Feb. 2, 1932. J. C. LEDBETTER 1,843,568

ELECTRIC STEAM IRON

Filed March 15, 1923 2 Sheets-Sheet 1

Fig. 1.

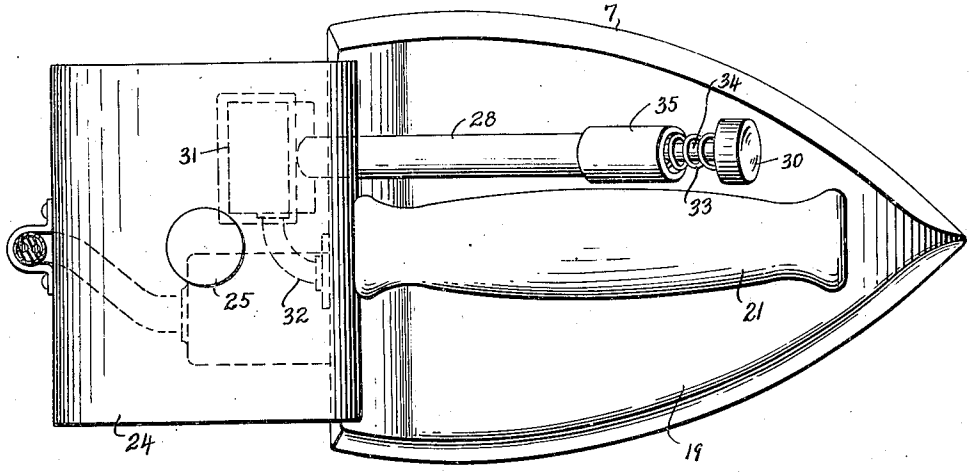
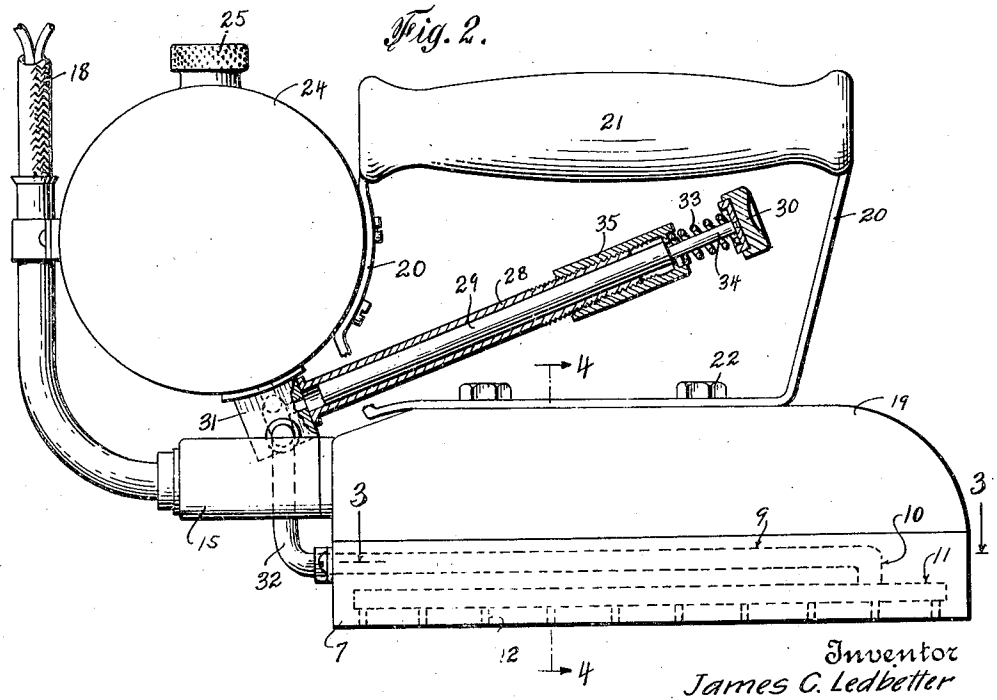


Fig. 2.



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Fig. 3.

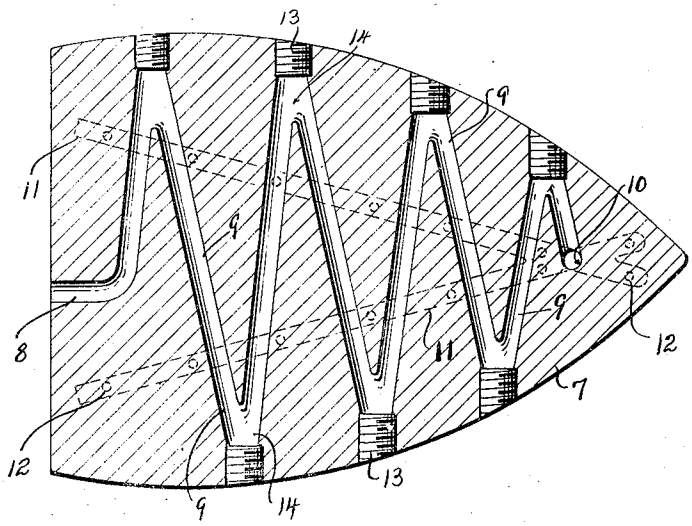
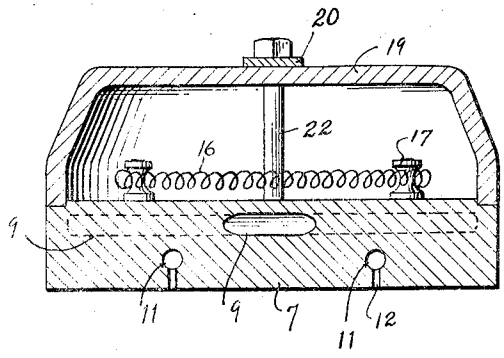


Fig. 4.



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UNITED STATES PATENT OFFICE

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ELECTRIC STEAM IRON

Application filed March 15, 1923. Serial No. 625,195.

The invention relates to electric irons and more particularly to improvements in electric steam generating irons and electric clothes pressers.

An object of the invention is to produce improvements in electric steam generating irons and clothes pressers to the end that sad or smoothing irons may be utilized for steam pressing all manner of garments such as wash goods, woolen goods, clothing and apparel, and particularly for steam pressing, sterilizing, renewing and raising the nap of woolen garments such as men's suits and the like in order that the goods or work may be quickly steam pressed and dried by the simultaneous application of steam, mechanical pressure, and heat.

Steam generating press irons have not come into general use for the reason that they do not satisfactorily generate steam, but instead thereof discharge water or spray on the work or garments which overwet or moisten the garment in some portions, while they leave the garment dry in other portions. Furthermore, the irons became cooled when it was attempted to generate live hot steam of high temperature and pressure due to lack of sufficient heat and when it was attempted to supply sufficient heat to actually vaporize all the water supplied thereto, then in that event the iron became overheated and was liable to scorch the garment.

It is the general object of this invention to produce a steam generating iron and clothes presser capable of actually generating steam possessing high temperature and pressure characteristics, and to do so from the ordinary temperature at which an electric iron safely works without danger of scorching the work; and the steam generated in my iron is effective in raising the nap of the garment by steam expansion because of its characteristic velocity at which it strikes the goods. My electric steam clothes presser reveals a new mode of operation adapting it in fact to new and useful purposes which were heretofore imperfectly carried out by irons primarily due to the fact that no positive means was provided for actually forcing water under pressure through a moderately heated long sinuous passage capable of breaking up and vaporizing the water. The water passed through the iron and reached the garment in a wet and partly generated condition, and this class of irons have never attained commercial success.

In the main I produce this new mode of electric steam generation and operation by forcing a small predetermined amount of water at normal or ordinary temperature under quick positive pressure into a substantially long tortuous hot passage of small diameter, which passage necessarily has flow obstructions embodied therein to retard the rush of water, whereupon steam is generated which then steam flows into a spray channel and ejects therefrom at great velocity upon the garment being treated and pressed without at the same time the iron being so hot as to injure the work.

With the above principal objects and others in view, an embodiment of the invention is shown in the accompanying drawings serving to illustrate the principle of the invention, the operation and use thereof. This electric steam sad iron or clothes presser may be varied or modified in construction and use without departing from the scope of the invention.

Figure 1 is a plan view of the iron; and Figure 2 is a side view thereof.

Figure 3 is a sectional view taken on the line 3—3 of Figure 2 to illustrate a zigzag or tortuous labyrinth of steam generating passages connecting with foraminous spray passages leading downwardly through the pressing face of the iron.

Figure 4 is a cross-sectional view taken on the line 4—4 of Figure 2.

A substantially heavy or weighted iron

body, sole piece, pressing block or pressing head 7 is suitably shaped for the class of ironing or pressing work to be done, and is made with a water intake 8 connecting with a tortuous labyrinth and preferably, and in this particular style of iron, a zigzag steam generating passage 9 which leads forwardly and connects with a plurality of steam spray channels 11. The spray channels are perforated with steam spray holes 12 which discharge steam from the channels 11 directly onto the work.

In the manufacture of the iron it may be preferable to cast the passages 9 with closed connecting ends, but in the present case I have shown the passages as bored through and through the iron body 7 in V-shaped form, with the said intersecting passages closed at the connecting ends thereof by plugs 13 so as to form one long continuous steam passage having a plurality of abrupt quick turns therein. My iron is improved in respect to the type of steam generating passage which I provide, and is improved in the manner of providing a large number of corners or quick turns in these passages so as to retard and break up the flow of water as it traverses the body of the iron. The steam generating passages of old irons are usually not of the character of construction as will retard and hold back the water until it is thoroughly vaporized but allows the water to spray through the iron onto the cloth. The structure of my generating passages overcomes this difficulty and actually produces pressure steam without having to overheat the iron to do so. The water passing through my iron is so continuously forced into intimate contact with the heated passages that thoroughly generated steam results.

In order that water be vaporized and transformed into live hot steam of suitable pressure, it is necessary to retard the passage of water and vapor thereof, so as to cause it to remain in contact with the walls of the iron; and this is done by making the passages 9 comparatively small in diameter with a large number of abrupt turns, corners or breaks 14. When water first enters the intake 8, the tendency thereof is to run through the passages 9 without touching the walls because of the fact that cold water and a hot metal surface have practically no contacting affinity, the natural tendency of the water being to rebound from the wall surfaces and remain suspended by the enveloping steam vapor which tends to insulate the water from actual contact with a hot metal surface. As the steam pressure builds up and increases, the tendency of the water to be blown away from the hot metal surface is also increased and it is found practically impossible to satisfactorily generate steam by injecting water into a straight hot tubular passage because the water will not intimately contact the walls long enough at a time to become thoroughly vaporized. Were it not for the preferably small diameter of the passages with the abrupt sharp corners and turns 14, the said steam and water would reach the hole 10 and spray channels 11 in a vaporous and wet form. However, the corners 14 and the small size of the passages 9, together with the very great length thereof which is much greater than the length of the iron, forces the water in contact with the metal walls during the flow of the water and steam therethrough; and the impact of the steam and water vapor projected against the walls of the iron at the turns 14 continually works a breaking up and disintegration of the water vapor, thereby thoroughly transforming it into steam, and producing live hot steam of high temperature capable of sterilizing the garment and expanding the nap thereof because of its pressure and velocity as it ejects from the pressing head.

It is to be appreciated that the iron is provided with any suitable form of electrical resistance heating element; and in the present form of the invention I show a coil heating element 16 carried on insulator posts 17. A flexible electric cord 18 and plug connector 15 may be used to supply current to the iron. The long sinuous steam generating passage is preferably located near the top surface of the iron body 7 to be in most intimate relation with the heating element 16; and it is to be observed that I lead the water in through the intake 8 at the rear portion of the iron where the body thereof is the most massive and thereby contains the most heat. In this manner I first feed the water into that portion of the iron capable of yielding up and imparting the most heat to the generating passages, and the water vapor feeds through the long generating passage approaching the forward end of the iron where less heat is available, and where, at the same time, less heat is required because of the fact that the water has by this time been thoroughly generated into steam. The design and construction of my iron is therefore most efficient in that I feed the water into the portions of the iron having more available heat and draw the steam from that portion having less available heat.

A cover 19 is fitted over the body to cover the heating element and to carry the other parts of the iron. A handle bracket 20 carries a handle 21, and any suitable means such as cap screws 22 fasten all the parts together; and the bracket and handle carries a water tank and force pump as later described.

A water tank 24 with a water filler cap 25 is carried on the rear end of the iron and is fixed on the bracket 20. The position of the water tank 24 is important and is located at the rear of the iron, above and away from the heated body thereof, for the purpose of maintaining as cool as possible the water therein

for the reason that the iron works more satisfactorily with water which is not too hot inasmuch as it is impracticable to deliver under pressure, hot water which may boil before reaching the steam generating passages. A characteristic feature of my invention is the tank for water to prevent the water from boiling before it reaches the steam generating passages, and a means to force water under pressure to the steam generating passages, the said passages being so constructed that the water is subjected to moderate heating for a long period of time during which it is being agitated or broken up into vapor by the particular kind of passages I employ. Furthermore, it is not practical to feed water to the generating passages under the head of its own pressure through a valve into the steam generating passage for the reason that the steam pressure, as it builds up in the passages, forces back on the water, and at best, water will not flow past a valve by gravity under back-pressure to the iron, and it follows therefore, that a solid piston pump, one having no escape by which water may pass, is necessarily employed to operate the iron most satisfactorily.

A water force pump 28 is fitted with a plunger of piston 29 and is preferably positioned at an angle with relation to the handle 21 so that the outer end of the pump is at the front end of the iron and the rear pump end is at the rear end of the iron so that the finger or thumb piece 30 anchored to the top of the plunger 29 is conveniently arranged in proximity to the hand or thumb of the operator as he grasps the iron handle. The lower end of the pump cylinder 28 is anchored in a valve cage 31 which is secured to the water tank thereby carrying the pump on the tank away from the hot iron; and water which is prevented from boiling feeds downwardly from the tank 24 into the valve cage and thence downwardly through a discharge pipe 32 which connects with the intake passage 8 thereby delivering water from the tank 24 directly into the steam generating passage 9. The valve cage is fitted with any suitable ball or check valve that prevents the water from returning to the tank when acted on by the pump. It is to be observed that the tank and pump are located remotely from the hot iron and press head which serves to keep these parts cool thereby preventing the water from boiling away and causing the iron to most effectively operate.

A compression spring 33 is confined on the upper end of the plunger stem 34 with one end thereof resting against the finger piece 30, while the other end of the spring is seated against a threaded adjustable collar 35 which screws up and down on the outside of the cylinder barrel 28. The length of the stroke of the plunger 29 is capable of being regulated by screwing the collar 35 up or down on the barrel which moves the bottom end of the plunger into a new position up or down in relation to the bottom end of the cylinder thereby increasing or decreasing the volumetric capacity of the cylinder and hence the quantity of water drawn into the cylinder. In this manner, the volume of water forced into the iron and the volume of steam produced thereby, is decreased by screwing downwardly on the adjustment collar 35 or increased by screwing it out. It is to be observed that the finger piece 30 and the plunger are adapted to be thrust downwardly against the spring 33 to compress it, and the spring expands to move the plunger out again to draw water into the lower end of the cylinder ready for the next plunger movement to inject water into the iron to generate steam. The lower end of the plunger stops against the face of the valve box 31, and the upper end of the plunger stops against the upper movable and adjustable stop 35.

In the operation of the iron, the tank 24 is kept supplied with water, and the operator periodically operates the pump plunger to force one cylinder of water at a time into the passage 9 by moving his thumb against the plunger end or thumb piece 30. The water moves under pressure into the small size passage 9 and is forced into intimate contact with the hot walls of the said passage, and the water and steam forces ahead at high velocity through the press head impinging the sides of the walls of the generating passage at each turn 14; and the steam, water, and vapor is forced to traverse such a long passage of small diameter that the water is thoroughly vaporized and discharges through the spray channels 11 under pressure and high heat.

In order that steam be satisfactorily used for sterilizing and pressing garments, it must be discharged from the iron under pressure insuring considerable velocity, and this is accomplished by forcing the water which is not too hot into the iron under pressure and confining the water in intimate contact with small passages. The small passages produce better results because the water is more nearly kept in contact with the walls of small passages than large passages. This iron functions well warmed up to ordinary laundry iron heat. No additional current is drawn by this iron merely because, as commonly thought, it is a steam iron. Quantities of water so small are injected into the iron and remain so long under agitation that steam is generated without consuming any large amount of current. The iron may be used for dry work as well as steam pressing because the presence of the steam and water equipment is no impediment to ordinary dry ironing.

The location of the water tank keeps the water cool, prevents it from boiling away and

also avoids having a hot-water tank near the operator's hand with resulting discomfort, and avoids the difficulty of having to pump boiling water which is not so easily handled in a pump and thru a valve as water which is not boiling.

What I claim is:

1. An electrically heated steam clothes presser comprising a heated foraminous pressing head having a continuous tortuous steam generating passage connected with the foraminations and of a length substantially longer than that of the pressing head, said passage being constructed with a plurality of flow obstructions in the form of bends to break up and disseminate the water during vaporization thereof, a water tank carried on the presser and located remotely from the heated head to maintain low temperature therein to keep the water cool, and a pump means carried on the tank and out of contact with the heated head for forcing water under pressure from the tank into the steam generating passage.

2. An electrically heated steam clothes presser comprising a heated foraminous pressing head having a single continuous tortuous steam generating passage connected with the foraminations and of a length substantially longer than that of the pressing head, said passage being constructed with a plurality of flow obstructions to break up and disseminate the water during vaporization thereof, and pump means to force water to the passage under pressure.

3. An electrically heated steam generating clothes presser comprising an iron base having a steam generating passage therein, said base being provided with perforated steam spray channels which connect with the generating passage, a water tank carried on the iron and located distantly from the base to prevent undue heating of the water, and a pump connected with the tank and passage to force water under pressure into the passage.

4. An electrically heated steam garment presser comprising a member having a long tortuous steam generating passage through which water is forced to travel during the generating period, said member being provided with spray channels connecting with the passage, a water tank having an outlet to the steam passage and carried on the presser at a place where it will not become heated, a pump to force water from the tank outlet to the generating passage, and means for varying the pump displacement to regulate the volume of water pumped and hence the volume of steam produced.

5. An electrically heated steam sad iron comprising an iron body made with steam generating and spray passages which are connected together, a water tank located to the rear and above the iron body and away from the heat of the iron and connected with the steam generating passage, a handle, and a pump connected to and reaching from the tank on the rear to the forward part of the handle in a position adjacent said handle and convenient to be actuated by the operator to force water from the tank into the steam generating passage.

6. An electrically heated steam sad iron comprising an iron body having interconnected steam generating and spray passages, said body having an inlet passage in the rear of the body and connecting with the generating passage, a water tank disposed to the rear of the iron away from the heat thereof, a handle by which the iron is guided over the work, a pump cylinder secured to the lower part of the tank in fluid communication therewith and reaching forwardly over the iron body and close to the handle, a pump plunger finger piece disposed adjacent the iron handle for convenient manipulation to manually actuate the pump, and a discharge pipe connecting the pump with the inlet passage.

7. An electrically heated steam pressing iron comprising an iron body made with interconnected steam generating passages and steam spray perforations, a handle and bracket attached to the iron body, a water tank carried on the handle and bracket and spaced from the iron body to keep the water from becoming unduly hot, and pump means for forcing water under pressure from the tank into the passages while the iron is in engagement with the work to be ironed.

8. An electrically heated steam pressing iron comprising an iron body having interconnected steam generating passages and steam spray perforations, a handle and bracket attached to the iron body, a water tank carried on the handle and bracket and spaced from the iron to avoid undue heating of the water, and a force pump anchored to the water tank and spaced from the iron body and being connected with the steam generating passages to force water from the tank into the steam generating passage.

9. An electrically heated steam iron comprising a pressing head having spray channels located near the pressing face thereof, spray foraminations from the channels to the pressing face, steam generating passages provided in the pressing head above the spray channels and connecting with the said channels, and manually operable force-pump means carried on the iron to force water under pressure to the steam generating passages.

10. An electrically heated steam iron comprising a pressing head having spray channels located near the pressing face thereof, spray foraminations from the channels to the pressing face, steam generating passages provided in the pressing head above the spray channels and connecting with the said

channels, an electric heating element disposed on the upper face of the pressing head adjacent the generating passages, and pump means for forcing water to the passages under pressure.

11. An electric steam generating sad iron comprising, an iron base and an electric resistance element for heating the same, a handle adapted to be grasped by an operator to guide the iron, said iron having spray means by which to eject steam onto the work, said iron being provided with steam generating means connecting with the spray means, a water tank carried with the iron, a force pump including a plunger which is connected with the tank to pump water to the steam generating means, and a thumb piece mounted on the plunger at the forward end of the iron and adjacent to and on one side of the handle in a position convenient to the operator's thumb so he may actuate the pump while grasping the handle and using the iron.

12. In a pressing device, a base member having a steam generating means, an electric heater, and a steam spray face connected with the steam generating means, a water tank mounted on the device at one end thereof, a pump cylinder having its rear lower end attached to and connected with the tank to receive water therefrom and its forward upper end disposed toward the front end of the device, the pump cylinder thus being mounted at an angle to the base, a water connection extending from the pump to the steam generating means, a handle attached to the device and having its front end disposed proximate the front end of the pump cylinder; and a plunger having a thumb-press piece slidably mounted in the pump cylinder; said thumb piece being placed proximate, to one side, and below the top surface of the handle.

13. A garment pressing device comprising a channeled member including steam generating means and a perforated pressing face to steam spray the work, an electrical heating element therefor, a pump carried on the pressing device to force water into the channels, and said steam generating means consisting of a single and continuous channel-passage which is longer than the length of the device and having sharp flow obstructions to break up the water to aid vaporization thereof and being restricted in size and of substantially small diameter by which to keep the water vapor in intimate contact with the walls of the passage for a long travel thru the device to effect good steam generation.

14. A heated steam generating clothes presser comprising an iron base, perforated steam spray channels in the base, an imperforate tortuous steam generating passage in the base connected with the perforated steam spray channels, the imperforate steam generating passage consisting of a plurality of V-shaped portions connected together with their ends opening through the side wall of the base, means to plug the openings in the side wall to form a single continuous and tortuous steam generating passage, and means to feed water into the imperforate steam generating passage.

In testimony whereof I affix my signature this 14th day of March, 1923, in the city of New York, county of New York, and State of New York.

JAMES C. LEDBETTER.