Maaz
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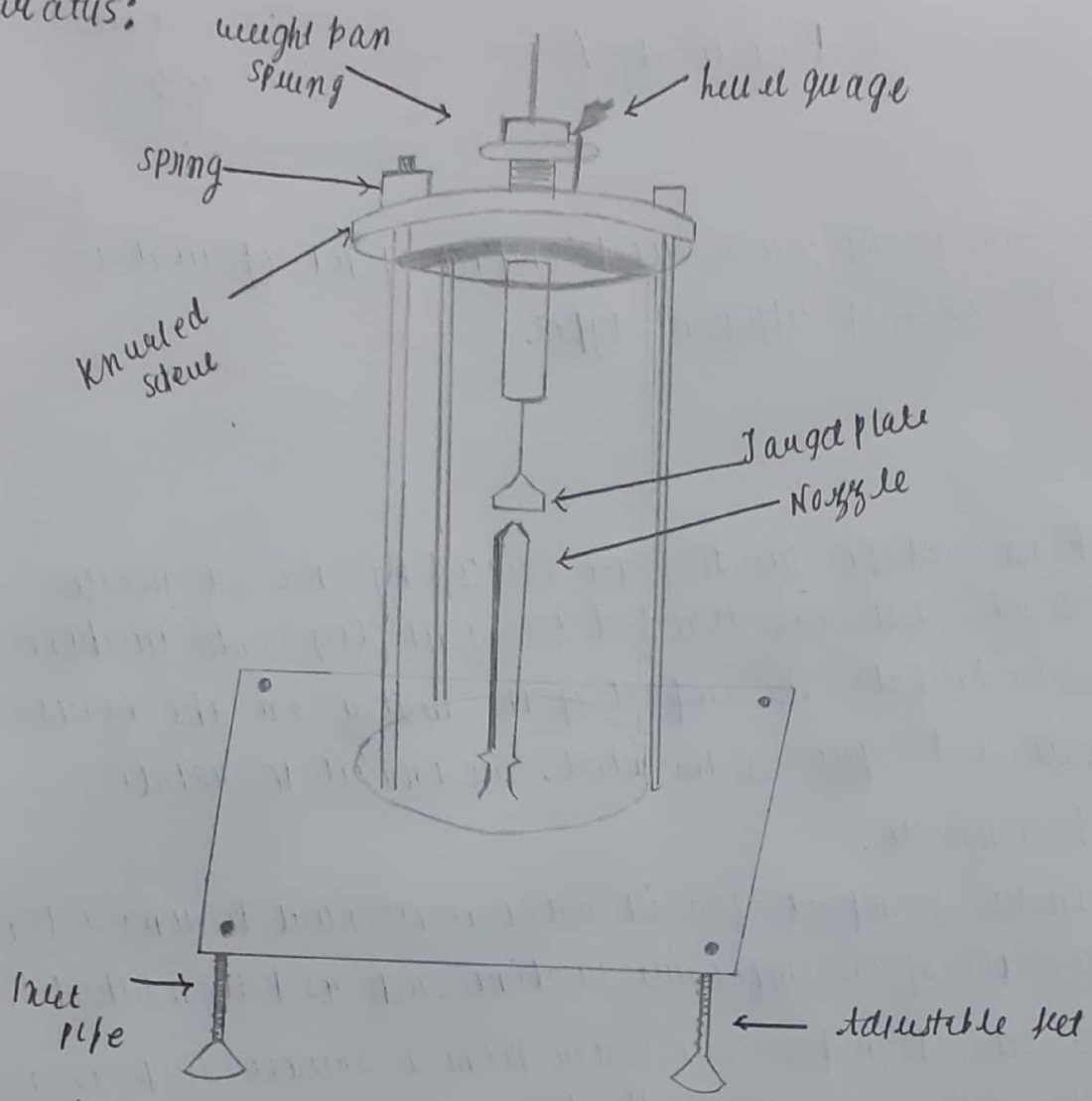
Practical - 1

Objective:- To measure force due to impact of jet of water on vanes of different types.

Theory: Turbines rotate due to force exerted by one or more water jets that are directed tangentially onto turbine vanes or buckets. The impact of the water on the vanes generate a torque on the wheel, causing it to rotate and to generate.

The study of impact of a jet water is essential to understand the principle of an impulse turbine such as Pelton wheel Turbine. When high pressure water from a source such as a dam flows through a nozzle in the form of a jet, the entire pressure energy of the water is converted into kinematic energy at the nozzle. In the form of jet, the entire pressure energy of water is converted into kinetic energy at the nozzle. When the jet of water hits a vane positioned in front of it, the vane deflects the jet and due to the change in the momentum of water jet, a force is imparted to the vane by water.

Apparatus:



Procedure:

1. Fit the required vane on the lever.
2. Measure the differential lever arms.
3. Balance the lever system by means of counter weight for no load.
4. Place a weight on hanger.
5. Open the gate valve and adjust the jet, so that the lever arm is balanced.

6. Collect water in the collecting tank.

Repeat the procedure for different loads.

Formula used:

$V = Q/A$

$F_y = \rho Q V(\cos\theta + 1)$

$W = \rho Q V(\cos\theta + 1)$

$W = \rho A V^2(\cos\theta + 1)$

F_y : Force exerted by the deflector on the fluid

ρ : fluid density

θ : $180 - \alpha$ [$\alpha \rightarrow$ flow angle]

Precaution:

1. Fix the vane in the housing exactly above the nozzle.
2. Put the weight on hanger so that steel rod remain exactly horizontal.
3. Minimum leakage from tank.
4. Shut the opening of transparent tank so that water does not get out.