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I. JEPSON ET AL

3,407,522

PRESSING IRON

Original Filed June 19, 1962

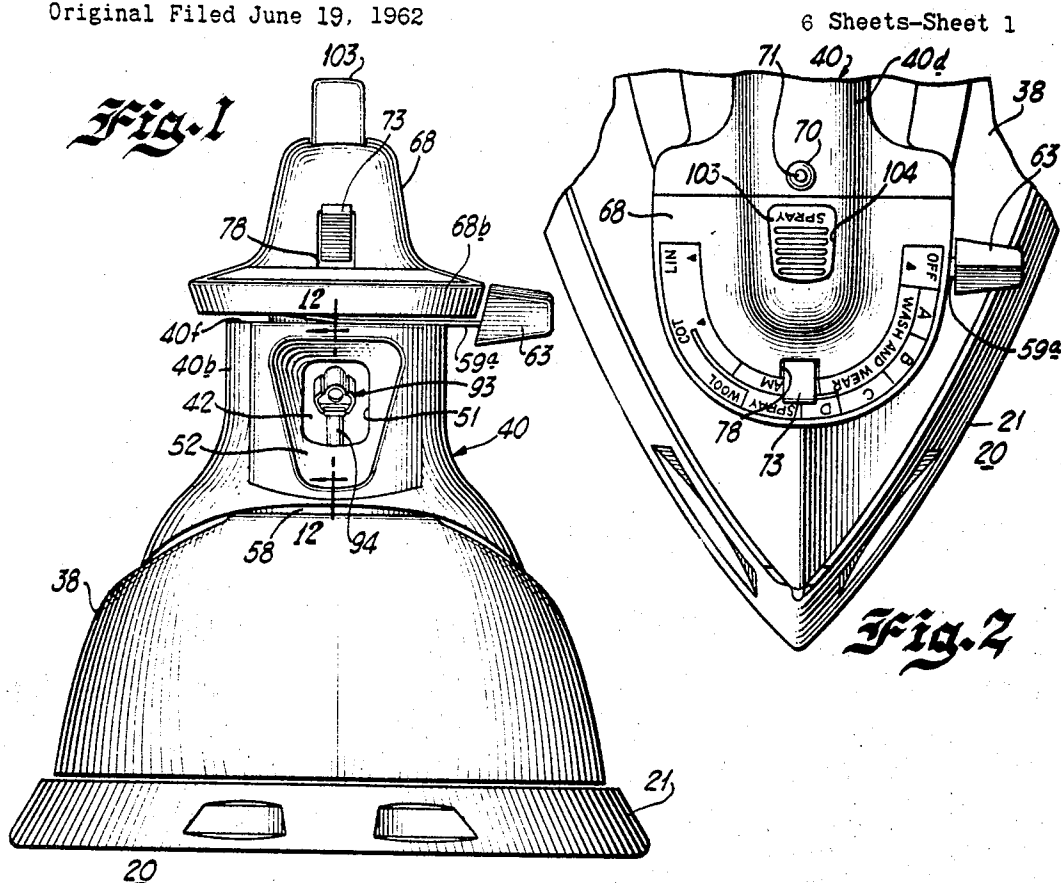
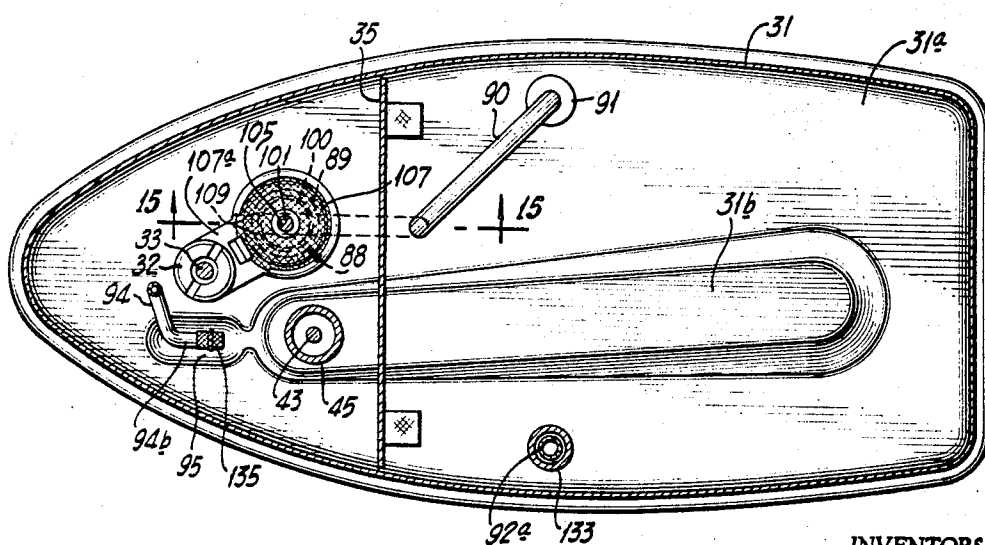


Fig. 3

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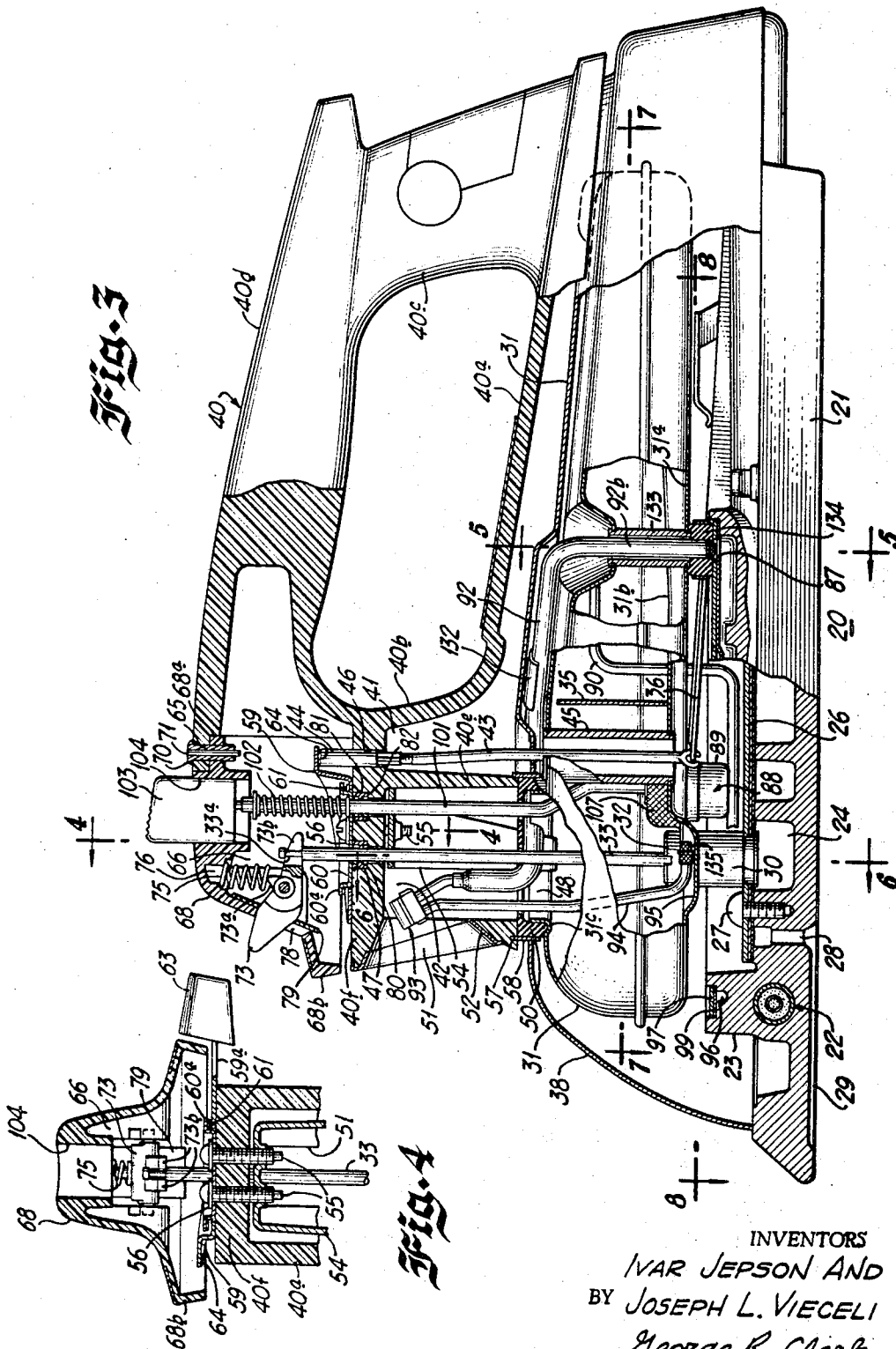
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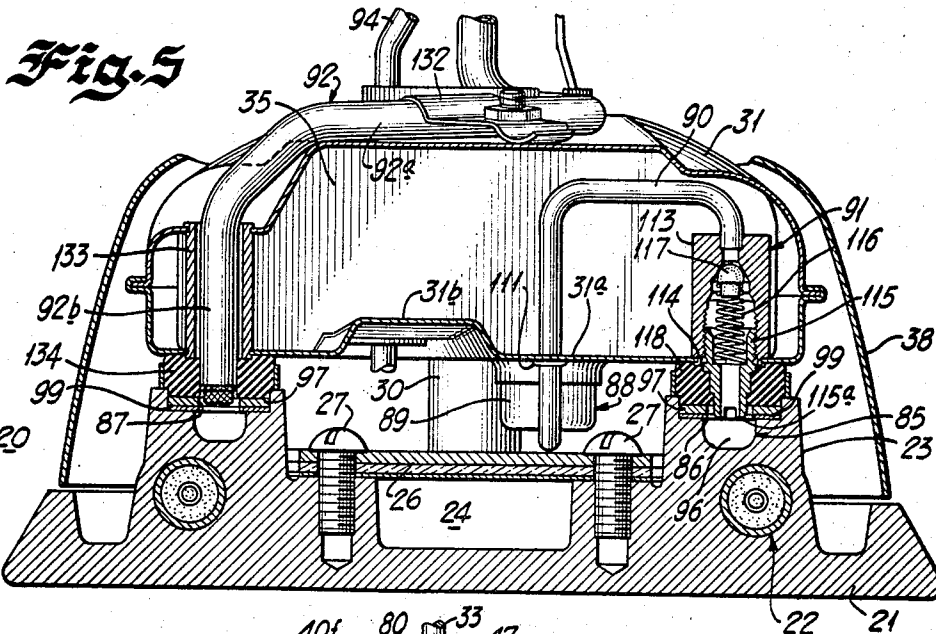
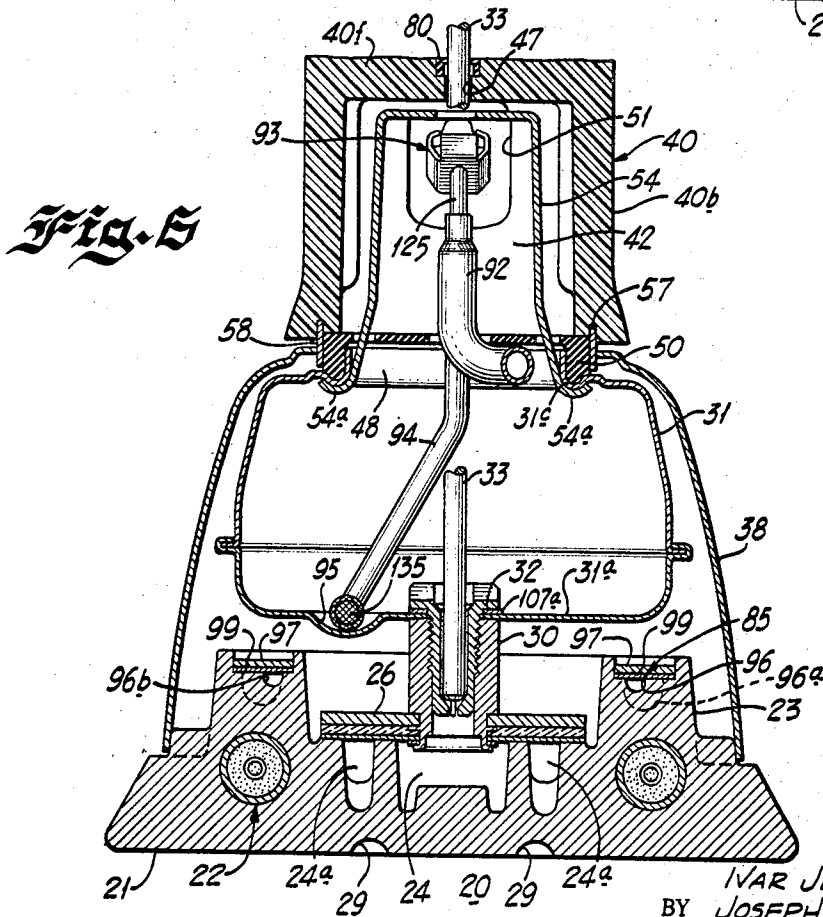
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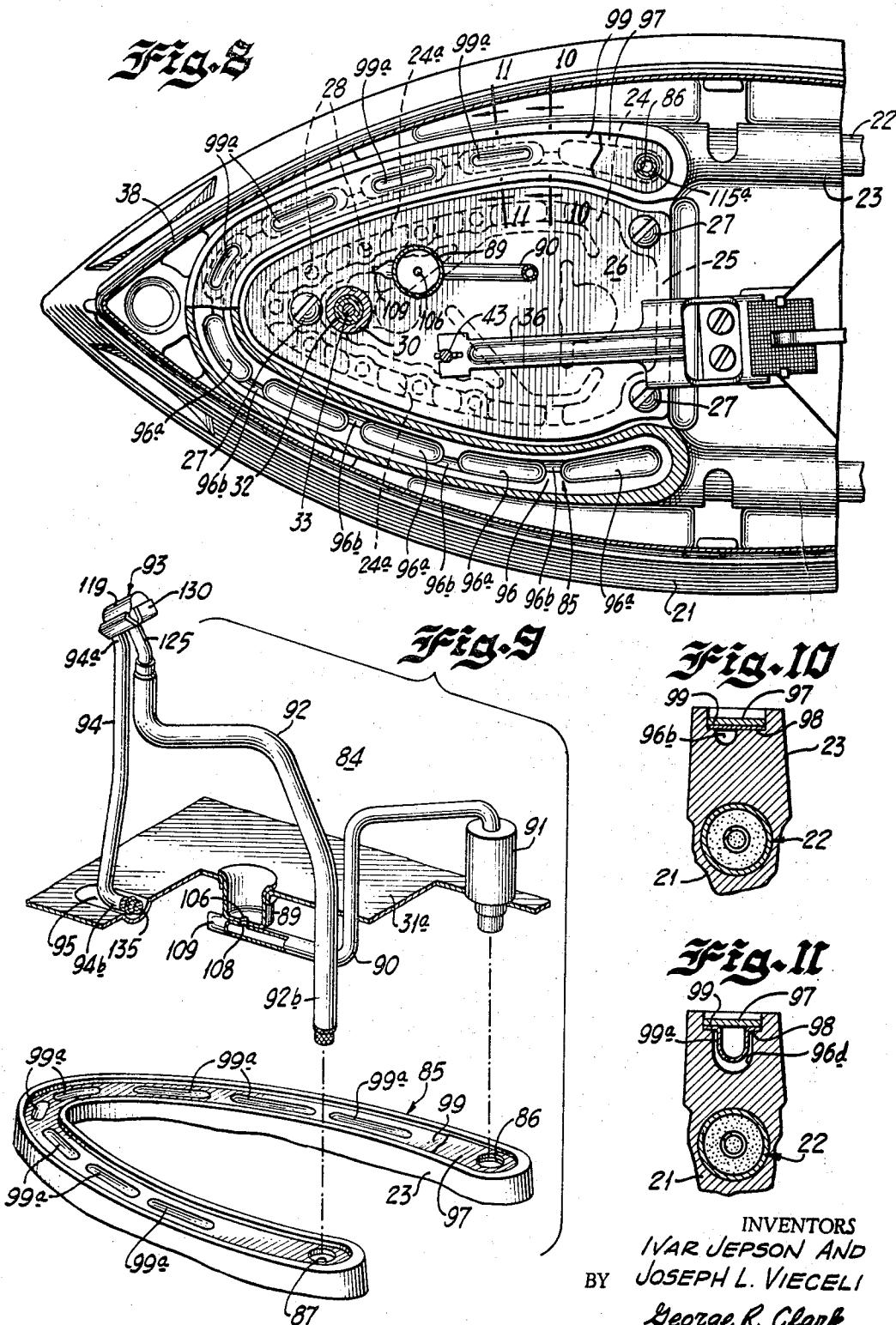
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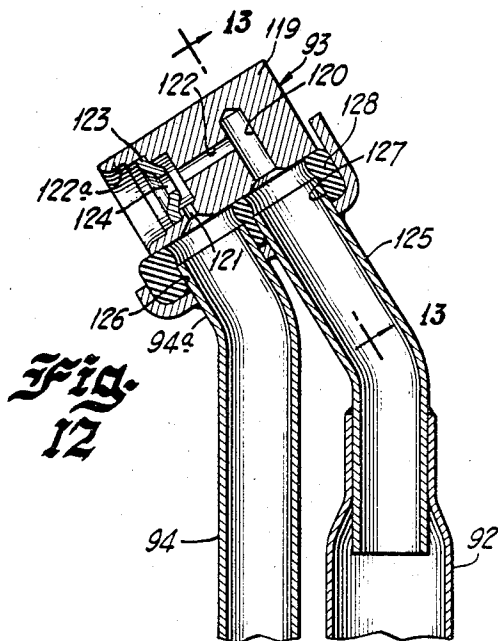
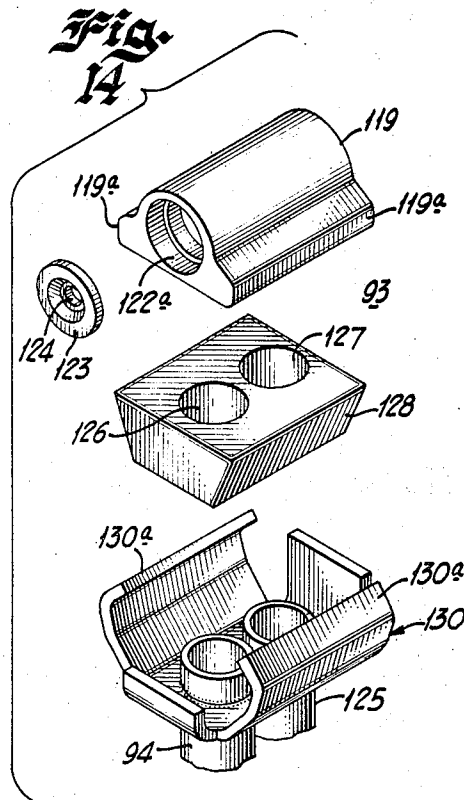
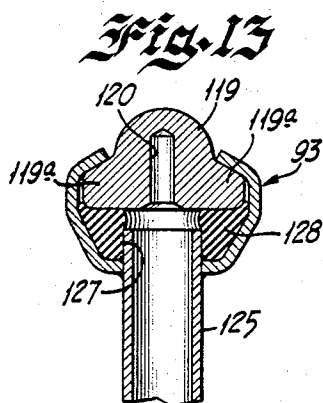
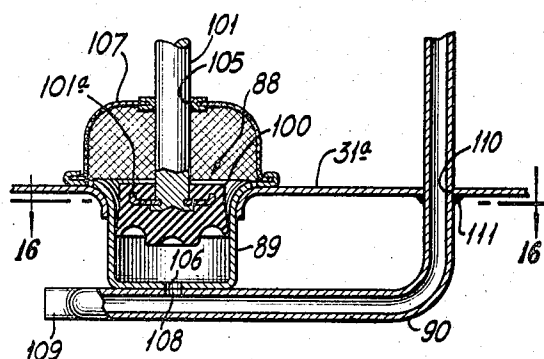
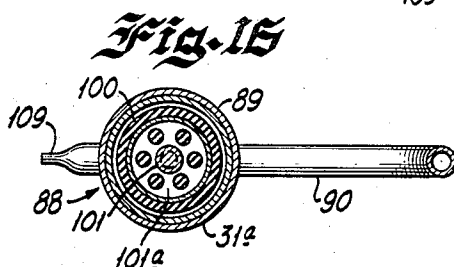
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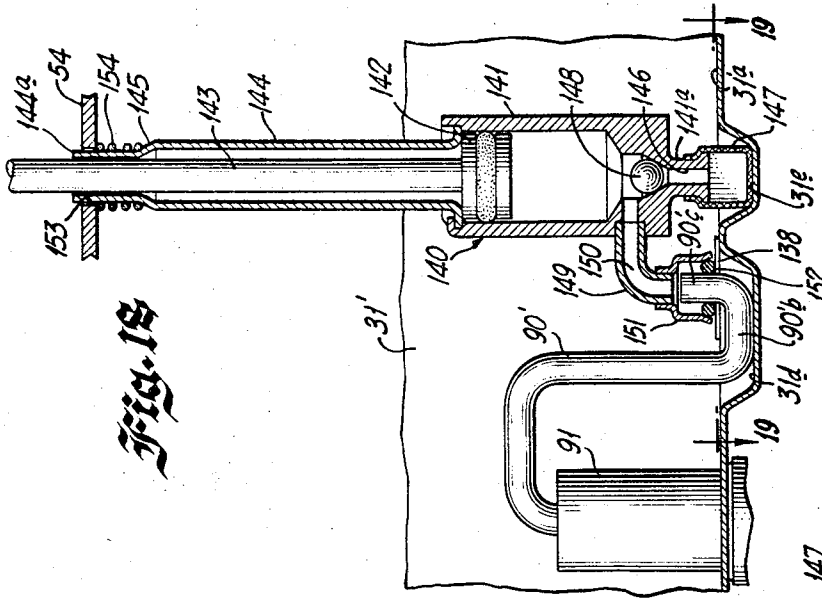
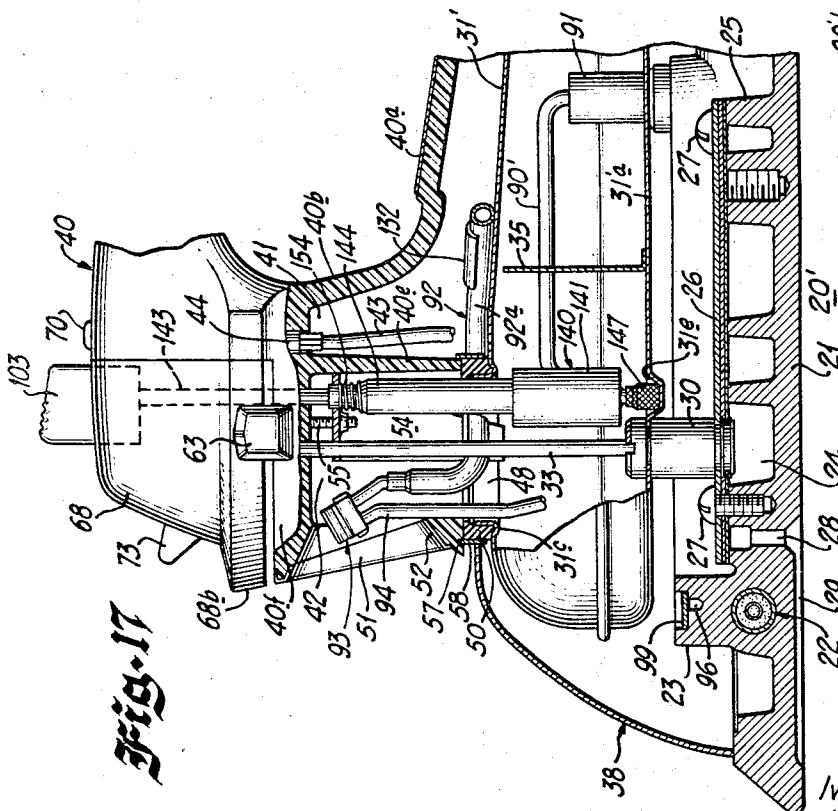
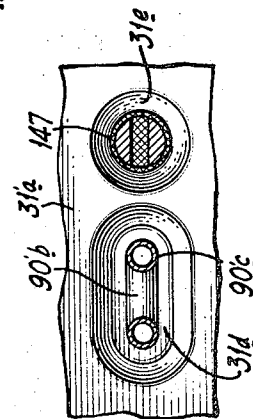
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3,407,522

PRESSING IRON

Ivar Jepson, South Duxbury, Mass., and Joseph L. Vieceli, La Grange, Ill., assignors to Sunbeam Corporation, Chicago, Ill., a corporation of Illinois
Continuation of application Ser. No. 203,500, June 19, 1962. This application Jan. 17, 1966, Ser. No. 528,691
24 Claims. (Cl. 38—78)

This application is a continuation of U.S. application Ser. No. 203,500, filed June 19, 1962, now abandoned, by the inventors of the present application. The present invention relates generally to pressing irons, and more particularly to pressing irons capable of selectively operating as a steam iron, a dry iron or a spray iron.

The steam iron has been extensively used for ironing purposes for many years, primarily because more satisfactory ironing of many fabrics is obtained by utilizing a steam iron rather than the conventional dry iron. As a matter of fact, many fabrics can be smoothed effectively only upon the application of heat when moisture is contained in the fabric. Long before the steam iron became practically a household necessity, flat irons or pressing irons were provided with means for sprinkling or spraying the clothes.

Steam irons have comprised two principal types, one commonly referred to as the boiler type and the other as the flash type. The advantages of the flash-type steam iron are well known and the large majority of steam irons now sold on the market are of the flash type.

For certain types of fabrics, sufficient steam condensation does not occur with the ordinary steam iron and additional moistening is necessary for completely satisfactory operation. It is common practice for the housewife to manually sprinkle certain fabrics before ironing with a steam iron to increase the moisture content. More recently, there has been a desire for a pressing iron which is both a steam, a dry and a spray or sprinkle-type iron and there are numerous prior art disclosures of such combined steam, dry and spray irons. These irons have taken numerous forms. The power for producing the spray has been obtained by both manually or motor-powered pumps, by steam pressure and by various other means. Since the flash-type steam iron has been found to be the most successful for numerous reasons, it would be desirable to provide a combined steam and spray iron wherein the spray is powered by steam produced by the flash-boiler principle. The basic idea of utilizing a flash generator to power a liquid spraying apparatus is very old and is disclosed in Tiscornia Patent 2,291,423, granted July 28, 1942.

In spray-type steam irons available on the market which are powered by the steam produced by a flash-type generator, the same generator for producing the steam released through the sole plate is also used to power the spray device. Unfortunately, the flash-type steam generator in a practical type construction is not capable of satisfactorily producing the steam for operating as a steam iron and simultaneously powering the spray. Moreover, the steam pressures desirable for a steam generator for generating steam supplied to the sole plate and for a steam generator for powering a liquid spray are quite different. Nevertheless, simultaneous operation of both of these features is many times desirable. Accordingly, it would be desirable to provide a combined dry, steam and spray iron which will operate satisfactorily as a steam and dry iron and which may also operate as a spray iron having a completely separate flash generator for powering the spray.

Accordingly, it is an object of the present invention to provide a new and improved pressing iron of the dry, steam and spray type.

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It is another object of the present invention to provide a combined steam and spray iron wherein the steaming action of the iron or the spray action of the iron are completely independent and neither is adversely affected by operation of the other.

It is a further object of the present invention to provide an improved pressing iron with two separate and independent steam generators of the flash type, both supplied from a common water reservoir.

It is another object of the present invention to provide a new and improved combined steam, dry and pressing iron which is simple and compact, which is of sturdy construction, and which will give long years of foolproof operation.

Still another object of the present invention resides in the provision of a steam and spray iron with two separate and independent flash-type steam generators in which the steam pressures in the two steam generators differ substantially.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the present invention, reference may be had to the accompanying drawings in which:

FIG. 1 is a front elevational view of a pressing iron embodying the present invention;

FIG. 2 is a top fragmentary view of the toe portion of the pressing iron of the present invention;

FIG. 3 is a side elevational view of the pressing iron of FIG. 1 with certain portions cut away more clearly to illustrate the present invention;

FIG. 4 is a sectional view taken on line 4—4 of FIG. 3, assuming that FIG. 3 shows the complete structure;

FIG. 5 is a sectional view taken on line 5—5 of FIG. 3, also assuming that FIG. 3 shows the complete structure;

FIG. 6 is a sectional view taken on line 6—6 of FIG. 3 again assuming that FIG. 3 shows the complete structure and with certain portions broken away more clearly to illustrate the invention;

FIG. 7 is a sectional view taken on line 7—7 of FIG. 3 again assuming that FIG. 3 shows the complete structure;

FIG. 8 is a fragmentary sectional view taken on line 8—8 of FIG. 3, again assuming that FIG. 8 shows the complete structure, and with certain portions cut away more fully to disclose the present invention;

FIG. 9 is an exploded perspective view in somewhat diagrammatic form illustrating the spray apparatus of the present invention, but with certain portions cut away more clearly to illustrate the present invention;

FIG. 10 is an enlarged fragmentary sectional view taken on line 10—10 of FIG. 8, assuming that FIG. 8 shows the complete structure;

FIG. 11 is a sectional view similar to FIG. 10 taken on line 11—11 of FIG. 8 and also assuming that FIG. 8 shows the complete structure;

FIG. 12 is a greatly enlarged sectional view of the spray nozzle incorporated in the pressing iron of the present invention illustrating the water and steam passageways connected thereto;

FIG. 13 is a sectional view taken on line 13—13 of FIG. 12, assuming that FIG. 12 shows the complete structure;

FIG. 14 is an exploded perspective view of portions of the spray nozzle illustrated in FIG. 12;

FIG. 15 is an enlarged fragmentary sectional view

taken on line 15—15 of FIG. 7, assuming that FIG. 7 shows the complete structure;

FIG. 16 is a sectional view taken on line 16—16 of FIG. 15, assuming that FIG. 15 shows the complete structure;

FIG. 17 is a fragmentary sectional view, with certain portions cut away, somewhat similar to FIG. 3 illustrating a modification of the present invention;

FIG. 18 is an enlarged sectional view taken through the pump structure of FIG. 17; and

FIG. 19 is a sectional view taken on line 19—19 of FIG. 18, assuming that FIG. 18 shows the complete structure.

Briefly, the present invention is concerned with a pressing iron which will function both as a steam and a dry iron and which also functions as a spray iron when desired. The spray is powered by a flash generator entirely separate and independent from the flash generator supplying steam to the iron when functioning as an ordinary steam iron. In order to get very fine water sprays, the spray generator should operate at a pressure in excess of twenty pounds per square inch and preferably between thirty and fifty pounds per square inch. A manually actuable pump supplies water to this spray generator. The generator for steam supplied to the sole plate operates at a low pressure usually under one pound per square inch and commonly at about one-quarter to one-half pound per square inch. Thus, a satisfactory spray is obtained at any time either simultaneously with the iron operating as a steam iron or separately. A common reservoir supplies water to both the spray generator and the steam generator. The pump of the plunger type supplies water to the spray generator through a restricted passageway whereby the operator can supply water for a sustained period of time with each plunger actuation, if desired. This water which is quickly flashed into steam in the spray generator then aspirates water from the reservoir which is broken up into fine particles and mixed with the steam to moisten the material being ironed.

Referring now to the drawings, there is illustrated in FIGS. 1 to 16 of the drawings, an electric pressing iron 20 which essentially is very similar to the pressing iron disclosed and claimed in Jepson et al. Patent 2,906,043, granted Sept. 29, 1959 and assigned to the same assignee as the instant application. Consequently, the description of the pressing iron of the present invention insofar as the features which are essentially the same as that disclosed in the above-mentioned patent is concerned, will be rather briefly described, and for a more detailed description, reference may be had to the above-mentioned patent. The pressing iron 20 comprises a sole plate 21, preferably constructed of cast metal, such as aluminum. This sole plate 21 is heated in a conventional manner by an electrical heating element 22 of the sheathed type (FIGS. 3, 5, 6, 10 and 11). Sheathed heating elements are well known and generally comprise a helical resistance conductor centrally disposed within an outer metallic sheath and supported in spaced relationship in reference to the sheath by an electrical insulating material which is also a good heat conductor, such as highly compressed magnesium oxide. As clearly shown in the above-mentioned Jepson et al. patent, the sheathed heating element 22 preferably has a generally U-shaped configuration, or, in other words, is in the shape of a hairpin. Also as best shown in FIG. 8 of the drawings, the sole plate is provided with a raised integral U-shaped rib 23 in which the sheathed heating element 22 is embedded. As is apparent from the ensuing description, rib 23 adjacent the forward part of the iron 20 is in somewhat different form from that disclosed in the above-mentioned Jepson et al. patent to accommodate the spray generator described hereinafter. It will be understood that the sheathed heating element 22, as fully described in the above-mentioned Jepson et al. patent is provided with suitable terminals which are electrically connected in a circuit including a

switch controlled by a temperature responsive device for controlling the heating of the sole plate 21 in any desired selected manner.

As in the above-mentioned Jepson et al. patent, there is provided a steam generating chamber 24 (FIGS. 3, 5, 6 and 8 of the drawings) which operates to produce steam on the flash principle for supplying the desired steam beneath the sole plate when the iron functions as a steam iron. The steam generating chamber 24 is in good heat transfer relationship with the heating element 22 and is defined within the space bounded by the closed end of the U-shaped rib 23 and a vertical wall or cross member 25 (FIG. 8). The particular construction of the steam generating chamber 24 and the steam flow therein starting with the supply of water thereto and the conversion of this water to dry steam forms no part of the present invention and may be identical with that disclosed in the above-mentioned Jepson et al. patent. Suffice it to say that the top of this steam generating chamber is defined by a suitable cover 26 preferably like that in the above-mentioned Jepson et al. patent, which is secured to the sole plate in sealing relationship therewith by suitable screws or fastening means 27. A plurality of steam discharge openings 28 through the sole plate 21 permit steam generated in generating chamber 24 to reach the underside of the sole plate 21 and be distributed over a substantial area of the ironing surface of the pressing iron 20. The sole plate 21 is preferably provided with a plurality of elongated grooves 29, which might be identical with those disclosed in FIG. 7 of the above-mentioned Jepson et al. patent. The steam pressure in steam generating chamber 24, due to the presence of the continuously open ports 28, is preferably less than one pound per square inch, and in a device built in accordance with the present invention was of the order of one-quarter pound per square inch. This low pressure is essential where as described hereinafter water is supplied under the force of gravity to the steam generating chamber 24. Suitably secured to the cover 26 of the steam generating chamber 24 is the valve body member 30 of a water control valve for supplying water to the steam generating chamber 24. As in the aforementioned Jepson et al. patent, the valve body 30 not only functions as a water control valve, but also holds the cover 26 in assembled relationship and suitably supports a water reservoir 31 in a predetermined relationship with respect to the valve body 30. For a detailed description of this valve body 30 and associated functions thereof, reference should be had to the above-mentioned Jepson et al. patent. When the water reservoir 31 is assembled to the sole plate 21, the valve body 30 defines a passageway for water to flow from the water reservoir to the steam generating chamber 24. The valve body 30 supports suitable means 32 for defining a metering orifice which may be opened or closed by selectively raising and lowering a needle valve element 33.

From the above description, it will be apparent that water, under the force of gravity, enters the steam generating chamber 24 near the forward portion thereof immediately beneath the needle valve element 33, as best shown in FIG. 8 of the drawings. This water, which is quickly flashed into steam by virtue of the high temperature of the walls defining this steam generating chamber 24, moves rearwardly through labyrinth passageways and then forwardly along the inside walls of U-shaped rib 23 which define a U-shaped passageway designated as 24a (FIGS. 6 and 8). Along the legs of this U-shaped passageway 24a and particularly adjacent the bight portions are the openings or steam ports 28 through which dry steam will pass to the grooves 29 in the sole plate 21. The water reservoir 31 is preferably provided with a conventional baffle 35.

For the purpose of selectively controlling the temperature of the sole plate 21, there is provided a thermal responsive control device which may be identical with

that disclosed in the above-mentioned Jepson et al. patent and which comprises the conventional bimetallic element, not shown, for controlling a suitable switch connected in the electrical circuit supplying energy to the sheathed heating element 22. This switch will be opened and closed in dependence upon the temperature of the sole plate 21, and, of course, in dependence upon the setting to which the thermal responsive control device is selectively adjusted. This temperature responsive control device is preferably mounted beneath the water reservoir 31 and between the legs of the U-shaped rib 23 rearwardly of the wall 25 defining the rear wall of the steam generator 24. Since the specific details of the temperature responsive control device form no part of the present invention, very little of it is disclosed in the drawings. As in the above-mentioned Jepson et al. patent, the temperature responsive control device includes a pivotally supported lever 36 (FIGS. 3 and 8 of the drawings) which may be identical with the lever 90 disclosed in the above-mentioned Jepson et al. patent and the position of which determines the position of a stationary contact of the switching mechanism, not shown, for determining the particular heat setting of the pressing iron 20. Since the portion of the temperature responsive device connected to the lever 36, as shown in FIG. 8 of the drawings, is substantially identical with the similar portion shown in FIG. 4 of the above-mentioned Jepson et al. patent, no further discussion thereof is included herewith and reference should be had to the above-mentioned Jepson patent, for a detailed description thereof. To permit free movement of lever 36, the bottom 31a of reservoir 31 may be provided with an elongated indentation 31b (FIGS. 3, 5 and 7).

So that the pressing iron 20 of the present invention provides a more pleasing appearance insofar as the top of the sole plate and the parts supported thereon, such as the water reservoir and the temperature responsive control means, is concerned, there is provided a cover shell 38, which is preferably very similar to that disclosed in the above-mentioned Jepson et al. patent. This cover shell is provided with suitable openings at the front and rear. The opening at the front is necessary to afford access to the water reservoir 31, while the one at the rear permits electrical connections to the sheathed heating element 22 and control switch to be made. The rear of the cover shell 38 is preferably secured to a support bracket, not shown, attached to the sole plate by suitable fastening means in a manner identical to that disclosed in the above-mentioned Jepson et al. patent. The front of the cover shell 38 is preferably also secured to the remainder of the pressing iron 20 in the manner disclosed in the above-mentioned Jepson et al. patent and briefly described hereinafter.

As in the above-mentioned Jepson et al. patent, the pressing iron 20 includes a handle 40 which, of course, permits the operator to manipulate the pressing iron in the desired manner. The handle 40 is preferably formed of a molded insulating material, such as one of the many synthetic resins, capable of withstanding relatively high temperatures in the neighborhood of 275 to 300 degrees F. The handle 40 is of substantially D-shape and comprises a base or skirt portion 40a of somewhat the same configuration as the upper surface of the cover shell 38 and a pair of somewhat vertical posts 40b and 40c interconnected at the top by a hand grip portion 40d. This entire handle is preferably molded as a one-piece construction. As in the above-mentioned Jepson et al. patent, the rear post is hollow to define a chamber for making electrical connections with a suitable power cord, not shown. The front post 40b of the handle 40 defines two more or less vertically extending chambers 41 and 42 separated by a wall portion 40e. The passageway or chamber 41 accommodates an elongated temperature control rod 43 which may be identical with a similar control rod

lower end of which rod is connected to one end of the lever 36 and the upper end of which terminates in a selectively adjustable cam follower 44. This control rod 43 passes through a passageway defined in reservoir 31 by a tube 45 (FIGS. 3 and 7) which may be identical with a similar tube described in the above-mentioned patent.

The top of the chambers 41 and 42 is defined by a shelf-like member 40f integrally molded with the handle and this shelf-like member 40f is provided with an opening 46 through which the control rod 43 or at least the upper end comprising the adjustable cam follower 44 may project. The shelf 40f is also provided with another opening 47 (FIGS. 3 and 6) leading into the chamber 42 through which the elongated upwardly extending portion of the needle valve element 33 extends.

The lower portion of the chamber 42 leads to an opening 48 in the water reservoir 31, which opening is also aligned with a corresponding opening in the cover shell 38. A suitable sealing gasket 50, preferably formed of silicone rubber, makes sealing engagement with the handle 40, the water reservoir 31 and the cover shell 38, whereby water supplied to chamber 42 must enter the opening 48 in the water reservoir 31.

As in the above-mentioned Jepson et al. patent, the pressing iron 20 of the present invention is provided with simple means for filling the reservoir 31 comprising a filling opening 51 of generally rectangular configuration, as best shown in FIGS. 1, 3 and 6 of the drawings. This opening 51 is located at the forward part of the front post 40b of the handle 40 in a conventional manner so that when the iron is placed on its heel, the opening 51 will be at the uppermost portion of the iron and water can readily be poured through the opening into chamber 42. The opening 51, as will become apparent from the ensuing description, also is the opening through which the spray when the iron is operated as a spray iron, passes. Furthermore, it is also the opening through which the reservoir is emptied. Preferably, and for decorative purposes, the opening 51 is defined by a collar or flange member 52 suitably secured to walls defining the opening.

The front of the handle 40 is secured to the remainder of the pressing iron 20 in substantially the same manner as is described in the above-mentioned Jepson et al. patent. To this end, a generally U-shaped clamp 54 (FIG. 6) is employed, the legs of which terminate in outwardly directed hook portions 54a. The bight of the U-shaped member 54 is provided with two openings through which the control members, including the needle valve element 33 may extend, and also suitable tapped openings for fastening means 55 (FIG. 4) which extend through openings defined in the shelf 40f. Suitable nylon sealing washers 56 are preferably disposed under the heads of fastening means 55. The legs of the clamp 54 are resilient and are spread apart more than the diameter of the opening 48 in the reservoir 31. By squeezing the legs together, however, the clamp may readily be inserted into the opening 48 whereupon the resilience of the legs will cause them to spread apart to the maximum extent permitted by this opening, as clearly shown in FIG. 6 of the drawings, with the result that the hook portions engage an annular deformation 31c surrounding the opening 48. To insure proper positioning of the handle 40 relative to the opening 48, the lower end of the front post 40b is preferably provided with an annular recess 57 for receiving an annular ring 58 which embraces the sealing gasket 50, as clearly shown in FIG. 6 of the drawings. When the fastening means 55 are applied, it will be apparent that the front part of the handle 40 is secured to the bight of the clamp 54 and this compresses the sealing gasket 50 and makes a liquid tight seal at the junction of the handle 40, the reservoir 31 and the shell 38, as clearly indicated in FIGS. 3 and 6 of the drawings.

Preferably, and as disclosed in the above-mentioned Jepson et al. patent, the cam follower 44, associated with

the temperature control rod 43 is actuated by a rotatable cam 59 pivotally supported on the shelf 40f. To this end the cam 59 comprises a sheet metal stamping having a central opening which receives a dish-shaped cam retainer 60 having an annular flange 60a. A suitable spring washer 61 is interposed between the flange 60a of the cam retainer 60 and the cam 59. The cam 59 is preferably provided with an integral projection 59a to which a manually actuatable control knob 63 may be applied, as best shown in FIGS. 1 and 2 of the drawings, whereby the operator may readily rotate the temperature control cam 59 about a vertical axis defined by the cam retainer 60. It will be understood that the fastening means 55 extend through suitable openings provided in the cam retainer 60 and hold it and the resilient washer 61 in the position clearly shown in FIG. 4 of the drawings. The cam retainer 60 is also provided with suitable openings through which control means, such as the needle valve member 33, may extend. As in the above-mentioned Jepson et al. patent, the periphery of the cam 59 is deformed throughout an arc in excess of one hundred eighty degrees so as to provide on the underside thereof a cam surface 64 which overlies the opening 46 in shelf 40f and so as to be engageable with the cam follower 44 of the temperature control rod 43, in identically the same manner as in the above-mentioned Jepson et al. patent.

As illustrated in FIG. 3 of the drawings, the temperature setting of the pressing iron 20 can be readily calibrated at the factory by adjusting the cam follower 44 relative to the control rod 43. The upper end of the cam follower 44 is provided with an opening to receive a conventional Allen wrench which may be inserted into this opening, not shown, through an opening 65 in the handle 40 which overlies the opening 46 in the shelf 40f, receiving the cam follower 44. Similarly, there is provided an opening (not shown) in the overlying portion of the cam 59, which, when the cam is rotated to a predetermined position, is in alignment with the opening 65 and the Allen wrench recess in the cam follower 44.

In order more completely to house the portions of the temperature control mechanism, such as the cam 59 and the needle valve member 33, as well as to provide a more pleasing appearance, there is provided what is commonly termed a temperature dial 68 which is so shaped as to provide an enclosure or chamber 66 above the platform or shelf 40f and give the appearance of a continuation of the hand grip portion 40d. Preferably, the temperature dial 68 is provided with rearwardly directed projections receivable in a handle recess, one rearward projection comprising the element 68a (FIG. 3) which has an opening aligned with the opening 65 for receiving a hollow cap rivet 70. This hollow rivet permits an Allen wrench to still extend through the aligned openings 65 and 66 to adjust the temperature. The rivet 70 is preferably split at the lower end into a plurality of legs which expand and, thus, firmly lock the temperature dial 68 in position. If desired, a coaxial plug, such as 71, is inserted into the hollow rivet 70 to expand the legs and lock the hollow cap rivet 70 in position. In disassembly the plug 71 may be pushed out whereupon the cap rivet 70 may be removed and the plug can then be recovered upon disassembly of the dial 68. The temperature dial 68 is provided with a somewhat circular forwardly projecting flange portion 68b, best shown in FIGS. 1, 2 and 3 of the drawings, upon which flange portion suitable indicia may be placed indicating the various temperature settings of the cam 59 and its associated knob 63.

For the purpose of controlling the open or closed position of the needle valve member 33, there is pivotally supported within the chamber 66 defined by the temperature dial 68 a suitable toggle member or lever 73. This lever or toggle member 73 is pivotally mounted by virtue of integral laterally projecting trunnions which are received in suitable trunnion receiving recesses defined in temperature dial 68. A compression spring 75 having

one end disposed in a recess 76 defined in the temperature dial 68 has the other end engaging with a projection 73a. Toggle spring 75 thus acts as an overcenter spring and holds the toggle lever 73 either upwardly in the position shown in FIG. 3 of the drawings (closed position of needle valve) or downwardly (open position of needle valve), as the case may be. The lever 73 is provided with a forked projection 73b to receive a necked down portion 33a of the needle valve member 33 whereby pivotal movement of lever 73 will cause reciprocal movement of needle valve element 33. The end of lever 73 remote from forked end 73b projects through an opening 78 defined in the temperature dial, and so that this opening is generally closed, a suitable movable sheet member 79 having an opening closely fitting the lever 73 is provided which sheet slides with the lever 73 as is obvious from FIG. 3 of the drawings. The temperature dial 68 is preferably provided with suitable indicia immediately above and immediately below the projecting portion of lever 73 indicating in the upper position the fact that the iron is operated as a dry iron, and in the lower position the fact that the iron is operated as a steam iron.

In order that the passageway 47 in the shelf 40f through which the needle valve member 33 extends may be sealed against the flow of water therethrough, a suitable sealing gasket 80 (FIGS. 3 and 6) is preferably provided which is disposed in a counterbore surrounding the opening 47 at the top of shelf 40f. A similar sealing member 81, disposed in a counterbore surrounding an opening 82 in the shelf 40f is also provided, the purpose of which will become apparent from the ensuing description.

The operation of the steam and dry iron, described thus far, will be substantially identical in every respect with that disclosed in the above-mentioned Jepson et al. patent and no further description is, therefore, included with respect to the operation.

In order that pressing iron 20 may be used as a spray iron, as well as a steam iron and as a dry iron, there is provided in accordance with the present invention a spray apparatus, best shown in schematic form in FIG. 9 of the drawings, which spray apparatus is generally characterized by the reference numeral 84. For reasons set forth hereinafter spray apparatus 84, except for common water reservoir 31, is completely independent of the steam generator 24 described above. In general, this spray apparatus 84, as schematically indicated in FIG. 9, includes a flash-type spray generator, generally designated by the reference numeral 85, having a water inlet opening 86 and a steam outlet opening 87. For supplying water to spray generator 85, a suitable pump, generally indicated at 88, is provided (FIG. 15). In the specific embodiment illustrated in FIG. 9, the bottom 31a of the water reservoir 31 is illustrated as being provided with a depending pump well 89 for pump 88. This pump well is connected by a tubular water passageway or conduit 90 and a check valve 91 to the water inlet opening 86 of the flash-type spray generator 85. Connected to the steam outlet opening 87 of the spray generator 85 is a steam conduit 92. This steam conduit is connected to a spray nozzle 93. Also connected to the spray nozzle 93 in a water conduit 94 which has its inlet end disposed in a well 95 defined in the bottom 31a of water reservoir 31. The steam flowing through spray nozzle 93 draws water through water conduit 94 and nozzle 93 breaks up the particles of water so as to produce a spray of very finely divided water particles and steam.

An important feature of the present invention resides in the fact that the spray generator 85 is completely independent of the steam generator 24. Thus, it may be designed to produce steam at much higher pressures than could be developed in steam generator 24. Actually steam generator 24 is essentially a low pressure chamber since it is continuously open to atmosphere through the steam ports 28. Moreover, water delivered to the steam generat-

ing chamber 24 flows by gravity and obviously would cease flowing if any substantial steam pressure were built up in the steam generating chamber 24. The steam pressure in steam generator 24, as mentioned above, is less than one pound per square inch, whereas for most satisfactory operation of the spray iron to produce a fine spray, a pressure of between thirty and fifty pounds per square inch is desirable and this is accomplished in spray generator 85. It will be appreciated that the pump 88 is necessary, as described hereinafter, to supply water to the spray generator 85 against the relatively high pressures that are developed therein, and the check valve 91 is provided to prevent any surging of steam back through the conduit 90 when the pressure produced by the pump 88 is released. Thus, by utilizing two separate steam chambers, each can be operated at the pressure most desirable for satisfactory operation of the particular device with which it is associated. The steam produced at the sole plate and the water spray are, of course, produced completely independently of each other. With the arrangement of the present invention, the spray can be produced without utilizing the steam generator for producing steam at the sole plate and vice versa. Furthermore, steam may be produced at the sole plate simultaneously with operation of the spray.

Considering now the spray apparatus 84 in more detail, the spray generator 85 comprises a U-shaped or hair-pin-shaped recess 96 defined within the U-shaped rib 23 forwardly of the wall 25 in the sole plate 20. As clearly shown in FIG. 8 of the drawings, the U-shaped recess 96 defining the flash-type spray generator is provided with alternate deep sections 96a interconnected by shallow sections 96b, best shown in FIGS. 8, 10 and 11 of the drawings. It will be apparent that since the spray generator 85 is disclosed in the portion of rib 23 directly above the heating element 22 that water supplied thereto will be rapidly flashed into steam. For the purpose of completing the spray generator 85, the upper part of U-shaped recess 96 is widened to define a shoulder 98 (FIGS. 10 and 11) on either side for receiving a two part cover comprising cover members 97 and 99. In FIGS. 8 and 9 the top cover member 97 is almost completely cut away and in FIG. 8 a substantial portion of lower cover member 99 is cut away. It should be understood that a one-piece cover member might be employed instead of the two part cover member shown. Lower cover member 99 is a relatively thin member and rests on shoulder 98. Preferably the upper cover member 97 is thicker than cover member 99 and is initially of bowed configuration whereby it is forced into the top of recess 96 against the lower cover member 99 which in turn rests on shoulder 98. Upper cover member 97 is secured in sealing relationship to the rib 23, as by welding or the like. The cover member 99 is provided with spaced depressions 99a received within the deep recesses 96a, as clearly shown in FIG. 11 of the drawings. The portions 96b of recess 96 which are relatively shallow interconnect the deeper recesses 96a and are staggered as shown in FIG. 8 so that a relatively tortuous passageway is provided restricting flow of water from the water inlet opening 86 to the outlet opening 87 which inlet and outlet openings are defined in the cover member 99. Thus, water supplied to steam generator 85 is quickly converted to steam.

Considering now the way water is supplied to the inlet 86 of the flash steam generator 85, the well or pump chamber 89 is preferably brazed to the bottom 31a of the reservoir 31. This well 89 forms a pump chamber for the piston operated pump 88, best shown in FIGS. 15 and 16 of the drawings, where the pump piston 100 is shown reciprocally disposed in the well 89. This piston is preferably molded from a suitable resilient material and is connected to a piston or pump rod 101 which extends upwardly through the opening 48 in the reservoir 31 and through the chamber 42, as well as through the opening 82 in shelf 40f which has the sealing member 81

surrounding the pump rod 101. Preferably a washer 101a molded within piston 100 is secured to the end of pump rod 101. A suitable compression spring 102 (FIG. 3) surrounds the upper end of the pump rod 101 above the shelf 40f and is compressed between the shelf and means secured to the rod 101, such, for example, as a manually actuatable pump button 103 which protrudes above the top of temperature dial 68 through a suitable opening 104 defined therein. The spring 102 normally biases the pump rod 101 to the upward position shown in FIG. 3 of the drawings, which means that the piston 100 is normally biased to the upper position shown in FIG. 15 of the drawings. When downward pressure is applied to the top of the spray button 103, the piston 100 is moved downwardly within the pump chamber or well 89 thereby forcing water through pump outlet opening 106 defined in the bottom of the well 89. The piston 100 is so designed relative to the well 89 that when the spray knob 103 is in its uppermost position as determined by the spring 102, water from the reservoir 31 may enter the well 89. Preferably the piston 100 is molded of a relatively pliable silicone rubber material and on the upward stroke the downwardly extending sealing rim is collapsed sufficiently to permit water to pass around this rim. Actually only a very small quantity of water is necessary when converted into steam to produce the desired spray in the spray nozzle 93.

For the purpose of guiding pump rod 101 and also to prevent foreign matter from entering pump well 89, there is provided a screen member 107 (FIGS. 3, 5, 7 and 15) overlying pump well 89. This screen is provided with a frame having an extension 107a which is clamped into position by the means 32. This screen has an opening 105 for guiding pump rod 101.

Preferably the passageway between pump well 89 and inlet opening 86 of spray generator 85 is a restricted passageway thereby to restrict substantially the flow of water out of the pump well 89 to insure that water is delivered at a reasonably slow rate to the spray generator 85. Thus, a full stroke of the piston 100 by actuating the spray knob 103 will produce a sustained spray discharge from the spray nozzle 93 for a period of the order of five to ten seconds. Of course, a shorter stroke will produce a spray of shorter duration. The restricted passageway might comprise a capillary tube or as illustrated the combination of the orifice 106 and the check valve 91, the latter providing a very restricted passageway.

As illustrated in the drawings, the conduit 90 is provided with an opening 108 (FIG. 15) aligned with the opening 106 at the bottom of the pump well 89 and this conduit is suitably welded or brazed to the bottom of the pump well and the end thereof adjacent the pump well is preferably sealed as by pinching the end as indicated at 109 in FIGS. 7 and 16 of the drawings. This conduit then passes through an opening 110 defined in the bottom 31a of the water reservoir, suitable sealing means 111 (FIGS. 5 and 15) being provided at this opening so that water contained in the water reservoir may not escape there-through. The other end of conduit 90 enters the top of a housing 113 forming a part of the check valve 91, best shown in FIG. 5 of the drawings. This housing 113 is disposed within the reservoir 31 and the lower end of the housing extends through an opening 114 in the reservoir 31 and is suitably sealed thereto. The housing 113 is internally threaded to receive a bushing 115 having a portion of reduced cross section 115a receivable in the water inlet opening 86 of the flash-type steam generator 85. A suitable compression spring 116 normally biases a valve member 117 into sealing engagement effectively to close the outlet end of conduit 90. Actually, this valve member 117 functions as a check valve which will permit water, when pump 88 is actuated, to flow into the spray generator 85 but prevent reverse flow. As mentioned above, it also defines a restricted passageway between the pump 88 and spray generator 85. It will be appreciated

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that a suitable seal is provided between the check valve 91 and the entrance to spray generator 85 so leakage of water or steam at that junction is prevented. Accordingly, an annular sealing gasket is indicated at 118 in FIG. 5 of the drawings which is compressed between the bottom of reservoir 31 and cover 99 of spray generator 85.

In order that the spray nozzle 93 can be protected from damage, it is preferably mounted within the chamber 42 inside the filling opening 51 supported by conduits 92 and 94, as best shown in FIGS. 1, 3 and 6 of the drawings. As will be described hereinafter, the discharge opening of the spraying nozzle 93 is disposed so that the spray will be directed toward the surface being ironed just in front of the pressing iron 20. As best shown in FIGS. 12, 13 and 14 of the drawings, the spray nozzle 93 comprises the nozzle body 119 having lateral ears or projections 119a which body is provided with a steam inlet passageway 120 and a water inlet passageway 121 arranged in parallel interconnected by a cross passageway 122 which culminates in an enlarged spray opening 122a. A suitable dished spray nozzle plug 123 having a small central opening 124 is press fitted into the enlarged opening 122a and acts to break up the water particles so as to produce the desired water spray mixed with steam.

To support the spray nozzle 93 on the steam tube 92 and the water tube 94, there is secured in sealing relationship to the end of the water tube 92 a steam tube nozzle 125 which has a slight bend so as to terminate in spaced parallel relationship with an upper bent portion 94a of water tube 94, as clearly shown in FIG. 12 of the drawings. The ends of tube portion 94a and tube 125 are disposed in spaced openings 126 and 127, respectively, of a silicone rubber gasket 128 and a suitable clamping member 130 defines a seat for the nozzle body 119. The clamping member 130 is provided with opposed flanges 130a which engage the ears 119a on nozzle body 119 to hold the nozzle 119 and the gasket 128 in assembled relationship on the ends of tubes 94 and 125 with the gasket compressed to provide the desired seal, as clearly shown in FIGS. 12 and 13 of the drawings. This arrangement permits ready assembly and disassembly and, moreover, eliminates any requirement of soldering or the like which might block or impair passageways 120, 121 or 122.

As illustrated in the drawings, the steam tube 92 includes a more or less horizontally disposed intermediate portion 92a which rests on top of the reservoir 31 and may be suitably clamped thereto as by clamp means 132 (FIG. 5). The end of steam tube 92 remote from the nozzle 93, and designated as 92b, extends through a passageway in reservoir 31 defined by a tubular member 133 (FIGS. 3, 5 and 7) and enters the opening 87 in cover 99 of spray generator 85. The tubular member 133 may be similar to the tubular member 45 and is suitably sealed top and bottom to the corresponding walls of reservoir 31. A suitable annular sealing member 134, formed of a material such as silicone, which will withstand high temperatures, is clamped between the cover 99 for spray generator 85 and the bottom 31a of reservoir 31 in the same manner as sealing member 118. This sealing member 134 permits the end 92a of steam tube 92 to enter opening 87 in sealed relationship with spray generator 85.

The water tube 94, as was mentioned earlier, has its inlet end disposed in the well 95 defined in the bottom 31a of the reservoir 31. Preferably the lower end of the water tube 94 is bent at an angle so as to produce the lateral projection 94b disposed within the well 95. A suitable screen 135 is provided for the inlet end of water tube 94 to prevent any foreign matter from reaching the spray nozzle 93.

In view of the detailed description included above, the operation of the pressing iron of the present invention with respect to producing a spray at the front of the iron will readily be understood by those skilled in the art.

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When it is desired to produce a spray, the operator depresses the spray button 103 which causes water which has accumulated in the pump well 89 to pass through the restricted passageway comprising opening 106 and check valve 91 into the inlet of spray generator 85. Due to the restricted passageway a sustained supply of water will be provided over a period of time, such as five to ten seconds with full plunger actuation. The check valve 91 will prevent steam surges from entering water tube 90. This water will be instantly flashed into steam and by the time it passes through the tortuous passageway 96 in the U-shaped spray generator 85 and reaches the outlet opening 87, it is in the form of superheated steam which passes through the steam conduit 92 into the nozzle 93. The flow of steam through the restricted passageway 122 in nozzle 119 causes water to be aspirated through water tube 94 and this mixture of steam and water passing through the opening in spray nozzle plug 123 causes the water particles to be broken up into a fine spray mixed with the steam. As is designated in FIG. 12 of the drawings, the angular disposition of the nozzle 93 is such that the water is discharged through the filling opening 51 in the pressing iron 20 so as to strike the material being ironed in front of the toe of the iron. By virtue of the pump arrangement, the steam pressure in the spray generator 85 may be between thirty and fifty pounds per square inch and, hence, a very satisfactory fine spray is obtained by virtue of this high pressure. Moreover, this spray can be obtained at any time whether the iron is being operated as a steam or a dry iron or independently as a spray iron. With this arrangement, the steam generator 24 may be operated at the desired low pressure of less than one pound per square inch which will not interfere with the supply of water thereto by gravity in the conventional manner.

In FIGS. 17, 18 and 19 of the drawings, there is illustrated a minor modification of the present invention which is presently considered the preferred embodiment thereof. Essentially all parts of the pressing iron 20' shown in FIGS. 17, 18 and 19 of the drawings are identical to those previously described except for the construction of the pump 88. Corresponding reference numerals are appended to identical parts. It will be apparent that a piston operated pump occasionally requires replacement of the plunger and in FIGS. 17, 18 and 19 there is disclosed an arrangement in which a very simple piston-operated pump is employed which can be bodily replaced with ease. The water reservoir in FIGS. 17, 18 and 19 is designated by the reference numeral 31' in view of the slight modifications thereof. These modifications consist in the elimination of the pump well 89, heretofore described, and the substitution therefor in the bottom 31'a thereof with a pair of spaced recesses 31d and 31e. Also, the water conduit 90 is slightly modified and is designated by the reference numeral 90'. This water conduit 90' has one end connected to the check valve 91 in exactly the same manner as in the previous embodiments. However, the end of the conduit 90' which was connected to the pump well 89 in the previously described embodiment is provided with a U-shaped end 90'b which U-shaped end is disposed within the recess 31d in the reservoir 31'. Thus, the pump end of water conduit 90', designated as 90'c, is directed upwardly within the reservoir 31' and extends through a suitable supporting plate 138, which may be welded or otherwise secured to the bottom 31'a of the water reservoir 31'.

In accordance with the present invention, a unitary piston operated pump 140 is employed having a cylinder 141 within which is reciprocally mounted a piston 142 connected to a piston rod 143, the upper end of which may be identical with that of the piston rod 101 described above. Connected to the upper end of cylinder 141 and enclosing the piston rod 143 is a tubular housing 144 which extends out of water reservoir 31' into chamber 42 through opening 48. This housing 144 includes a portion 144a of reduced cross section at the upper end thereof defining a

shoulder 145 at the junction of the two sections of different cross sections. The lower end of reduced tubular projection 141a of cylinder 141 defines a water inlet passageway 146. A suitable screen 147 is secured to the inlet end of projection 141a. This screen is disposed within the recess 31e so that water from reservoir 31' may enter the inlet passageway 146 through the screen 147. A suitable ball type check valve 148 is provided which under the action of gravity normally closes pump inlet passageway 146. An L-shaped tube 149 defines a pump discharge passageway 150. The outlet end of this passageway 150 terminates in a downwardly directed flared or funnel-shaped member 151. A suitable O-ring seal 152 surrounding the end 90'c of water tube 90' and receivable in sealing engagement with the inside walls of flared member 151 provides the desired seal which can be made merely by telescoping member 151 and end 90'c of water tube 90'. Thus, pump 140 may be bodily removed through opening 48 or inserted therein and the mere insertion insures completion of the connection with water conduit 90' and reception of screen 147 in recess 31e.

To hold the pump in assembled relationship in pressing iron 30', portion 144a is disposed in a suitable opening 153 in clamp 54. A compression spring 154 interposed between the clamp 54 and the shoulder 145, as clearly indicated in FIG. 18 of the drawings, removably holds the pump 140 in the operative position shown in FIGS. 17 and 18 with the inlet disposed in the well 31e and the outlet in sealed relationship with the water tube 90'.

The modification shown in FIGS. 17, 18 and 19 of the drawings will operate in the same manner as the previously described embodiment and differs therefrom only in the provision of a readily removable and replaceable pump for supplying water to the spray generator. When a spray is desired, the operator depresses the spray button 103 connected to the plunger 143 and water contained in cylinder 141 is forced through outlet passageway 150 and into water conduit 90' whereby it passes through check valve 91 into the spray generator 85. When the spray button 103 is released a suitable spring, such as 102 described above, returns the plunger 143 and the piston 142 to the position shown in FIG. 18 of the drawings. This causes water from water reservoir 31' to be drawn into cylinder 141 through inlet passageway 146.

It will be appreciated that there has been provided a pressing iron which may be used as a steam, a dry or a spray iron, and in which the optimum operating conditions of the spray principle, the steam principle, and the dry ironing principle may be employed.

While there have been shown and described several embodiments of the present invention, it will be apparent to those skilled in the art that various changes and modifications may be made without departing from the invention in its broader aspects, and it is, therefore, contemplated in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In a steam iron, a sole plate, electric heating means for heating said sole plate, a first flash type steam generator in intimate heat exchange relationship with said sole plate for supplying steam to the ironing surface of said sole plate, a water reservoir overlying said first steam generator, means for selectively supplying water from said reservoir to said first steam generator for conversion into steam, a second flash type steam generator completely independent of said first steam generator disposed in said sole plate in intimate heat exchange relationship with said heating means, means for forcing water from said water reservoir into said second steam generator, a spray nozzle mounted adjacent the front of said iron, means for supplying steam from said second steam generator to said nozzle, and a water conduit connected between said reservoir and said nozzle whereby steam supplied to said nozzle causes

water to be aspirated from said reservoir and discharged as a spray from said nozzle.

2. A steam iron comprising a sole plate, electric heating means for heating said sole plate, a first flash type steam generator in intimate heat exchange relationship with said sole plate for supplying steam to the ironing surface of said sole plate, a water reservoir overlying said first steam generator, means for selectively supplying water by gravity from said reservoir to said first steam generator for conversion into steam, a second flash type steam generator completely independent of said first steam generator disposed in said sole plate in intimate heat exchange relationship with said heating means, pump means for forcing water from said water reservoir into said second steam generator, a spray nozzle mounted adjacent the front of said iron, means for supplying steam from said second steam generator to said nozzle, and a water conduit connected between said reservoir and said nozzle whereby steam supplied to said nozzle causes water to be aspirated from said reservoir and discharged as a spray from said nozzle, the pressure in said first steam generator being of the order of one pound per square inch or less, while the pressure in said second steam generator is over twenty pounds per square inch.

3. The steam iron of claim 2 wherein said pump means is disposed within said reservoir and said second steam generator is of U-shape having a water inlet at one end of the U and a steam outlet at the other end of the U and said second steam generator is defined in said sole plate directly above said heating element.

4. The steam iron of claim 3 wherein said U-shaped steam generator includes a plurality of deep recesses interconnected by shallow recesses.

5. A spray iron including a sole plate, electric heating means for heating said sole plate comprising a U-shaped sheathed heating element embedded in said sole plate with the bight of the U adjacent the toe of the iron, a flash type steam generator disposed directly adjacent said U-shaped heating element and defined in part by said sole plate, said generator having a U-shaped configuration conforming substantially to that of said heating element, water inlet means for said generator defined at the end of one leg thereof, steam outlet means for said generator defined at the corresponding end of the other leg thereof, a water reservoir overlying said sole plate, pump means for forcing water from said water reservoir into said water inlet means, a spray nozzle mounted adjacent the front of said iron, means for supplying steam from said outlet means to said nozzle, and a water conduit connected between said reservoir and said nozzle whereby steam supplied to said nozzle causes water to be aspirated from said reservoir and discharged as a spray from said nozzle.

6. The spray iron of claim 5 wherein said steam generator over the entire extent thereof comprises a plurality of deep elongated recesses connected in series by a plurality of shallow recesses.

7. The spray iron of claim 6 wherein said steam generator includes a U-shaped cover member having indentations adjacent said deep recesses and receivable in said deep recesses to define a tortuous passageway between said water inlet means and said steam outlet means.

8. A spray iron comprising a sole plate, electric heating means for heating said sole plate including a U-shaped sheathed heating element embedded in said sole plate with the bight of the U adjacent the toe of the iron, a flash type steam generator disposed directly over said U-shaped heating element and defined in part by said sole plate, said generator having a U-shaped configuration conforming substantially to that of said heating element, water inlet means for said generator defined at the end of one leg thereof, steam outlet means for said generator defined at the corresponding end of the other leg thereof, a water reservoir overlying said sole plate, pump means for forcing water from said water reservoir into said water inlet means, a spray nozzle mounted adjacent the front of said

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iron, means for supplying steam from said outlet means to said nozzle, a water conduit connected between said reservoir and said nozzle whereby steam supplied to said nozzle causes water to be aspirated from said reservoir and discharged as a spray from said nozzle, and means for producing a spray sustained over a period of time with a single actuation of said pump means comprising a restricted passageway between said pump means and said water inlet means.

9. A spray iron comprising a sole plate, electric heating means for heating said sole plate, a flash type steam generator disposed directly over said heating element and defined in part by said sole plate, water inlet means for said generator, steam outlet means for said generator, a water reservoir overlying said sole plate and secured thereto, pump means disposed in said reservoir for forcing water from said water reservoir into said water inlet means, a spray nozzle mounted adjacent the front of said iron, means for supplying steam from said outlet means to said nozzle, a water conduit connected between said reservoir and said nozzle whereby steam supplied to said nozzle causes water to be aspirated from said reservoir and discharged as a spray from said nozzle, a handle for said iron, and a U-shaped clamp for securing the forward portion of said handle to said reservoir, said clamp also holding said pump means in operating position within said reservoir.

10. A spray iron comprising a sole plate, electric heating means for heating said sole plate, a flash type steam generator disposed in good heat transfer relationship with said heating element and defined in part by said sole plate, said generator having a water inlet and a steam outlet, a water reservoir overlying said sole plate and secured thereto, a pump well remote from said water inlet defined in the bottom of said reservoir, a piston reciprocally movable in said well, conduit means for connecting said well with said water inlet whereby actuation of said piston forces water from said well into said water inlet, means for producing a spray sustained over a period of time with a single actuation of said piston comprising a restricted passageway between said pump well and said conduit means, a spray nozzle mounted adjacent the front of said iron, means for supplying steam from said steam outlet to said nozzle, and a water conduit connected between said reservoir and said nozzle whereby steam supplied to said nozzle causes water to be aspirated from said reservoir and discharged as a spray from said nozzle.

11. A spray iron comprising a sole plate, electric heating means for heating said sole plate, a flash type steam generator disposed in good heat exchange relationship with said heating element, said generator including a water inlet and a steam outlet, a water reservoir overlying said sole plate including a constantly open filling aperture therein, a handle for said iron, means for securing said sole plate said handle and said reservoir together as a unitary assembly, pump means disposed in said reservoir for forcing water from said water reservoir into said water inlet, a spray nozzle mounted adjacent the front of said iron within a chamber defined in said handle, steam conduit means for supplying steam from said outlet to said nozzle, and water conduit means connected between said reservoir and said nozzle whereby steam supplied to said nozzle causes water to be aspirated from said reservoir and discharged as a spray from said nozzle, said pump means extending through said aperture and into said chamber.

12. The spray iron of claim 11 wherein manually actuable means projecting above said handle for operating said pump means are provided.

13. A spray iron including a sole plate, electric heating means for heating said sole plate comprising a U-shaped sheathed heating element embedded in said sole plate with the bight of the U adjacent the toe of the iron, a flash type steam generator disposed directly adjacent said U-shaped heating element and defined in part by said

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sole plate, said generator having a U-shaped configuration conforming substantially to that of said heating element, water inlet means for said generator, steam outlet means for said generator, a water supply, pump means for forcing water from said water supply into said water inlet means, a spray nozzle mounted adjacent the front of said iron, means for supplying steam from said outlet means to said nozzle, and a water conduit connected between said water supply and said nozzle whereby steam supplied to said nozzle causes water to be aspirated from said water supply and discharged as a spray from said nozzle.

14. The spray iron of claim 13 wherein said U-shaped heating element and said U-shaped generator are superimposed, one above the other.

15. A spray iron comprising a sole plate, electric heating means in said sole plate, a flash type steam generator disposed in good heat exchange relationship with said heating means, said generator including a water inlet and a steam outlet, a water reservoir overlying said sole plate, a pump well defined in the bottom of said reservoir, a manually operated piston reciprocally movable in said well, said piston being completely withdrawn from said well when in its inoperative position, conduit means connecting said well with said water inlet whereby actuation of said piston forces water from said well into said water inlet, a spray nozzle mounted adjacent the front of said iron, means for supplying steam from said steam outlet to said nozzle, a water conduit connected between said reservoir and said nozzle whereby steam supplied to said nozzle causes water to be aspirated from said reservoir and discharged as a spray from said nozzle, and means for producing a spray sustained over a period of time with a single actuation of said piston including a restriction in said conduit means.

16. In a steam iron, a sole plate, U-shaped electric heating means for heating said sole plate, a first flash type steam generator in intimate heat exchange relationship with said sole plate and within the confines of said U-shaped heating element for supplying steam to the ironing surface of said sole plate, a water reservoir overlying said first steam generator, a handle associated with said sole plate and water reservoir, first means for selectively supplying water from said reservoir to said first steam generator for conversion into steam, a second flash type steam generator of U-shaped configuration disposed in said sole plate immediately above said heating element in intimate heat exchange relationship therewith and surrounding said first steam generator, second means for selectively supplying water from said water reservoir to said second steam generator for conversion into steam, means for supplying steam from said first steam generator over a substantial area of the ironing surface of said sole plate, and means for conveying to an area adjacent the front of said steam iron the output from said second steam generator.

17. A spray iron comprising a sole plate, electric heating means for heating said sole plate, a flash type steam generator in heat exchange relationship with said heating means and defined in part by said sole plate, water inlet means for said generator, steam outlet means for said generator, a water reservoir overlying said sole plate and secured thereto, a spray nozzle mounted adjacent the front of said iron, pump means disposed in said reservoir for forcing water from said water reservoir for ultimate discharge from said spray nozzle, a handle for said iron, and a U-shaped clamp for securing the forward portion of said handle to said reservoir, said clamp also holding said pump means in operating position within said reservoir.

18. In a liquid spray iron, a liquid reservoir, a steam generating chamber, a positive displacement liquid metering pump chamber, a one-way valve providing liquid flow from said reservoir into said pump chamber, a second one-way valve providing liquid discharge from said pump chamber into said steam generating chamber, a

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pump piston positioned in said pump chamber, means for causing movement of said piston in said liquid chamber to inject a measured quantity of liquid into said steam generating chamber, heating means for said steam generating chamber, a continuously open steam discharge conduit for producing a flow of generated steam from said steam generating chamber extending from an inlet end positioned in said steam generating chamber to a discharge end, and means for introducing liquid from said reservoir by aspiration into the path of the steam, whereby said liquid will be sprayed from the vicinity of the discharge end of said conduit in a measured quantity proportional to the quantity of liquid injected into said generating chamber.

19. In a liquid spray iron as defined in claim 18 wherein said liquid is introduced into the path of the steam at said discharge end of said conduit.

20. In a liquid spray iron, a liquid reservoir, a steam generating chamber, manually operable means for forcing a measured quantity of liquid to said steam generating chamber, heating means for said steam generating chamber, a continuously open steam discharge conduit extending upwardly from said steam generating chamber and terminating in a nozzle, and a liquid conduit extending upwardly from said liquid reservoir discharging adjacent said nozzle, whereby said liquid will be aspirated from said liquid reservoir to spray a measured quantity of liquid proportional to the quantity of liquid forced into said generating chamber.

21. In a liquid spray iron, a liquid reservoir, a steam generating chamber, a liquid pump chamber, a one-way valve providing liquid flow from said reservoir into said pump chamber, a second one-way valve providing discharge from said pump chamber into said steam generating chamber, a pump piston positioned in said pump chamber, means for causing movement of said piston in said liquid pump chamber to inject forcibly a measured quantity of liquid into said steam generating chamber, heating means for said steam generating chamber, whereby liquid therein is converted into steam, a continuously open steam discharge conduit extending upwardly from said steam generating chamber and terminating in a restricted nozzle, and a liquid conduit from said liquid reservoir discharging adjacent said nozzle, whereby said liquid will be aspirated from said liquid reservoir and sprayed as steam is discharged at high velocity from said nozzle in a measured quantity proportional to the quantity of liquid injected into said generating chamber.

22. In a liquid spray iron, a liquid reservoir, a steam generating chamber, a manually operable positive displacement pump for forcing a measured quantity of liquid into said steam generating chamber from said liquid reservoir, said pump including a housing positioned remote from said steam generating chamber and including means for permitting liquid flow from said reservoir to said housing and from the housing to said chamber, heating means for said steam generating chamber, a re-

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stricted steam discharge conduit for producing a high velocity flow of generated steam from said steam generating chamber extending from an inlet end in said chamber to a discharge end, and means for introducing liquid into the path of the steam, whereby liquid will be sprayed from the vicinity of the discharge end of said conduit.

23. In a liquid spray iron, a steam generating chamber, a liquid reservoir positioned over said steam generating chamber, a manually operable positive displacement pump for forcing a measured quantity of liquid into said steam generating chamber from said liquid reservoir, said pump including a housing positioned adjacent to the upper wall of said reservoir and including means for permitting liquid flow from said reservoir to said housing and from the housing to said chamber, heating means for said steam generating chamber, a steam discharge conduit for producing a high velocity flow of generated steam from said steam generating chamber to a discharge end directed to the exterior of the iron, and means for introducing liquid into the path of the steam, whereby liquid will be sprayed from the vicinity of the discharge end of said conduit.

24. In a liquid spray iron, a liquid reservoir, a steam generating chamber, a manually operable positive displacement pump for forcing a measured quantity of liquid into said steam generating chamber from said liquid reservoir, heating means for said steam generating chamber, a continuously open and restricted steam discharge conduit for producing a high velocity flow of generated steam from said steam generating chamber, said steam discharge conduit extending from an inlet end positioned in said chamber to a discharge end, and means for introducing liquid by aspiration into the path of the steam at said discharge end of said conduit, whereby a measured quantity of liquid will be sprayed from the vicinity of the discharge end of said conduit upon each injection of liquid into said steam generating chamber.

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