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Generation of Electric Power, Harnessing Atmospheric Pressure

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Abstract— This paper reports a metod / technique to produce huge amount of electricity by harnessing atmospheric pressure .It also discusses unique features and further scope of the project .Calculations suggests that power generated is large enough to meet the need of electric power for the globe .It should also reduce effect of global worming .

Index Terms— Atmospheric pressure, Bernoulli's theorem, Electric generator, Electric power, Efficiency, Partial vaccum, Pressure difference,

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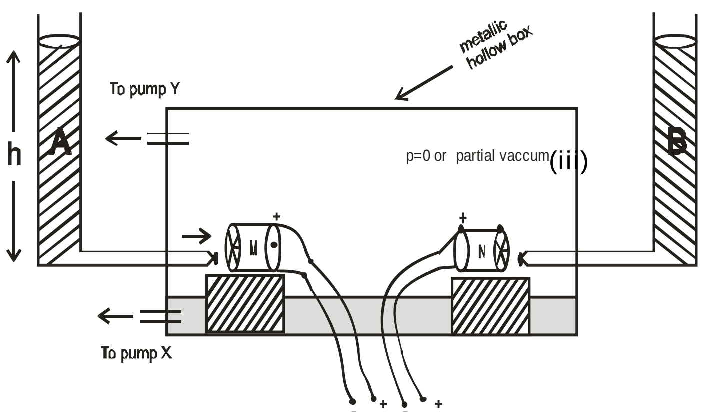
1 INTRODUCTION

With the continuing damand of electric power ,it has become mandatory to look for alternate sources of energy .Sun energy and all of it's derivative ways such as wind energy ,ocean energy etc could provide only limited and specific use baring hydroelectric power .Hydroelectric power which has it's own limitations such as amount of rain fall , large catchment area , cost of making dams etc. What I feel is that solution lies within ever lasting our own atmosphere.

2 METHOD/TECHNIQUE

The working of the project based upon conservation of energy / Bernoulli's theorem. Following is block diagram the project. Take a metallic structure (e.g. hollow cuboid) with vertical hollow pillar/ cylinders A & B [radius 8 cm] as shown in the following diagram.



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A & B vertical towers filled with liquid.

M & N are AC – generators.

To pump X – Water coming out through the outlet will be collect in a large container and then will be lifted up with the help of pump X to recharge vertical towers.

To pump Y –This inlet will be used to pump out air / gases within the metallic box.

(i) If air is not pumped out of the chamber, water will out with velocity $v = \sqrt{2gh}$ = 20 m/s

(ii) If we pump out air/gases from the box, velocity of liquid (say water) falling on the turbine.

$$v = \sqrt{\frac{2(p_o + h\rho g)}{\rho}}$$ [Using Bernoulli's theorem]

$$= 25\,m/s\ ,\ here\ \ p_o = 10^5\,N/m^2\,,$$

$$\rho = 10^3\,kg/m^3\,(for\ \ water),\ h \approx 20m$$

(iii) Power delivered to AC generator /dynamo

$$P = Av^3\rho$$

$$= 2\times10^{-2}\times25\times25\times25\times10^3 W$$

$$= 500\times625\,W \quad = 322500\ \ W$$

$$= 322.5\ KW \text{ or } 0.3MW \text{ per tower}$$

If we attach ten such towers (e.g.) to single metallic box, the power generated will be 3MW. The efficiency of A.C. generators /dynamo is about 50 % [1-4] ,so the produced power will be 50% of 3 MW = 1.5 MW * .

(iv) Power expanded in recharging towers will be

$$P = \frac{w}{t} = mgh$$

$$= (500\times10)\times10\times20\ \ watt \text{ **}$$

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$= 0.5 MW$ (In recharging)

If we take efficiency consideration of all pumps and other factors such as non ideal nature of water, we expect net useful power produced $\approx$ 1 MW from single unit with ten towers. So produced electricity will enough to light ~ 500 houses with requirement 2.0 KW each.

(c) Water that collects within the chamber will not be able to come out all by itself. To solve this problem, we will install two such systems side by side. When first system is active other will be idle. Once the water reaches up to turbine level in first system, the electronic gadgets will perform following actions :—

(i) Should switch off first system and switch on second system

(ii) Should open valve V_1 (attached just after pump Y; not shown in the diagram) so that air gushes in to the chamber and helps the water to evacuate all by it self .Once it is done create vaccum again. All this should be done before water level in second system reaches up to the turbine height .Now the cycle can be repeated .

2 UNIQUE FEATURES UTILITY AND FURTHER SCOPE –

(i) Relatively pollution free production of power

(ii) Low cost /unit of electricity

(iii) First time atmospheric pressure harnessed for the production of power.

3 UTILITY AND FURTHER SCOPE

(i) Such type of systems can be installed any where within the city as per requirement.

(ii) Above I have illustrated using one example. (In general power delivered to the turbine will be proportional to cube root of height and square of radius of pipe. For improving result we can increase radius or height of towers or both)

(iii) Further similar system can be installed deep inside sea to harness power.

(iv) Work is continuously done by the atmospheric pressure and hence will help to reduce global worming.

Note: — To reduce evaporation rate of water , we can use suitable liquid at appropriate temperature and we will need to run vaccum pump continuously for the evacuation of evaporated gases.

Note: — the height of supports holding the dynamo should be increased.

* This number can vary as per requirement (Calculation shown for 10 towers).

** For radius of the pipe = 8cm and velocity = 25 m/s, so the mass of water entering the chamber per second = A $v\,\rho$

$= 3.14 \times 0.08 \times 0.08 \times 25 \times 10^3$ kg/s $=\approx$ 500 kg/s××× ×

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