

## Spiral Tube Water Wheel Pump

Praveen Mishra, Divakar Verma  
Department of Mechanical Engineering,  
University Of Mumbai

Vishwatmak Om Gurudev College of Engineering,  
Maharashtra State Highway 79, Mohili, Maharashtra  
421601, India.  
pravinmishra.420@gmail.com

Harshal Sankhe, Rajesh More  
Department of Mechanical Engineering,  
University Of Mumbai

Vishwatmak Om Gurudev College Of Engineering,  
Maharashtra State Highway 79, Mohili, Maharashtra  
421601, India.  
harshalsankhe4@gmail.com

**Abstract**—India is a developing country and faces a lot of problems related to pump water from river or canal. With the prices of fuels rising around the world, it is becoming more difficult to pump water by piston pump. In this situation, the common man bears the brunt to run his household affordable rates. Our aims at simplifying this problem and pump water at small scale with the easiest of economical and green technique. The setup required is cheap and efficient. We pump water by using wheel which has a straight pedal, by wrapped a tube around the plane of wheel to form a coil shape. The inlet of tube is submerged in water, when the water flow is strike on pedal of wheel then wheel in rotate water goes down on the tube with atmospheric air which compressed in spiral tube. Course of water contained in the spiral compresses air between them as they travel around the tube and air expelled under pressure into the hollow axel of the wheel. the water which is under pressure rises up the pipe and this process is assisted by the compressed air which lifts water above it in its attempt to escape through the pipe. The spiral tube water wheel pump has the potential to pump water for agriculture and domestic purpose as it extract water above 50 ft head. Spiral tube water wheel pump is direct replacement of small standard piston pump and just as efficient at pumping a set volume per day.

**Keywords**— pump, canal, wheel, spiral tube.

\*\*\*\*\*

### I. INTRODUCTION

A pump is a gadget that moves (Liquids or gasses), or at some point slurries, by mechanical activity. Pump can be characterized into three noteworthy gatherings as indicated by the technique they use to move the liquid: uprooting, and gravity pumps. Pumps work by some system (regularly responding or revolving) and expend vitality to perform mechanical work by moving the liquid. Pumps work by means of numerous vitality sources, including manual operation, power, motors or wind power, come in numerous size, from tiny for use in medicinal applications to vast mechanical pumps. Mechanical pumps serve in an extensive variety of utilizations, for example, pumping water from wells, aquarium separating, lake sifting and air circulation, in the auto business for water-cooling and fuel infusion, in the vitality business for pumping oil and regular gas or for working cooling towers.

to incidental mechanical disappointment and there was the likelihood of it spilling oil into the River. Electric engines which generally utilized as a part of Indians structures to concentrate water from the stream or other streaming water is bad thought in India as power is expensive and enough. The winding water wheel has the upsides of being naturally well disposed, nearly systems for upkeeps free, made of essential modest materials. This winding pump is immediate substitution of a little standard cylinder pump and pretty much as effective at pumping a set volume for each day. General it's an excellent bit of option innovation. Furthermore, it additionally duplicates as unwinding treatment, after a torrid session managing plant wreckers by the reviver watching it discreetly turn returns some balance.

### II. METHODOLOGY

Basic construction of a spiral tube water wheel pump is very simple consist of a part which are easily available in market.

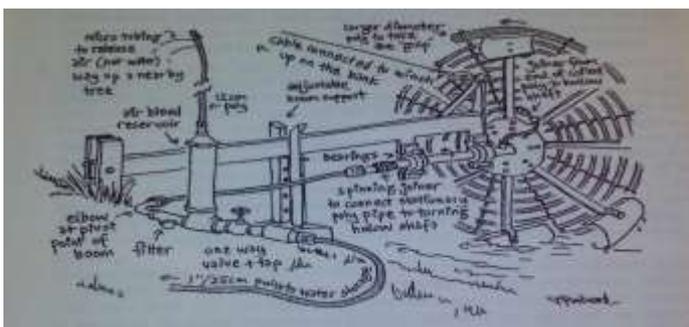


Fig 1 Conceptual design of spiral tube water wheel pump.

The little stream in the waterway is insufficient to work a pressure driven ram pump. The petrol worked pumps are unstable and loud. Its work entirely well yet was inclined



Fig 2. Set up of spiral tube water wheel pump.

The principle that allow this pump to create columns of water within its coils that of alternatively taking in air and water also acts to increase the delivery the air which is compressed as its moves towards the center of the wheel expand as it goes up the delivery pipe producing the lift effect on the water. To construct the pump:-

1. At first we need a ploy pipe to construct a spiral wheel. So that it could be flexible enough that we can turn it form a coil. And the same pipe to discharge the water form pump.
2. In order to quickly construct the spiral tube water wheel pump a bicycle wheel can be used as holding member. The use of available bicycle drive train technology made interfacing with parts easier, and makes taking the system apart easier with the use of a quick release.
3. Then made slots on the wheel to attach pedals on it. This pedal will attach to the wheel by welding or nuts and bolts.
4. Then assemble pipe over the spoke of the wheel by the plastic clamps and turn it in to the coil shape.
5. Then attach this pipe to the TEE by means of nipple and attach one end of TEE of the wheel by welding and other end the hollow pipe. Attach the same pipe to the other side of the wheel.
6. Both of these hollow pipes are supported by hosing bearing which are mounted on stand, so that wheel will rotate continuously over stand by the force of the water.
7. At discharge end of the wheel we will attach rotary union valve which will work as intermediate between rotating wheel we and stationary poly pipe.
8. Then we need to attach another ploy pipe to the stationer end rotary union which is discharged to the collecting tank.

### III. FABRICATION

The component selection was the key factor of the project as we want to use the parts which are easily available in the market. "SPIRAL TUBE WATER WHEEL PUMP" is designed and constructed by using following parts:-

1. **BICYCLE WHEEL:-** We used bicycle wheel of 66cm diameter. The purpose of using bicycle wheel is to reduce the excess work of constructing the wheel and is provided with larger number of spokes to make attachment of pipe easier and efficient.
2. **POLYPIPE:-** We have selected the poly pipe of 30mm internal diameter having length 5m which is wrapped around the spokes of the wheel to from a coil shape. Outer end of which is open to take in gulp of water and other end is connected to the rotary union. And same pipe of length 5m we took for the discharge of the water and connected to the stationary side of the rotary union.
3. **BALL BEARING:-** We used two bearing having bearing number 6304 and 28mm internal diameter. These two bearing are welded to the cost iron plates and attachment on two sides of the basin by means of nut and bolts. Purpose of using bearing that the wheel should rotate smoothly by application of water force, and it can be easily welded to the pipe to avid misalignment while rotating.
4. **TEE:-** TEE is used to join three threaded pipes of same diameter. We used TEE of mild steel of 25 mm inner diameter one end of TEE is attach to the wheel by electric welding and

at other end hollow shaft is attached and at third end the nipple is fitted.

5. **MILD STEEL HOLLOW SHAFT:-** We used two hollow shaft of mild steel having outer diameter 27mm and length 30cm. purpose of using mild steel is that it should be easily weld to bicycle wheel and water will supply through MS pipe to discharge pipe from rotary union. Shaft should have sufficient strength that it can take a load of wheel without fracture so that we have chosen MS shaft.
6. **NIPPLE:-** The use of nipple is to join threaded pipe with ploy pipe. We used nipple of stainless steel for attachment of the pipe and rotary union. Data of nipple at rotary union end is 19.5mm and at pipe end 13mm.
7. **PEDDLES:-** Peddles are the plants made from mild steel having area 10cm \*14cm. which is attached at the circumference of the wheel. Peddles are used to provide momentum to the wheel. Water strike on the face of peddles which in turn forces the wheel to rotate.
8. **ROTARY UNION VALVE:-** Rotary union valve is part which is used as intermediate between the stationary and rotating pipe. We used rotary union of 20 mm outside dia. Made up of brass material. It takes water from rotating coil pump and transfer to the stationery discharge pipe.
9. **REDUCER:-** Reducer is used to join tow pipes of different diameter or used as convergent or divergent pipes for fluid flow. We decided to use plastic reducer having length 15cm and 6cm dia. Opening. This reducer is connected to the open end of the pipe so that it can maximum possible amount of water.

### IV. WORKINIG PRINCIPLE

As the wheel revolves each paddle in turn becomes submerged in the water passing around it. Thus once per revolution each water collector also dips into the water. Just after the water collector passes the horizontal position and begins to rise it takes in a gulp of water-expelling air previously contain within it when the collector rises out of the canal it is of water. This charge of water run back into the first spiral of the tube pump and the cycle is repeated. As the wheel revolves a pressure head develops within each coil of spiral tube, water in the ascending coil being higher than in the descending coil. Course of water contained in the spiral compresses air between them as they travel around the tube and both water and air are expelled under pressure into the hollow axel of the wheel. The water which is under pressure rises up the pipe and this process assisted by the compressed air which lifts water above it in its attempts to escape through the pipe.

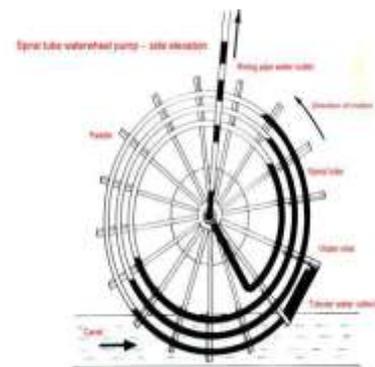


Fig 3. Working of spiral tube water wheel pump

Steps while performing Spiral Tube Water Wheel Pump experiments

1. A spiral tube water wheel pump is positive displacement at low speed.
2. A wheel has to be submerged 1/3 of its total dia. In the water so that it can take in maximum possible amount of water.
3. Pump can be run at maximum speed of 20 to 30 rpm and efficiency increase with increase in speed and pipe size.
4. Our model takes in 125ml of water at each revolution of the wheel and discharges the same at each revolution.
5. Speed cannot be exceeds 38 rpm to avoid blow-back of water through pipe.
6. If diameter of poly pipe is 30mm. And running at speed 27 rpm then it can delivered the water up to the head of 6feet.
7. The efficiency of spiral tube water wheel pump is 90.80% and the discharge of water from spiral tube water wheel pump will be 4litres/min.
8. As the water wheel and spiral both needed to dip into the water, the coil has to be the same diameter as the peddles.
9. The coiled pipe needs to be about three times as long as the height is being pumped to.
10. We decided to make to lots of coils consisting of five coils each, so there where two opening to take "gulp". In theory this should have pumped twice the volume of water as a single coil. However this proved to be too heavy for the flow of the stream to move.
11. The material used for the shaft and pedals depend on flow of river. if flow water is low then we can use light materials for design which may increase rpm of the wheel.
12. The speed of wheel increases as increasing the peddles size.

#### V. FUTURESCOPE

1. As this project concentrates on energy conservation and energy harness we can use the rotation of the wheel for electricity generation.
2. Large diameter pipe can be used to extract more amount of water
3. Rotary union can be replaced with the specialized parts to intermediate between the stationary and rotary pipe.
4. Can be manufactured in the large size to produce extra head.
5. Poly pipe can be on both side of the wheel so that it can extract double amount of water.
6. Peddles size can be increase so that more amount of water will strike on blade and speed of the wheel will increase.

#### VI. APPLICATION

1. Can be installed any flowing water source like and canals.
2. Spiral pump can be installed in the stationary tank to delivers water to other place by operating pump by hand.
3. Spiral pump can be installed just after hydroelectric power plant to extract water.
4. Spiral pump can be useful to generate electricity with gear arrangement.

#### VII. CONCLUSION

We have successfully researched and studied spiral tube water pump, and we found that the spiral tube water wheel pump is a suitable solution for the community because it could be powered by the river, made from local materials and easily

maintained by the residence. We concluded that most attractive ways of powering the spiral tube water wheel pump is to be mounted it on pedal wheel. There are no valves and moving parts accepts for the wheel and rotary fitting would a driven spiral tube water wheel pump a good choice compare to pump.

#### VIII. REFERENCE

- [1] Peter R. "A Morgan New Water Pump: Spiral Tube", The Zimbabwe Rhodesia Science News. 13(18):179-180 (1979).
- [2] Stuckey A.T., Wilson E.M. "The Stream-powered Manometric Pump", Proceeding of the institute of Civil Engineers Conference on Appropriate Technology in Civil Engineering, London, 105-108 (1980).
- [3] ortimer G. H. and Annable R. "The Coil Pump – Theory An Practice", Journal of Hydralic Research, 22: 1, 9-22 (1984).
- [4] Tailer Peter. (2005). "The Spiral Pump, a High Lift, Slow Turning Pump", Retrieved April 6, 2011.