

MINE MACHINERY – 2

Bore hole pump :

A pump which is used in a borehole of a couple of cm diameter is called as borehole pump. It is nothing but a multi stage turbine pump having with non over loading characteristics.

Applicability condition :

1. In deep wells with the 200mt. borehole pump is suitable.
2. It is suitable for driving and shaft.
3. In washers borehole pump is used.
4. Borehole pump is used, where several logs of HP is required.
5. In shortage of electrical energy borehole pump is a suitable option.

Construction :

Essentially it consist of 2 parts, one at the surface and the other inside the borehole.

1. The motor is placed in the surface & driving the pump through along driving shaft and lower the pump unit is placed.
2. In the top part the motor is spindle connected through a thrust bearing to the shaft.
3. This also contains first discharge bend of rising men where the driving shaft inters the rising man.

The lower part along with suction pipe with strainer is suspended from the rising men the rising column.

- The rising column is supported by intermediate guide bearing.
- Impellers diffusers of pump are usually bronze.
- In this pump a strainer is attached at the end and there is no foot valve.

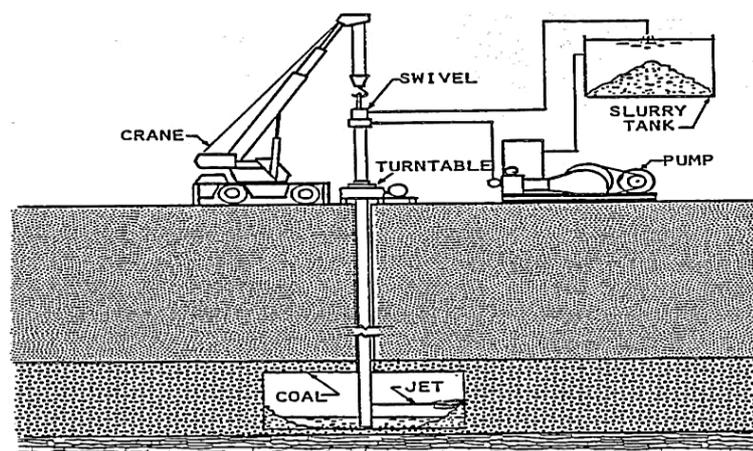


FIGURE 3. BOREHOLE MINING

Pipes and Valves :

State types of pipe used in Mines.

There are three types of pipe used in mines for conveyance of water such as :

1.**Mild steel pipe** : These pipes are made up of mild steel. Generally these type of pipes are largely preferred. It has much higher tensile strength & can therefore can be much thinner & lighter in weight for a given strength. Therefore it is much convenient to handle both in shaft and underground.

It is also a much ductile material and less liable to fracture from shock load & it can be bent when necessary flange or small pipe length can be welded on it but it offers less resistance to corrosion.

2.**Cast iron pipe** : These pipes are made up of cast iron. It has a lower tensile strength so it is thicker & heavier in weight for a given strength. Cast iron offers greater resistance to corrosion and also offers difficulties in welding.

3. **Alkathene pipe** : In recent year these pipes are used in increasing side mainly due to their lightness flow co-efficient of friction.

State types of valve used in Mines.

In the reciprocating pumps generally two types of valves are used such.

(a)Indian rubber disc valve.

(b)Single beat valve.

In turbine pump a no. of external controlling valves & locks are used for convenient operation such valves are such as:

1. Foot valves in suction pipe.
2. Retaining valve in delivery pipe.
3. Main valve in delivery pipe.
4. By pass valve for primary purpose.
5. Air cocks to release the air when priming the pump.
6. Water steel regulating valve.

Describe constructional features of various type of valves.

Foot valve : It is a non return valve above the strainer. The valve consists of a cast iron body inside which a hinged valves of gun metal is placed over a gun metal set ring. The galvanized mild steel strainer has a no. of holes the total area of holes being 3 to 4 times the cross sectional area of the suction pipe. The purpose of the foot valve is to prevent water flowing back into the sump & to ensure the pump & suction pipe solidly primed before starting.

The main valve : The main valve also known as sluice valve, gate valve or delivery valve, it used to regulates the delivery water & also the load of the motor. The valve consists of cast iron body with inlet & outlet branches & having a wedge shaped gate valve tightened against a gun suct ring. The valves is operated by a hand wheel with a screwed a spindle for opening or closing the valve. The spindle is sealed by a gland & staffing boy at the top.

Retaining valve : A sometime called a reflex valve is a non return valve placed above the main valve in the delivery column. The valve is of bronze sealing ring at an angle. It is hinged at one end and fitted with a bronze spring at the other end. The lift of the valve is limited by a stop on the side of the body. The function of the valve is to hold the delivery column independently of the main valve of the pump should stop suddenly due to failure to electric supply & thus protecting the pump from the effect of water hammer.

By pass valve : The by pass valve is a small auxiliary valve fitted externally to the body of both the main valves the retaining valve to allow water direct from the delivery column to the pump for priming.

State & describe different types of pipe joints.

Pipe joint : Pipes are lengthened by the use of joints & coupling the different types of joints in a pipe range are.

(a)Loose-flange joint :

- 1.It is suitable for mild steel pipes subject to heavy pressure.
- 2.The loose flanges are of cast steel and are placed on the pipes during manufactures.
- 3.The pipe ends are then turned outwards to retain the flanges in position or they are strengthened by a shout welding, mild steel ring or solder.
- 4.A joint ring or corded rubber or other fibrous materials is finally placed between the pipe ends for making the joint leak proof and the whole drawn together by bolts, (i) cast steel flange, (ii) Strengthening ring, (iii) Joint ring, (iv) Loose flange.

(b) Spigot & faucet joint :

1. It is suitable for cast iron pipes subject to heavy pressure.
2. The flanges are cast solid with the pipe and are strengthened by external ribs.
3. The end of one pipe (Spigot) has a projection which fits into a recess or groove (faucet of its behavior).
4. A hollow rubber is placed between the pipes for bridging the gap between them & preventing any leakage when the whole is drawn lightly together by a roof balls depending on the pipe diameter.

(c) The uncore joint :

1. It is suitable for either water up to 300m head or compressed air up to 11 kg per sq. cm. pressure and as the advantage to all of an angular movement of the pipe rang its +6 degrees without causing leakage.
2. The joints consists of a specially shaped rubber ring or gasket and a forged steel housing made in halves & bolted together to hold to the rubber gasket in position.
3. The end of each pipe is plain but they are beveled out to receive the gasket the inner dia of which the same as that of the pipe is negligible an uninterrupted bore.
4. It is not suitable for suction pipe line where the pressure is negative.

(d) Expansion joint :

1. Expansion joints are also essential for pipe installation. So that variations in length caused by the expansion and contraction can be accommodated without causing damage to the pipeline.
2. In some cases a simple sheave like sliding telescope arrangement is employed.
3. The sleeve joint is made water tight by using packing material such as graphite and asbestos.
4. As an alternative horse shoe shaped bend in pipe line is fitted at suitably spaced distances the adjustment in length as required.

Describe support of laying main pipe in shaft.

A common method of supporting the delivery column in shaft is every third pipe has top flanges resting up on buttim across the safety and the pipe is secured by a milds strap or clamp which is bend around the & is bolted through the buttons at each side, the clamp has to secured end over which stulplate is fixed & the whole is firm tightened by the nuts. It is

advisable which possible to put in special buttons. For the cage guides so any vibration or shock and to the water hammer. After natively with large heavy pipe columns at cast iron pipe every pipe may be special stand pipe having supported bracket cast hold way in its length.

These are excel rest open short cross joints futimbe which are let into the shaft wall at one end bolted to supporting frider or buttons at the other end. In this way the pipe are supported in to the large in many cases however to stand pipe are emitted & the upper flanges evey 2nd or 3rd pipe is than arranged to the directly on the cross players where buttons not used as in shaft will rope wall. A wood block used to fit the curve of the shaft is first secured into the wall at one end have screw thread it receive the pipe & letter than held flange by a steel trap or column which is secured by nuts to the bolts.

State the procedure of supporting the pipe in shaft.

1. Laying pipe lines in shaft is very labour consuming as the work enclosed preparation delivery of pipes.
2. Installation of pipes & fittings and pipe line testing in shaft for a raising main to carry non-corrosive water mild steel pipes may be inlet.
3. It is lighter in weight therefore much more convenient to handle and easier to support in the shaft.
4. The steel pipe is cheaper but they are affected by acid water.
5. To present the section of mine water the inside of such pipes are handle but they are good for rough and are not affected by acidic water.
6. Therefore cast iron pipes are most common for installation in shaft ranges.