Oct. 6, 1953 A. A. JOHNSON 2,654,167

STEAM IRON

Filed Sept. 21, 1948

Fig. 1

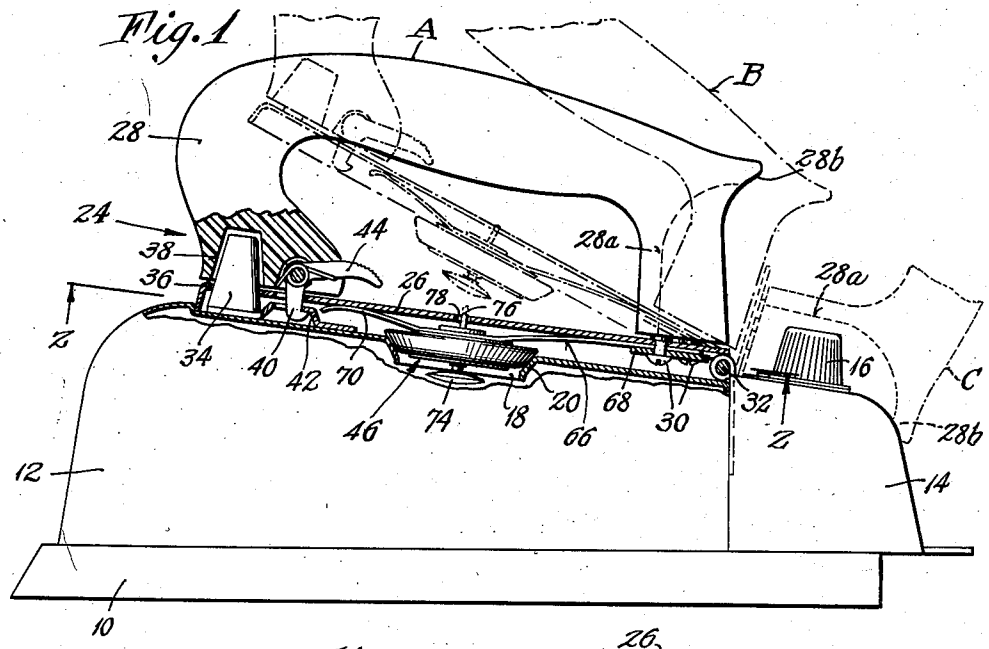


Fig. 2

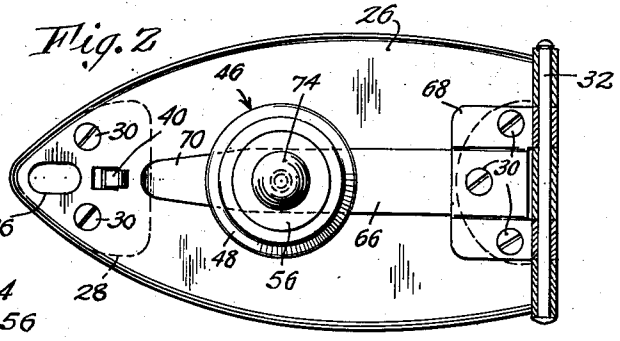


Fig. 3

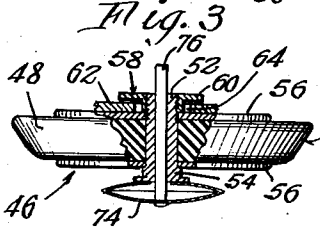


Fig. 5

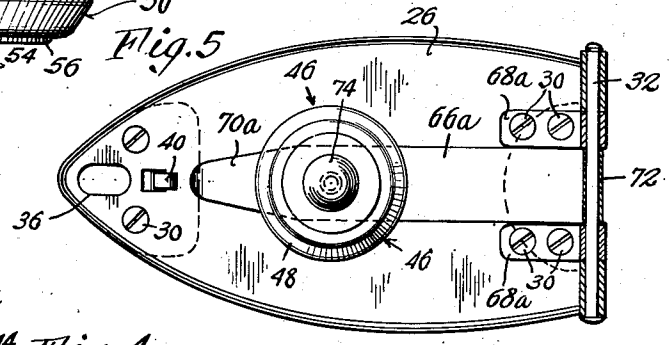
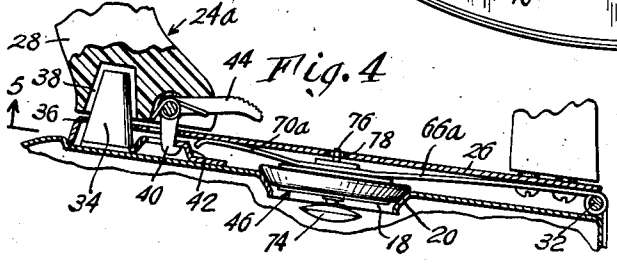


Fig. 4



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Patented Oct. 6, 1953 2,654,167

UNITED STATES PATENT OFFICE

2,654,167

STEAM IRON

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Application September 21, 1948, Serial No. 50,299

17 Claims. (Cl. 38—77)

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This invention relates to self-heating sadirons and particularly to irons of this character designed to carry a supply of water and heat the same to produce steam, and further provided with escape passages by which the steam may be caused to impinge upon the workpiece being ironed.

My invention has for its object the provision of an iron of this character which can be made sufficiently small in size and light in weight for domestic use, and which will make the most economical use of the available dimensions by providing for maximum reservoir capacity within such restrictions.

It is another object of my invention to provide a steam iron having a reservoir closure means by which the filling opening is securely sealed at normal pressures and which will automatically vent in response to excessive pressure in the reservoir.

It is a further object of my invention to provide a steam iron having such a reservoir closure means but in which the same also provides for filling the reservoir, is simple and convenient to operate so that the frequent refilling often necessary in the operation of a small domestic iron will not become burdensome, and the structure of which is sufficiently uncomplicated for economical production.

The steam iron in accordance with my invention is provided with a closure member carried by a resilient element for movement towards and away from the filling aperture of the reservoir, and a hinged handle which overlies the resilient element and stresses the same to thereby urge the closure member into aperture closing position. A releasable latch is provided for holding the handle in such position so that the iron may be transported and guided thereby in normal ironing position.

The steam iron of this invention is also preferably equipped with a pressure operated indicator mounted in the closure element for aiding the operator in detecting such conditions as readiness of the iron for use, and failure of the water supply.

Additional features and advantages will hereinafter appear.

In the drawing:

Figure 1 is an elevation of one form of steam iron according to my invention, certain positions of the handle being illustrated by broken lines therein, and parts being broken away.

Fig. 2 is a view of the handle and closure means according to Fig. 1 looking in the direction of the arrows 2—2 thereof, parts being shown in section.

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Fig. 3 is an elevation to a larger scale of the closure element of my invention, parts being shown in section.

Fig. 4 is a fragmentary elevation of a steam iron according to my invention and illustrating a modified closure mounting, parts being broken away.

Fig. 5 is a view of the handle and closure means of Fig. 4 looking in the direction of arrows 5—5 thereof, parts being shown in section.

The steam iron constituting my invention and illustrated in the accompanying drawing, consists of a sole plate 10, having a water reservoir 12 mounted thereon. Heating means, not shown, preferably of the electrical resistance type are disposed in the sole plate, or between the reservoir and sole plate, for heating the latter or for boiling the water in the reservoir, or both. As the particular heating means employed forms no part of my present invention the same has not been illustrated in the drawing and it will be understood that any suitable heater properly positioned may be substituted for the electrical means mentioned if desired.

A housing 14 mounted at the rear of the iron may contain the control devices necessary for regulating the operation of the heater, said devices being adjusted by means of a manually engageable setting knob 16.

The top surface of the reservoir 12 has a filling opening 18 therein, the same being provided with a peripheral conical seat 20 for engagement with the closure member to be hereinafter described.

Overlying the top surface of the reservoir is a handle member 24 which includes a flanged plate 26 and an insulating grip 28 attached to the upper surface thereof as by screws 30. The plate 26 is hinged to the rear portion of the reservoir by a pin 32 and the handle member may be pivoted thereon between the positions designated A and C in Fig. 1 and is capable of occupying various intermediate positions such as B. Preferably, the rear portion of the grip 28 is provided with a recess 28a which will receive control elements such as setting knob 16 when the handle member is moved to position C in order that such controls will not unnecessarily limit the travel of the handle member in an opening direction.

The grip 28 is also preferably provided with an integral rearwardly extending stop element 28b shaped to engage a rear portion of the iron

such as housing 14 in order that strain on the hinge pin 32 may be avoided, the handle 24 being furthermore positively located in position for transportation of the iron during filling of the reservoir as will be hereinafter described.

A post 34, rigidly mounted on the upper forward surface of the reservoir, is shaped to be received in an opening 36 in the plate 26 and also within a corresponding recess 38 in the grip 28. The post 34 serves to guide the swinging handle into proper closed position and to reinforce the free end of the same against side loads due to ironing.

When the handle member 24 is in closed position A, it is held therein by a latch consisting of a spring pressed dog 40 mounted on the handle member 24 and engageable under the edge of a catch member mounted on the upper surface of the reservoir 12. Integral with the dog 40 is an operating lever 44.

Disposed between the top of the reservoir and the bottom of handle member 24 is a closure member 46. As shown in Fig. 3, this closure member consists of a disc 48 of yieldable and resilient material preferably having a conical engaging surface 50 complementary to the seat 20 of opening 18. The disc 48 is mounted by providing a threaded shaft 52 having a head 54 at one end and passing the same through appropriate central openings in said disc and a pair of reinforcing washers 56, one on either face thereof. The parts are clamped in place by a nut 58 threaded on the shaft 52, which nut is provided with a radially extending flange 60. The nut 58 is placed on shaft 52 in such a way that the flange 60 is spaced from the adjacent washer 56 and provides an annular space to accommodate and provide for connection with a supporting element 62 having an opening 64 therein small enough to be retained by the flange 60 and large enough to allow a certain amount of side play of the nut 58 therein so that the disc 48 will be permitted to center itself in the opening 18.

In the form of my invention shown in Figs. 1 and 2 the supporting element 62 takes the form of an elongated resilient element or leaf spring 66, rigidly connected at one end to the plate 26 near the hinge thereof. Preferably one of the screws 30 which attaches the plate 26 to the grip 28 and which also serves to connect a reinforcing and hinge plate 68 to the bottom of plate 26, may be used as the attaching means therefor. The spring 66 has a downwardly bowed central portion to which the closure 46 is attached and a free end 70 which bears on the under face of plate 26. The relaxed position of the parts is illustrated by the arrangement thereof in position B of Fig. 1. When the handle 24 is moved to ironing position A and latched in place, the spring 66 is flattened slightly and urges the closure 46 into the opening 18 to form a tight seal. Furthermore, the resilience of spring 66 is such that if greatly excessive pressures should develop in the reservoir for any reason, for example due to accidental stoppage of the stream exit passages, the closure is permitted to lift slightly so as to act as a pop-off valve and relieve the pressure, thereby preventing damage to the reservoir and avoiding danger to the operator.

The modification of my invention shown in Figs. 4 and 5 is similar to the form shown in Figs. 1 and 2 and where the parts are the same, they are indicated by identical reference characters. The modified iron differs from the form previously described only in that, on handle member 24a thereof, two reinforcing hinge plates 68a are substituted for the plate 68 of Fig. 2, and between them is disposed a closure supporting leaf spring 66a having a free end 70a similar in all respects to the spring 66 except that its rear end, instead of being rigidly attached to the plate 26, is hingedly mounted on pin 32 as at 72, whereby the leaf spring support is movable independently of the plate 26 and must be lifted to expose the filling opening 18 after the handle 24 has been raised.

The structures described above result in an iron which can be kept within dimensional restrictions suitable for domestic use. Moreover, as clearly shown in the drawings, the vertical space occupied by the closure means is maintained at a minimum so that a relatively large reservoir volume may be made available.

In either form of my invention I prefer to mount an indicating means on the closure member 46. This consists of a pressure sensitive bellows 74 attached to and hermetically sealed at its connection with the head 54 of shaft 52. The moving side of the bellows is connected to an indicating pin 76, which passes through a central bore in the shaft 52. An opening 78 is provided in the plate 26 to accommodate freely the upper end of the pin 76. Preferably the sensitivity of the bellows 74 and the length of the pin 76 are so chosen that very little if any of the pin will be exposed above the upper surface of plate 26 with the parts in the closed or ironing position A of Fig. 1, and with atmospheric pressure in the reservoir, while a slight steam pressure in the chamber corresponding to the normal operating pressure should extend the pin to a clearly visible raised position. Thus the raised pin indicates to the operator that the iron is generating steam and is ready for use, while the lowered pin shows initially that the water is not sufficiently hot to generate steam or, during use, that steam generation has ceased and refilling of the reservoir is required.

In the iron of this invention the water reservoir may be readily refilled by merely depressing lever 44 to release the latch, and swinging the handle member 24 back to position C of Fig. 1. In the case of the form shown in Figs. 1 and 2, this motion of the handle also carries the closure member 46 away from the opening 18 and the iron can be transported in this condition by its handle to a water tap where the reservoir can be easily and quickly filled. With one motion the handle member can be swung down to the ironing position A and latched, this motion also firmly positioning the closure 46 in the opening 18 of reservoir 12. In using the modification of Figs. 4 and 5, the operation is the same as described above, except that after handle 24a has been raised the tip 70a of spring 66a must be engaged and flipped up to expose the aperture 18 before the reservoir can be filled. This arrangement provides for relieving spring pressure on the closure member 46 by lifting the handle member 24a an instant before the aperture 18 is thrown wide open, and has the advantage that any residual stream pressure in the reservoir will be exhausted in a metered fashion between the periphery of the disc 48 and the edge of the aperture 18, thus giving an indication of the existence of such pressure and warning the operator against suddenly uncovering the aperture in a heedless manner.

Variations and modifications may be made

within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. In a steam iron, an assembly comprising a sole plate and a reservoir mounted on said sole plate, said reservoir having a filling aperture in its upper wall; an elongate transporting and operating handle member for said iron hinged at one of its ends to the rear of the assembly for movement between a filling position exposing said aperture, and an ironing position overlying the reservoir and aperture; a closure member for said aperture, normally located above the same; an elongate resilient biasing element; and means movably mounting said element adjacent the hinged end of the handle member to be movable with respect thereto, said element extending along the handle member and bearing on both said members and being stressed therebetween when said handle member is in ironing position and said closure member is in aperture closing position to urge the members apart, whereby said closure member is firmly maintained in closing relation to said aperture.

2. An iron as claimed in claim 1 wherein said handle member is hingedly mounted on said assembly and wherein said biasing element is a leaf spring pivotally connected at one end with said handle member and also connected at another portion thereof to said closure member and carrying the same.

3. An iron as claimed in claim 2 wherein said handle member and said leaf spring are each hinged to said assembly, and the closure member is a seating disk carried by said leaf spring.

4. An iron as claimed in claim 2 wherein said handle member and leaf spring are each hingedly mounted on said assembly by means of a common hinge pin, and the closure member is carried by said leaf spring between said mounting and the other end of the spring.

5. In a steam iron, an assembly comprising a sole plate and a reservoir mounted on said sole plate, said reservoir having a filling aperture in its upper wall; a transporting and operating handle member for said iron mounted on said assembly for movement between a filling position exposing said aperture, and an ironing position overlying the reservoir and the aperture; a closure member for said aperture, normally located above the same; an elongate resilient biasing element bearing on said members and being stressed therebetween when said handle member is in ironing position and said closure member in aperture closing position to urge both the members apart, whereby said closure member is firmly maintained in closing relation to said aperture; and pressure indicating means mounted on said closure member and having a portion extending through said handle member to a visible exterior position.

6. In a steam iron, an assembly comprising a sole plate and a reservoir mounted on said sole plate, said reservoir having a filling aperture in its upper wall; a transporting and operating handle member for said iron mounted on said assembly for movement between a filling position exposing said aperture, and an ironing position overlying the reservoir and the aperture; a closure member for said aperture, normally located above the same; an elongate resilient biasing element bearing on said members and being stressed therebetween when said handle member is in ironing position and said closure member in aperture closing position to urge both the members apart, whereby said closure member is firmly maintained in closing relation to said aperture; and pressure indicating means comprising a pressure-sensitive element mounted on the inner surface of said closure member, and a movable indicator connected to said pressure-sensitive element and passing through said closure member, said biasing element and said handle member to a visible exterior position.

7. In a steam iron an assembly comprising a sole plate and a reservoir mounted on said sole plate, said reservoir having a filing aperture in its upper wall; a transporting and operating handle member for said iron and a resilient element, each independently pivotally mounted on said assembly for movement between a filling position exposing said aperture, and a covering position overlying the same; a closure element connected to one portion of said resilient element and overlying and closing said aperture when the resilient element is in covering position, said handle member, when in covering position, engaging another portion of the resilient element and stressing the same, whereby said closure member is resiliently urged in an aperture closing direction.

8. An iron as claimed in claim 7, and further including a releasable latch positioned to retain said handle member and resilient element in their covering positions with said resilient element in stressed condition.

9. A steam iron comprising a steam generating chamber having an aperture; a closure for said aperture; normally releasable means removably mounting the closure on said chamber; an element mounted on said closure and so located as to be within said chamber when said closure is in aperture closing position, said element having a portion which is movable in response to pressure changes in said chamber; and an indicating pin operatively connected to the movable portion of said element and extending through said closure to a position such that a portion thereof is perceptibly exposed when said closure is in aperture closing position.

10. A steam iron comprising a steam generating chamber having an aperture; a closure for said aperture; manually releasable means removably mounting the closure on said chamber; a pressure sensitive element mounted on said closure in a position to be within said chamber when said closure is in aperture closing position; and indicating means mounted on said closure in a position to be perceptible from the exterior of said chamber when said closure is in aperture closing position, said indicating means being operatively connected to said pressure-sensitive element.

11. A steam iron comprising a steam generating chamber having an aperture; a closure for said aperture; manually releasable means removably mounting the closure on said chamber; a pressure-sensitive element mounted within said chamber; and indicating means mounted on and extending through said closure so as to be perceptible from the exterior of said chamber, said means being operatively connected with said pressure sensitive element.

12. A steam iron comprising a steam generating chamber having an opening therein; a closure for said opening; manually operable means for removably mounting said closure on the chamber; and means for determining from the exterior of said chamber the steaming condition obtaining on the interior thereof, said means in-

cluding an element so mounted on said closure as to be exposed to and affected by pressures within said chamber and having a portion which is movable in response to pressure changes in said chamber; and indicating means mounted on said closure, perceptible exteriorly of said chamber and operatively associated with the movable portion of said element for actuation thereby.

13. A steam iron comprising a base member including a steam generating chamber; a handle member having a plate overlying and secured to said chamber in spaced relation thereto to prevent the hand of the operator from inadvertently touching the chamber and having a finger-grip portion extending above said chamber for manually controlling the movement of the iron in use; pressure-sensitive means in said chamber, affected by steam pressures therein and having a part movable in response to pressure changes; and an indicator element mounted on said iron, actuated by said movable portion, and extending through the plate of said handle member to an accessible position on the exposed surface thereof, whereby the same is readily available for tactile perception by the hand of the operator.

14. An attachment for a steam iron boiler comprising a closure member for the filling opening of the boiler, said closure member having an aperture therethrough; manually releasable means removably mounting the closure member on the boiler; an element sensitive to steam pressure and having a portion movable in response to changes in pressure mounted on one surface of said closure member to close said aperture; and an indicator mounted on said attachment, extending through said aperture to the other surface of said closure member and operatively associated with said movable portion.

15. In a steam iron, a tank having an opening in its upper wall for the passage of fluid; a stopper for said opening, normally disposed over the same; a handle for manipulating the iron, movably mounted on the tank for positioning in either an operative position adjacent the tank or a position remote from the tank; means movably mounting the stopper independently of the handle on the tank for positioning in either a position sealing or unsealing the fluid opening; and means for shifting the stopper from unsealing to sealing positions in response to movement of the handle from its remote to its operative position.

16. The invention as defined in claim 15 in which there is means connected to the stopper and normally acted upon by the handle and maintaining the stopper seated against the fluid opening when the handle is in operative position.

17. The invention as defined in claim 16 in which the means maintaining the stopper seated is resilient and yields in response to excess fluid pressure on the stopper, thereby to permit loosening of the stopper and escape of fluid from the opening past the stopper when the tank has an excess of pressure in it.

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