

# Foundry tools and equipments

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MANUFACTURING PROCESSES-II  
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# INTRODUCTION

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- There are large number of tools and equipments used in foundry shop for carrying out
- different operations such as sand preparation, molding, melting, pouring and casting. They
- can be broadly classified as hand tools, sand conditioning tool, flasks, power operated equipments,
- metal melting equipments and fettling and finishing equipments. Different kinds of hand tools
- are used by molder in mold making operations. Sand conditioning tools are basically used for
- preparing the various types of molding sands and core sand. Flasks are commonly used for
- preparing sand moulds and keeping molten metal and also for handling the same from place
- to place. Power operated equipments are used for mechanizing processes in foundries. They
- include various types of molding machines, power riddles, sand mixers and conveyors, grinders
- etc. Metal melting equipment includes various types of melting furnaces such as cupola, pit
- furnace, crucible furnaces etc. Fettling and finishing equipments are also used in foundry
- work for cleaning and finishing the casting. General tools and equipment used in foundry are
- discussed as under.



# HAND TOOLS USED IN FOUNDRY SHOP

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1. Hand riddle
2. Shovel
3. Rammers
  1. Hand rammer
  2. Peen rammer
  3. Floor rammer
  4. Pneumatic rammers

# CONT...

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4. Sprue pin
5. Strike off bar
6. Mallet
7. Draw spike
8. Vent rod
9. Lifters
10. Trowels
11. Slicks
12. Smoothers
13. Swab
14. Spirit level



## CONT...

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15. Gate cutter
16. Gagers
17. Bellows
18. Clamps, cotters and wedges

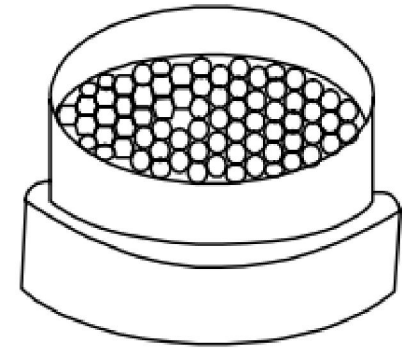
OK. LETS UNDERSTEND THESE ALL IN SHORT....

# HAND RIDDLE

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## Hand riddle

Hand riddle is shown in Fig. 11.1(a). It consists of a screen of standard circular wire mesh equipped with circular wooden frame. It is generally used for cleaning the sand for removing foreign material such as nails, shot metal, splinters of wood etc. from it. Even power operated riddles are available for riddling large volume of sand.



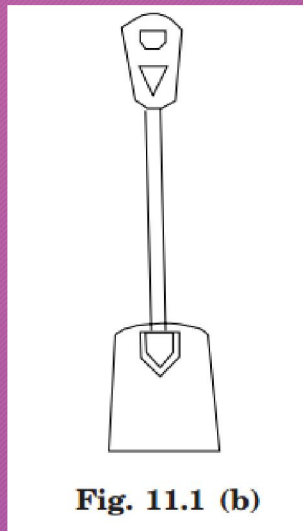
**Fig. 11.1 (a)**



# SHOVEL

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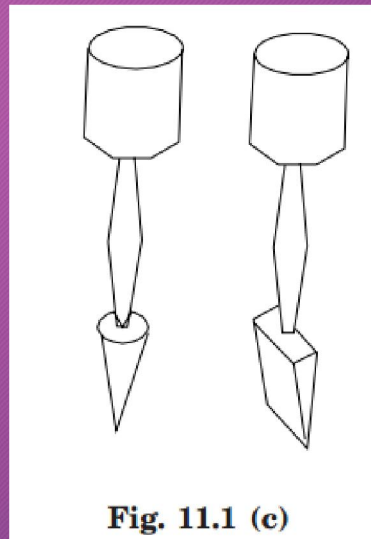
Shovel is shown in Fig. 11.1(b). It consists of an steel pan fitted with a long wooden handle. It is used in mixing, tempering and conditioning the foundry sand by hand. It is also used for moving and transforming the molding sand to the container and molding box or flask. It should always be kept clean.



# RAMMERS

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Rammers are shown in Fig. 11.1(c). These are required for striking the molding sand mass in the molding box to pack or compact it uniformly all around the pattern. The common forms of rammers used in ramming are hand rammer, peen rammer, floor rammer and pneumatic rammer which are briefly described as



**Fig. 11.1 (c)**



# TYPES OF RAMMER

## **(i) Hand rammer**

It is generally made of wood or metal. It is small and one end of which carries a wedge type construction, called peen and the other end possesses a solid cylindrical shape known as butt. It is used for ramming the sand in bench molding work.

## **(ii) Peen rammer**

It has a wedge-shaped construction formed at the bottom of a metallic rod. It is generally used in packing the molding sand in pockets and comers.

## **(iii) Floor rammer**

It consists of a long steel bar carrying a peen at one end and a flat portion on the other. It is a heavier and larger in comparison to hand rammer. Its specific use is in floor molding for ramming the sand for larger molds. Due to its large length, the molder can operate it in standing position.

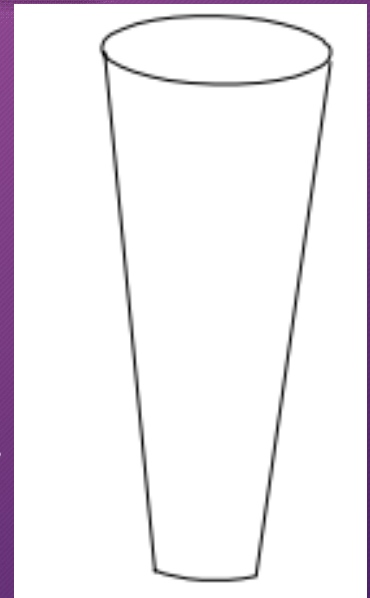
## **(iv) Pneumatic rammers**

They save considerable time and labor and are used for making large molds.

# SPRUE PIN

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- Sprue pin:
- Sprue pin is shown in Fig. It is a tapered rod of wood or iron which is placed or pushed in cope to join mold cavity while the molding sand in the cope is being rammed. Later its withdrawal from cope produce a vertical hole in molding sand, called sprue through which the molten metal is poured into the mould using gating system.
- It helps to make a passage for pouring molten metal in mold through gating system

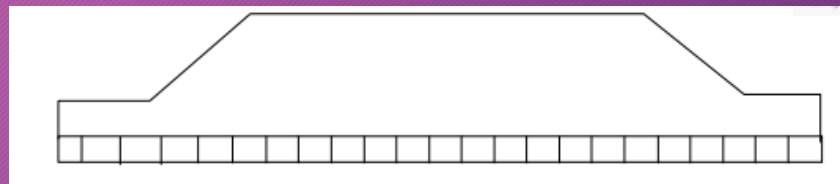




# STRIKE OFF BAR

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- Strike off bar:
- Strike off bar is a flat bar having straight edge and is made of wood or iron.
- It is used to strike off or remove the excess sand from the top of a molding box after
- completion of ramming thereby making its surface plane and smooth. Its one edge is made
- beveled and the other end is kept perfectly smooth and plane.



# MALLET

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- Mallet:
- Mallet is similar to a wooden hammer and is generally as used in carpentry or sheet
- metal shops. In molding shop, it is used for driving the draw spike into the pattern and then
- rapping it for separation from the mould surfaces so that pattern can be easily withdrawn
- leaving the mold cavity without damaging the mold surfaces.



# DRAW SPIKE

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Draw spike:

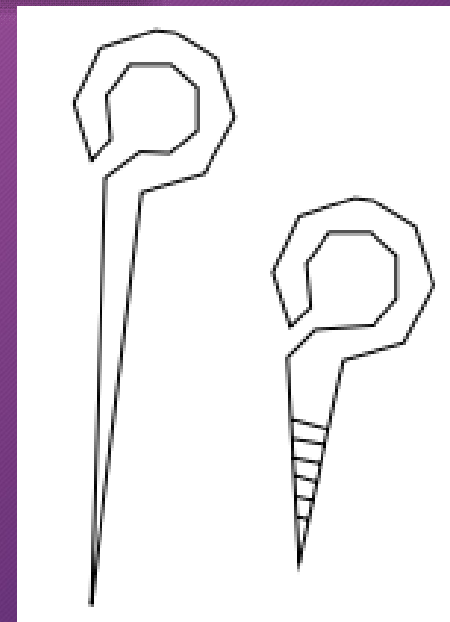
Draw spike is shown. It is a tapered steel rod having a loop or ring at its one

end and a sharp point at the other. It may have screw threads on the end to engage metal

pattern for its withdrawal from the mold. It is used for driven into pattern which is embedded

in the molding sand and raps the pattern to get separated from the pattern and finally draws

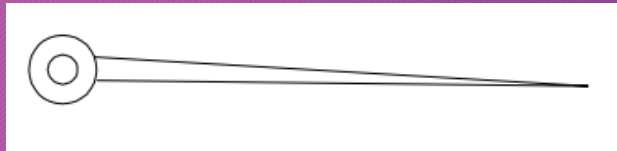
out it from the mold cavity.



# VENT ROD

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- Vent rod is shown in. It is a thin spiked steel rod or wire carrying a pointed
- edge at one end and a wooden handle or a bent loop at the other. After ramming and striking
- off the excess sand it is utilized to pierce series of small holes in the molding sand in the cope
- portion. The series of pierced small holes are called vents holes which allow the exit or escape
- of steam and gases during pouring mold and solidifying of the molten metal for getting a
- sound casting.





# LIFTERS

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- Lifters are shown in FIG. They are also known as cleaners or finishing
- tool which are made of thin sections of steel of various length and width with one end bent
- at right angle. They are used for cleaning, repairing and finishing the bottom and sides of
- deep and narrow openings in mold cavity after withdrawal of pattern. They are also used for
- removing loose sand from mold cavity.

# LIFTERS FIGURE

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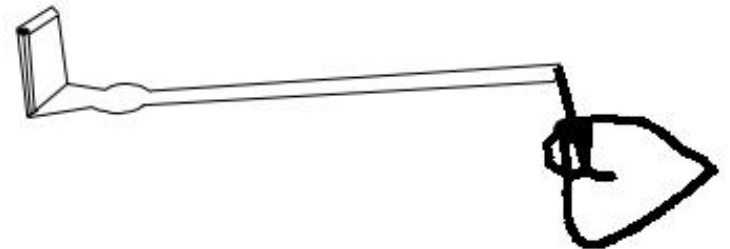
**Fig. 11.1 (h)**



**Fig. 11.1 (i)**



**Fig. 11.1 (j)**



**Fig. 11.1 (k)**



# TROWELS

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- Trowels are shown in Fig. 11.1(l, m and n). They are utilized for finishing flat surfaces and
- joints and partings lines of the mold. They consist of metal blade made of iron and are equipped
- with a wooden handle. The common metal blade shapes of trowels may be pointed or contoured
- or rectangular oriented. The trowels are basically employed for smoothing or slicking the
- surfaces of molds. They may also be used to cut in-gates and repair the mold surfaces.



**Fig. 11.1 (l)**



**Fig. 11.1 (m)**



**Fig. 11.1 (n)**



# SLICKS

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- Slicks are shown in Fig. 11.1(o, p, q, and r). They are also recognized as small double ended mold finishing tool which are generally used for repairing and finishing the mold surfaces and their edges after withdrawal of the pattern. The commonly used slicks are of the
- types of heart and leaf, square and heart, spoon and bead and heart and spoon. The
- nomenclatures of the slicks are largely due to their shapes.

# SLICK FIGURE

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**Fig. 11.1 (o)**



**Fig. 11.1 (p)**



**Fig. 11.1 (q)**



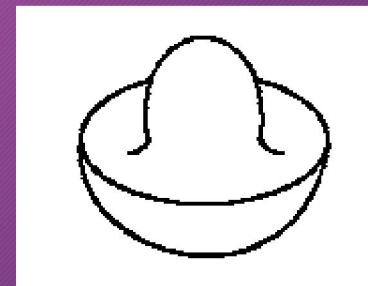
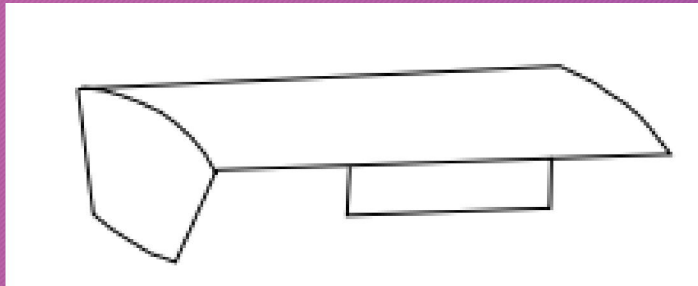
**Fig. 11.1 (r)**



# SMOTHERS

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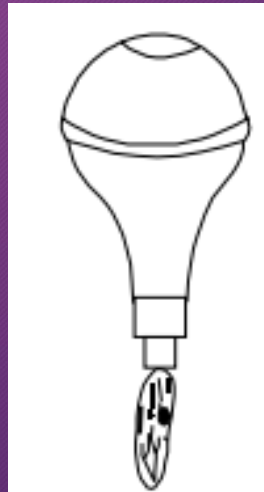
- Smothers are shown in FIG. According to their use and shape they are
- given different names. They are also known as finishing tools which are commonly used for
- repairing and finishing flat and round surfaces, round or square corners and edges of molds.



# SWAB

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- Swab is shown in Fig. It is a small hemp fiber brush used for
- moistening the edges of sand mould, which are in contact with the pattern
- surface before withdrawing the pattern. It is used for sweeping away the
- molding sand from the mold surface and pattern. It is also used for coating
- the liquid blacking on the mold faces in dry sand molds.





# SPIRIT LEVEL

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- Spirit level is used by molder to check whether the sand bed or molding box is horizontal or not.

# GATE CUTTER

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- Gate cutter
- Gate cutter is a small shaped piece of sheet metal commonly used to cut
- runners and feeding gates for connecting sprue hole with the mold cavity.





# GAGGERS

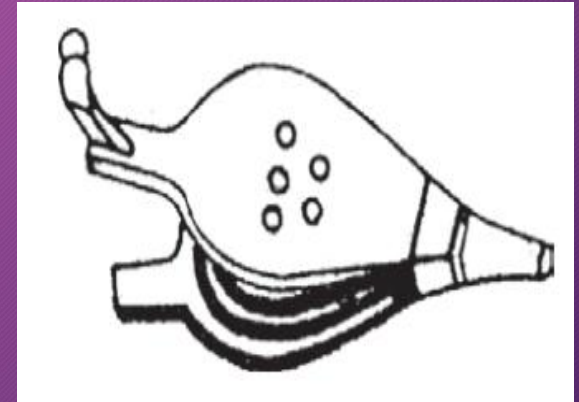
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- Gaggers are pieces of wires or rods bent at one or both ends which are used for reinforcing
- the downward projecting sand mass in the cope are known as gaggers.

# BELLOWS

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- Bellows gun is shown in Fig. It is hand operated leather made device equipped
- with compressed air jet to blow or pump air when operated. It is used to blow away the loose
- or unwanted sand from the surfaces of mold cavities.





# Clamps, cotters and wedges

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- They are made of steel and are used for clamping the molding boxes firmly together during pouring.

# KINDS OF MOULDING SAND

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- Green sand
- Dry sand
- Loam sand
- Facing sand
- Backing sand
- System sand
- Parting sand
- Core sand



# GREEN SAND

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- Green sand is also known as tempered or natural sand
- just prepared mixture of silica sand with 18 to 30 percent clay, having moisture content from 6 to 8%. The clay and water furnish the bond for green sand.
- is fine, soft, light, and porous. Green sand is damp, when squeezed in the hand and it retains the shape and the impression to give to it under pressure.
- Molds prepared by this sand are not requiring backing and hence are known as green sand molds.

# DRY SAND

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- Green sand that has been dried or baked in suitable oven after the making mold and cores, is called dry sand.
- It possesses more strength, rigidity and thermal stability.
- It is mainly suitable for larger castings.
- Mold prepared in this sand are known as dry sand molds.



# LOAM SAND

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- Loam is mixture of sand and clay with water to a thin plastic paste.
- Loam sand possesses high clay as much as 30-50% and 18% water.
- Patterns are not used for loam molding and shape is given to mold by sweeps.
- This is particularly employed for loam molding used for large grey
- iron castings.

# FACING SAND

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- Facing sand is just prepared and forms the face of the mould.
- Initial coating around the pattern and hence for mold surface is given by this sand.
- This sand is subjected severest conditions and must possess, therefore, high strength refractoriness.
- A facing sand mixture for green sand of cast iron may consist of 25% fresh and specially prepared and 5% sea coal.



## BACKING SAND

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- Backing sand or floor sand is used to back up the facing sand and is used to fill the whole volume of the molding flask.
- The backing sand is sometimes called black sand because that old, repeatedly used molding sand is black in color due to addition of coal dust and burning on coming in contact with the molten metal.

# SYSTEM SAND

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- A so-called system sand is used to fill the whole molding flask. In mechanical sand preparation and handling units, no facing sand is used.
- the properties such as strength, permeability and refractoriness of the molding sand must be higher than those of backing sand.



# PARTING SAND

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- Parting sand without binder and moisture is used to keep the green sand not to stick to the pattern and also to allow the sand on the parting surface the cope and drag to separate without clinging.
- This is clean clay-free silica sand which serves the same purpose as parting dust.

# CORE SAND

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- Core sand is used for making cores and it is sometimes also known as oil sand.
- This is highly
- rich silica sand mixed with oil binders such as core oil which composed of linseed oil