Aug. 14, 1945. A. G. THOMAS 2,382,587

ELECTRIC IRON

Filed June 12, 1942

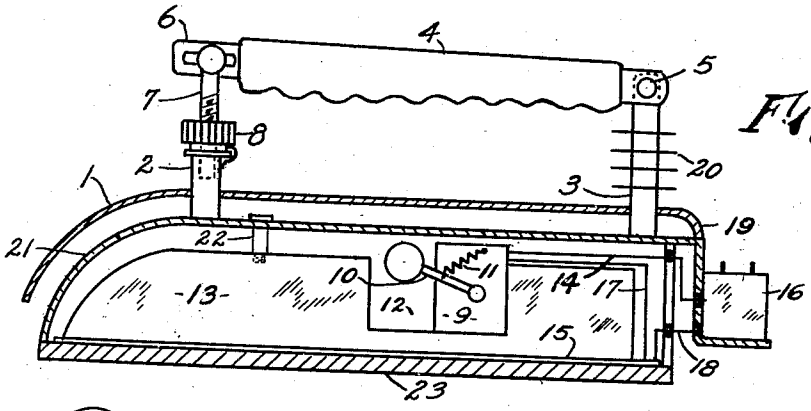


Fig. 1

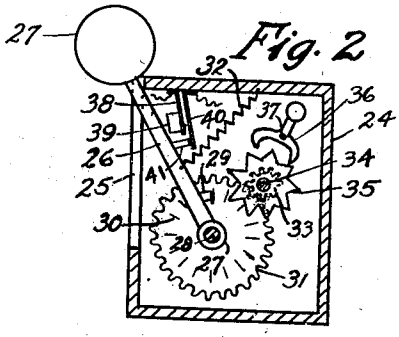


Fig. 2

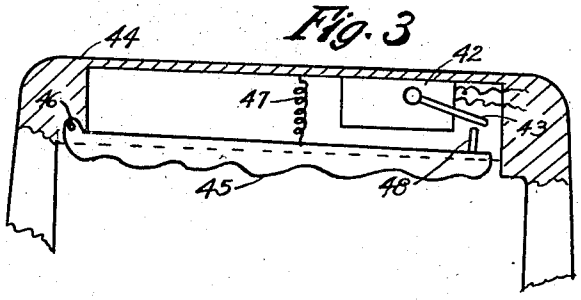


Fig. 3

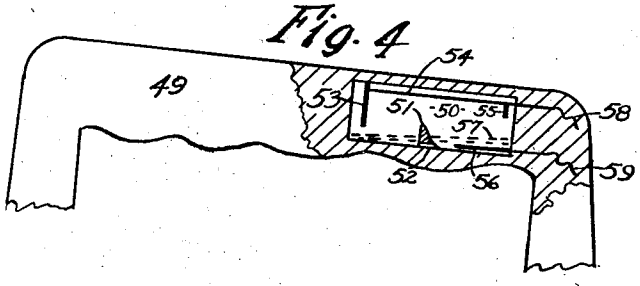


Fig. 4

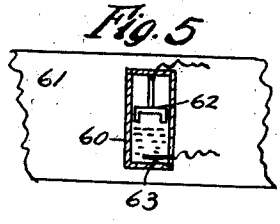


Fig. 5

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ELECTRIC IRON

Albert G. Thomas, Lynchburg, Va.

Application June 12, 1942, Serial No. 446,685

9 Claims. (Cl. 219—25)

This invention relates to electric irons, and is a continuation-in-part of my co-pending application, Serial No. 265,608, filed April 1, 1939.

An object is to provide an electric iron that may be left in circuit without danger of setting fire to objects upon which it may be placed. Serious fires have resulted from heated irons being left too long in contact with cloth or other combustible material. This iron has therefore been devised so that current will be supplied to its heating element as long as it is given movement, as in using it, but so that the heating element circuit will be broken if the iron is allowed to remain stationary for a certain elapsed time, which may be chosen to suit conditions.

A further object is to provide an automatic cut-off iron that will remain heated when turned up on end, so that the hot surface is not in contact with a support. It is obvious of course that the usual thermostatic control can be used in any case to maintain the iron at a somewhat uniform temperature.

An additional object is the provision of an iron with an adjustable handle.

A still further object is to provide an iron with a heat reflector to protect the user's hand from becoming over heated.

Another object is to place the electrical connecting element of the iron, so that it will be kept relatively cool.

Other objects are to provide simple timing devices for effecting cut-off of the heater element circuit after predetermined time intervals.

In the drawing:

Figure 1 is a side elevation, in part section, of an electric iron with an automatic circuit breaker, and a reflector, and adjustable handle.

Figure 2 is a side elevation in part section, of a timing device or circuit breaker similar to that shown exteriorly in Figure 1.

Figure 3 is a side elevation, in part section, of an electric iron handle with timing switch, operated by movements of the bottom grip of the handle.

Figure 4 is a side elevation, in part section, of an electric iron handle with a built-in mercury timing switch or circuit breaker.

Figure 5 is a fragmentary side elevation of an electric iron handle, containing another form of mercury circuit breaker switch.

In Figure 1 is shown an electric iron with reflector 1 covered on the under side with a mirror surface of aluminum or other material to reflect heat back down on the iron, and away from the handle. This reflector is supported on posts 2, and 3 attached to the iron, and made of porcelain or other insulating material, if desired. Handle 4 is pivoted to post 3, and 5, and has slotted extension 6 to which threaded rod 7 is pivoted. This rod is vertically movable in a hole in post 2, and is adjusted by turning threaded thumb nut 8, which is held to post 2 in any suitable manner. Therefore the angle of the handle 4 may be adjusted relative to the iron. Any suitable adjusting mechanism may be used however, as the details may be widely varied. Time switch 9, of any suitable design, is placed in space 12 in weight 13 of the iron. Switch 9 is provided with weighted lever 10 which is normally held up by tension spring 11, but as the iron is used the movement of the iron will cause weighted lever 10 to bob up, and down, and to wind the time switch 9 through a suitable ratchet in the switch. The switch can be set to keep electrical contact for any desired time after the iron is left stationary, and then to cut off. Suitable retarding fans, centrifugal brakes, or dash pots can be used for this purpose. Wire 14 connects switch 9 with one terminal of connection plug 16 and the other terminal of the switch is connected to heating element 15 by wire 17. Wire 18 connects the other terminal of plug 16 to the remaining terminal of the heating element 15.

Therefore if the iron is allowed to remain stationary for a longer period than the calibrated time, the current will be automatically cut off, and danger of fire will be obviated. It could be arranged so that the switch would not cut off if the iron is turned up on end so that there would be no danger. A suitable mercury time switch could be used also or a slight movement of handle 4, or any other part of the iron could be utilized to operate the time switch. The switch can be placed on the outside of the iron or even in the connecting cord circuit. A movable projecting element below the iron could be used to keep the time switch wound. This element would strike the ironing board, and be moved when the iron is used.

Reflector 1, is extended to form rear wall 19 which supports connecting plug 16. The air space between the wall, and the iron will then prevent plug 16 from becoming too hot. Fins 20 may be provided on post 3, and the other post to cool them, especially if they are of metal.

Parts 2, and 3 may be fastened to cover 21 by means of screws, welding or in any suitable manner, or these parts can be screwed into weight 13, according to well known construction. Separate screws similar to element 22 may be used

to fasten cover 21 in place, and these may connect with bottom plate 23 if desired. Any accepted construction for fastening the essential parts of the iron together may be employed.

In Figure 2, timing switch housing 24 is shown with slot 25 through which arm 26, carrying weight 27, may oscillate, but the arm 26 may be on the outside of the casing as shown in Figure 1. Arm 26 is fastened to sleeve 27 which is rotatable on shaft 28 fixed to housing 24 or to some other suitable support. Spring ratchet 29 is fastened to arm 26, and serves to engage one of the radial grooves 30 in the face of gear wheel 31, when arm 26 is pulled in clockwise direction by tension spring 32 fastened to arm 26, and to housing 24. Gear 31 meshes with pinion 33, shown dotted, which is supported on shaft 34 which is rotatable in suitable bearings. Pinion 33 is fastened to star wheel 35 which engages escapement 36, which is pivoted to a support at 37.

Spring strip 38 is fastened to housing 24 at one end, and has attached weight 39 at the other end. Spring strip 40 is also attached to housing 24 at one end, and normally presses against spring strip 38 to make electrical contact. Suitable wires, similar to wires 14, and 17 lead from the contact strips so that the timing switch can be connected in the heater element circuit of the iron. Either strip 38 or 40, or both are electrically insulated from housing 24, unless this housing is non conductive. Housing 24 may be fastened to any suitable part of the iron by welding or by screws.

In operation, as the iron is moved forward, and brought to a stop weight 27 will be thrown forward, and downward so that ratchet 29 engages one of the grooves 30 on the return. Spring 32 will then pull arm 26 back up, the rate of return movement being governed by escapement 36. When arm 26 is thrown downward or counter clockwise, attached arm 41 separates from strip 40 so that the resiliency of that strip forces it against strip 38 to make electrical contact. When arm 26, and its attached arm 41 are returned to starting position by spring 32, arm 41 strikes strip 40, and forces it out of contact with strip 38, so that the heater element circuit is broken. Weight 39 on strip 38 causes this strip to be pressed against strip 40 to close the heater element circuit when the iron is turned up on end, the weight 39 then being above strip 40.

Arm 26 is limited in movement by the upper, and lower edges of slot 25.

The acceleration given to weight 27 by either a forward or downward movement of the iron will cause counter clockwise rotation of this weight and arm 26 when the iron is brought to a more or less sudden stop. This causes displacement of ratchet 29 in steps or otherwise relative to wheel 31, the maximum displacement being determined by the lower edge of slot 25, assuming that the momentum of weight 27 and arm 26 is sufficient to overcome the tension of spring 32. Therefore as long as the iron is used the arm 41 will be kept out of contact with strip 40, so that the heater element circuit is closed, but if the iron is left resting on it's heated bottom surface for dangerous periods of time the heater element circuit will be opened.

Figure 3 shows timing switch 42, with operating arm 43, built into iron handle 44 which has bottom grip element 45 pivoted at 46, and positioned by compression spring 47. Projection 48 on element 45 strikes arm 43 when grip 45 is pressed upward with the fingers so that timing switch 42 is kept wound as long as the iron is in use. If not used however, a suitable spring in the switch causes it to break the circuit.

In Figure 4, iron handle 49 has chamber 50 on the floor of which barrier 51 with small bottom channel 52 is fastened. Electrical contact rod 53 is fastened to the handle in chamber 50, and shorter contact 55 is likewise fastened on the opposite side of barrier 51. Wire 54 connects contacts 53, and 55. Contact strip or rod 56 is placed in chamber 50 on the floor as shown, and suitable connecting wires 58, and 59 lead from the upper contacts, and lower contact 56 respectively, and are connected into the heater element circuit. A quantity of mercury 57 is placed in chamber 50 sufficiently high to cover contact 56, but not enough to reach contact 53 when the iron is resting normally upon an approximately horizontal surface.

If however, the iron is used, the movement will cause mercury to splash over barrier 51, and to build up a height sufficient to make contact with element 53, so that the heater element will be electrically energized. If the iron is set down and left, the mercury will flow back through restricted channel 52 until a level is reached, and contact of the mercury with element 53 will be broken. The time required for the mercury to flow back will depend upon the quantity of mercury, the size of channel 52, and the height of barrier 51, assuming that the mercury rises to this height.

If the iron is turned on end, the mercury will make contact between elements 55, and 56 so that the heating element will be continuously energized, unless a thermostat is placed in the circuit as usual.

It will be seen therefore that an iron equipped with a mercury contact of this type will be cut off automatically, after a period, if it is not used, nor turned up on end. The mercury switch or an equivalnt switch could of course, be placed away from the iron in the cord circuit, so that the movement of the cord will operate the switch.

The switch shown would actually work without barrier 51, since the intermittent contact due to the splashing or rolling of the mercury could be sufficient to keep the iron heated.

Figure 5 shows a mercury switch 60 in electric iron handle 61, with an upper insulated double contact 62, and a lower contact 63. The rolling of the mercury, when the iron is in use, causes contact to be made between elements 62, and 63, and if the iron is turned on end, the mercury will make contact between element 63, and the right hand prong of element 62.

It is obvious that a pendulum contact, which may be controlled by a dashpot, can be used in place of mercury.

Numerous variations of the broad idea of using the normal movement of an electric iron, or an associated part to control the heating of the iron, may be made without departing from the spirit of my invention. Any type of timing switch suitable for the purpose may be employed, and other obvious adaptions will readily occur to those skilled in the art. As an illustration, the inertia effect of a moving weight may be used instead of the momentum effect.

What I claim is:

1. An electric iron comprising, an ironing ele-

ment, a heating element therefor, a handle, a circuit to supply current to said heating element, a pair of relatively movable contacts for opening and closing said circuit, at least one of said contacts being biased to move toward the other contact, means to maintain separation of said contacts to keep open said circuit, means movable by ironing movement of said iron to render said separating means ineffective, and time delay means to cause said separating means to open and to maintain said circuit open after an interval of time after cessation of ironing movement of said iron.

2. An electric iron comprising, an ironing element, a heating element therefor, a handle, a circuit to supply current to said heating element, a pair of relatively movable contacts for opening and closing said circuit, yielding means to move one contact toward the other contact, means to hold said one contact against movement in a direction to close said circuit, a weight movable by ironing movement of said iron to move said holding means so that said yielding means will move said one contact to touch the other contact to close said circuit, and time delay means to cause said holding means to become ineffective whereby said circuit will be opened and held open after an interval of time after cessation of ironing movement of said iron.

3. An electric iron comprising, an ironing element, a heating element therefor, a handle, a circuit to supply current to said heating element, a pair of relatively movable contacts for opening and closing said circuit, at least one of said contacts being biased to move toward the other contact, means to maintain separation of said contacts against the bias of said contact to keep said circuit open, a weight oscillatable about a support below the center of gravity of said weight to move at least part of said separating means to allow said contacts to close said circuit, and time delay means to cause said separating means open and to keep said circuit open after an interval of time after cessation of ironing movement of said iron.

4. An electric iron comprising, a sole plate, a heating element therefor, a handle, a circuit to supply current to said heating element, a pair of relatively movable contacts for opening and closing said circuit, at least one of said contacts being biased to move toward the other contact, means to prop said biased contact against movement to close said circuit, means movable by ironing movement of said iron to displace said prop means so that said biased contact will move to touch the other contact, and time delay means to restore said prop means to open circuit position after an interval of time after cessation of ironing movement of said iron.

5. An electric iron comprising, a sole plate, a heating element therefor, a handle, a circuit to supply current to said heating element, a pair of relatively movable contacts for opening and closing said circuit, biasing means for bringing said contacts into engagement, means to prevent engagement of said contacts, means operable by ironing movement of said iron to render said preventing means ineffective, and time delay means to restore said preventing means to open circuit position after an interval of time after cessation of ironing movement of said iron, the operation of said time delay means being substantially independent of the temperature of said iron.

6. An electric iron comprising, a sole plate, a heating element therefor, a handle, a circuit to supply current to said heating element, a pair of relatively movable contacts for opening and closing said circuit, at least one of said contacts being biased to move toward the other contact as a result of said iron being in use, means to prop said biased contact against movement while said iron is stationary, and means movable by ironing movement of said iron to displace said prop so that said biased contact will touch the other contact, and means to move said prop to open circuit position after a predetermined interval of time after cessation of ironing movement of said iron.

7. Same as in claim 6, said prop moving means including a timing device having a spring, a gear train, and a governing escapement.

8. In an electric iron, an ironing element, a heating element therefor, a circuit to supply current to said heating element, means for opening and closing said circuit and being normally biased to close, means to affect said first named means to maintain said circuit open, means movable by ironing movement of said iron to render said affecting means ineffective, and time delay means to cause said previously named means to open and to maintain said circuit open after an interval of time after cessation of ironing movement of said iron.

9. An electric iron comprising, an ironing element, a heating element therefor, a handle, circuit means for supplying current to said heating element, a pair of switch contacts in said circuit, means biased to cause said contacts to be normally open while the iron is at rest, inertia means for momentarily overcoming the biased means for causing the contacts to close in response to normal ironing movement of the iron, and time delay means operative to delay the opening of the switch contacts by the biased means for an appreciable period of time after ironing movement ceases.

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