Tinker the Water Wheel

Waterwheel, a mechanical device for tapping the energy of running or falling water by means of a set of paddles mounted around a wheel. The force of the moving water is exerted against the paddles, and the consequent rotation of the wheel is transmitted to machinery via the shaft of the wheel. The waterwheel was perhaps the earliest source of mechanical energy to replace that of humans and animals, and it was first exploited for such tasks as raising water, fulling cloth, and grinding grain.

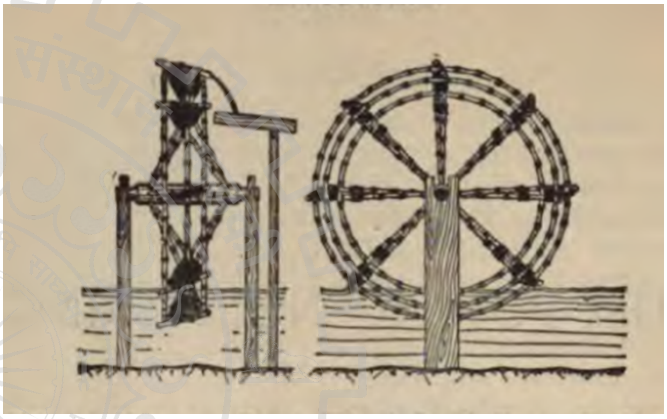
Waterwheels are usually positioned vertically over a water source. This means that the axle is positioned horizontally. This axle transfers the energy from the falling water to a drive belt or a system of gears that then operates some sort of machine. These wheels require some source of falling or flowing water, and these sources can include streams or rivers. Sometimes special ponds known as **mill ponds** were created by damming a flowing stream. This creates a special channel known as a **mill race** from the pond to the waterwheel.
Although waterwheels are not used widely today, hydroelectric dams function on the same basic principle of using the power of flowing water to move machines known as turbines.

Of the three distinct types of water mills, the simplest and probably the earliest was a vertical wheel with paddles on which the force of the stream acted. Next was the horizontal wheel used for driving a millstone through a vertical shaft attached directly to the wheel. The third was the geared mill driven by a vertical waterwheel with a horizontal shaft. This required more knowledge and engineering skill than the first two, but it had much greater potential.

The history of waterwheels has witnessed immense development ranging from the oldest **Chinese Nora or float wheel** to the turbines and hydroelectric dams being used across the globe for the generation of electricity.
Electricity generation from water power began from 1880, with a 7-kW Thomson turbine on an 8.8-m-high chute, in Cragside (Northumberland). From that date, plants developed quickly, using different types of turbines. And since 1889, all hydropower projects have been devoted to electricity generation.

1. THE CHINESE NORA OR FLOAT WHEEL

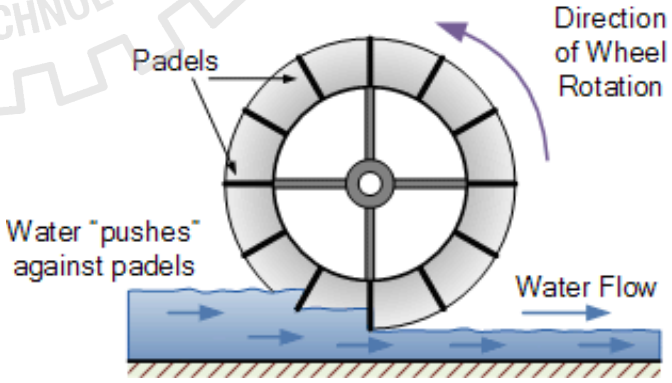
Among the most ancient water wheels, the Chinese and Roman water wheels and turbines.



The one with a horizontal axis placed vertically, rotating with the flow of water. Mainly used for raising water, fulling clothes and grinding grains.

2. THE UNDERSHOT WATER WHEEL

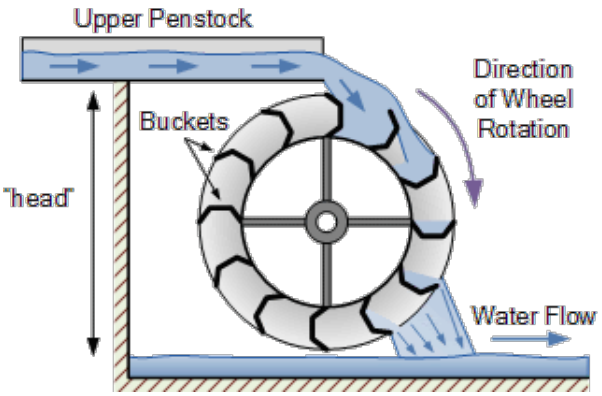
This design, also known as a **stream wheel** was the most commonly used type of waterwheel designed by the ancient Greeks and Romans as it is the simplest, cheapest and easiest type of wheel to construct.



In this type of waterwheel design, the wheel is simply placed directly into a fast-flowing river and supported from above. The motion of the water below creates a pushing action against the submerged paddles on the lower part of the wheel allowing it to rotate in one direction only relative to the direction of the flow of the water.

3. THE OVERSHOT WATER WHEEL

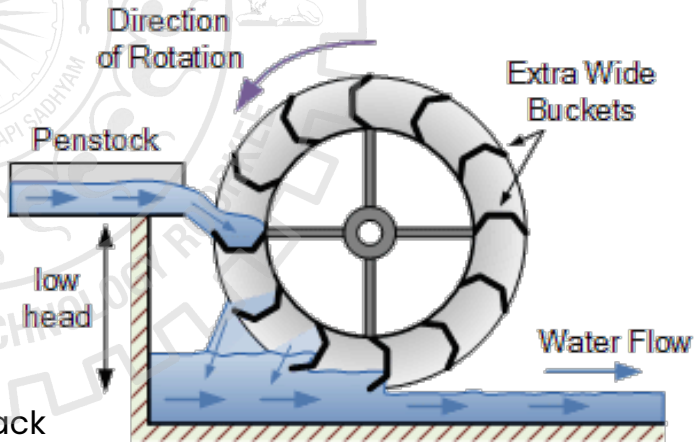
This design is the most common type of waterwheel design. The **overshot waterwheel** is more complicated in its construction and design than the previous undershot waterwheel as it uses buckets or small compartments to both "catch and hold" the water.



These buckets fill with water flowing in at the top of the wheel. The gravitational weight of the water in the full buckets causes the wheel to rotate around its central axis as the empty buckets on the other side of the wheel become lighter.

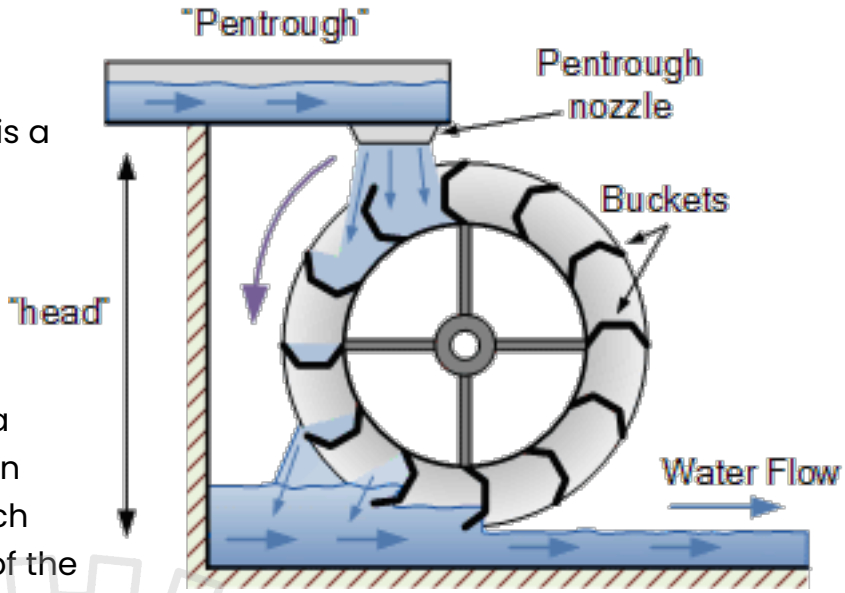
4. THE BREASTSHOT WATER WHEEL

This design is another vertically-mounted waterwheel design where the water enters the buckets about halfway up at axle height, or just above it, and then flows out at the bottom in the direction of the rotation of the wheel. Generally, the **breastshot waterwheel** is used in situations where the head of water is insufficient to power an overshot or pitchback waterwheel design from above.



The disadvantage here is that the gravitational weight of the water is only used for about one-quarter of the rotation unlike previously which was for half the rotation. To overcome this low head height, the buckets of the waterwheel are made wider to extract the required amount of potential energy from the water.

5. THE PITCHBACK WATER WHEEL



The Pitchback Water Wheel Design is a variation on the previous overshot waterwheel as it also uses the gravitational weight of the water to help rotate the wheel, but it also uses the flow of the wastewater below it to give an extra push. This type of waterwheel design uses a low head infeed system which provides the water near to the top of the wheel from a pentrough above.

Unlike the overshot waterwheel which channeled the water directly over the wheel causing it to rotate in the direction of the flow of the water, the pitchback waterwheel feeds the water vertically downwards through a funnel and into the bucket below causing the wheel to rotate in the opposite direction to the flow of the water above.

SCOPE

Distributed/decentralized renewable power projects using wind energy, biomass energy, hydropower, and hybrid systems are being established in the country by the Ministry of New Renewable Energy to meet the energy requirements of isolated communities and areas which are not likely to be electrified in near future. Off-grid, or stand-alone, systems can be more cost-effective than connecting to the grid in remote locations. (https://mnre.gov.in/grid-power)

Currently, most of the schemes of the government focus on solar power to achieve off-grid. Residential solar panels get all of the press for a simple reason — everyone gets sunlight. But there's an equally green method of power generation that doesn't get as much attention: the water wheel generator. If you happen to live on a rural plot of land that features a river or stream, you might be able to partially power your home with hydroelectric power at comparatively low rates, the efficiency may be less but considering the off-grid systems, hydroelectricity is a cheaper option for people residing near water sources.

So aiming to increase the efficiency at affordable rates would definitely prove out to be a huge revolution in this sector.

Problem Statement

- Design innovative and most efficient water wheel both in terms of efficiency and feasibility.

- Prepare a complete plan of the materials, dimensions, position with respect to water flow and other aspects.

- Digital models (SolidWorks, AutoCAD or any other software) will be appreciated.

- Innovations are most welcomed only until they are completely applicable and ready to go into action.

Contact:

Aditya: +91 7409 007 097

Bhupesh: +91 9216 271 000