Quadrant II – Transcript and Related Materials

Programme	**: Bachelor of Science (First Year)**
Subject	**: Electronics**
Paper Code	**: ELG 102**
Paper Title	**: Repair and Maintenance of Electrical and Electronic Appliances**
Unit	**: II**
Module Name	**: Introduction, working principle, construction, operation, Installation, Maintenance and Repair: Electrical iron**
Module No	**: 08**
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Notes:

Types of iron:

The general types of electric irons are:

- the non-automatic electric iron
- the automatic electric iron

Non-Automatic Iron:

1) It does not contain thermostat switch. Thus temperature is not regulated.

2) User has to switch ON or OFF the supply to iron according to the heat requirement.

3) There is no pilot lamp to point out the temperature condition whether it is within the limit or not.

4) Cost is low.

5) Overheat might burn the cloth. Thus more care is needed.

Automatic electric irons are more common as compared to non-automatic due to their safety benefits.

Automatic Iron:

(1) It has a thermostat switch to regulate the heat to a predetermined value. When the predetermined value of the temperature is reached, the thermostat switch automatically disconnects the electricity supply and reconnects the same when iron starts cooling down.

2) It has pilot lamp to indicate. It will glow if the temperature is under predetermined value, otherwise not glow.

3) Cost is high.

4) As the temperature is controlled automatically through thermostatic switch, the risk of burning the cloth is minimized.

Components of an electric iron

1. Handle

- The handle of an electric iron is made with plastic.

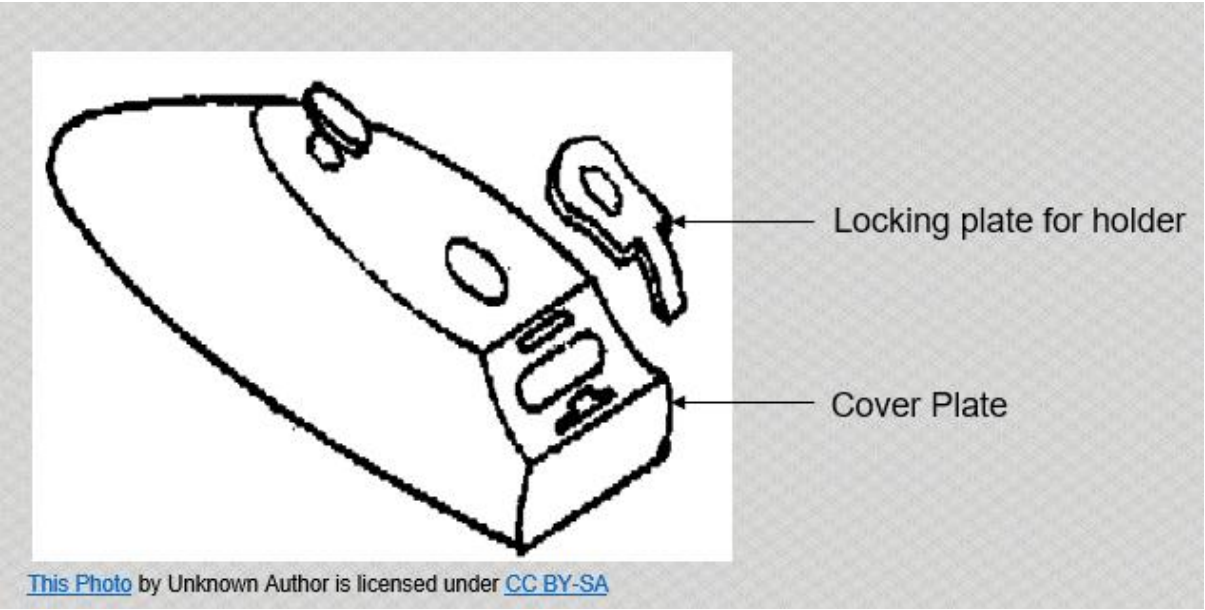
- The reason is that these materials are insulators, current doesn't pass through them, so person who touch the handle while ironing would be saved to get shocked. It's attached to the cover plate with the aid of screws.

2. Sole plate

- Soleplate, also called the hot plate, is the thick and flat triangular shaped surface made of aluminum that forms the base over which the electric iron is built up.
- The iron converts electricity into heat at the sole-plate, where it can be utilized to iron clothes.

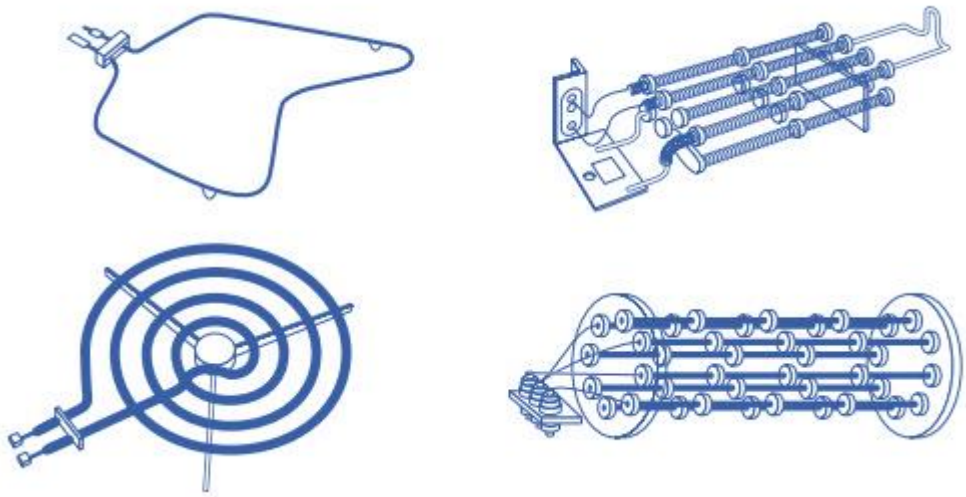
3. Cover Plate

- The cover plate is made of thin sheet of iron.
- It is placed on top of the base plate and it covers all the internal parts of the iron. The handle and connector are only attached to the cover plate.

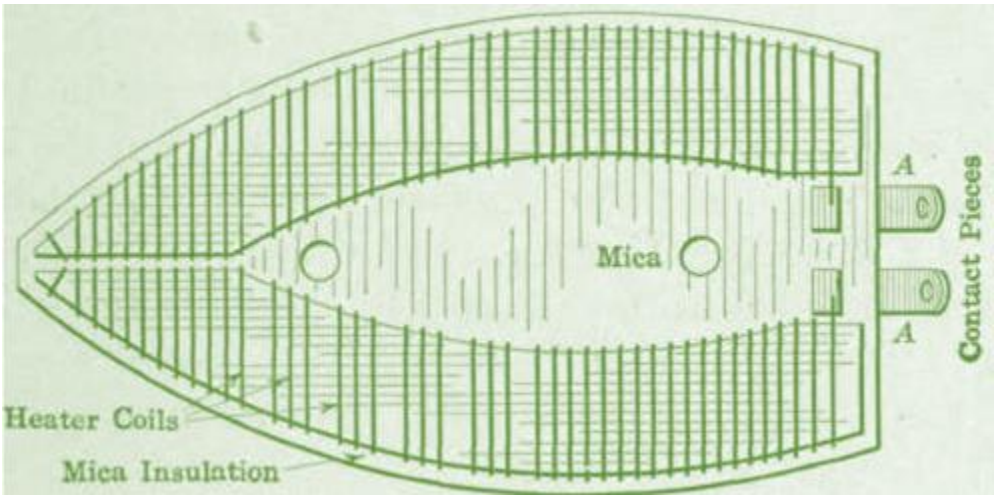


4. Heating Element

- Most heating elements are made with a nickel-chromium wire, having both tensile strength and reasonable resistance to current flow.
- The resistance and voltage can be measured with a multimeter to verify if the element is functioning properly. Heating elements are available in many sizes and shapes.



- In an electric iron, the heating element is present between the sole plate and pressure plate.
- It is pressed hard between the two plates. The heating element consists of nichrome wire wound around a sheet of mica.
- The two ends of the nichrome wire are connected to the contact strips.
- The contact strips are connected to the terminals of the iron. There are two reasons for which mica is chosen in the heating material. Mica is a very good insulating material. Besides that mica can also withstand very high temperatures.

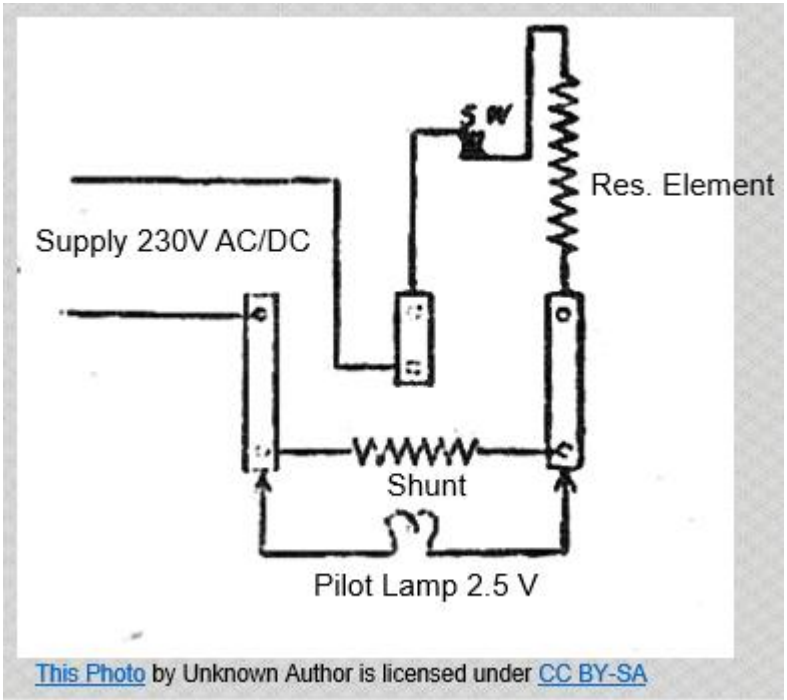


5. Pressure Plate

- This plate is generally called the top plate as it follows the shape of sole plate.
- The pressure plate has some holes through which the studs form the base plate passes through. We should tighten the nuts on the studs in such a way that the pressure plate and sole plate are pressed tight against each other.

6. Pilot Lamp

- The pilot lamp is housed on the cover plate of the electric iron. One end of the pilot lamp is connected to supply, while the other end is connected to the heating element.
- A shunt resistance is provided across the pilot lamp which assists in providing a voltage drop. The shunt is designed to provide a voltage drop of 2-5 volts.



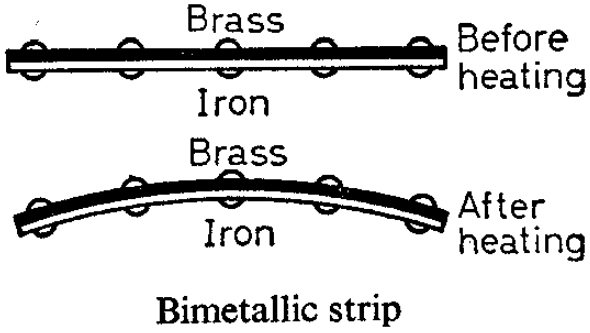
7. Thermostat-Why is it needed??

- The main function of thermostat in an electric iron is to make sure that the iron doesn't get too hot if it is left unattended to for a period of time.
- When electric current is passed through a coil in an electric iron, the coil becomes very hot. Through conduction the heat is transferred to the flat base plate of the electric iron which is used to iron our clothes.
- However, the heating element continues to get hotter, so there is continuous drawing of electricity from the power supply. This results into a lot of energy wastage, clothes ruin and in the worst scenario, cause nasty accident.
- At this point, thermostat comes in because it is important that the iron doesn't heat up to temperature that is hazardous

Working of a Thermostat

Bimetallic Strip

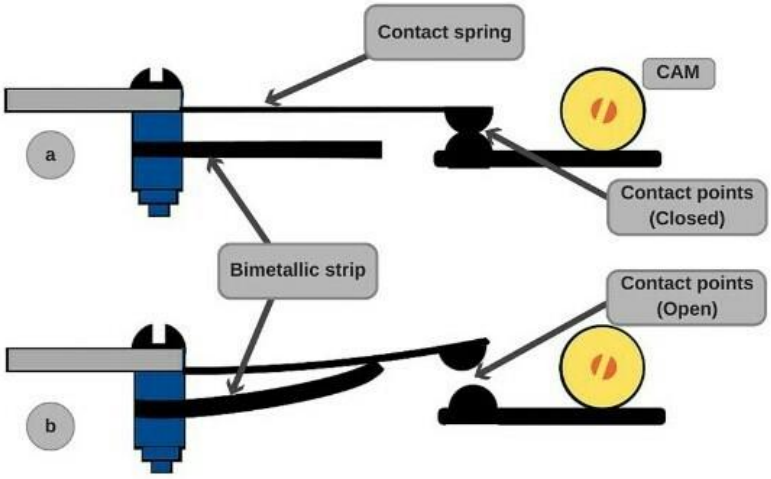
- The thermostat in iron makes use of bimetallic strip.
- This bimetallic strip is made up of two different types of metals (Brass and iron) with different coefficient of expansion bonded together. Therefore, in the presence of heat, the bimetallic strip expands differently. The metallic strip is connected to a contact spring through small pins.



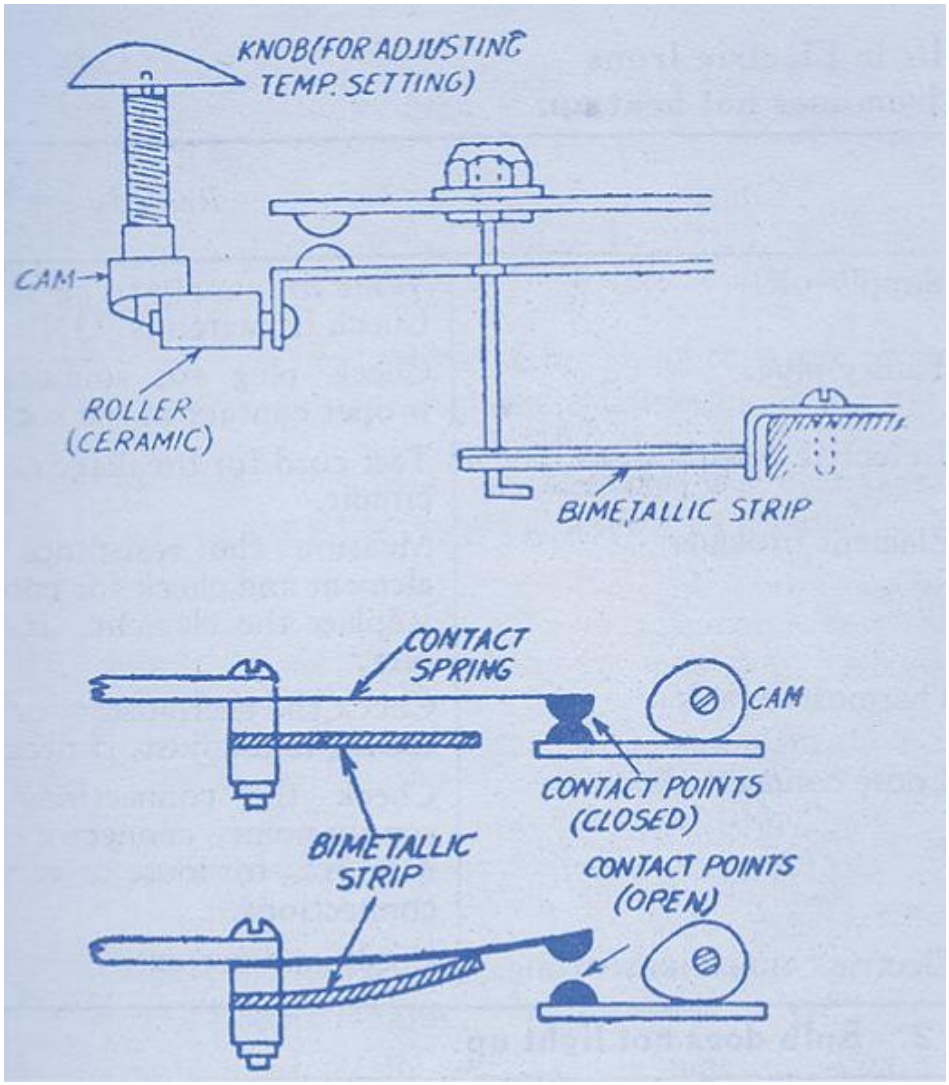
Bimetallic strip

Thermostat

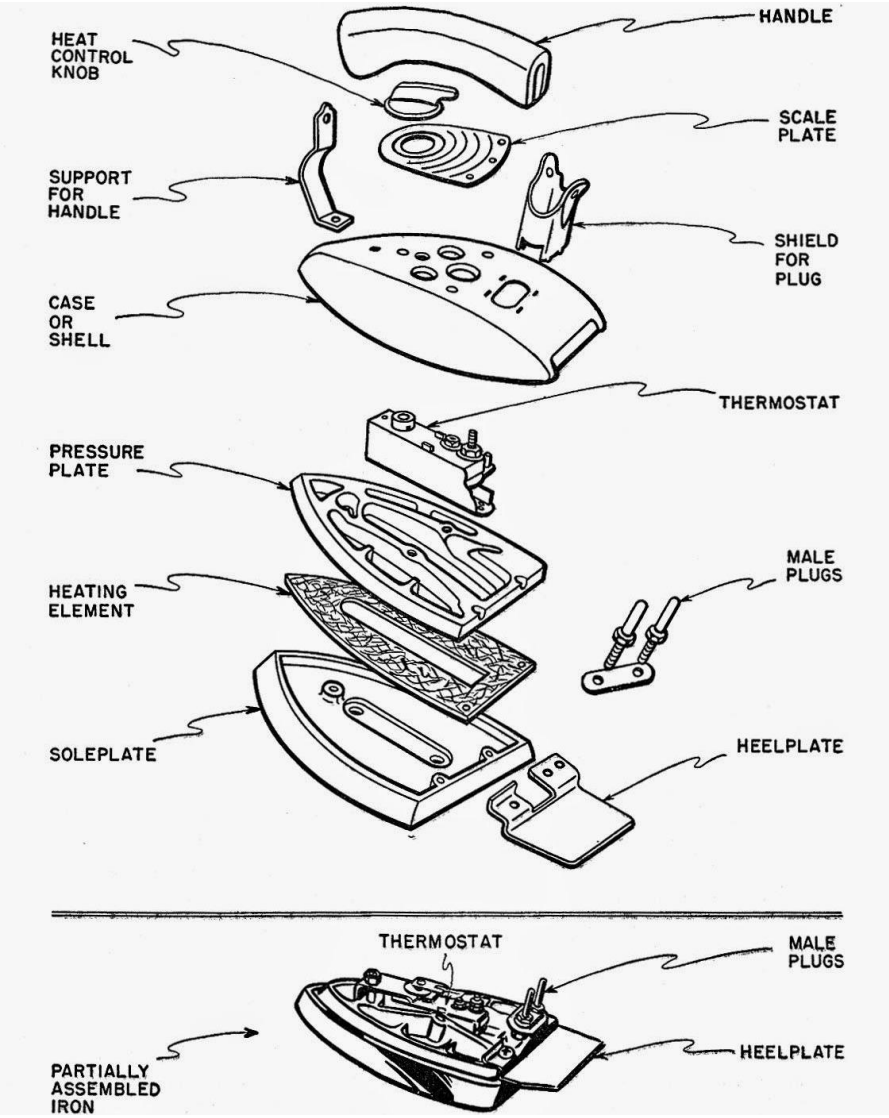
- The bimetallic strip remains in physical contact with the contact point at moderate temperature.
- However, at a temperature of the iron above a certain limit, the strip tends to bend towards the metal with lower coefficient of expansion.
- At this point, the strip stops to be physically connected to the contact point and current stops flowing because of opening of the circuit.



- As far as the circuit remains open, the temperature of the iron continues to reduce, then the strip goes back to its original position and current begins to flow again.
- This cycle continues until the power supply is being switched off from the main electricity source.
- This is the main reason why your iron tends to power on and off on its own when connected to electric source.



Components/Installation of electric iron



Operation and Working

- When a current is passed through the heating element which is placed between the sole plate and pressure plate, the element gets heated up and transfers its heat to the sole plate through conduction and in-turn the sole plate also gets heated up.
- Now to remove the wrinkles in clothing, we should apply heat and pressure. Heat is formed due to the coil and when we press the clothes with iron, the wrinkles are removed.
- For maintaining the optimum temperature, a thermostat is used along with pilot lamp which serves as an indicator

Repair of electrical iron

- **Electric Iron doesn't heat**: Make sure power is ON to the outlet, check the electrical cord using the multi-meter or series test lamp to check for open circuit and short circuit faults.
- The fault can also arise if the heating element is open circuited, tested with the help of multi-meter after dismantling the iron.

- If everything above is proper, adjust the calibration of the thermostat.
- If no, check for continuity of the thermostat in normal position and when exposed to heat, if not responding appropriately and replace it.
- **Iron sticks to fabric:** Clean or repair the sole plate.