Closed Loop Water Power Plant

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ABSTRACT: - Nowadays electric power has become a great necessity. Without electricity, it has become a difficulty to carry on human even day to day activities. So electric power consumption and the generation have a greater role to meet the demands. With this thought in my mind, this article is to develop a reasonable and affordable system to generate a sizeable quantity of electric power using closed loop water power plant system (clwpp). In this proposed concept, there is a possible for generating power with limited range o water. In hydro power plant generation of power depends on the water in the reservoir. So the generation of power only possible when the reservoir having maximum supply of water. So we achieve this the proposed concept did not need huge amount of water, it required some amount of water is enough for generation. More over construction vise also it's very simple. The concept consist of a total system water is in the closed loop within the two tanks with the help of external pressure. The external pressure is given to the tanks by the compressor. The generated power is stored in the batteries banks, the charged batteries bank, one is given to the compressor input. And other charged batteries banks are connected to the load. And this process is continuously happen with the fully automated system.

KEYWORD: compressor, water tank, automation, batteries, future energy.

1. Introduction

1.1Compressor

In closed loop water power plant a high pressure compressor is used to pump the water from one tank to another tank which consumes low power with effective efficiency. To achieve this we have to use Atlas copco air Compressor. The outstanding Features of this compressor are reliable performance which results in minimizing the operation cost. This compressor is energy saving compressor which reduces energy costs by 35% with high efficiency. While comparing with traditional compressors which consume high power results in low efficiency. So we prefer to select this Atlas copco air compressor.

1.2Water tank

The water tank is made up of a very hard metal. It must be have a good pressure standby capacity also should have a pressure withstand capacity. The water tank made up of a cylindrical shape. The result of cylindrical water tank gives the better pressure to our system compare to other shapes. The Cylindrical tanks are better at containing pressure and also better surface area. While comparing with the other shapes cylindrical shape is better to use less manufacturing cost also.

1.3Automation

Entire system is fully automated with Micro-Controllers to reduce human effort. The microcontroller is also relatively easy to maintain and is very reliable, features which can also be an advantage because of the amount of money that can be saved by this system. Microcontroller processors are designed to fill a smaller process, and focused to variety of roles while making use of less expensive and less complex circuit design. The main advantage of a microcontroller is that it allows electronic automation in situations where a full sized computer is not needed. So, we are not preferred to the select other advanced automatic systems due to less number of switching operations are necessary to operate this Power Plant.

1.4Batteries

An External Advanced lithium ion battery is needed initially to start the plant. Later it is charged by output of the same plant. Only Lithium ion batteries have the capability of low charging time and high discharging time. By this we can decrease the charging time and increase the discharging time. Lithium ion batteries are smaller in size and lighter in weight. The important feature of this lithium ion batteries are charge cycle is stable when compared with other batteries.

1.5Future energy

The further future development of this system is to made the fully automatic recycle system. In this system used compressed air from the water tank is collected to recollected air tank. Recollected air tank has piston arrangement which is used to transfer air from recollected air tank to air tank. Switching operation power is consumed by using solar power.

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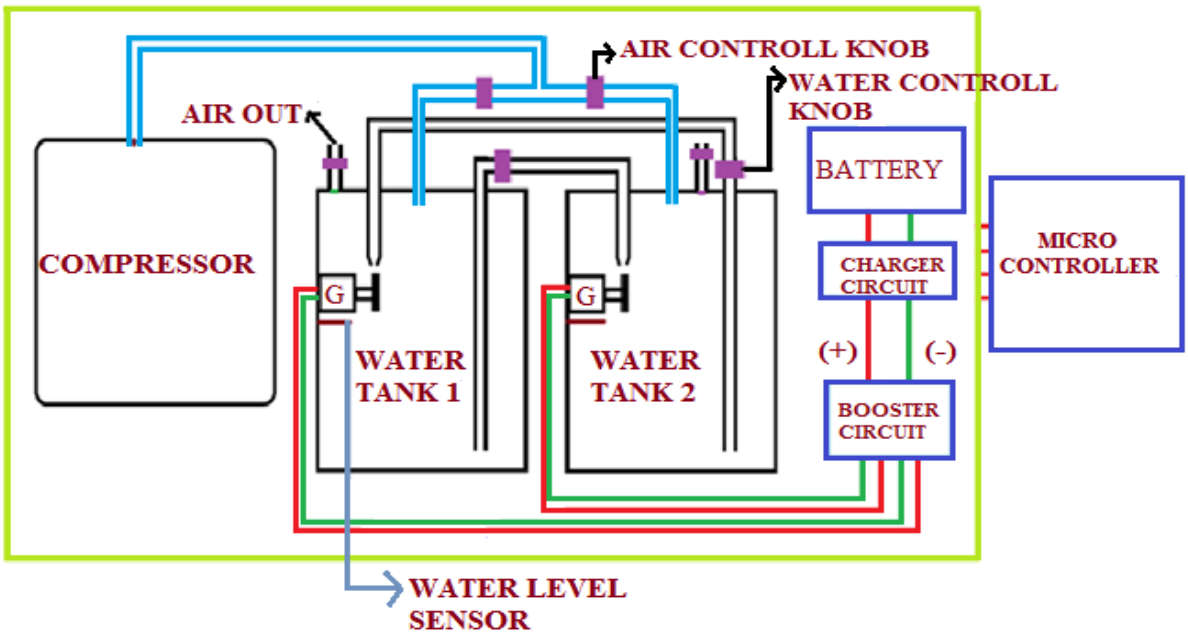
2. LAYOUT OF CLOSED LOOP WATER POWER PLANT



2.1COMPRESSOR

Compressor is used in this project is to give the input pressure to water tank. Because the water is need a force to flow in a closed loop and also run the turbine in high speed. At the starting time the compressor start with external power. Then after some time of running, the compressor input is given from the generated power which is stored in the battery bank.

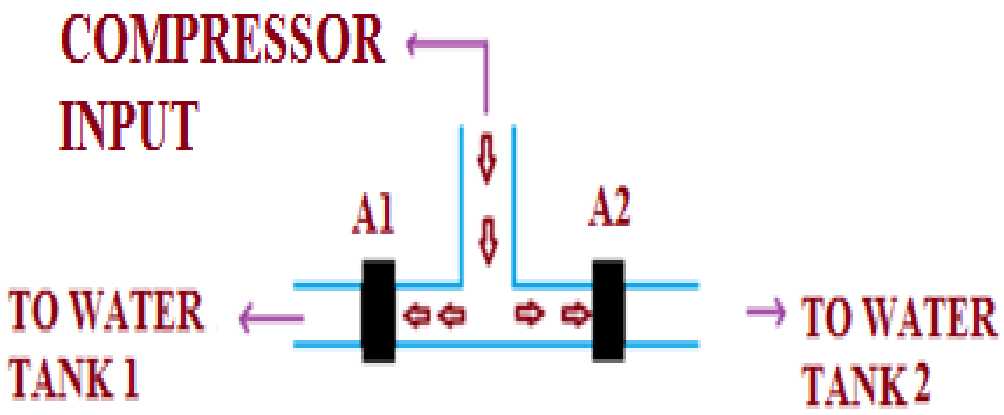
2.2. Controllers

Controllers are used to control the flow of liquid – compressor input - air out - charging tap changing - switching purpose selection etc in the project. All controllers are controlled by micro controller.

2.2.1. Air Controller

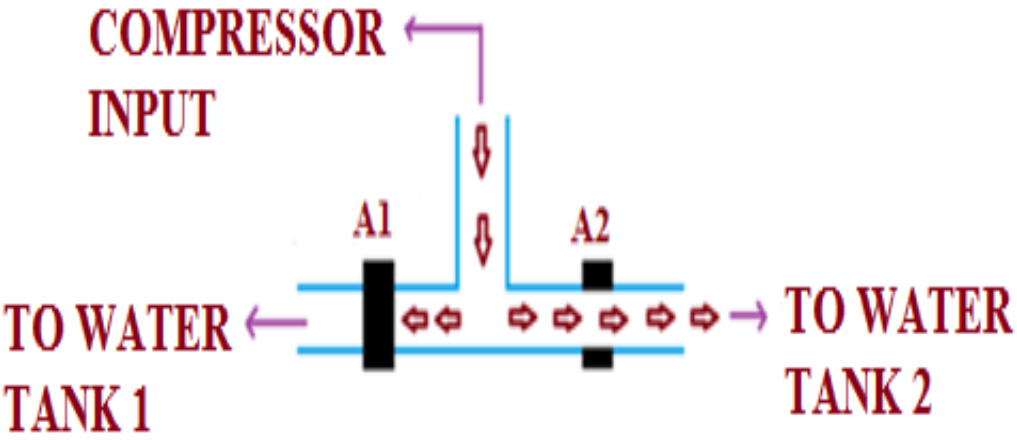
Air controller is like a pressure knob it is used to controls the compressed air flow through the water tank, based on the micro controller instruction.

In initial condition

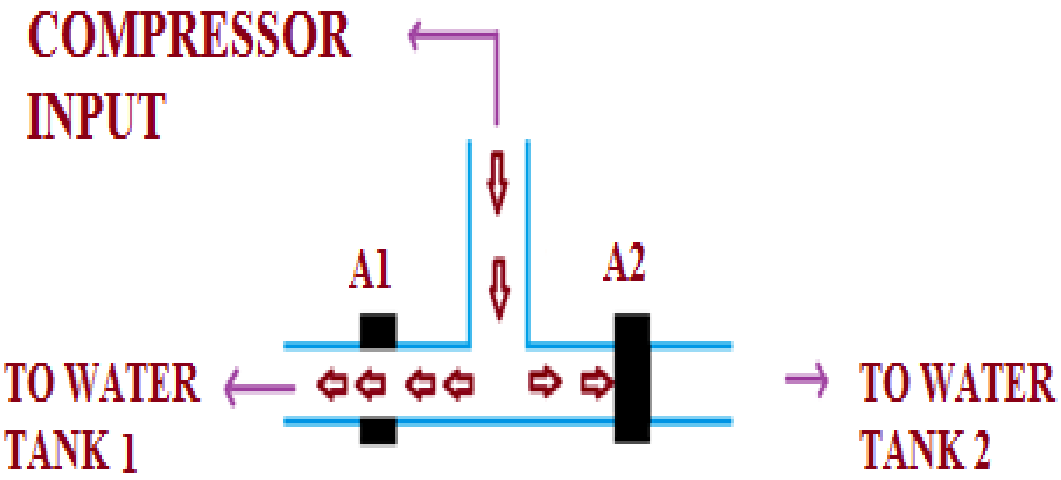


A1-input air control knob for tank1
A2-input air control knob for tank2

In initial both pressure air control knobs are in closed condition. Then the micro controller sense, which tank having maximum water limit? If the tank 2 is having maximum limit of water means the compressed air through the knob A2 will open and the water is circulated from tank 2 to tank 1. At the same time the corresponding tank2 knobs all are in closed condition expect A2.its shown is below diagram.



If the tank 1 is reached its maximum limit of water means the water sensor send the signal to the microcontroller and the respected tank 1 knob A1 will open. At the same time the corresponding all other knobs of tank 1 will in closed condition. Now the water is circulated from tank 1 to tank 2 it's shown in below figure. The above two process are again and again continuous.

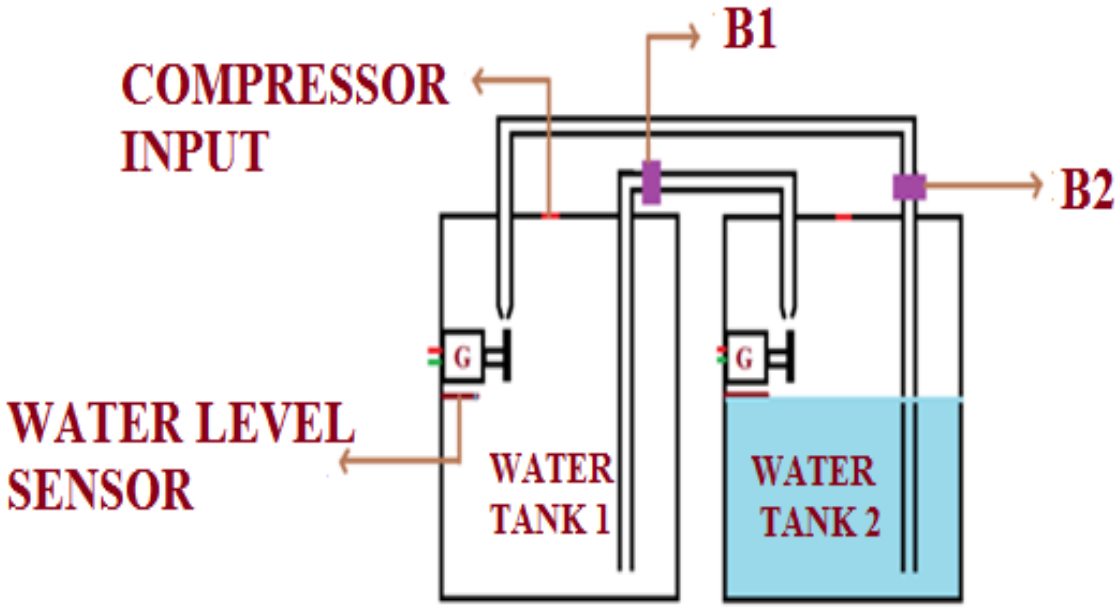


2.2.2. WATER CONTROLLER

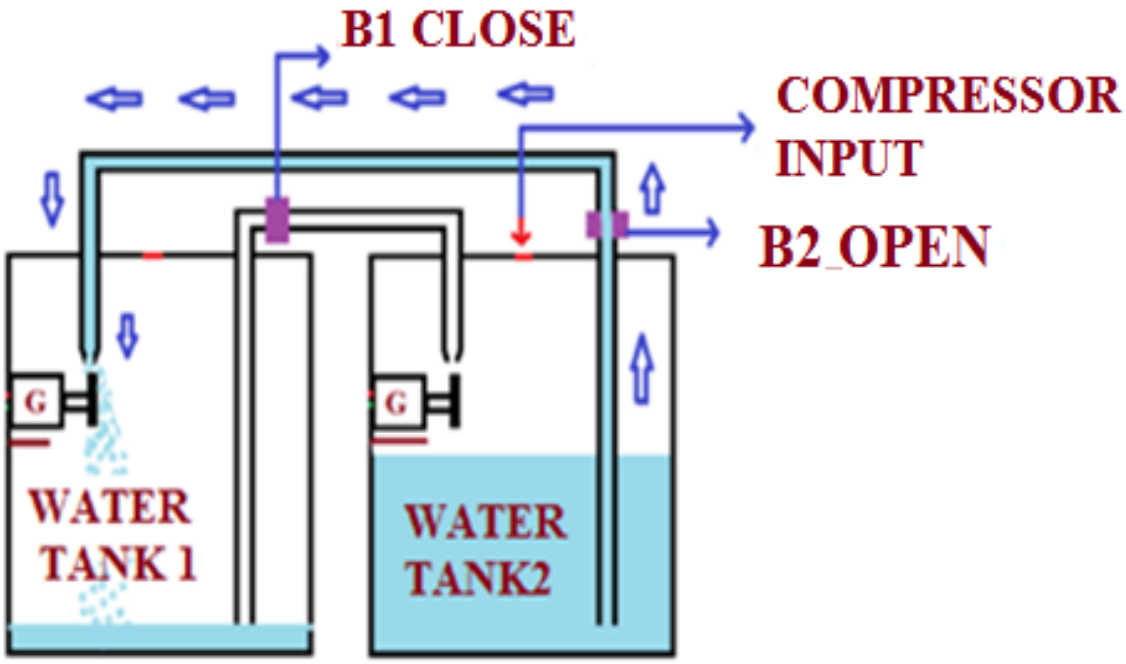
Water controller is like a water control knob. It is used to control the flow of water to one tank to other tank.

B1-water control knob for tank1
B2-water control knob for tank2

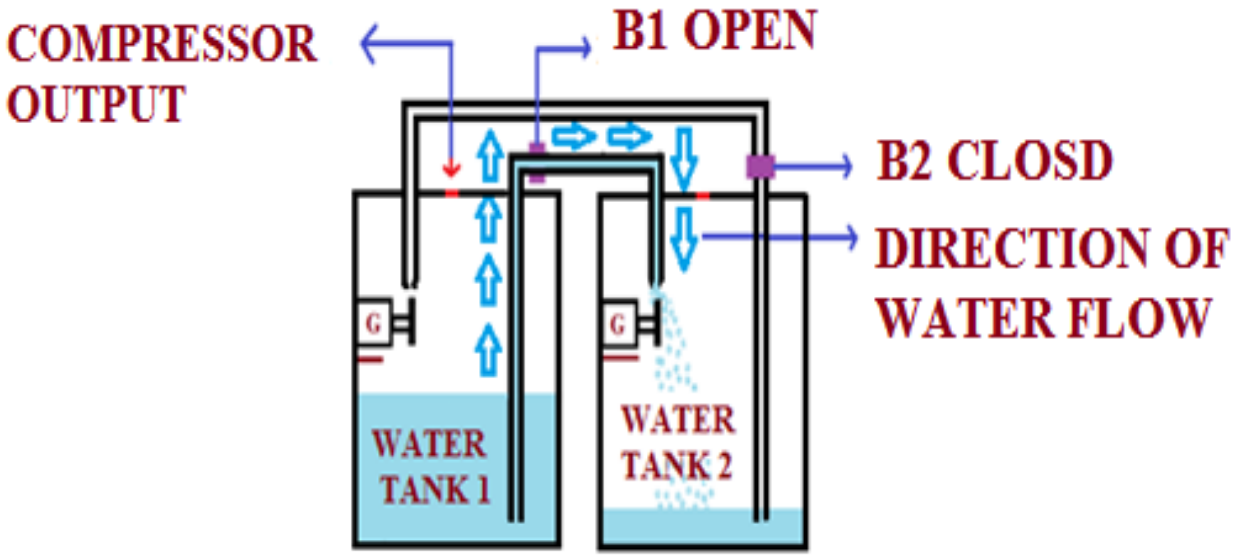
In the first case the input is given to the tank 2 because the water is in tank 2, which is sensed by water sensor. Then the respected water control knob “B2” will open.



The respective positions of water control knob are clearly indicated in the diagram as shown below. When the water level in the water tank2 is at maximum level, Water controller knob B2 get open and transfer the water to tank1, at the same time the water controller knob B1 remains closed.



When the water level in water tank1 is at maximum level, Water controller knob B1 get open and transfer the water to tank2, at the same time the water controller knob B2 remains closed.

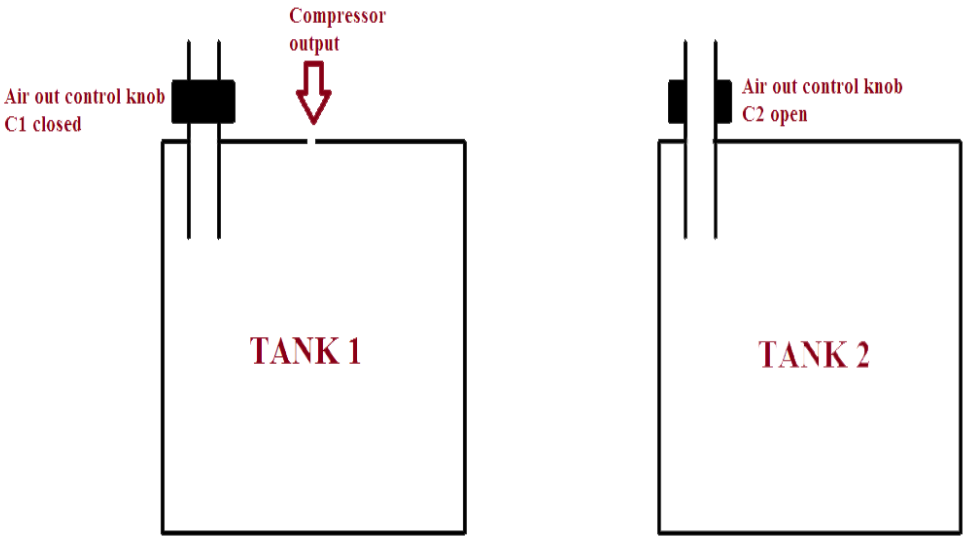


2.2.3. AIR OUT CONTROLLER

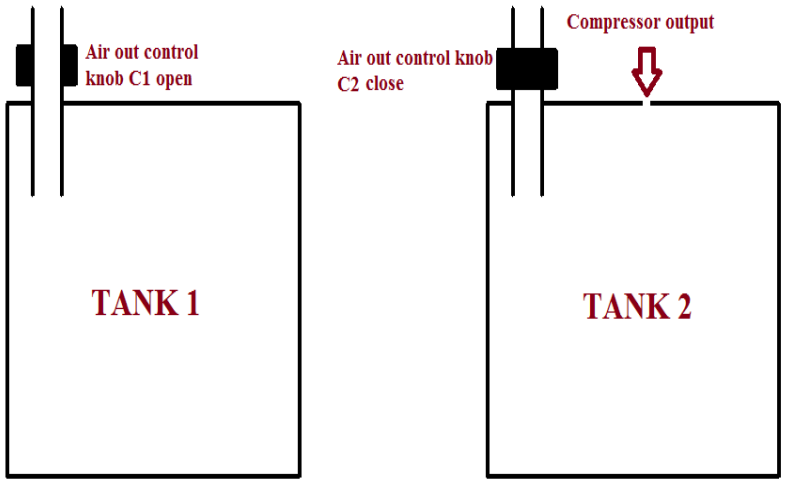
Air out controller is nothing but it is a air release, pressure close and open knob it is important control in this power plant.

For an example

If tank 1 is having water means the input air is given to the tank 1 in that time tank 1 air out knob “C1” will in the close condition and the respected tank 2 knobs “C2” will in open condition.

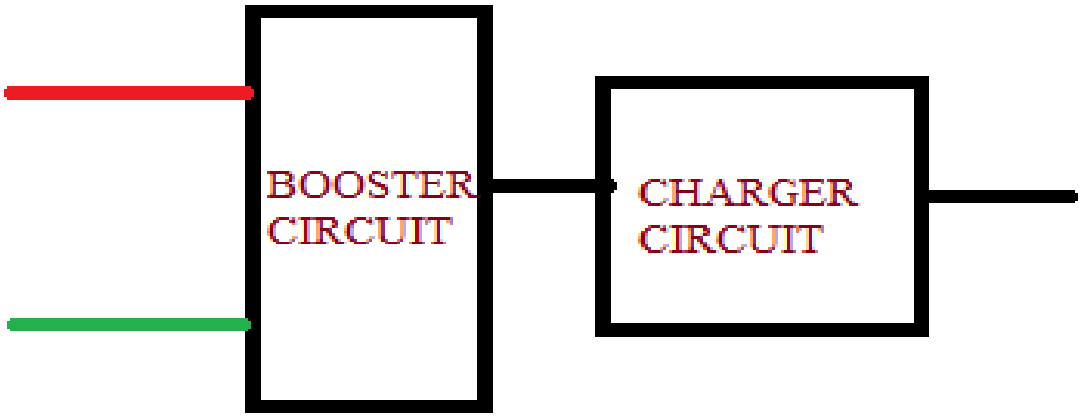


If tank 2 is having water means the input air is given to the tank 2 in that time tank2 air out knob “C2” will in the close condition and the respected tank 1 knob “C1” will in open condition.



3. BATTERY CHARGER AND BOOSTER CIRCUIT

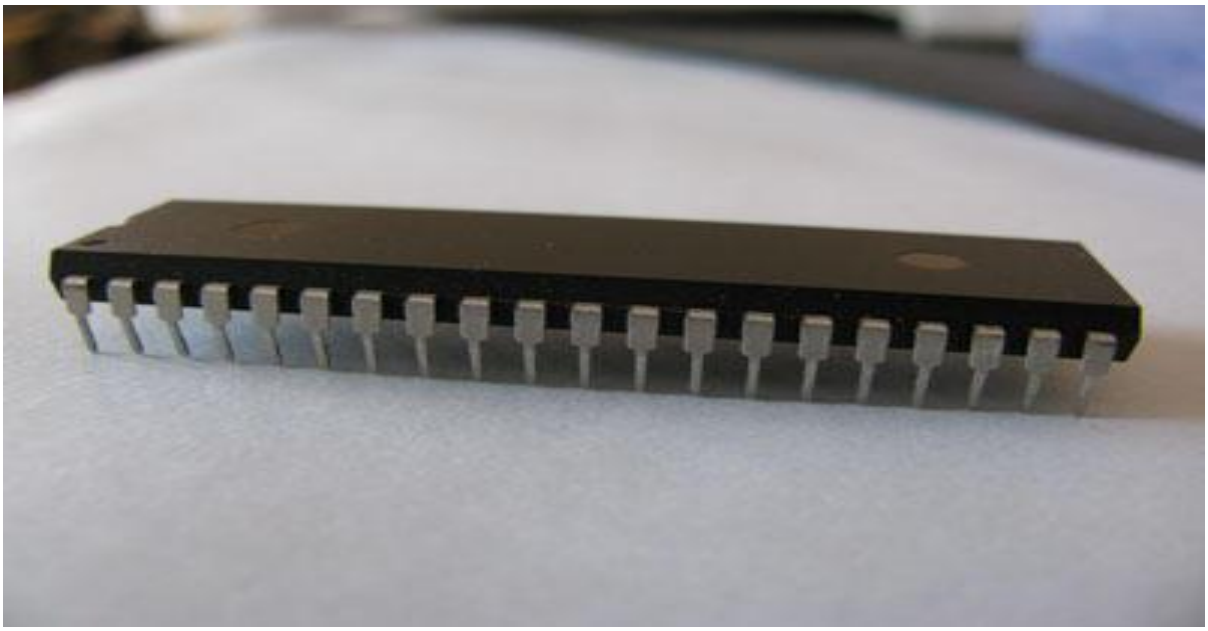
Booster circuit is used to boost up to the required voltage of battery for charging. Charger circuit is a normal battery charger with tapping arrangement. In the starting time of this plant the compressor input is given to the external power and after some hours the compressor input is given from the charged batteries banks.



3.1. Logic Table for Battery Charging Selection

Battery 1 BB1	Battery 2 BB2	Battery 3 BB3	Switch BB1 SBB1	Switch BB2 SBB2	Switch BB3 SBB3
1	1	0	0	0	1
1	0	1	0	1	0
0	1	1	1	0	0

4. MICRO CONTROLLER

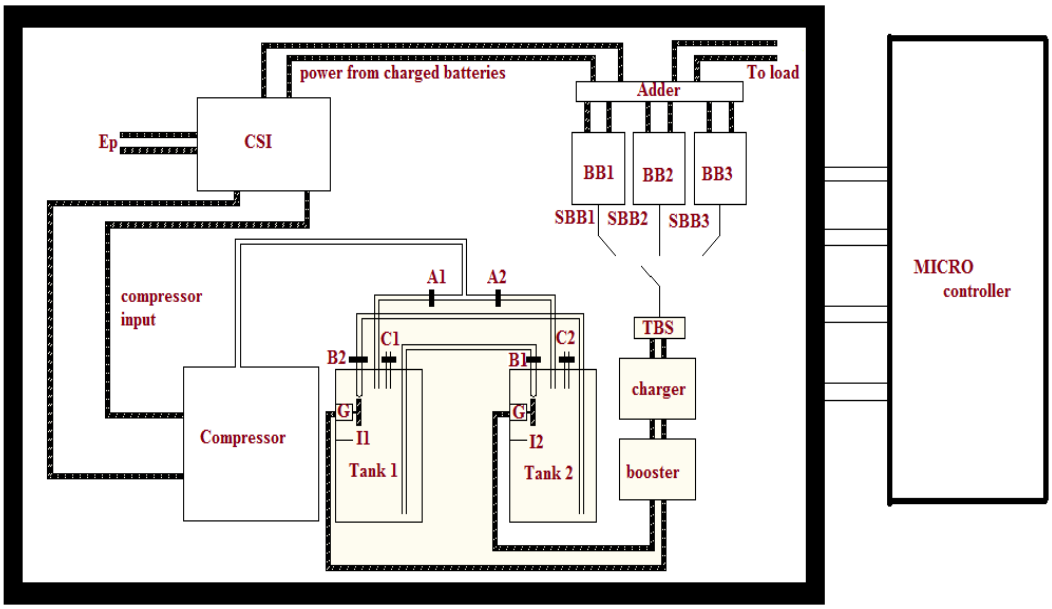


It is the heart of the power plant, the total control process happens by microcontroller only. It controls the water knob, air knob, air out knob, recollecting air tank, and also charging and input controller all the above operation are controlled by the microcontroller. All these are achieved by the simple coding process.

4.1. Logic Table for Air, Water & Air out controller

I1	I2	A1	A2	B1	B2	C1	C2
1	0	1	0	0	1	0	1
0	1	0	1	1	0	1	0

Closed loop water power plant control operation



WHERE

A1= Air control valve for tank1

A2= Air control valve for tank2

B1= Water control valve for tank1

B2= Water control valve for tank2

C1= Air out valve for tank1

C2= Air out valve for tank2

I1= Maximum water level sensor for tank1

I2= Maximum water level sensor for tank2

EP=External Power

CSI=Compressor Input Switching

TBS=Tap Batteries Switch

4.1.1. LOGIC

In the initial condition the microcontroller check high level.
For an example→
In the first case
For an example If (I1 is high)
Open (A1, B1, and C2);
Close (A2, B2 and C1);
If (I2 is high)
Open (A2, B2, and C1);
Close (A1, B1, and C2);
This process repeated based on the sensor signal
For an example,
If BB1 is high means
Close (BB1); power from batteries;
Open (EP);
Charge (BB2, BB3) based on power;
If (BB2) low
Close (SBB2);
All the above process repeated continuously.

5. Conclusion

In this project we can generate power, with limited range of water. So in this power plant no wastage of water. And also the closed loop water power plant will be the future energy for the world.

6. ACKNOWLEDGMENT

Am wishing thanks to my project guide, **W.A.Augusteen** M.E (PHD) Assistant Professor, Dept of EEE Indira Institute of Engineering & Technology.

W.A.Augusteen M.E (PHD)

7. Reference

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