

EXPERIMENT NO 9

Aim:- To study constructional details of reciprocating pump and draw its characteristic curve.

Apparatus Used:- Pump, Pipe work system with all necessary control pipe or valve, Collecting tank, Pressure gauge located on suction and discharge side.

Theory:- The reciprocating pump is positive displacement pump i.e. it operates on the principles of actual displacement or pushing of liquid by a piston or plunger that executes a reciprocating motion in a closely fitted cylinder. The liquid is alternatively drawn from the pump and filled into suction side of the cylinder. The liquid fed to discharge side of the cylinder and emptied to the delivery pipe. The piston or plunger gets its reciprocating motion by means of a crank and connecting rod mechanism.

Working:- To start with when the crank angle θ is zero or the piston is towards extreme left as the crank moves from inner dead to outer dead centre i. e. from $\theta=0^\circ$ to $\theta=180^\circ$. The piston moves from extreme left to extreme right end. This movement of piston called backward stroke. So during the backward stroke volume of air in the cylinder increase, resulting fall in pressure or partial vacuum. The air in suction pipe being at atmospheric pressure rush to the cylinder. This by the end of backward stroke air in the suction pipe and the cylinder is rearranged and started otherwise partial pressure of some degree is created. During the forward stroke of the piston as the crank moves from $\theta = 180^\circ$ to $\theta = 360^\circ$. The air in cylinder is forced out through the delivery pipe. Thus after a few backward stroke and forward stroke sufficient partial vacuum is created. A stage come in backward stroke, the liquid due to the atmospheric pressure existing on the surface is sucked in and forced out during the backward stroke, the liquid sucked is forced out through the non return delivery valve it is called discharge stroke or delivery stroke.

From above we find that pump has a capacity to create partial vacuum resulting in the suction of the liquid by itself property is called self priming.

It may be observed that a single acting single cylinder pump liquid is swept and only once in one revolution of the crank where is in double acting, it is swept twice for each revolution of the crank.

Observation table:- Area of collecting tank, $a = \text{cm}^2$
 $\rho g = 9810$

Sl no	Discharge measurement			Discharge Q m ³ /s	Delivery head m	Water power w	Input power w	η %
	Initial m	h_1	Final h_2 m					

Procedure:-

1. Note down the area of collecting tank
2. Priming the pump set before starting.
3. Before starting ensure that pump is free to rotate.
4. Flow regulating valve was adjusted to give the max. Possible discharge.
5. Conditions were allowed to steady before the rate of discharge Q, discharge and load on the motor were recorded.
6. The flow rate is reduced in stages and the above procedure is repeated.

Result:-

Viva Questions:-

1. What is priming?
2. The reciprocating pump is based on which principle