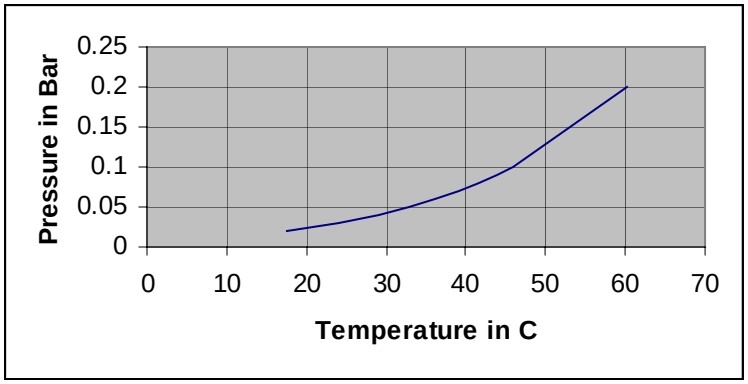
MODEL, WHICH WILL GENERATE ELECTRICITY BY ABSORBING HEAT FROM ATMOSPHERE.

Model, which will generate electricity by absorbing heat from atmosphere.

Author want to developed the model that will generate power automatically. Author developed five different mathematical models & discusses that with researchers from V. N. I. T. Nagpur, Ramdeo Baba engineering college, Nagpur, Maharastra Energy Development Agency, Pune & Tata Power, Mumbai but most of them was theoretically good but was not practically applicable models. After nearly one year of work, one day Author got this innovative idea. This will be the ultimate model. Environment is fill with energy & only technique to convert that energy into useful form is require. Here, Author gets inspiration from fridge where gas is liquefied by increasing pressure by compression.

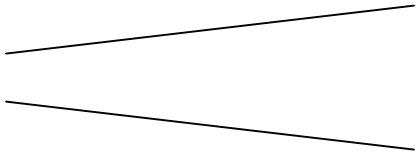


Graph of boiling point and pressure for water

Model is simple. It based on following principles

1) Any liquid can be boiled by direct heating or by decreasing pressure. For example, if environmental temperature is 24.1 ^{0}C then by decreasing pressure below 3000N/m^2, water will boil. When pressure decreases below 3000 N/m^2 at 24.1 ^{0}C, water will start boiling. Now, temperature of water falls due to consumption of latent heat & environment heat start flowing towards water due to temperature difference.
2) Any gas can be converted into liquid by cooling down or by increasing pressure. If pressure is more than liquefaction pressure then gas start converting into liquid just by giving out latent heat to surround environment. So, back of fridge is comparatively hot.

3) Pressure of flowing fluid can be increased or decrease by changing cross section. If cross section area increases, velocity head of liquid decreases and pressure head increases and vice versa. Means without using any compressor pressure of gas can be increase or decrease.



4) Here Author considers impulse Turbine, in which nozzles are mounted on circular disc as shown in figure.

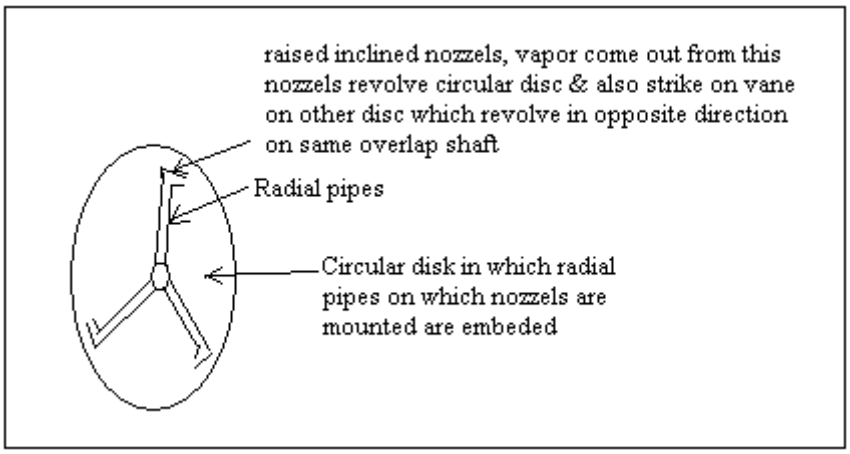


Figure 1

Due to circular motion, vapor in radial pipe is pushed due to centrifugal force. This force increases pressure of gas when it moves from shaft to tip of nozzle.

By using above methods like increasing cross sectional area of pipe, using revolving self operated nozzles two different areas are created in model where two different pressure zones are created & maintained. In first zone pressure is just less than vaporization pressure & in second part pressure is more than vaporization pressure. In first zone, water boiled by absorbing atmospheric heat & in second zone vapor gets converted into water by giving out heat to atmosphere. In this complete process water absorb more heat that can be converted into work.

Detailing of model: - Model 1 (Water vaporize in big zigzag pipe)

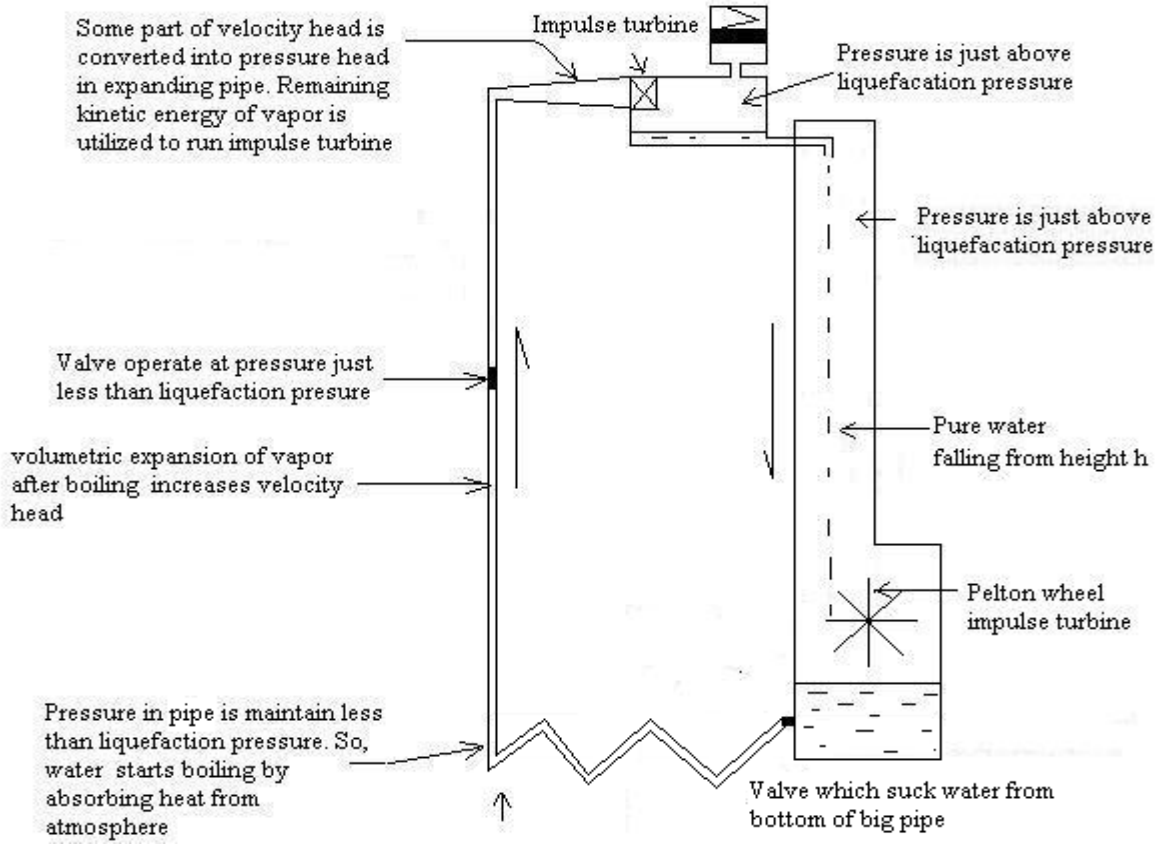
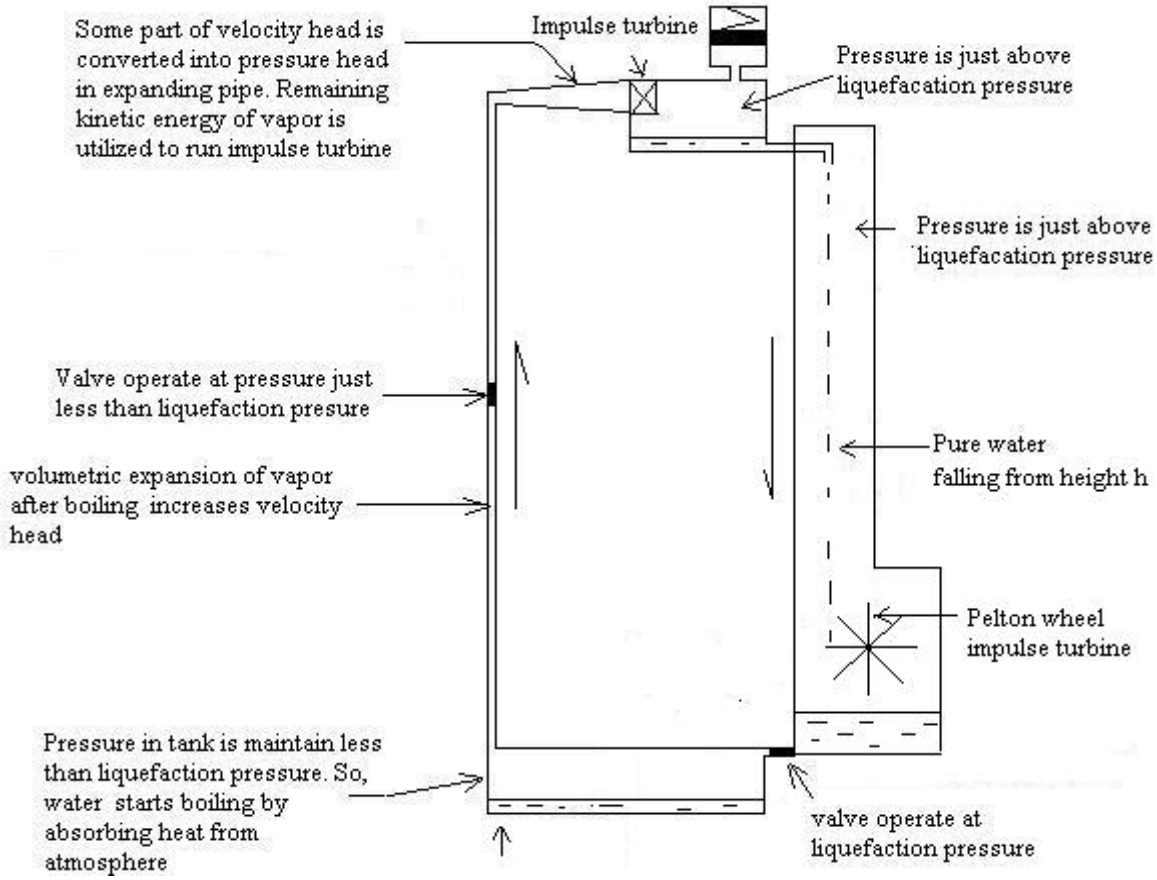


figure 2:- Model 2 (Water vaporize in bottom big tank)



Turbine:-

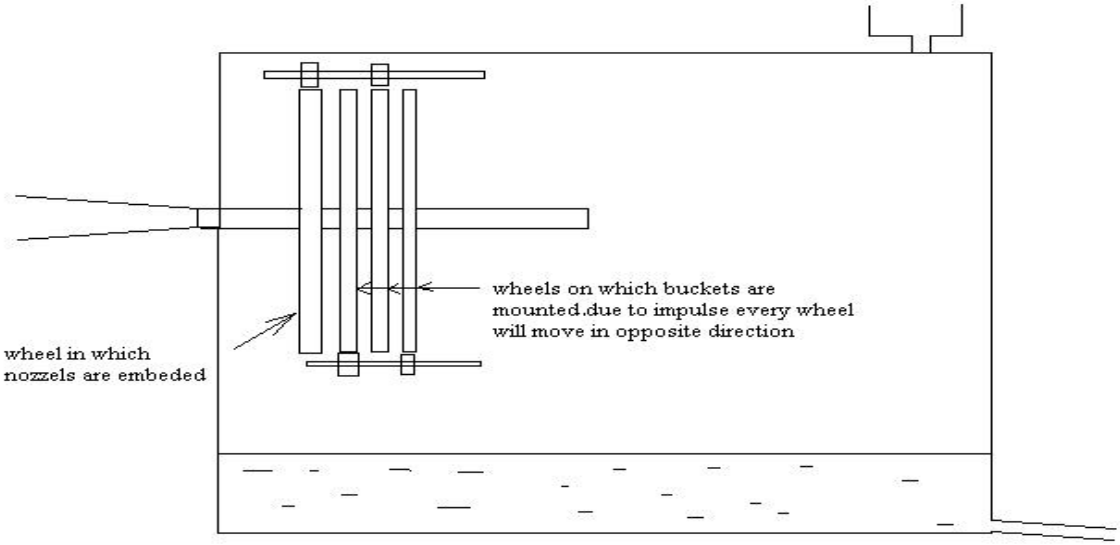


Figure 3:- Impulse Turbine in top tank

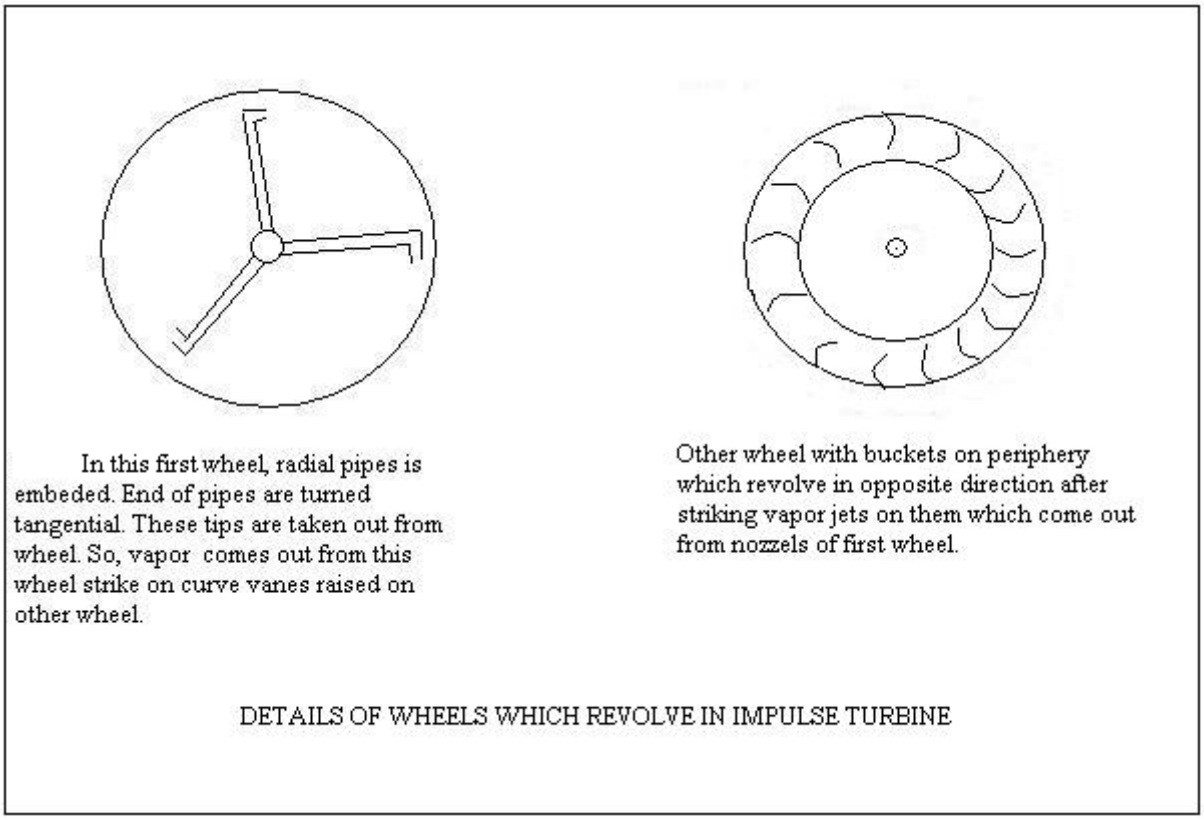
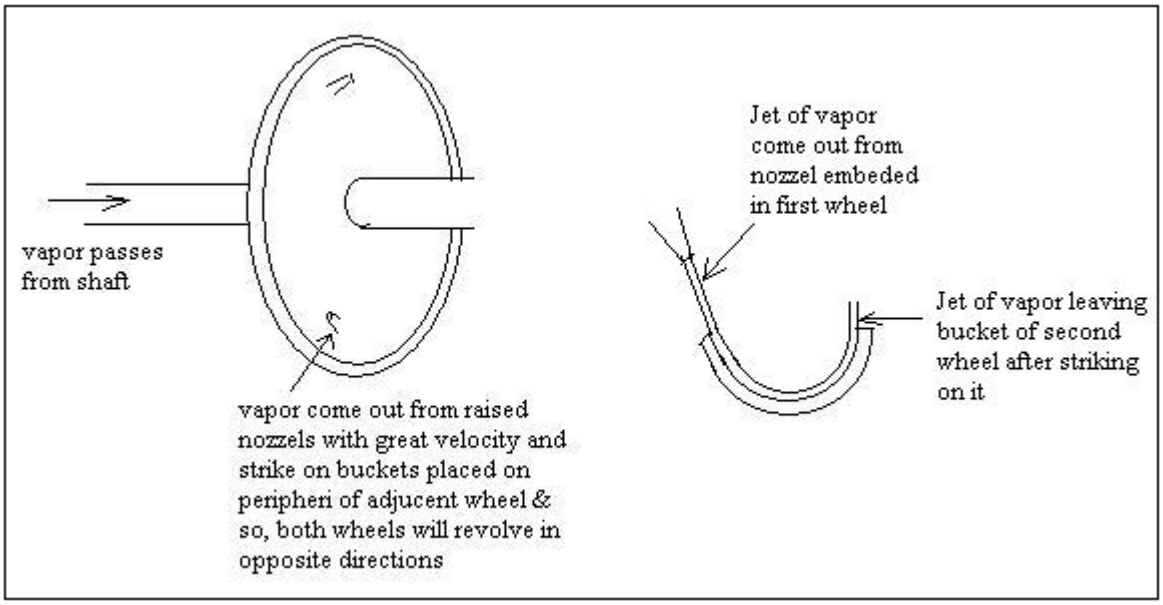


Figure 4:-Details of wheels which revolve in impulse Turbine



General Idea of Model: -Consider environmental temperature is 24.1^0 C where liquefaction pressure is 3000 N/sqm. Height of waterfall in right tube is 2 m. Water circulate in model is 0.01 kg/s.

a) Generation of power at bottom:- In this model, in right tube waterfalls from height h & pressure in this tube is maintaining just above liquefaction pressure i.e. above 3000 N/sqm . At the bottom of right tube, Palton wheel impulse turbine converts kinetic energy of this falling water into mechanical work.

b) Boiling of water at bottom: - When sufficient water is accumulated at bottom of tube. Valve on left side open & some water is suck into adjacent bottom tank as shown in figure 2. For sucking this water, pressure in tank has to be below liquefaction pressure i.e. below 3000 N/sqm. This tank is attached by pipe to impulse turbine placed in upper tank as shown in figure 2. In the middle of vertical pipe, valve is placed which operate at pressure just less than liquefaction pressure.

c) Increasing pressure of vapor: - Between valve and inlet of turbine cross section of pipe is increase in such a way that velocity head of vapor get converted into pressure head. After detail calculation in above example it is found that velocity of steam at the beginning of pipe is 436.88 m/s &

pressure is 2500 N/sqm & at the end of enlarge pipe velocity of steam becomes 333.99 m/s & pressure is 3300 N/sqm. Now pressure is above liquefaction pressure i.e. 3000 N/sqm & kinetic energy $=1/2mv^2$ =557.76 watt is in the steam. This energy is utilized to run impulse turbine in above tank. In this Turbine due to centrifugal force pressure of steam again increases. In above model, pressure of steam increases from 3300 N/sqm to 3609.85 N/sqm when it moves from shaft pipe to nozzles in radial pipe.

d) Operation of impulse turbine at top: - When steam comes out from nozzles, some part of pressure head is converted into velocity head and that increase in velocity will give back ward push to nozzles and first wheel of turbine rotate. If any velocity head remain in vapor then it will strike on curve blades of next wheel then again on next wheel. This striking of vapor converts complete kinetic energy of vapor into mechanical work. Pressure of steam 3609.85 N/sqm decreases when it moves through nozzle but still maintain above 3000 N/sqm in above tank, which is liquefaction pressure in 24.1^0C. So, **steam gets converted into water in above tank by giving out heat to surrounding**. Pressure in this above tank is maintained above 3000 N/sqm by piston arrangement shown in figure. Now, water accumulated in above tank is again fall freely in right side tube from height h.

How this model starts working: - At the beginning pressure in this model reduces by absorbing air from it completely. Only some water is maintained in above tank and at bottom part of model. Now, some water will boil automatically and remaining space of model will get filled by water vapor & liquefaction pressure is automatically maintain inside model at environmental temperature.

Now first wheel of top impulse turbine on which nozzles are mounted is rotated around shaft by additional torque supplied from external source at beginning. Due to centrifugal force, vapor in shaft move out from radial pipes & nozzles by force. Now pressure of vapor in shaft reduces & to fill this

partial vacuum, vapor from bottom tank move up from vertical pipe. Now, as pressure in tank at bottom reduces than liquefaction pressure, water in this bottom tank starts boiling automatically by absorbing atmospheric heat. Now as vapor come out from nozzle in above tank. Additional vapor increases pressure in above tank more than liquefaction pressure. Vapor in above tank starts converting into water automatically by giving out heat to atmosphere. Now, current of steam from bottom tank to above tank is created as boiling of water in bottom tank & cooling down of steam into water in above tank started.

Small quantity of water is converted into huge quantity of vapor, which flows from vertical pipe with great velocity. When vapor moves from pipe of increasing cross section. Some of velocity head get converted into pressure head, which may be more than liquefaction pressure. In radial pipe this pressure again increases due to centrifugal force. So, when vapor come out from nozzle pressure of vapor in above tank increases more than liquefaction pressure i.e. 3000 N/sqm. Piston arrangement attached to this tank maintains liquefaction pressure in above tank. Now, vapor in this tank starts converting into water at liquefaction pressure.

As vapor come out from nozzles with great velocity. Nozzles are pushed in opposite direction due to impulse in opposite direction. As more and more water start boiling in bottom tank, impulse act on nozzles increases. After some time first wheel of impulse turbine in above tank starts revolving our self due to torque created by this impulse forces on nozzles.

Pressure of vapor at the inlet of turbine increases more than liquefaction pressure but some velocity head remain in vapor. This remaining kinetic energy of vapor is used to run above impulse turbine and generate power. Kinetic energy of vapor revolve first wheel of nozzles by impulse created by out going vapor. If any kinetic remain in vapor then jet of it struck on bucket of near wheel which revolve in opposite direction. If again some kinetic energy remains then it struck on adjoining buckets of 3rd wheel. By such arrangement maximum kinetic energy of vapor is converted into useful work.

In this model energy is generated at two turbines, Palton wheel impulse turbine at bottom & Impulse turbine at top. Energy generated by Palton turbine is depending on flow of water & height of fall of water. As fall of water is more energy generation will be more.

Mathematical calculation of this small model: -

Input -

1) Liquid = Water
2) Height (head) = 2 m
3) Consumption of water = 0.01 kg/s
4) Pressure at the entrance of top Turbine = 3300 N/sqm
5) Pressure at which valve at bottom release (pressure under which water boiled) = 2500 N/sqm
6) Diameter of pipe through which vapor flows = 0.04 m
7) Adiabatic constant k = 1.4
8) Gas constant R for this gas = 461.50 J/kg ^{0}k
9) Consider environmental temperature = 24.1 ^{0}C = 297.25 ^{0}k

Output: -

When water falls from height h

$$\text{Height } h = 1/2gt^2$$

$g = 9.81 \text{ m/s}^2$ $h = 2$ m

So, $t = 0.638$ s

Final velocity of water near Palton wheel turbine $V = gt$

$$V = 9.81 \times 0.638 = 6.264 \text{ m/s}$$

Max work done by turbine = kinetic energy of water $= \frac{1}{2} m V^2$

$$= 0.5 \times 0.01 \times 6.264 \times 6.264 = 0.196 \text{ watt}$$

Now, water get suck into zigzag pipe or tank where it boils

For boiling at bottom: -

By Gas equation

$$P1V1 = mRT$$

At environment temperature

$$V1 = 0.01 \times 461.50 \times 297.25 / 2500$$

Volume V1=0.5487 cum/seconds

C/s area of pipe after boiling $A = 3.14 \times d^2/4 = 0.001256$ sqm as d=0.04cm

Velocity of vapor = Volume/area = 0.5487/0.001256

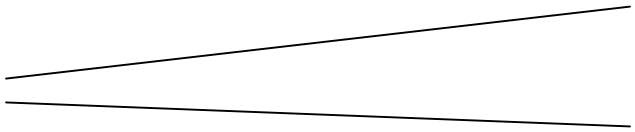
= 436.88 m/s

= 1572.77 km/hr

Density of vapor D=Mass/Volume

Density of vapor D=0.01/0.5487 =0.018 Kg/cum

w1=0.018 x 9.81 = 0.1788 N/cum



Now, c/s of pipe is increases to increase pressure of gas

<u>In adiabatic change</u>,

Require pressure P2 for liquefaction = 3300 N/sqm

If this change of pressure is sudden then

$$P1V1^k = P2V2^k$$

Volume of vapor after c/s changes $V2 = (2500/3300)^{(1/1.4)} \times 0.5487 = 0.45$ cum/s

Density of vapor =0.01/0.45 =0.0222 kg/cum

w2= 9.81 x 0.0222=0.218 N/cum

<u>For Adiabatic flow</u>

$k/(k-1)P1/w1+V1^2/2g=k/(k-1)P2/w2+V2^2/2g+(Z2-Z1)$ ------(1)

Z2-Z1=wt of gas X height/w

= 2 m

$k/(k-1)P1/w1 = 48943.23$ m

$V1^2/2g = 9728.118$ m

P2= 3300 N/sqm

k/(k-1)P2/w2=52983.7 m

So, by 1st equation

$V2^2/2g = 5685.644$ m

V2 =333.9945 m/s

Area A = Quantity of flow/velocity

A2=0.45 /333.9945=0.001347 Sqm

Diameter of pipe require, d2=0.04143 m

Gas equation PV =mRT

So, temperature T=3300x0.45/(0.01x 461.50) $=321.7893\ ^0$ A

$= 48.639\ ^0$ C

Due to sudden change in pressure temperature of vapor increases to $48.639\ ^0$ C

Kinetic energy remain in gas $=0.5m\ V^2 = 0.5 \times 0.01 \times 333.9945^2$

K.E. =557.7616 Watt

This energy can be generated by second impulse Turbine

Total energy generated = 0.196 + 557.7616

= **557.9578 Watt ----------(1)**

Energy get absorbed in boiling = 0.01 x 2433.10 x 1000

=24331 Watt

Efficiency of Turbine =557.9578 /24331 = 2.29 %

To convert this kinetic energy into useful work impulse turbine is used

Author consider new impulse Turbine

In this turbine water vapor moves through pipe embedded in disk radially.

Due to rotational motion of disk pipe also rotate. This creates centrifugal force.

This force will act on water vapor in pipe. Due to this force, pressure of vapor at the tip of pipe, which is ready to leave pipe increases.

Consider radius of this circle trace by pipe r = 10 cm

Consider velocity of tip of pipe move with tangential velocity =0.5(Velocity of vapor in pipe)

=0.5(333.9945)

=166.9973 m/s

Velocity of vapor in radial pipe in circular direction =Velocity at middle of pipe

= 0.5 x 166.9973

= 83.498 m/s

rotation =166.9973/(2x3.14xR)= 265.919 rotation/second

Mass density of vapor = 0.0222 kg/cum

Let, three radial pipes are mounted on shaft of area A

Area of one pipe C/S =A/3

=0.001347/3

=0.000449 Sqm

So, diameter of pipe d=0.0239 m

Volume of vapor in one pipe = Length X Area

=0.1 x 0.000449

= 4.4912×10^{-5} Cum

Total mass in one pipe = density x volume

=$0.0222 \times 4.4912 \times 10^{-5}$

m=9.98×10^{-7} kg

Total centrifugal force on vapor in one pipe =mv^2/r

R = 0.05 m & v =83.498 m/s

F =0.139 N

Additional pressure developed due to this force at outer tip =F/A

Additional pressure= 0.139/0.000449

=309.855 N/sqm

Vapor come out from pipe tip under pressure =3300 + 309.855

=3609.855 N/sqm

In nozzle some pressure head get converted into velocity head due to convergent but pressure in tank maintain more than 3000 N/sqm.

So, due to liquefaction pressure in above tank water vapor gets converted into water by giving out heat to atmosphere.

This water is accumulated at bottom tank and again drop from height h. This type of cyclic motion takes place in this model continuously.

As top turbine of this model is not operated at the high temperature. Blade in this turbine may be made up of lightweight good quality plastic or fiber material. So, angular velocity of this turbine is high. Even in generator, iron core & coil in magnetic field can be detached. This will increase angular velocity of coil in magnetic field & will generate more electricity. Pipe and tank will be made up of aluminum or copper. So, heat will easily come into the system & go out.

To create such type of model is challenging job. When environmental temperature changes liquefaction pressure of model also changes. So, we must create model, which operate at changing liquefaction pressure. This is possible by electronically controlling valves & pistons in model at different pressure.

Just consider material used in bottom & top tank is Aluminum.

Whose K =237 W/m ^{0}C

Thickness of Aluminum sheet = 2 mm =0.002m

Heat flow require per second in above example =24331watt

Heat flow per second =K x Area/Length x Temperature difference

Let, consider temperature difference = 1 ^{0}C only

So, 24331= 237 x Area/0.002 x 1

Area of sheet require to absorb this heat A =0.205 sqm

Or 0.453 x 0.453m size area is sufficient to absorb this heat.

If temperature difference is more then area require will be less.

If copper is used at the place of Aluminum then this area will be again less as K

for copper =403 W/m ^{0}C

Above model is small model. Big model can also be constructed by this method.