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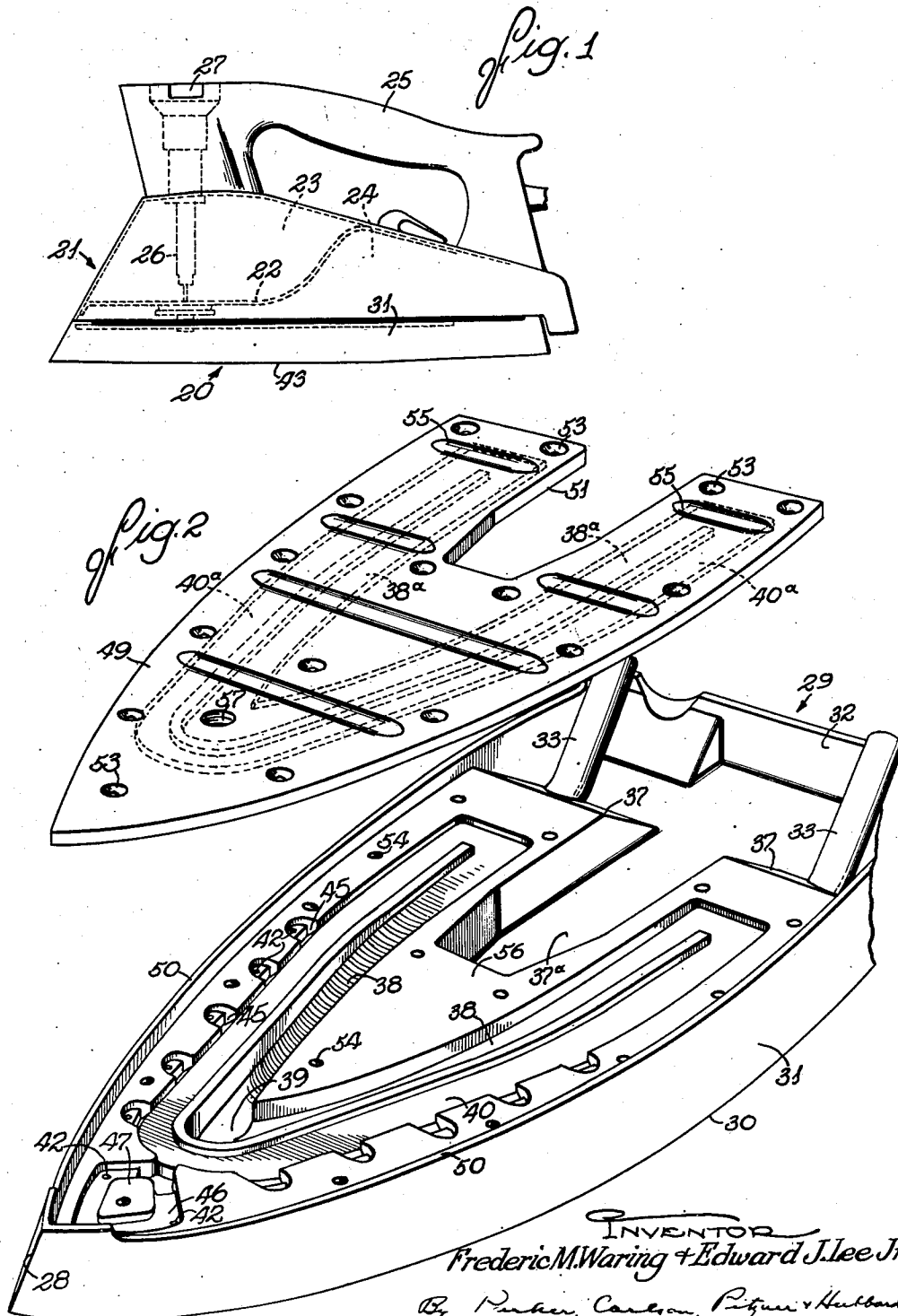
F. M. WARING ET AL

2,353,604

BASE UNIT FOR STEAM AND ELECTRIC IRONS

Filed Aug. 21, 1940

2 Sheets-Sheet 1



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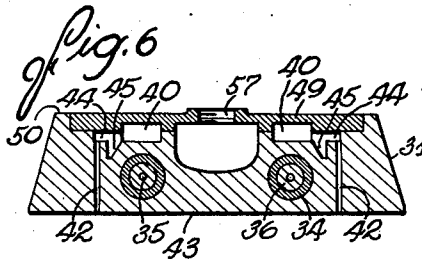
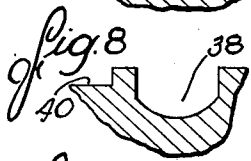
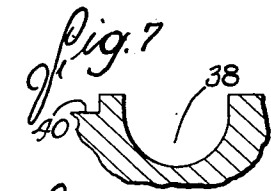
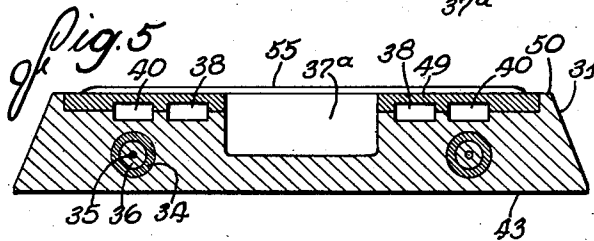
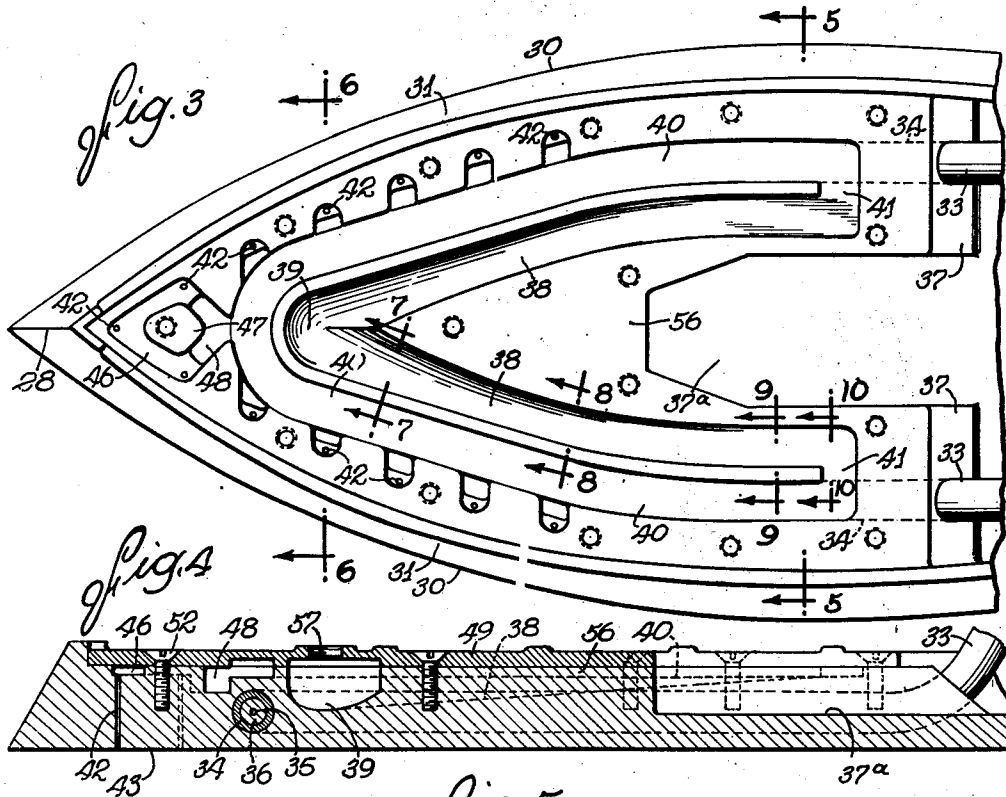
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BASE UNIT FOR STEAM AND ELECTRIC IRONS

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2 Sheets-Sheet 2



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BASE UNIT FOR STEAM AND ELECTRIC IRONS

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Application August 21, 1940, Serial No. 353,450

8 Claims. (Cl. 38-77)

The invention relates to base units for steam-electric iron devices of the type in which operation of the electrically heated iron is accompanied by the discharge of steam against the fabric being ironed. The present invention is an improvement of the base unit embodied in the device disclosed in the application of Merrill M. Kistner, Serial No. 338,962, filed June 5, 1940.

An object of the invention is to provide a new and improved base unit embodying novel means for efficiently effecting the conversion of water into steam.

Another object of the invention is to provide a new and improved unit of this character embodying novel means for preventing the passage of possible water accumulation through the discharge ports onto the fabric being treated.

Another object of the invention is to provide new and improved means in a device of this character for effectively controlling the rate of steam generation.

More particularly stated, an object of the invention is to provide a novel base unit having a first zone into which moisture to be converted into steam is delivered, and having a second zone through which steam or moisture passes toward discharge ports from the unit, the first zone being defined by a mass arranged to be heated rapidly and the second zone being defined by a mass that heats more slowly, the temperature of the second zone during steam generation being slightly higher than that of the first zone.

In conjunction with the foregoing, another object is to provide, in a base unit having first and second zones for converting moisture delivered to the first zone into steam, metallic means for retarding the travel of unconverted moisture particles through the second zone without baffling or retarding the flow of steam therethrough.

Another object is to provide novel means cooperating with the base unit to define the steam passages.

Other objects and advantages will become apparent in the following description and from the accompanying drawings, in which:

Figure 1 is a side view of a steam-electric iron including a base unit embodying the features of the invention.

Fig. 2 is a perspective view showing in disassembled relation the base and cooperating closure plate which together form the base unit.

Fig. 3 is a fragmentary plan view of the iron base.

Fig. 4 is a fragmentary sectional view of the

base unit taken on a central longitudinal vertical plane.

Figs. 5 and 6 are transverse sectional views through the base unit taken as indicated by the lines 5-5 and 6-6 of Fig. 3.

Figs. 7 to 10, inclusive, are detail sectional views illustrating the formation of the steam passageway and the views are taken as indicated by the lines 7-7, 8-8, 9-9 and 10-10, respectively, of Fig. 3.

While the invention is susceptible of various modifications and alternative constructions, we have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that we do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring to the drawings, Fig. 1 shows an exemplary form of iron structure for the purpose of illustrating the invention. The class of ironing device with which the invention is primarily concerned is that known as combined steam and electric irons, or simply steam irons. Such irons are characterized by the discharge of steam against or into the fabric being ironed. As shown in Fig. 1, the iron comprises generally a base unit 20 with which the present invention is particularly concerned, a superimposed body section 21 which includes an inner partition 22 defining a forward water reservoir 23, and a rear compartment 24 in which the electrical connections and a temperature control thermostat (not shown) are located. A handle 25 is mounted above the upper surface of the body section. Delivery of water from the reservoir 23 to a receiving zone located in the base unit is controlled by a valve assembly 26 manipulable by an operating finger piece 27. The valve assembly is hollow to permit the reservoir to be filled through it.

The foregoing structure, apart from the base unit, is more particularly described in the pending application of Merrill M. Kistner above identified.

Referring more particularly to Figs. 2 and 3, the base unit is of more or less conventional shape and includes a pointed nose 28, and an opposed heel 29 of substantial width connected by smoothly arcuate sides 30. Preferably the base is a cast metallic member having side walls 31 and a heel wall 32. Spaced inwardly from the side walls and preferably cast as an integral part of the base is a heating element 33.

As herein illustrated, the heating element is an elongated rod-like member of the type known commercially as "Calrod" and comprised of an outer sheath 34 (Fig. 4), an inner resistance wire 35, and an intervening mass of thermally conductive dielectric material 36. The heating element is bent into U or V-shaped form, as shown in Fig. 3, providing a closed end and outwardly diverged legs and the element is dimensioned so that in assembly the closed end is disposed in the nose portion of the iron and the diverging legs approximately follow the contour of the sides of the base. The mass of metal, in which the heating element is embedded, terminates as indicated at 37 in spaced relation to the heel wall 32 and the ends of the heating element extend outwardly therefrom and are inclined slightly away from the base for convenience in establishing the electrical connections to the opposite ends of the resistance wire. An elongated substantially deep recess 37^a extending forwardly and centrally through the heel portion of the base is provided to receive a suitable form of temperature control thermostat.

Along the inner sides of the heating element are steam flow channels 38 which meet in the area designated 39, which is enclosed on three sides by the bend of the heating element. This area 39 may be considered a zone of initial steam generation since it is located beneath the water discharge port from the reservoir controlled by the valve assembly 26. The channels 38 extend rearwardly from the zone 39 along the inner lateral sides of the legs of the heating element and terminate at their rear ends near but in spaced relation to the ends 37 of the mass of metal that surrounds the heating element. On the upper or top side of the heating element the enclosing or encasing metal has a continuous channel 40 therein which follows the contour of the legs and bend of the heating element. At its rear ends the channel 40 communicates, as at 41, with the respective rear ends of the channels 38. In the nose portion of the base and also in those portions located between the outer side of the heating element and the sides of the iron is a series of steam discharge ports 42 which extend downwardly through the base, as shown in Figs. 4 and 6, to open through the ironing face 43 thereof. Outwardly extending passages 44 from the channel 40 establish communication between the channel and the outlet ports and, if desired, a depression or well 45 may be formed in each passage between the channel and the outlet port. This arrangement is shown for all outlet ports except the three in the extreme nose portion of the base. These three ports are preferably served from the channel 40 by a continuous passage 46 which encircles a securing boss 47 and has a larger well or depression 48 adjoining the channel.

Since the channels 38 and 40, and the communicating passages leading to the outlet ports, are formed in the upper surface of the base, closure means is provided for completing the conducting system. As best shown in Figs. 2, 4 and 5, the closure means in the present instance comprises a plate 49 shaped and dimensioned to fit snugly within an upstanding flange 50 formed as a continuation of the side walls of the base. At its heel end, the plate terminates short of the ends 37 and the plate has a recess 51 registering with the walls of the recess 37^a on the base. Such means as screws 52 extend through countersunk apertures 53 in the plate for engagement with tapped bores 54 formed in the base preferably

both inwardly and outwardly of the line of the heating element, as well as in the securing boss in the nose portion of the iron, to secure the plate in steam tight relation to the upper surface of the base. Where it is desirable to avoid undue depth in the channels 38 and 40, registering grooves 38^a and 40^a may be provided in the under side of the plate.

It may in some instances be desirable to re-enforce the closure plate 49 against bending or buckling as a result of the thermally induced expansion and contraction of the base, or because of possible differences in the degree of expansion and contraction of the base and closure plate under given heat conditions. To this end, re-enforcing ribs 55, extending transversely from side to side across the upper surface of the closure plate, are provided.

In irons of this character difficulty is experienced in preventing, under all operating conditions, the discharge of small particles of water in unconverted form through the discharge ports. Various arrangements of baffles have been used to prevent the discharge of unconverted water particles from the iron, but baffling means have not been entirely satisfactory either in operation or from a manufacturing point of view. The present invention embodies a relationship which converts all of the moisture delivered thereto into steam even though the quantity of water delivered to the iron varies rather widely. Moreover, the character of the discharged steam itself may be varied through a wide range from a condition in which the steam is "wet" to a condition in which the steam is super-heated to a high degree. It is possible, therefore, by varying the relationship of the temperature of the ironing base to the quantity of water admitted thereto to produce that quality of steam proper for the reconditioning of practically any type of fabric.

Referring to Figs. 2, 3 and 4, it will be noted that the central portion of the base in front of the recess 37^a and within the confines of the channels 38 is occupied by a triangularly shaped mass of metal 56. As shown in Figs. 4 and 6, the generating zone within the bend of the heating element is comparatively deep. The channels 38, as they progress rearwardly from the generating zone, have an upward inclination; in other words, as may be seen from a comparison of Figs. 7 to 10, inclusive, the bottom walls of the channels 38 slope gradually upwardly until they reach the level of the channels 40 above the heating elements approximately at the rear or heel ends of the channels. It is preferred, moreover, that the bottoms of the channels be arcuate in cross sectional contour, the radius of the arc increasing gradually between the front and rear ends of the channels. As water is delivered into the generating zone 39 in a succession of drops through a closed conduit communicating with the tapped opening 57 in the cover plate, at least some portion thereof will instantly be converted into steam (it being presumed, of course, that the temperature of the base is at least above the temperature at which water would not be converted into steam). The volume of steam initially developed escapes out of the generating zone into the channels 38 and this flow of steam will carry with it such particles of water as remain unconverted. The upward inclination of the channels 38, however, tends to retard, but not obstruct, the flow of such par-

ticles of water along the channels. Since the heating element in effect forms one side wall of each channel 38, the water particles, as they move rearwardly along the channels, will be completely converted into steam before they reach the rear or heel ends of the channels. It will, moreover, be noted that the mass of metal to be heated by the heating element at the generating zone is less than the mass of metal heated by the element along the intermediate portions of the channels. The tendency of the incoming water to lower the temperature in the generating zone will be overcome by the rapidity with which the smaller mass of metal around this zone will return to its normal temperature. Rearwardly along the channels 38, the temperature will be more uniform. It has been found desirable in operation to have the temperature throughout the middle portion of the channels somewhat higher (on the order of 10°-15° F.) than the temperature in the generating zone.

An ironing base unit embodying these relationships will completely convert the maximum quantity of water that will be admitted by the completely opened valve assembly 26 into steam at the minimum temperature of the iron when conditioned for steaming operation. With the same temperature setting, the quantity of water admitted may be reduced to deliver steam in drier, more highly heated form. The same result may be achieved by increasing the operating temperature, although of course the volume of steam delivered will be correspondingly greater. By adjustably varying the quantity of water admitted and the operating temperature, steam at a desired degree of saturation and temperature, and the volume required, may be readily attained.

The delivery of water to the first zone in drops would tend to generate steam intermittently and tend to produce a pulsating discharge of steam from the ports. However, the decreasing cross sectional area of the channels 38 with the increasing velocity of steam flow and increased steam volume serves to eliminate all of such effect so that the steam as it leaves the channels 38 at the rear ends thereof is delivered with a smooth non-pulsating flow.

In the present relationship of the channels to the encased heating element, the element in effect defines a highly heated rib which is traversed substantially along its entire length and two sides by the steam as it flows to the discharge ports. A third side of the encased heating element also acts effectively on the steam as it passes through the passages 44 and 46 to the discharge ports. The dimensions of the wells or depressions 45 and 48 may be varied as desired.

We claim as our invention:

1. A base unit for an iron of the character described having, in combination, an ironing base provided with steam discharge ports, means defining a zone on said base to receive water to be generated into steam, said base having a pair of diverging channels each communicating with said zone and leading to said discharge ports, said base including a relatively large mass of metal located between said channels, each of said channels having an upward inclination at least through the portion thereof adjoining said zone, and means for heating said base, zone and channels said heating means being disposed adjacent to said zone and channels and remote from said mass.

2. A base unit for an iron of the character described having, in combination, an ironing base having a pointed nose portion and an oppositely located heel portion and having steam discharge ports located in the nose portion, a rib on the upper surface of said base of generally V-shaped configuration having its closed end located in the nose portion of the base, heating means housed in said rib, means at the closed end of said rib defining an area for receiving water to be generated into steam, a pair of channels communicating with said area and extending rearwardly to approximately the heel of the base along the inner side of said rib, said channels being upwardly inclined away from said area, said rib having return channels along another side thereof of communicating with the rearwardly extending channels and with the discharge ports.

3. A base unit for an iron of the character described having, in combination, an ironing base provided with a pointed nose portion, heating means on said base, means located adjacent said nose portion defining an area for receiving water to be generated into steam, a pair of elongated channels extending rearwardly from said area and of gradually diminishing cross sectional area, and a second pair of return channels communicating with the rear ends of said first-mentioned pair and having a uniform cross sectional area.

4. A base unit including a cast base having a pointed nose portion and an oppositely located heel portion, steam discharge ports in the nose portion, a heating element cast in the base and being generally V-shaped with its closed end located adjacent the nose portion of the base and the sides of the V extending along the sides of the base to locate the open end of the V at the heel of the base, a pair of channels connected at the front end adjacent the closed end of the heating element and extending rearwardly along the line of the sides of the heating element substantially to the heel of the base, and return channels communicating with the heel portions of the first mentioned channels and with said ports.

5. In a base unit for an iron of the character described, the combination of an ironing base having steam discharge ports therein and a flow channel extending generally parallel to the flat plane of the base and leading to said steam discharge ports, means for delivering water to one part of said channel, and means for heating said base and channel, said channel having an initial portion defined in part by a bottom wall upwardly inclined from the point of water delivery thereto and being of gradually diminishing cross sectional area, said channel having a terminal portion of substantially uniform cross sectional area.

6. In a base unit for an iron of the character described, the combination of an ironing base having a flow channel therein leading to steam discharge ports, means for delivering water to one part of said channel, and means for heating said base and channel, said channel from the point of water delivery thereto being of gradually diminishing cross sectional area for at least a portion of its length, and the base of said channel being arcuate in cross-section at the part where the water is delivered thereto, the arc changing progressively throughout the channel portion of diminishing cross-sectional area until the base of the channel is substantially flat.

7. In a base unit for an iron of the character described, the combination of a base having

means thereon defining a zone to receive moisture to be converted into active steam and diverging passages from said zone for conducting steam generated therein and such moisture as has not been converted, said passages inclining upwardly from said zone and defining a relatively large mass of metal therebetween, and means located between said channels and the adjoining sides of said base for heating said passages and said mass of metal.

8. In a base unit for an iron of the character described, the combination of a base having means thereon defining a zone to receive mois-

ture to be converted into active steam and a passage from said zone for conducting steam generated therein and such moisture as has not been converted, said passage inclining upwardly from said zone, means located between said channel and a side of said base for heating said zone and passage, and means defining a second passage in communication with the passage first mentioned and extending in close proximity along the heating means.

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