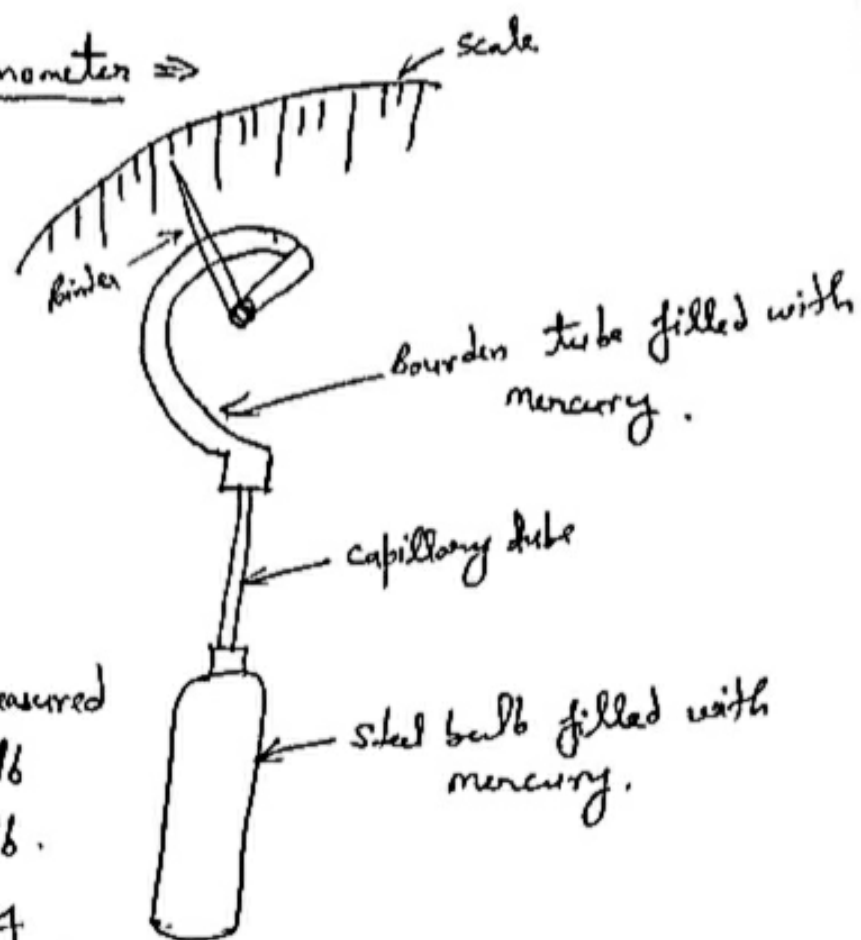


Liquid in metal thermometer ⇒



① Bourden tube

② capillary tube

③ Glass replaced by metal.

When the temperature to be measured rises, the mercury in the bulb expands more than the bulb. So that some ~~more~~ mercury will be driven into the Bourden tube.

As the temperature continues to rise, increasing amounts of mercury will be driven into Bourden tube. While the motion of Bourden tube deflects the pointer which calibrated temperature scale.

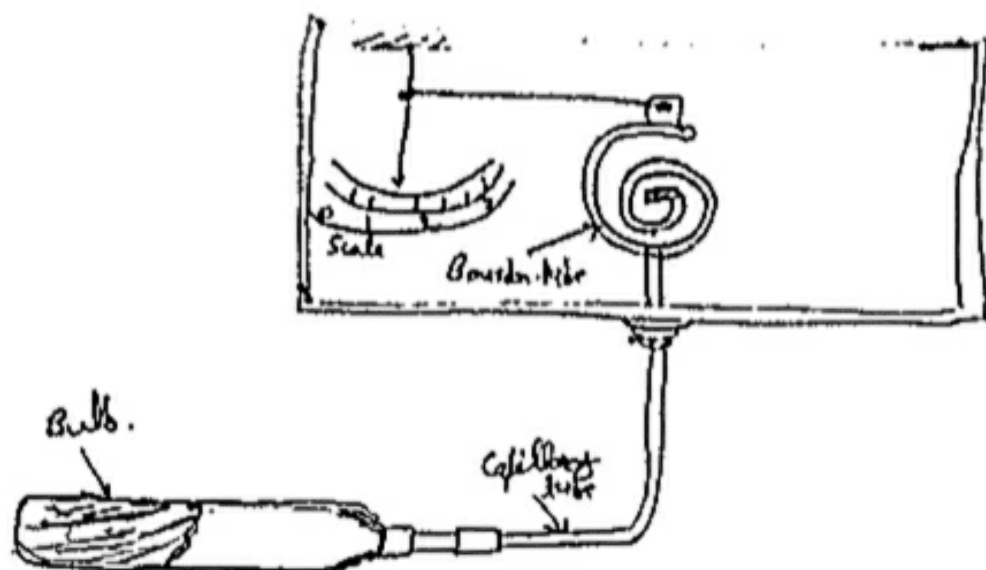
Gas thermometer ⇒ It depends on Ideal gas law which states that

the volume of gas increases with temperature, if the pressure is constant and the pressure increases with temperature, if the volume is constant.

⇒ Nitrogen used widely

It may work same as thermometer.

Filled system thermometer \Rightarrow



- ① Gas filled ② liquid filled ③ Mercury ④ Vapour pressure

It may also work as a thermometer.

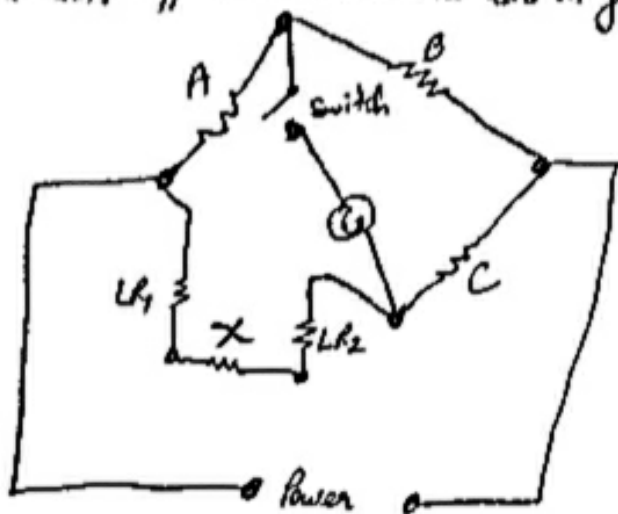
Sources of errors in filled system thermometer \Rightarrow

- ① Ambient temperature effect.
- ② Head or elevation effect \Rightarrow thermometer placed at different height
- ③ Barometric effect. \Rightarrow Effect due to change in atmospheric pressure.
- ④ Immersion effect.
- ⑤ Radiation effect.

Electrical Temperature Instruments →

- ① Resistance thermometer
- ② Thermocouple
- ③ Thermistor

Resistance thermometer → The resistance of certain metals change with temperature change. With the increase of temperature, the electrical resistance of certain metals increases in direct proportion to the rise temperature. Platinum, Copper and nickel are used in generally resistance thermometer.



Balance condition.

$$\frac{A}{B} = \frac{X + LR_1 + LR_2}{C}$$

In this type of thermometer, a temperature sensitive resistance element is fabricated in a suitable form to insert in the medium whose temperature is to be measured, and is connected by leads to wheat stone bridge.

The bridge consist of sensing element X having high temperature coefficient and resistance A, B, C whose ohmic values do not alter with the change of temperature. LR_1 and LR_2 are the lead wires resistance.

Now when resistance X changes, the wheatstone bridge becomes unbalanced and the galvanometer will give deflection which can be calibrated to give suitable temperature scale.