton patent above mentioned. The constant passage of relatively cold water down the tube 29 serves to preheat the water prior to its arrival at the steam generator and also serves to keep the pipe itself, and hence the orifice 22, relatively cool. As far as I am aware, this feature is broadly new in that in all prior steam iron constructions, the equivalent of my orifice 22 was always in direct registration with the steam generator, so that I am the first to place the valve orifice and the steam generator out of registration to connect the orifice 22 and the steam generator 30 by the pipe 29 or its equivalent.

When the iron is upended or made to rest on its heel rest R, in the well-known manner, the nose end 40 of the tube 24 will be higher than the level of the water in the reservoir, and the opening 39 in the upper end of the vent pipe 37 will be higher than the level of the water in the dome 38, even though the reservoir is filled to its complete capacity (see line A). Therefore, no water will enter the tube 24 or the vent pipe 37 when the iron is upended, even at the beginning of the ironing operation when the reservoir is completely full, and no steam will be generated even though the valve is left open.

In order to prevent the water contained in the tube 24 from being evaporated and wasted while the iron is upended, I have made the tube 29 of a much greater diameter than the tube 24, so that all the water contained in the tube 24 at the moment the iron is upended will not quite fill the portion of the tube 29 between the orifice 22 and the opening D. In other words, when the iron is upended and the tube 24 and pipe 29 are substan-

tially vertically disposed, the pipe 29 serves as a temporary storage reservoir for the water drained from the tube 24. This arrangement (*a*) prevents excessive heating of the pipe 29 while the iron is upended, which would happen if the pipe 29 were empty; (*b*) preheats the water stored in the pipe 29; and (*c*) provides a temporary over-supply of water to the steam generator when ironing is resumed, thus furnishing ample steam at the instant of resumption of the ironing operation and during the time it takes for a new supply of water to reach the orifice 22.

From the foregoing it will be seen that the reservoir may be completely filled so as not to sacrifice any of its limited capacity; that the iron will not steam while upended even though the valve 20 is left in its adjusted open position; that the small orifice which normally gets rapidly clogged by sedimentation is adequately shielded from heat by the insulation B, by the fact that it does not register with the steam generator so as to eliminate or reduce precipitation of sediment at and around the orifice; that the pipe 29 is so big and its opening D is so large that it will take a very long time before either will be clogged up; that the pipe 29, except for its large opening D, is shielded from the heat of the soleplate and that, by provision of the tube 24, with its open end at the nose of the iron and with the provision of the tube 29 to receive and preheat the water which runs down from the tube 24 when the iron is upended, I am not limited to placing the steam generator and the water valve at the nose of the iron as in the Kistner patent, No. 2,313,382, of March 9, 1943. Nor do I have to sacrifice twenty per cent, more or less, of the limited capacity of the reservoir as is necessary when the Kistner structure is employed. On the contrary, I can, and prefer to, locate the steam generator and the water valve substantially in the center section of the iron, approximately as shown; in this specific embodiment shown the vertical central axis of the generator is slightly forward of the exact center of the soleplate, while the valve is located to the rear of the generator; more specifically, the valve is spaced back from the very forward nose end of the soleplate a distance substantially equal to three-fifths of the length of the soleplate. Also, in this specific sample, the valve is spaced back from the nose of the reservoir a distance substantially equal to one-half the length of the soleplate.

With respect to the tube 29, I want to point out that it may be used for retarding clogging of the orifice 22, even though the tube 24 is omitted, and the water valve must be closed when ironing is interrupted, or when the arrangement of the Kistner patent is adopted. Broadly stated, this feature of the invention resides in placing the orifice out of registration with the steam-generating chamber and conducting water from the orifice to the steam-generating chamber through an insulated pipe as shown.

As above stated, the tube 24 can be made as shown in Fig. 3 or preferably as shown in Fig. 4, which construction is believed to be less expensive and in which the depressed groove 26, being below the top surface of the bottom of the tank, will more completely drain the water from the reservoir.

It will be noted that, even when the reservoir is filled to its complete capacity, and before the iron is used at all, the nose end 40 of the tube 24 will still be above the level of the water in the reservoir as soon as the iron is upended. This is due to the fact that a few drops of water will enter the portion of the dome 38 below the line A—A when the iron is resting on its heel R in an almost vertical position. Also, while the dome 38 has been shown in the handle, it can be otherwise arranged, and it need not be as wide as shown. In practice, the dome 38 is preferably only large enough to permit insertion thereinto of the end of the vent 37. In the drawings, the dome 38 has been greatly enlarged for clarity of illustration.

While the pipe 29 is made large enough so as to have a volumetric capacity equal to the volumetric capacity of the longer but narrower tube 24, it is pointed out that this is not necessary for satisfactory operation because, when the iron is uptilted, water in the tube 24 will stop flowing into the tube 29 as soon as the water level in both tubes is the same. In other words, not all of the water in the tube 24 is drained into the tube 29, so that the amount of water which is thus stored in the pipe 29 and which is rapidly discharged into the steam generator when the ironing is resumed will not be excessive but will be enough to keep the pipe 29, and hence the orifice 22, relatively cool, and it will be enough also to provide an instantaneous and somewhat larger steam volume at the resumption of the ironing operation, so that there will be no loss of time while waiting for water from the distal side of the orifice to reach the steam generator.

What I claim is:

1. A steam iron including a body having a nose, a soleplate and a heel, and adapted to assume an ironing position in which said iron rests on said soleplate and an upended position in which said iron rests on its heel, said iron further including a steam-generator carried by said soleplate, means for heating said soleplate and said generator, a reservoir for storing water to be converted into steam in said generator provided with a nose end at the nose of said body, an orifice for discharging water from said reservoir to said generator, an adjustable valve operatively associated with said orifice for regulating the flow of water therethrough, said orifice being spaced from the nose portion of the reservoir a distance substantially equal to one-half the length of the soleplate, there being an opening through which water may be introduced into the reservoir, said opening and said reservoir being so constructed and related that said reservoir may be filled to substantially its complete capacity, and a closed conduit extending along the bottom of said reservoir from said orifice to the vicinity of the extreme nose of said reservoir and having the end thereof near said nose of said reservoir open, whereby, when said iron is in its ironing position, the water in the reservoir will enter the open end of and will flow through said conduit to said orifice, and whereby when said iron is upended, the open end of said conduit will be above the level of the water in said reservoir even when the latter is filled substantially to its complete capacity.

2. The structure recited in claim 1 in which said orifice and said generator are out of vertical alignment, together with a second conduit extending along the underside of said reservoir and having one end thereof disposed below said orifice for receiving water discharged therethrough, the other end of said second conduit being open and registering with said steam generator for delivering said water thereto, and heat-insulating means shielding said orifice and said second conduit from the heat of the soleplate.

3. A steam iron including a body having a nose, a soleplate and a heel, and adapted to assume an ironing position in which said iron rests on said soleplate and an upended position in which said iron rests on its heel, said iron further including a steam-generator carried by said soleplate, means for heating said soleplate and said generator, a reservoir for storing water to be converted into steam in said generator provided with a nose end at the nose of said body, an orifice for discharging water from said reservoir to said generator, an adjustable valve operatively associated with said orifice for regulating the flow of water therethrough, said orifice being spaced from the nose portion of the reservoir a distance substantially equal to at least one-third the length of the soleplate, there being an opening through which water may be introduced into the reservoir, said opening and said reservoir being so constructed and related that said reservoir may be filled to substantially its complete capacity, and a closed conduit extending along the bottom of said reservoir from said orifice to the vicinity of the extreme nose of said reservoir and having the end thereof near said nose of said reservoir open, whereby, when said iron is in its ironing position, the water in the reservoir will enter the open end of and will flow through said conduit to said orifice, and whereby when said iron is upended, the open end of said conduit will be above the level of the water in said reservoir even when the latter is filled substantially to its complete capacity.

4. A steam iron comprising a body having a nose end and a heel end, said body also having a soleplate and an ironing position in which the iron rests on the soleplate and a non-ironing position in which the iron rests on its heel, a steam generator carried by said soleplate, means for heating said steam generator, a water reservoir carried by said soleplate provided with a nose end at the nose end of said body, a valve-controlled duct for discharging regulated quantities of water from said reservoir to be flashed into steam in said generator, said valve-controlled duct being spaced rearwardly from the nose portion of the reservoir and from said steam generator, a passage extending along the bottom of the reservoir from said duct to the nose portion of the reservoir, said passage having an open end so arranged within said reservoir as to be submerged within the water of the reservoir only when the iron is in said ironing position, and a second duct extending along the underside of said reservoir from said duct toward the nose of the iron to discharge into said generator.

5. A steam iron comprising a body having a nose end and a heel end, said body also having a soleplate and an ironing position in which the iron rests on the soleplate and a non-ironing position in which the iron rests on its heel, a steam

generator carried by said soleplate, means for heating said steam generator, a water reservoir carried by said soleplate provided with a nose end at the nose end of said body, a valve-controlled duct for discharging regulated quantities of water from said reservoir to be flashed into steam in said generator, said valve-controlled duct being spaced rearwardly from the nose portion of the reservoir and from said steam generator, a conduit extending along the bottom of the reservoir from said duct to the nose portion of the reservoir, said conduit having an open end so arranged within said reservoir as to be submerged within the water of the reservoir only when the iron is in said ironing position, and a second conduit extending along the under side of said reservoir from said duct toward the nose of the iron, said second conduit having a volumetric capacity at least equal to the volumetric capacity of said first mentioned conduit, whereby when said iron is upended and said conduits are both in a substantially vertical position, the water which drains from said first-mentioned conduit is received and stored in said second conduit pending return of the iron to its ironing position.

6. A steam iron including a soleplate, a steam generator carried thereby, means for heating said soleplate and said generator, a water reservoir above said soleplate, a valve-controlled orifice for discharging regulated quantities of water from said reservoir, said orifice being out of vertical registration with said generator, a structure defining an enlarged passage from said orifice extending along the underside of said reservoir and having one end thereof connected to said orifice and the other end thereof open and registering with said generator for delivering water discharged through said orifice to said generator, and means for shielding said orifice and said passage from the heat of said soleplate.

GEORGE KASSAB.

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