16.14 GATING SYSTEM

Gating system means all the passages through which the molten metal enters the mould cavity *i.e.* it includes the pouring basin, runner, gate and riser etc. The manner in which the molten metal enters the mould has a great impact on the quality of the casting produced. So the gating system should be carefully designed and produced.

16.14.1 Requirements of a Gating System

An ideal gating system is expected to meet the following requirements :

1. The velocity of molten metal entering into the mould cavity should be as low as possible, so that there is no erosion of mould.
2. Gating system should ensures the complete filling of the mould cavity.
3. Gating system should prevent the motten metal from absorbing air or other gases while flowing through it.
4. Gating system should prevent the formation of oxides.
5. Gating system should prevent the entry of oxides, slag, dross etc.
6. Gating system should assist in directional solidification of the casting.
7. Gating system design should be practicable and economical.

16.14.2 Elements of a Gating System

The various elements connected with a gating system are :

1. Pouring basin or pouring cup
2. Sprue
3. Sprue base well
4. Runner
5. Runner extension
6. Ingate
7. Riser

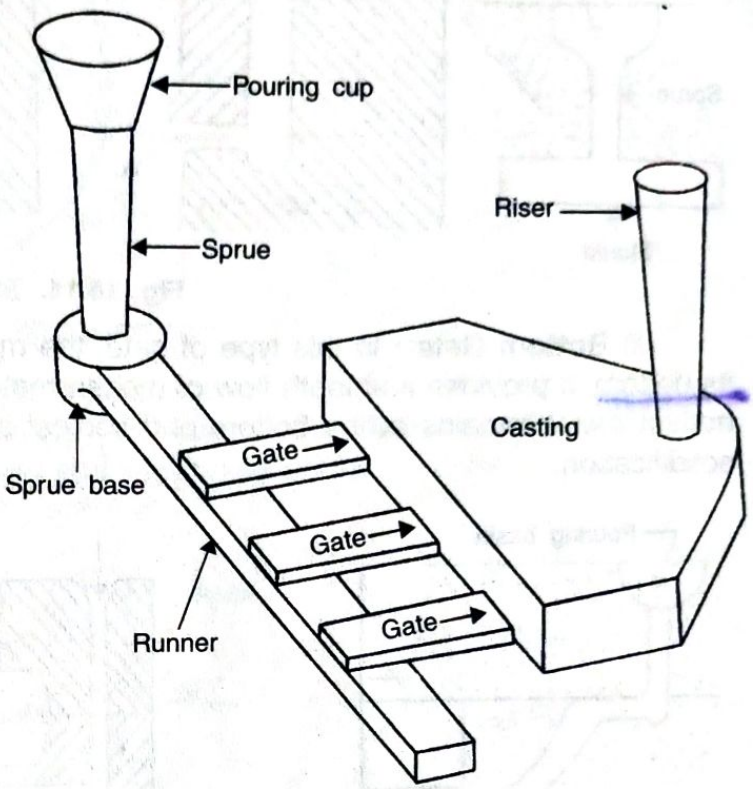

Fig. 16.13. *Gating System.*

Pouring Basin : Molten metal is poured into a pouring basin which acts as a reservoir from which it moves smoothly into the sprue. The pouring basin is also able to stop the slag from entering the mould cavity by means of a skimmer.

Sprue : It is the channel through which the molten metal is brought into the parting plane where it enters the runners and then gates. Sprues are conical in shape because:

- The molten metal when moving from top of the cope to the parting plane gains in velocity so requires a smaller area of cross section for the same amount of metal to flow at the bottom.
- Liquid tries to attain the minimum area at the bottom so there is an air gap between the liquid jet and sprue wall so air inspiration will be there which causes problem.

Sprue Base Well : This is a reservoir for metal at the bottom of the sprue to reduce the momentum of the molten metal.

Runner : It is generally located in the horizontal plane (parting plane) which connects the sprue to its ingates.

Runner Extension : This extension is provided to trap the slag in the molten metal.

Gates : These are the openings through which the molten metal enters the mould cavity.

16.15 TYPES OF GATES

(*i*) **Top Gate :** In this type of gating, molten metal enters the mould cavity from the top. More mould erosion is there because metal falls from a height.

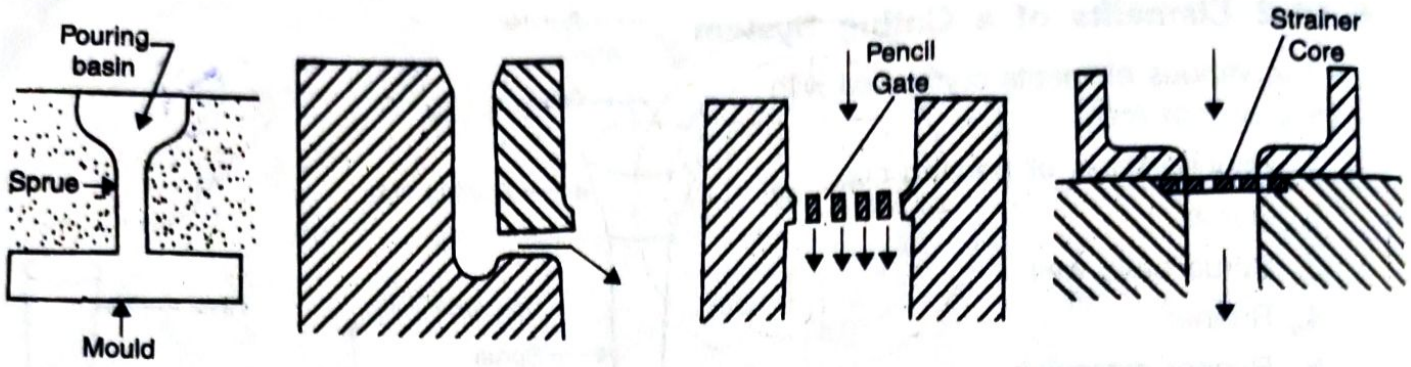

Fig. 16.14. *Top Gates.*

(*ii*) **Bottom Gate :** In this type of gate, the molten metal enters the mould cavity at or near its bottom. It provides a smooth flow of molten metal so there is less erosion of mould, but in this hottest metal remains at the bottom and coolest at the top which causes problem in directional solidification.

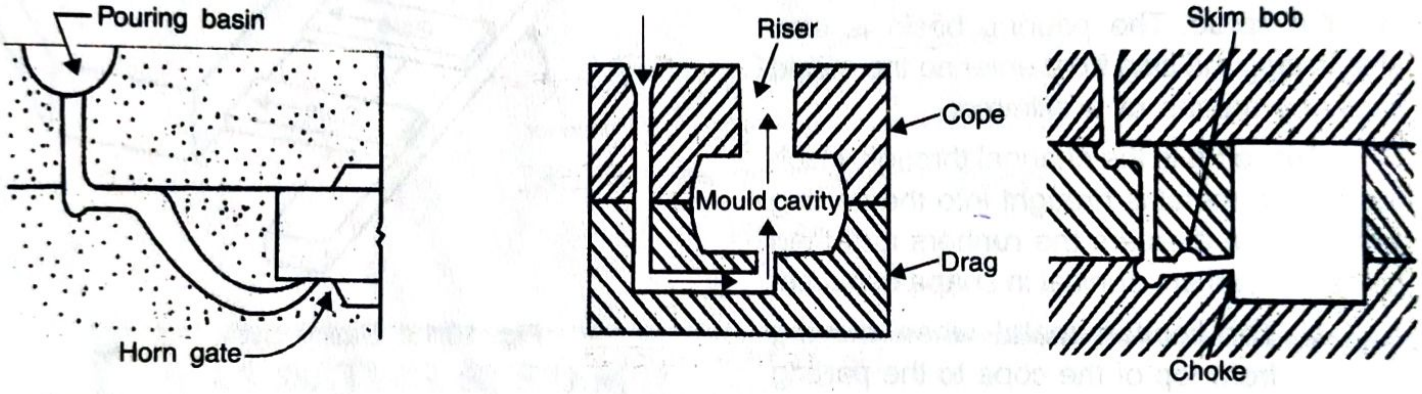

Fig. 16.15. *Bottom Gates.*

(*iii*) **Parting Gate :** In this type of gate, molten metal enters the mould cavity at the parting plane. So it is the compromise between top and bottom gate and mostly used.

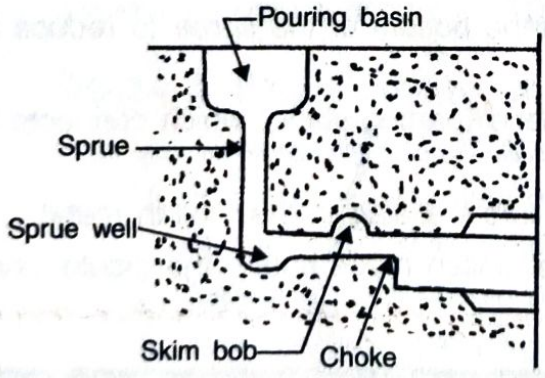

Fig. 16.16. *Parting Gate.*

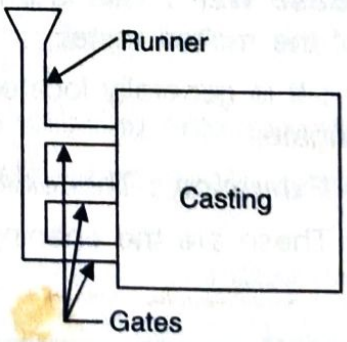

Fig. 16.17. *Step Gate.*

(*iv*) **Step Gate :** If the molten metal enters the mould cavity through a number of ingates which are arranged in vertical steps, is called step gate. This ensures a gradual filling of the mould without any mould erosion and produces a sound casting.

(*v*) **Ring Gate:** If a number of small gates conduct the metal from a circular runner to a mould in the centre, that type of gate is called ring gate as shown in Figure 16.18.

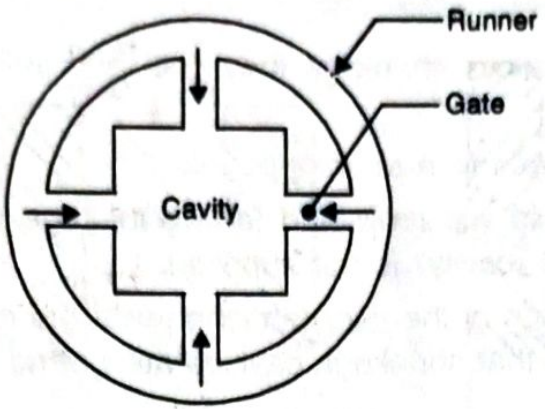

Fig. 16.18. *Ring Gate.*

(*vi*) **Whirl Gate:** Whirl gate introduces the centrifugal force in the molten metal while pouring which causes the dirt and slag to move away through the riser when metal enters the mould. It thus prevents dirt and slag from entering the gate and the mould cavity.

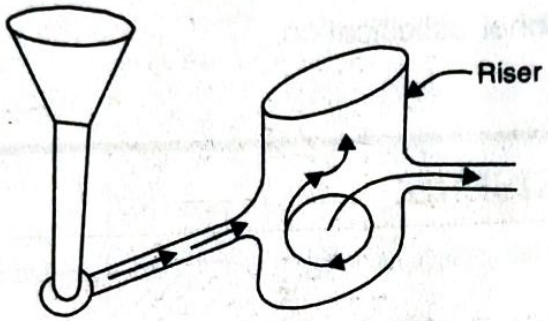

Fig. 16.19. *Whirl Gate.*

(*vii*) **Swirl Gate:** This gate is used with a feeder and runner. This is designed to swirl the metal in the feeder to remove the impurities.

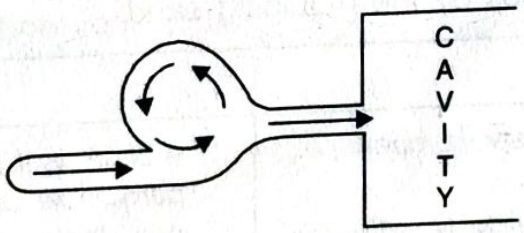

Fig. 16.20. *Swirl Gate.*