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One Way Water Valve

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***Abstract*—This electronic document is describing a new water valve. This valve can prevent liquid over flow from liquid tanks and also controls the liquid flow direction, this document describes the phenomena effecting water valve operation by analyzing various water valve designs and introduces CWTT(control water transfer technology) a revolutionary, well tested, concept in water and water hammer alleviation. This paper presents method of controlling the water flow in one direction. A valve is fitted in the pipe to control the water to flow in one direction only.**

Keywords—CWTT,CATT,Porous wall,Valve,One way;

1. Introduction

In day to day life we often need to control the flow of liquid. Sometimes, we need an equipment which can stop the current of water in one direction while it allows the flow in other direction. We also need some mechanism which prevents overflow of liquids. In other words, we need a valve for liquid which can perform the same task what air valves does for air. Due to complex property of liquid, it is quite hard to handle. Though liquids has its complex property, gravity based valve for controlling water has easy mechanism. Pipeline design and operation has entered a new era with the application of CWTT(Controlled Water Transfer Technology). The obvious questions are: what is CWTT and how it of benefit? The above and other questions are answered below in a simple question and answer format.

2. What is CWTT?

Like CATT CWTT can be used for water. CWTT is the acronym for Controlled water Transfer Technology and applies to a hydro mechanical pipeline flow enhancing mechanism. CWTT is advancement of CATT. Using CWTT water flow direction as well as quantity can be controlled.

3. Problem Statement

In the era of 21st century the science and technology have developed in its peak and hence lots of consequences namely global warming up, water pollution ,air pollution, sound pollution. Technology brings lots of great things to humanity but we are losing natural resources like water, air, land, and forests Maintaining the Integrity of the Specifications.

Drinking water is a major problem in many countries. Because of lack of drinking water mil-lions of peoples die every year. We cannot pro-duce more water efficiently so the only solution is to conserve water. Use water in a better manner. So here is a small step to save water and humanity as well.

4. Description

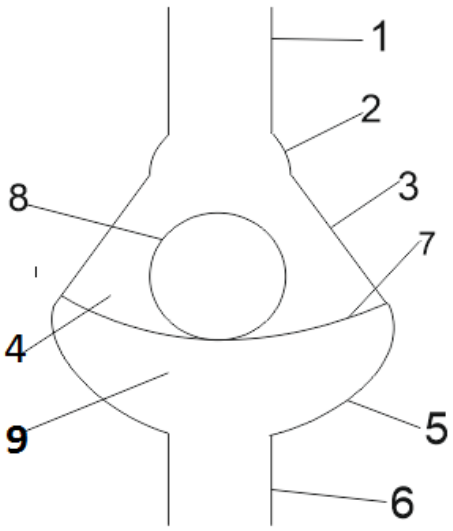

Fig 1: One way water valve

This valve not only controls the flow of water direction but also enables us to use water more beneficially. It can lots of water around the world. The valve(one way water valve) consists of 9 parts. These are:(Ref fig 1)

- Upper pipe (part 1)
- Curve part (part 2)
- Conical Part (part 3)
- Upper chamber (part 4)
- Hemisphere Part (part 5)
- Lower Pipe (part 6)
- Porous wall (part 7)
- Sphere (part 8)
- Lower chamber (part 9)

a) Upper part(part 1)

Upper pipe is marked as part 1. This pipe works as water inlet for the valve. Cross section area of this portion should be less so that at the time of blocking pressure applied by incoming water will be less on the blocking sphere part 8. And it will sustain the pressure to block the valve.

b) Curve Part(Part 2)

Curve part is the next part after the water inlet up-per part, part 1. This is marked as part 2. This part increases the blocking efficiency of the valve. Part 2 is increasing the contact area for sphere-8 at the time of blocking. This decreases the probability of leakage. Greater the curve area better the blocking capacity of valve. The diameter of lower opening of curve 2 should be less or equal to diameter of blocking sphere 8. Diameter of lower opening of part 2 cannot be greater than diameter of part 8. Greater the diameter of lower opening will results in lower the efficiency. Part 2 should be a part of hemisphere of sphere-8. The diameter of upper opening of part 2 should be equal to the diameter of upper pipe part-1.

c) Conical Part(Part 3)

Conical Part is numbered as part 3. This part is to fix the direction of flow of sphere 8 to part 2. It also maintains the pressure to up-thrust ratio. Pressure to up-thrust ratio should be less than 1. Lower the area lower the force applied for constant pressure. So the cross section area of upper pipe part 1 is less than the cross section area of upper part of conical part, part 3. Diameter of Conical part should be between 2.5 to 3 diameters of part-8.

d) *Upper chamber(part 4)*

Chamber stands for the space or volume. Upper chamber is denoted by number 4. The volume offered by conical part ,part-3 curve 2 and separated by wall 7 is called upper chamber part 4. For nor-mal flow or to be function the valve in open condition the fluid in upper chamber should be less. If upper chamber or part 4 got full the valve will go to block mode

e) *Hemisphere Part(part 5)*

Hemisphere is numbered as part 5. This part is connected to part 3. This part collects the water and gives it to lower pipe part 6. Hemisphere part makes way for water to flow in normal condition. Diameter of this part should be equal to part-3.

f) *Lower Pipe(part 6)*

Lower pipe is for water outlet.This part is num-bered as part 6. It collects fluid from part 5 and re-leases in further pipe or container. The cross sec-tion area of lower pipe part 6 should be equal to the cross section area of upper pipe part 1. There is a conical rubber layer can be wrapped on part 6 from the outer surface of upper hemisphere to lower outer point of lower pipe part 6. So that bot-tle or container having opening diameter between diameter of part 6 and part 5 can be fitted to the part 6 for automatic functioning of valve. Refer fig 1.

g) *Porous wall(part 7)*

Porous wall is an important part in the valve. It is numbered as part 7. This is a circular wall of diameter equal to the diameter of part 5 or part 3. This part is fitted between part-3 and part-5. The wall contains holes all over its surface. The radius of holes are equal to one fifth of radius of part 8. Radius of holes can not be greater then the radius of part 8. but it can be as small as 1 mm. So it allows the flow of fluid and holds the sphere-8. By holding the sphere it prevents the water blockage by stopping the part-8 to block the part-6.

h) *Sphere(part 8)*

Sphere is most important part in the valve, num-bered as part-8. The main function of part-8 is to block the valve at the situation of over flow or no room in that section. Part-8 is a hollow sphere made up of low density materials which can flow in fluid like water. Radius of part-8 should be be-tween twice to thrice radius of part-1 or part-6.

i) *Lower Chamber (part 9)*

Lower chamber is the volume offered by the hemispherical part and the porous wall. Lower chamber fills first when there is no space for water to out.

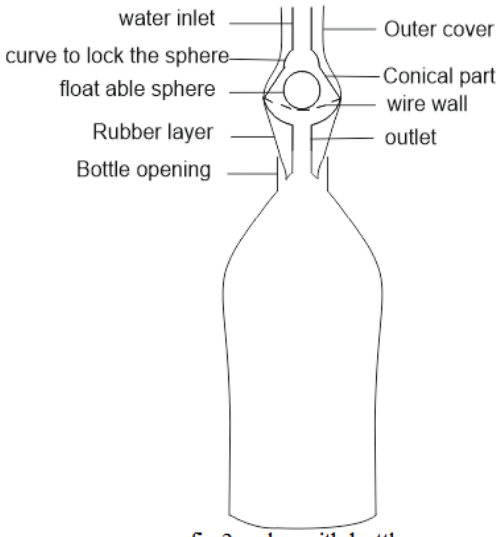

fig 2: valve with bottle

Generally people use to leave the water tap open after filling the water in bottles or they just open the tap fixing the bottle under tap and gets busy with another work. Mean time water continues to flow after filling the bottle. And priceless water is wasted. If we just use this automatic valve then we can save lots of water and life. (Ref fig 2)

5. WORKING

The valve is attached in the pipe. When water flows in the pipe it flows through valve. In normal condition water inters in the valve through part 1 and flows through part 2,3,7,5 and 6. Part 2 is a curve to lock the flow when water is full in the chamber. Part 8 is low density part which floats in water. When water starts filling in the section then part 8 start floating and reaches to part 2 and block the path of water flow and further water cannot enter in the valve hence water floats stops in the section.

Working of valve can be explained under 3 conditions:

i. Normal condition
ii. Closing condition
iii. Closed condition

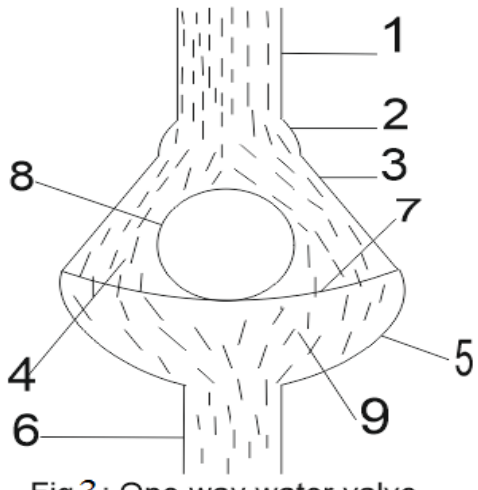

Fig 3: One way water valve

i. Normal condition

In normal conditions Valve allows fluid having one fixed parameter to flow. Valve is attached in fluid pipe. Fluid enters through inlet 1 and goes to chamber 4, through curve 2, part 3. Part 7 is a thin circular porous wall having pore of radius one fourth of radius of part 8. Hence fluid flows through wall 7 and enters in chamber 9. As pores of wall 7 is smaller than sphere 8 so it holds the sphere 8 but allows the fluid. Fluid goes to outlet 6 after chamber 9. It continues to flow till fluid gets space in outlet. Wall 7 prevents sphere 8 to block the outlet 6 by holding sphere 8. So in normal conditions fluid continues flow. (Refer fig3).

ii. Closing Condition

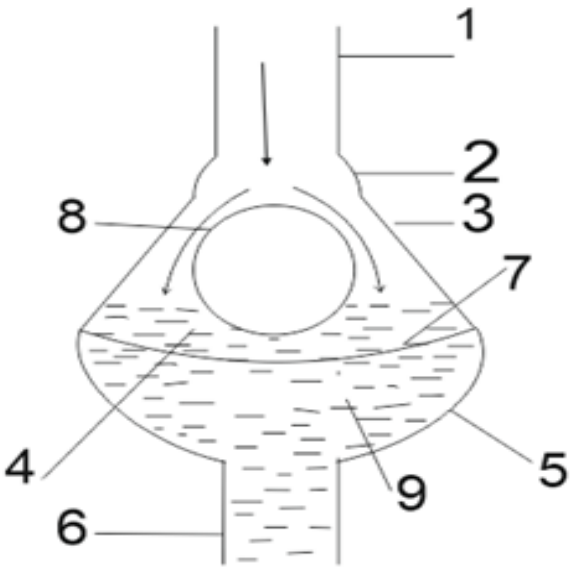

Fig 4: Closing valve

Closing condition is the condition between open (normal) and closed condition. This condition rises because of low room for water outlet. That mean the in pipe or at the outlet there is less space for water. Because of this condition water starts filling and starts flow backward. This makes water congestion in outlet 6 and then lower chamber 9. As soon as lower chamber 9 filled it starts filling upper chamber 4. The sphere 8 having low density starts floating as the up thrust under the sphere 8 increases. The process of raising the sphere 8 upward is called closing process. As soon as the fluid congestion will vanish the sphere 8 will be in its normal position at wall 7 and the valve will work on normal condition. If the congestion continues to increase then sphere-8 will continue to raise due to increasing up-thrust force on it. And finally sphere-8 will stick to curve-2 hence fluid flow will be blocked. (Refer fig4).

iii. Closed Condition

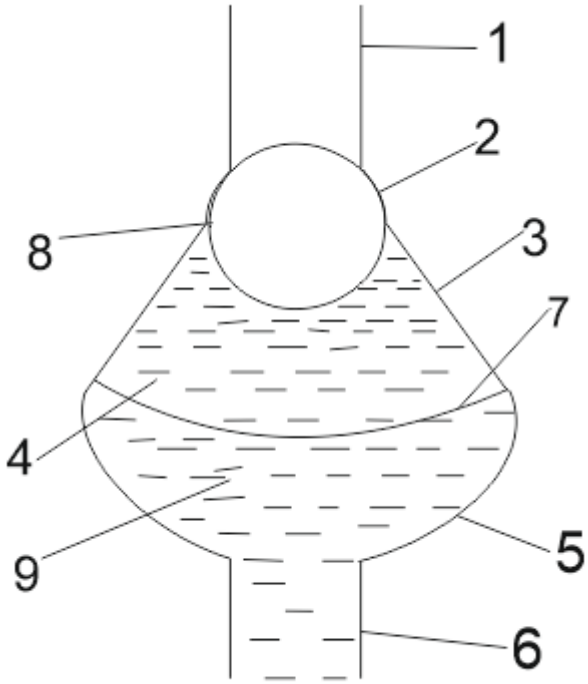

Fig5 : Closed valve

Closed condition is the condition in which flow of fluid is blocked. This condition rises due to no space for water outlet in the lower chamber-9. Valve will hold this condition as long as the up thrust force will greater than the pressure on sphere 8 i.e as long as the fluid in low chamber 4will be full the valve will closed. If pressure and the up thrust force will be equal on the sphere 8 in closing condition then valve will continue to closed condition. It will go again to normal condition if and only if pressure on sphere 8 will more then up thrust. (Refer fig 5).

6. CONCLUSIONS

The method of controlling the fluid flow direction and method of saving water by using this valve has been presented.

This valve can be used in the over flow outlet of water tanks which will get blocked at the times of over flow and we can save lots of water.

Also an electronics switch can be set at part 1 of the valve. When sphere lock the valve the electronics switch will be on and further it will off the motor.

We can also set this valve at the fuel tanks of vehicles, so that in case of over flow it gets automatic lock and save the fuel.

The focus of this paper has been materials selection and feasibility of design of these devices. The result shows that it is possible to control the direction of flow of any fluid. It also shows that we can save a great amount of water using these devices per year. The concept shows that to control the direction the valve must be in vertical position but we also can use it in horizontal pipes making the valve section vertical.

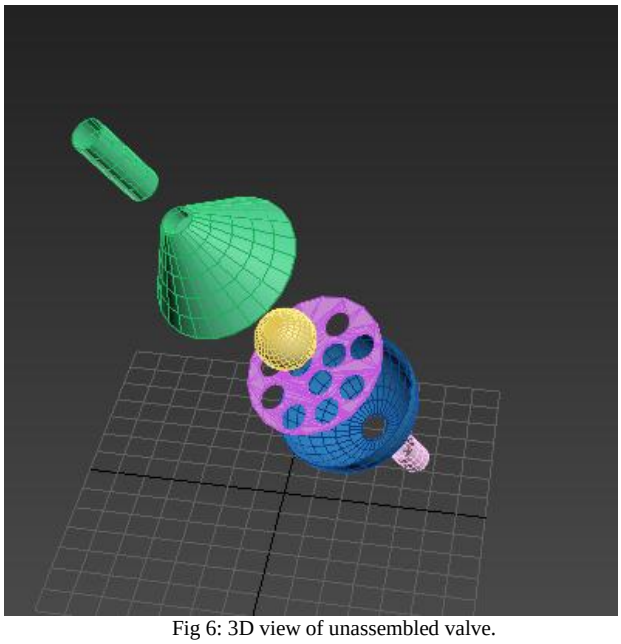

Fig 6: 3D view of unassembled valve.

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