

**YES!**  
**THE REAL**  
**SOLUTIONS!**

**30 YEAR**  
**ANNIVERSARY!**  
**1993—2023**



**TeslaEngine.org**  
**CLEAN ENERGY Now!**

**If "Climate Change"**  
**Concerns are Real Then**  
**Why Is Tesla's Greatest**  
**Invention Continuing to**  
**Be Suppressed?**

***Dedicated to Tesla and his Prime Movers***

***Thank You For Your Continued Support!***

***TeslaEngine is a Registered Charitable Organization***  
***Donations may be Tax Deductible***



**TeslaEngine.org**

# NO LONGER HIDDEN



## Nikola Tesla's Clean Energy Solutions



***Jeff Hayes***  
***Industrial Automation and Motor Control***  
***Instructor Tokyo Japan***

500039

# Power and Resonance

*The  
International Tesla Society's Journal*



VOLUME 6

NUMBER 3

July/August/September 1990



***Jeff Hayes represents the International Tesla Society at the 1989 Swiss Association for Free Energy Conference.***

**Universal evidence unmistakably shows that the best results are always obtained in healthful commercial competition...The fundamental patents have expired and the opportunities are open to all.**

***Nikola Tesla***

# **TESLA'S TURBINE ARCHIVES**

## **Museum's Turbine Holdings Remain Unavailable**

When Tesla died in 1943 his extensive archive, which consisted of 80 trunks, was impounded by the FBI and Office of Alien property. Most of the archive was finally released in 1952, to Tesla's Nephew, Sava Kosanovich, after extensive legal petitioning. It was transported to Belgrade Yugoslavia and housed in a museum erected to honor and memorialize Tesla. Much of this archive remains unpublished and unattainable, including documents pertaining to the turbine.

In 1990 Alexander Marincic, who was at that time the Tesla museum director, attended the International Tesla Symposium and gave a presentation. He also submitted a paper. There was, at the time, preliminary plans to microfilm the entire contents of the Tesla museum archive. This would finally make unpublished materials available to researchers and the general public. This never happened, however, and professor Marincic is no longer the museum's director.

The paper that professor Marincic submitted included a preliminary index of the contents of the museum archive in apparent anticipation of its expected release. This index included a category for Mechanical Engineering and Turbo Machines as listed below:

### **IV. MECHANICAL ENGINEERING - MECHANICAL TECHNIQUES IN GENERAL**

- 1.** Springs
- 2.** Gears
- 3.** Phonograph
- 4.** Crankshaft machines and tools (drills)
- 5.** Ships: propulsion, patents, dates and ship building
- 6.** Automobiles - general (other than propulsion) and automobile electrical device
- 7.** Practical mechanics
  - a.** Balancing of rotating parts at critical speeds
  - b.** Mechanism kinematics
- 8.** Valves and valvular conduits

9. Piston heat engines and motors  
(mechanical oscillator)
  - a. Locomotive
10. Various
  - a. Machine elements (except springs and gears)
  - b. Drawings
  - c. Rockets
  - d. Technical economy
  - e. Materials and tenses
  - f. Yugoslav patents of machine technique

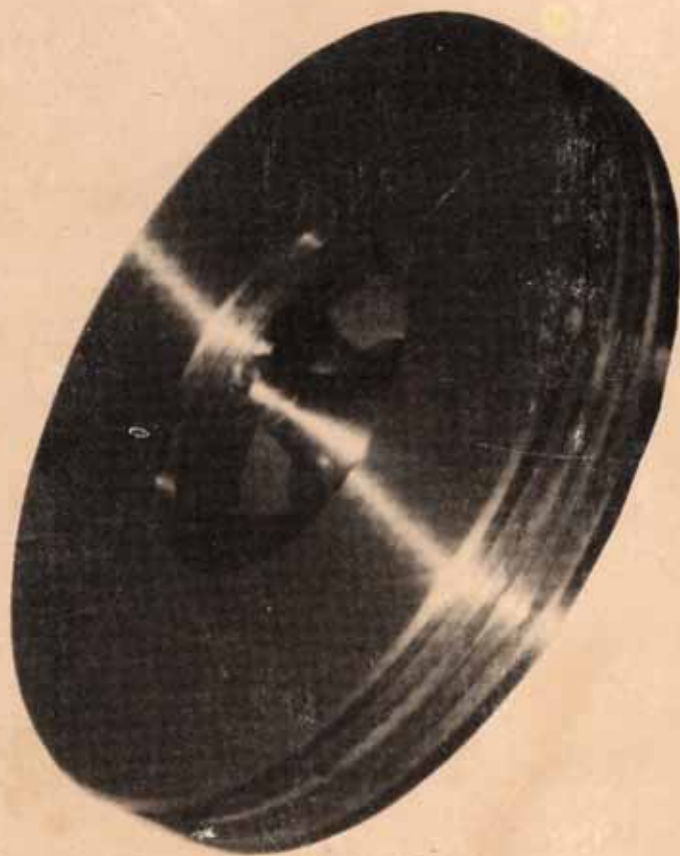
## **TURBO MACHINES AND THERMODYNAMICS**

1. Turbine (mostly heat), technical theoretical part, except group  
“Fluid Propulsion”
2. Active turbo machines
  - a. Vacuum pumps
  - b. Pumps (other than vacuum)
  - c. Compressors and blowers
  - d. Ventilators
3. Turbo Machines Generally
  - a. Generally about turbines
  - b. Collective works on turbo machines, related devices and  
hydraulic brake
  - c. Works on turbomachines which Tesla  
designated as “Fluid Propulsion”
4. Court processes in connection with turbo machines
5. Turbine propelled ships, torpedoes - propulsion in general
6. Gas turbine - propulsion of automobiles and airplane
7. Thermodynamics and thermics, also in connection with turbines

Tesla researcher Leland Anderson has informed TEBA that Sava Kosanovich, Tesla’s nephew, corresponded with him in 1952, after the release of the archive, claiming that it contained a comprehensive 300 page typewritten manuscript that Tesla had prepared on his turbines, including the gasoline turbine.

Mr. Anderson has, over the years, made continuing attempts to access this documentation. Unfortunately the contents of this document, as well as that of most of the other museum holdings pertaining to the turbine, remain unpublished and unavailable.

***BOUNDARY-LAYER  
BREAKTHROUGH***



***THE BLADELESS TESLA TURBINE***

As developed by C.R. "Jake" Possell

Compiled by Jeffery A. Hayes

**VOLUME II. THE TESLA TECHNOLOGY SERIES**



# TESLA'S ENGINE



**A NEW DIMENSION FOR POWER**

**Compiled by Jeffery A. Hayes**



*Nikola Tesla's Thermo Dynamic Transformer*

**THE REAL ENERGY SOLUTION**

Jeffery A Hayes

Journey back to the future and discover the fascinating secret behind the most powerful and economic combustion engine of our time: Tesla's whirl wind machine of natural harmony.

Experience the excitement of understanding as the vortex energy, of a perfectly controlled mechanical tornado, shatters the boundaries of our current mechanical standards.



***Nikola Tesla***

This amazing engine will improve all aspects of our mechanical life. Today's applications range from high mileage vehicles and supersonic aircraft to freon free air conditioning and virtually indestructible pumps.

Conventional pumps and engines pale in comparison. This jewel of mechanics has no equal. It stands alone above all others. No other pump or engine can match the longevity, economy, size, safety, silence and vibration free Herculean power of this truly elegant machine.

Tesla's Engine waits patiently, ready to solve the efficiency and pollution problems of today and will literally usher in

***A New World***

***Fully Illustrated***



***TeslaEngine.org***

# A TRUE ENERGY AWARENESS

## *Father of Atomic Energy Says **NO WAY** to Nuclear Energy*

The discover of deuterium, or heavy water, Nobel prize laureate Professor Harold Urey (1893 -1981), was one of the first and staunchest supporters of the use of nuclear power for electrical energy production. He was one of the prominent scientists to witness the hydrogen weapons test conducted at Bikini Atoll.

Professor Urey was dedicated to an effort that would exploit this power for the benefit of man and spearheaded a campaign, "Atoms for Peace," devoted to the rapid establishment of nuclear power for electrical generation.

As one of the worlds most respected spokesman for the nuclear theme, it is significant to note that by the early 1970's, after a spiritual and intellectual awakening, he was totally convinced of the folly of his previous convictions.

Warning bells rang in professor Urey's psyche as he realized that the nuclear poisons could not and were not to be contained. He predicted that this demon, which he had once embraced, would devastate all human life on the planet without even a single detonation of a nuclear device.

Professor Urey began to sound the alarm bells in the scientific community with a fervor unknown to his previous nuclear promotions.

His message, however, was falling on deaf ears.

Professor Urey explained that environmentally derived energy production in unlimited quantities had been proven a reality, therefore negating any need for atomic power on earth.

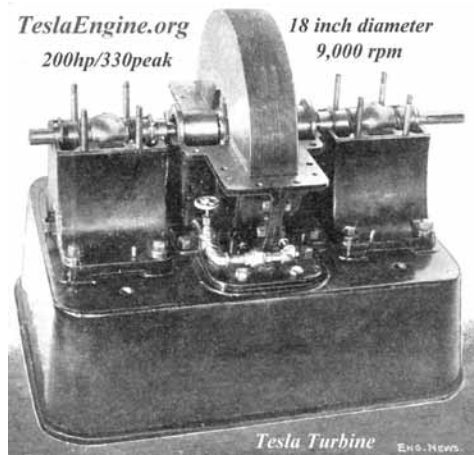
He accused the scientific community of being blind to the true and simple facts of energy, stating that nuclear scientists are like children not knowing the true value of currency. Thinking they are richer with many pennies, rather than a single piece of highly numbered paper.

Tesla's Engine is one of these highly denominated but ignored devices professor Urey was making reference to.

Professor Urey was, like Tesla, a scientist of the highest integrity. In both of these men's lives, truth reigned supreme over ego. Quoting Tesla:

***The scientists, from Franklin to Morse were clear thinkers and did not produce erroneous theories. The scientists of today think deeply instead of clearly. One must be sane to think clearly, but one can think deeply and be***

***Quite Insane!***



*Tesla Engine Builders Association*  
*Bringing You the **Real Power** of Tesla*  
*TeslaEngine.org*

# **OPEN LETTER TO ELON MUSK**

Greetings Mr. Musk,

Please accept our compliments on your progress!

We especially admire your attitudes toward constant exploration of your blind spots and ready admittance when errors have been made. Very admirable indeed. It is with this spirit in mind we are hoping to address some of Nikola Tesla's work, hidden from many, primarily aware of only Tesla's mainstream electrical accomplishments.

We had the pleasure of meeting your chief technical officer JB Straubel when he attended, as keynote speaker, the Midwest Renewable Energy Association Conference. During the VIP dinner he was asked if he, or Tesla Motors, was familiar with the Tesla Turbine Engine. His reply was no, he had never heard of this, or was even aware that there could be such a thing! He was given our website address but really didn't take it seriously, having no idea Tesla considered this his Greatest Invention, Tesla by training & First Love a Mechanical Engineer!

Since its inception in 1906, until his death in 1943, Tesla promoted his thermal converters as the Real Solution. How interestingly ironic it is, that Tesla Motors chiefs have completely missed and discounted Tesla's most important and comprehensive work. Proving once again that even the most "successful" among us are subject to such blinders. Please do become familiar with Tesla's Comprehensive Solution. It is what you are seeking.

Also you should be aware, that Harold Stine, Chief of Naval Operations, White Sands Missile Base, essentially declared rocketry, Dead, in 1957, while describing a new branch of physics, designated Electro-Gravitics, (William Crooks / Thomas Townsend Brown). Stating that the classified performance characteristics of craft employing this physics may be above light speed. Also stating that the entire thing might soon go black. This happened quickly with the formation of NASA, in the autumn of 1958. How could you have missed this? Seems many more than you have! See the work of Dr. Paul LaViolett, for a fascinating narrative of all the details.

See Also: TeslaEngine.org; "The Open Secret."  
Original Documents have been distributed for decades now!

Please also do get up to speed on the physics of Biphasic "Tesla Love" (attached). You have stated many many times that "Love is the answer." What you have missed, as have most others, is that Tesla electrically generated "Love." This Longitudinally polarized, other dimensional force, has proven to be the most effective treatment for a wide range of health conditions, including "incurable" cancers. Declared publicly as just such an advance by Tesla himself, in 1896! Suppressed during the 1940's by the Rockefeller/Carnegie medical takeover, initiated in 1912, with claims of quackery, while the opposite proven true. Not just Biphasics suppressed, but all forms of effective competing medical practice!

Hard to stop Biphasics now, as these devices have been sold in the millions for electro-massage! Even better yet, Tesla's health regenerative claims have been overwhelmingly validated by modern medical researchers. Although still politically charged, it has proven the best hope for the very aggressive Glioblastomas and even restorative dentistry and macular degeneration, while ruling supreme in the treatment of psychological conditions and so much more! Completely noninvasive, it is stealthily coming back into vogue.

Love Heals by Negation of the Transverse,  
Available to the Aware. Don't miss out!  
Praying you are Real!

*In your own words:*  
<http://www.TeslaEngine.org/musk.mp3>

***Tesla Turbine Amazes Engineers During testing at the Energy and Environmental Research Lab. Only turbine proven to survive undamaged when operated on 100% combustion products of biomass.***

***Political Considerations Block Further Funding!***



***Eleven Inch Tesla Turbine Engine***

# ***The Real Energy Solution***

**Funding for testing provided by  
the California Energy Commission  
establishes Tesla Turbine Engine**

**Has No Equal!**



***Tesla Turbine shown operating on  
combustion of saw dust***

**Unfortunately it would seem a  
solution is not what is really desired  
but instead only a constant  
Money Consuming Quest.**

PAUL A. LAVIOLETTE, PH.D.

SECRETS OF  
**ANTIGRAVITY  
PROPULSION**

Tesla, UFOs,  
and Classified  
Aerospace  
Technology

See: [TeslaEngine.org](http://TeslaEngine.org) "The Open Secret"





*Tesla Engine Builders Association*  
*Bringing You the **Real Power** of Tesla*  
*TeslaEngine.org*

# “LOVE IS THE ANSWER”

This mysterious expression has said to occur as primary resonance of the Fundamental Primordial Substance and is not a Separated Quantum. Instead being the Longitudinally transmitted harmony of the substance Itself. Powerfully Resonating throughout, instantly, and independent of “Time and Space.”

Detectable in the physical realm as “Longitudinal” Capacitance. Known and designated as “Tesla Scalar Waves.” Nikola Tesla being the first to electrically describe and experimentally demonstrate this Fundamental Dimensional Reality.

Tesla is also namesake to the official (SI) Quantum Element of “Transverse” Inductance, Symbol **T**. Tesla again being first in recognizing and experimentally demonstrating the resonance of this previously discovered electrical phenomena.

This Transverse energy, spontaneously manifesting as a Separation from the Primary Etherial Substance, expresses in equally created “Lines” of force. The arithmetic density of these lines per given area being defined by the term “Tesla.”

Conventional Chemistry, registered by our senses, is resultant from the rotational Transverse resonances of this “Flux” and is creative of all the physical “Elements.”

The Primary Substance, being the Fundamental, powerfully resonates Longitudinally Not Transversely. This eternal etherial substance has proven to be outside the realm of time and space, as perceived in our Transverse Physical Reality.

Often mistaken or counterfeited, Tesla Scalar Waves can only prove authentic if not a Derivative or Transverse Modulation. Propagating Longitudinally throughout, freely, without time delay, attenuation or separation.

***Tesla discovered that high level Physical and Spiritual Electrically Communicated Atonement can be Achieved by ‘Biphasic’ or ‘Caduceus’ Negation of the Transverse Magnetic/Chemical Polarities. Allowing expression of the Longitudinally Transmitted, Fundamental, Etherial Substance, from which all Healing Apparently Derives. Also described as “The One” “God” or “Love.”***



***Biphasic “Yin Yang” Negation Manifesting and Revealing Center Wave of Zero Resistance Longitudinal Resonance***

**Healing is Accomplished Primarily during Deep Sleep by the Low Frequency Communicating Longitudinal Resonance of the Lower Right Brain Lobe. Negating the Transverse Left Side "Reality." Fear will always Inhibit or Censor this Right Side Connection when "Conscious." A Physical Survival strategy required during our Transverse Embodiment here. The "Unconscious" Longitudinal Healing Right Side Merger is allowed by the Left Side during deep sleep. If not, Health Deteriorates, Ultimately Resulting in Physical Death. With Returning of One to Source.**



**The Late Spiritual leader Ram Dass developed the following Mantra for Effective Negation of the Transverse Imbalance during "Consciousness." Claiming Universal Transformation if Internalized Daily, Over Time. Although vigorously opposed by his Left side, he persevered, claiming it responsible for His Ultimate Spiritual Awakening, which had Stubbornly eluded him and became his lifelong instruction:  
I AM THE AWARENESS OF LOVE .... or even more effective  
I AM THE HEALING AWARENESS OF LOVE .....**

Patented July 11, 1894. No. 512,181.

OSCILLATION TRANSFORMER

INDUCTION MOTOR

WORLD WIRELESS TELEPHONE TRANSMITTER

TELAUTOMATOR

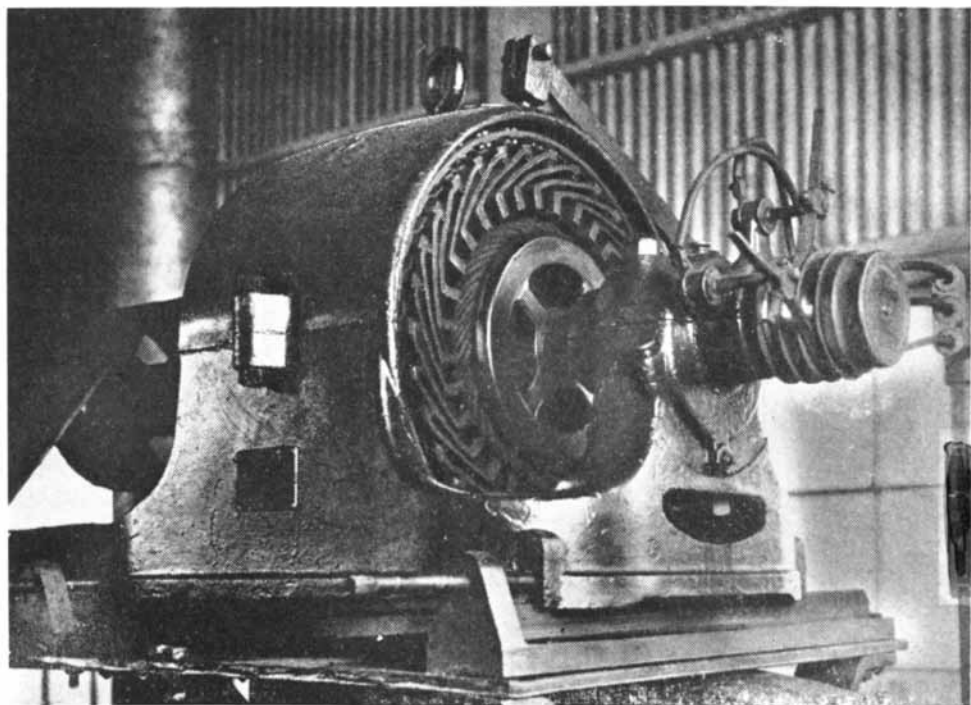
STEAM & GAS TURBINE

**TESLA COMPANY, INC.**  
TELEPHONE 9090 BRYANT

8 West 40<sup>th</sup> St.  
NEW YORK



**Niagara Falls Station**



**1895** Earliest commercial Tesla type motor developed by Westinghouse engineers is pictured above. Introduced about 1895, this two-phase 200-volt wound-rotor ma-

chine had resistances attached to ends of each stator bar. Manually operated multiple-contact (32) rotary rig was used to short resistances when motor attained full operating speed.

# Tesla A.C. Induction Motor



*Induction Motor Stator Rotor Removed*



***Nikola Tesla Introduces His  
Revolutionary Polyphase A.C. Induction  
Motors At The Columbian Exposition***

# ***“MG SET”***



## ***Motor/Generator***

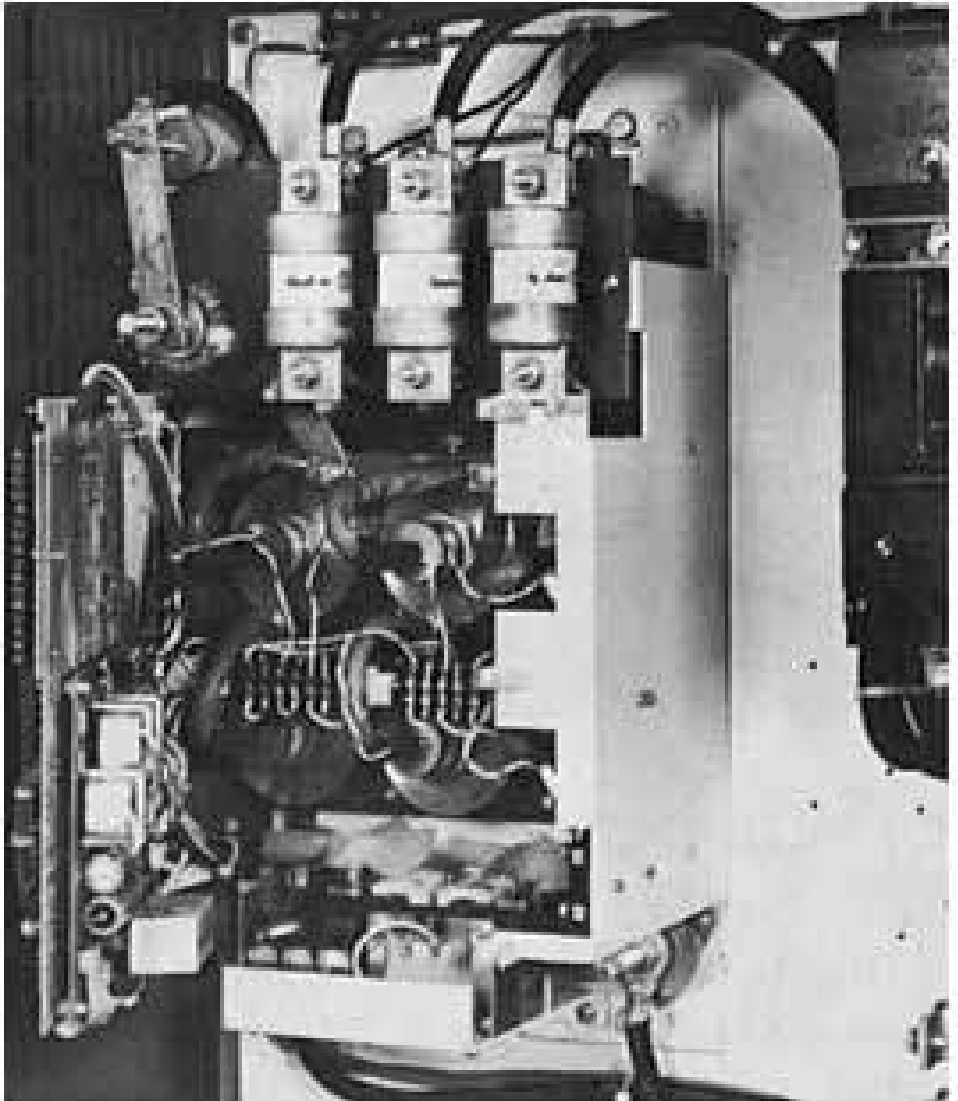
***Tesla A.C. Motor on Right***

***D.C. Generator Left***

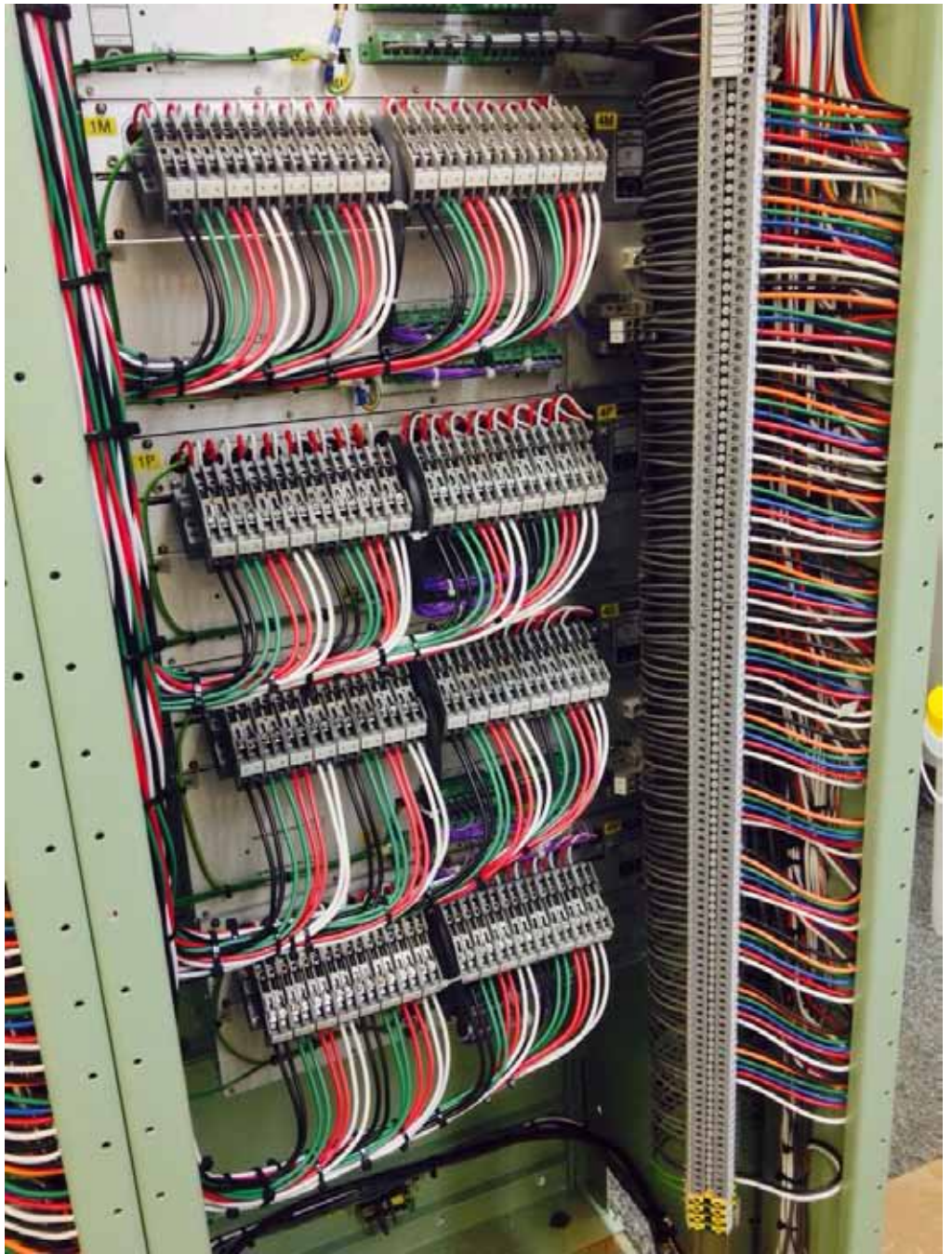


***Solid State Electronic DC Motor  
Speed and Torque Control***



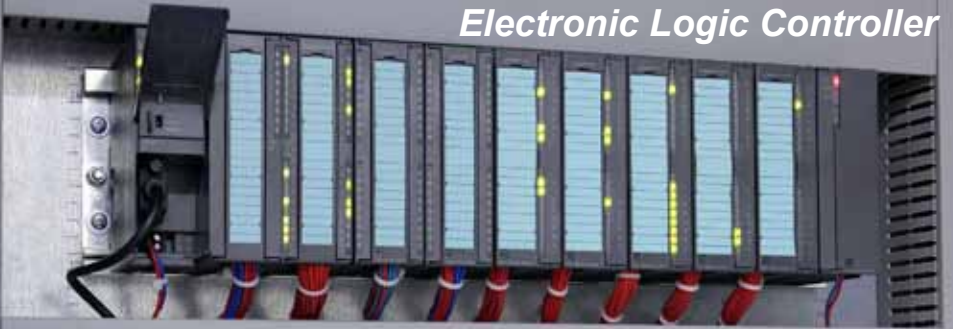


***Analog Computer and  
Silicon Controlled Bridge Rectifier***

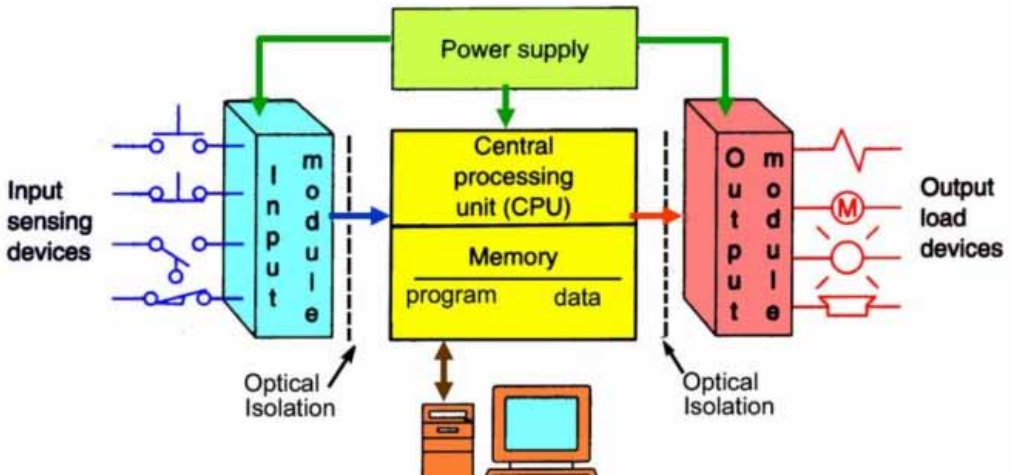


***Tesla Logic Relay Controller***

*Electronic Logic Controller*

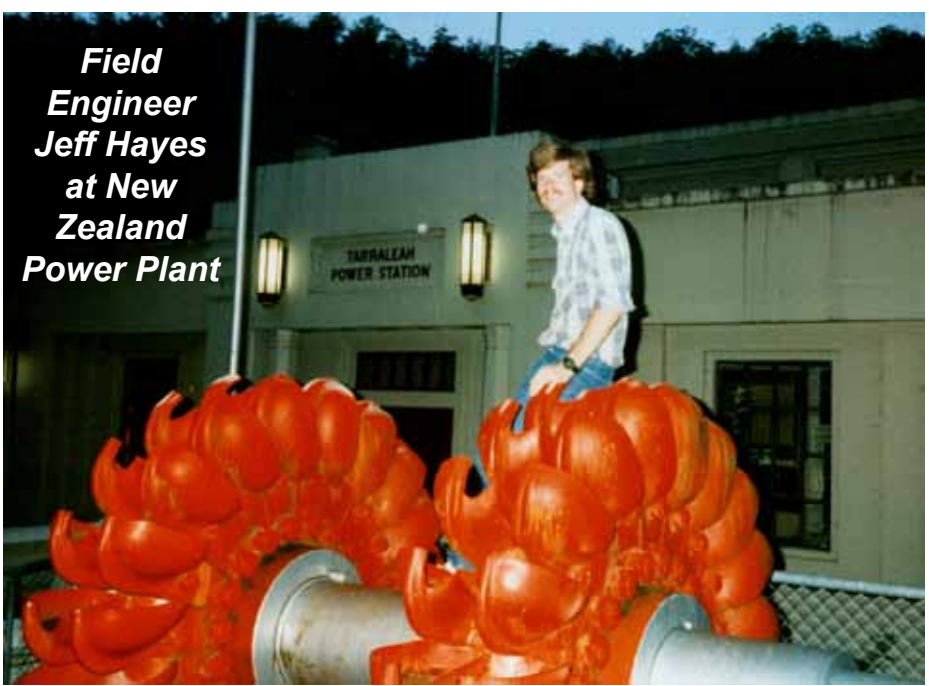


*Tesla Relay Logic*



*Programmable Logic Controller*

**Field  
Engineer  
Jeff Hayes  
at New  
Zealand  
Power Plant**



**Conventional  
Turbine Rotor  
with Lifting  
Surfaces,  
Operating by  
Impulse and  
Reaction,  
Versus  
Tesla's World  
Changing  
Device  
Operating by  
Adhesion and  
Viscosity.**



[TeslaEngine.org](http://TeslaEngine.org)



***THE SANE WAY TO DO WIND  
“Wing Generator”***

# Tesla Turbine *BLADELESS* Pumping

1,061,142.

N. TESLA,  
FLUID PROPULSION,  
APPLICATION FILED OCT. 31, 1909.

Patented May 6, 1913.

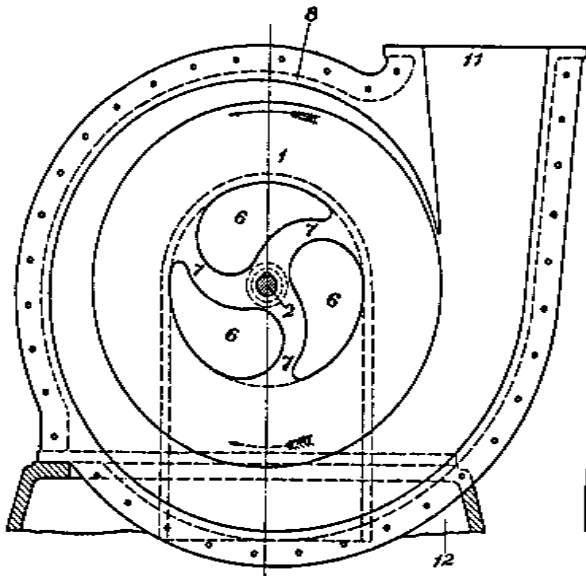


Fig 1

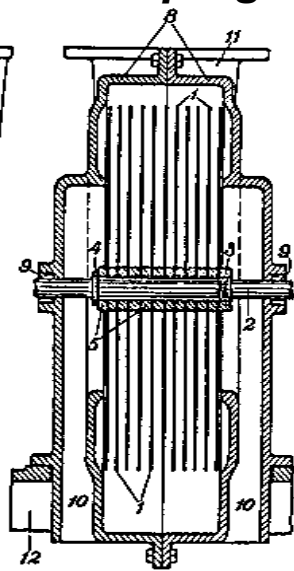


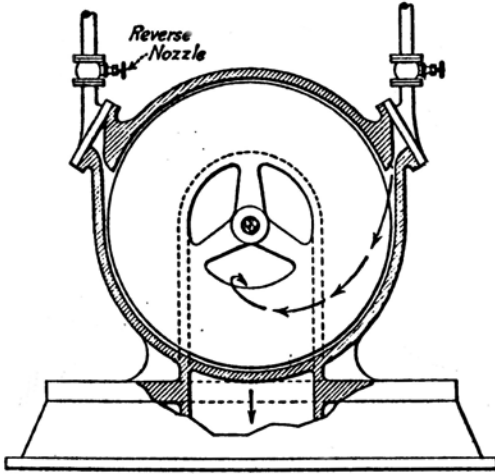
Fig 2

Nikola Tesla,  
Inventor

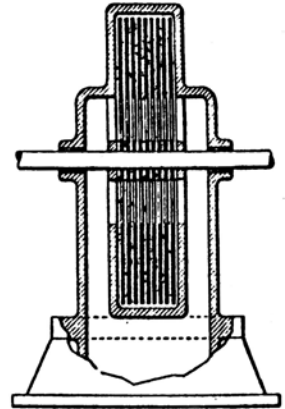


Tesla Turbo Pump

# Tesla Turbine Engine



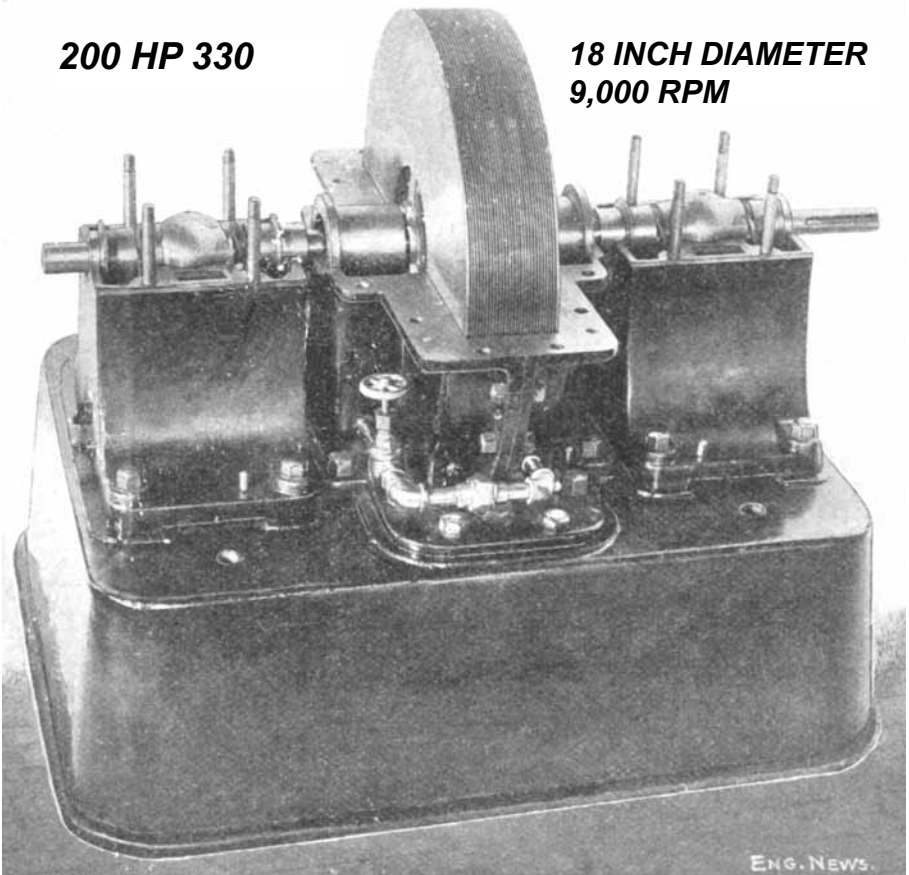
Longitudinal Section.



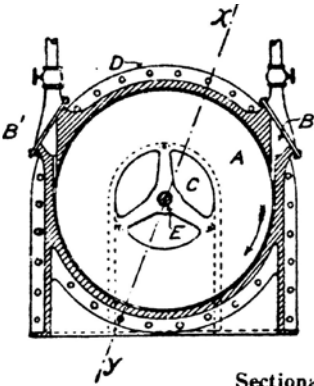
Cross Section.

**200 HP 330**

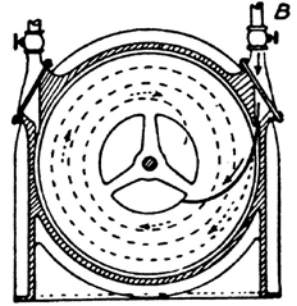
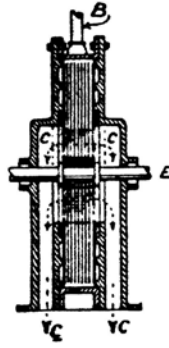
**18 INCH DIAMETER  
9,000 RPM**



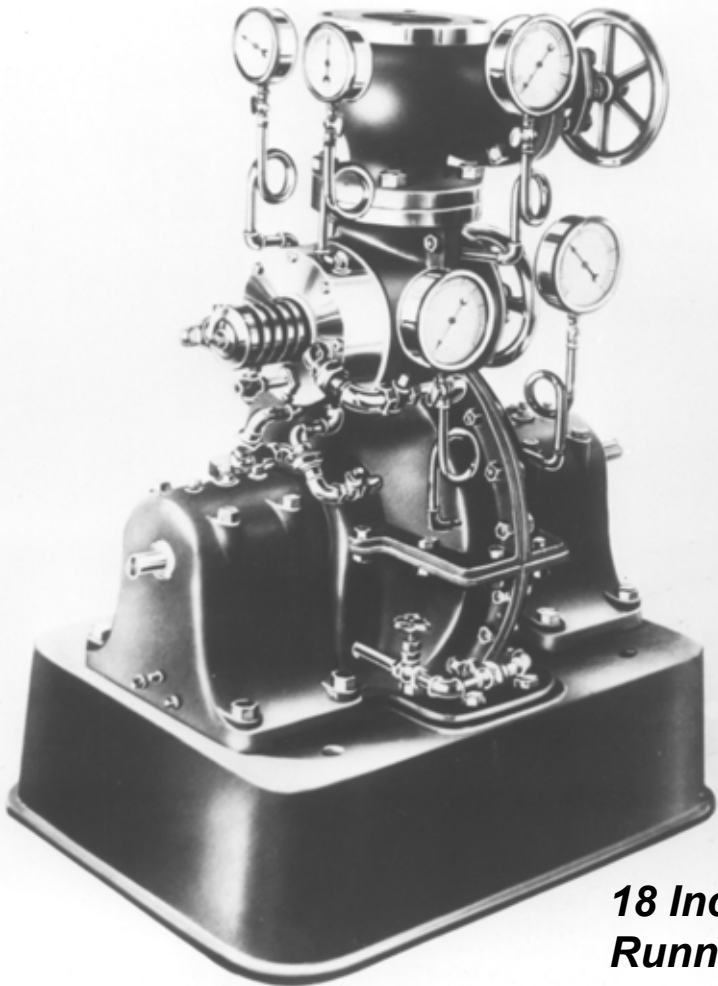
# Tesla Turbine Engine



Sectional views.

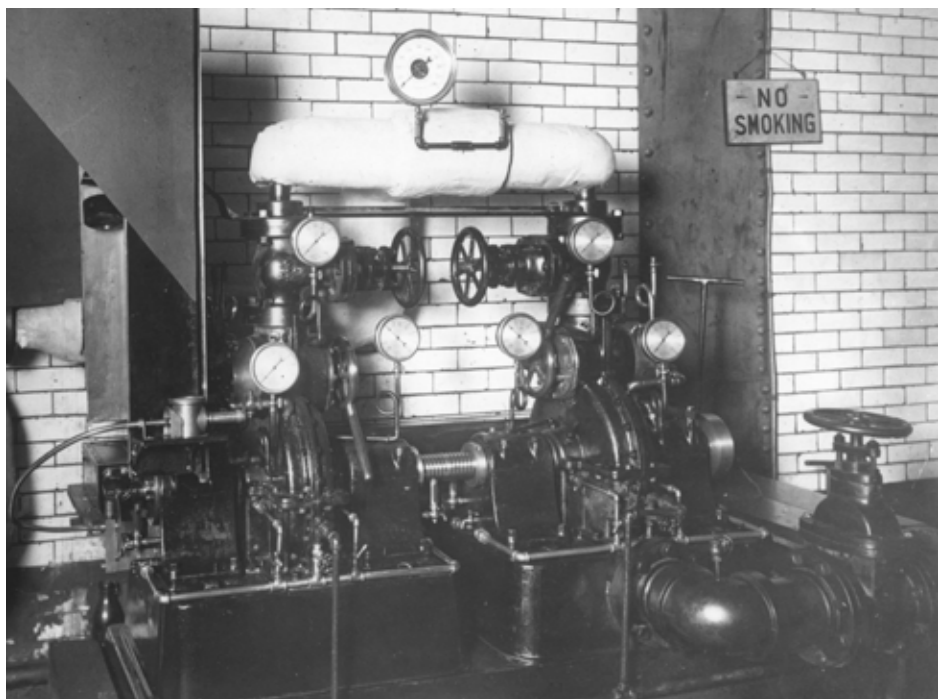


Spiral path of steam.

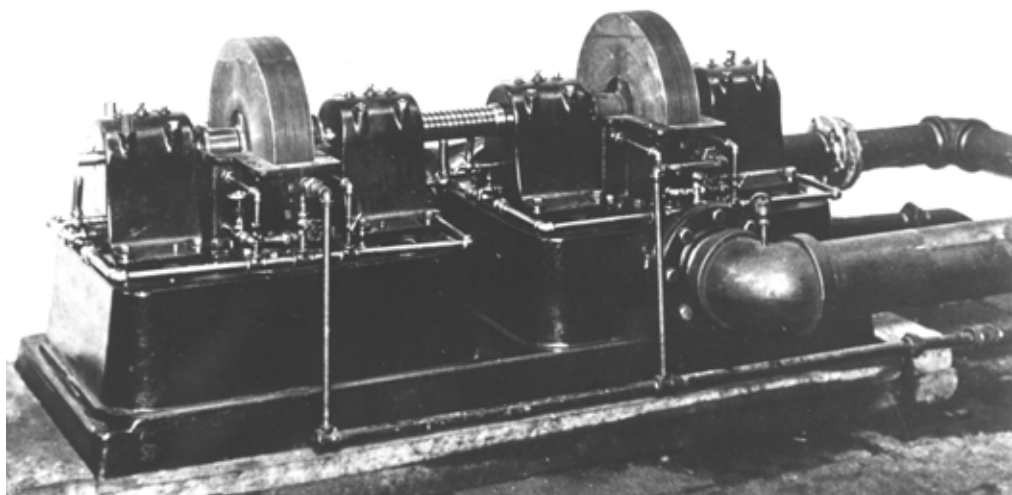


18 Inch  
Runner



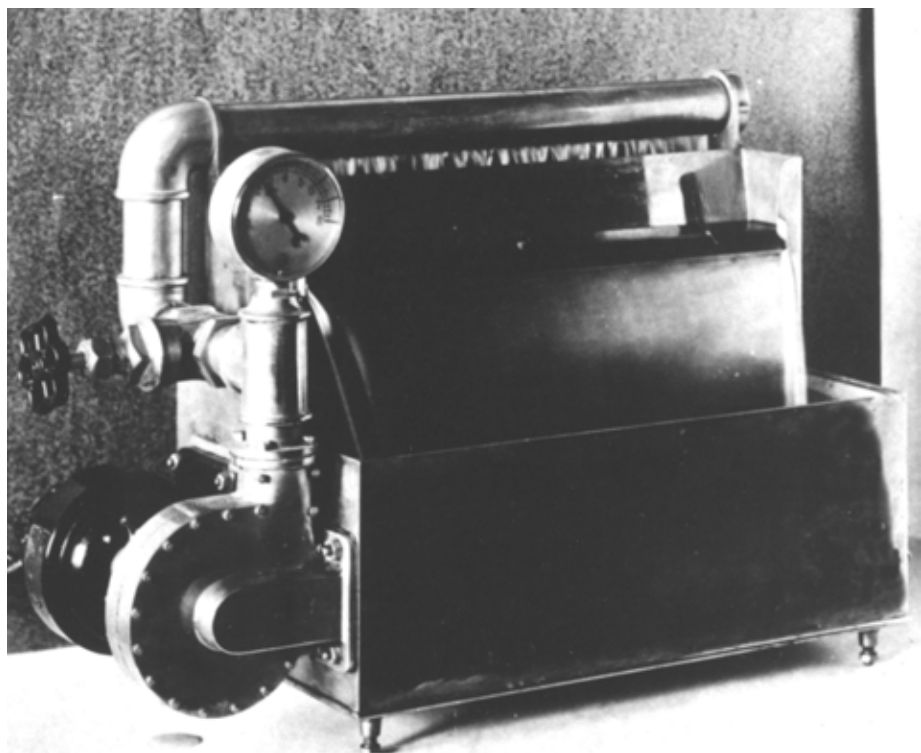


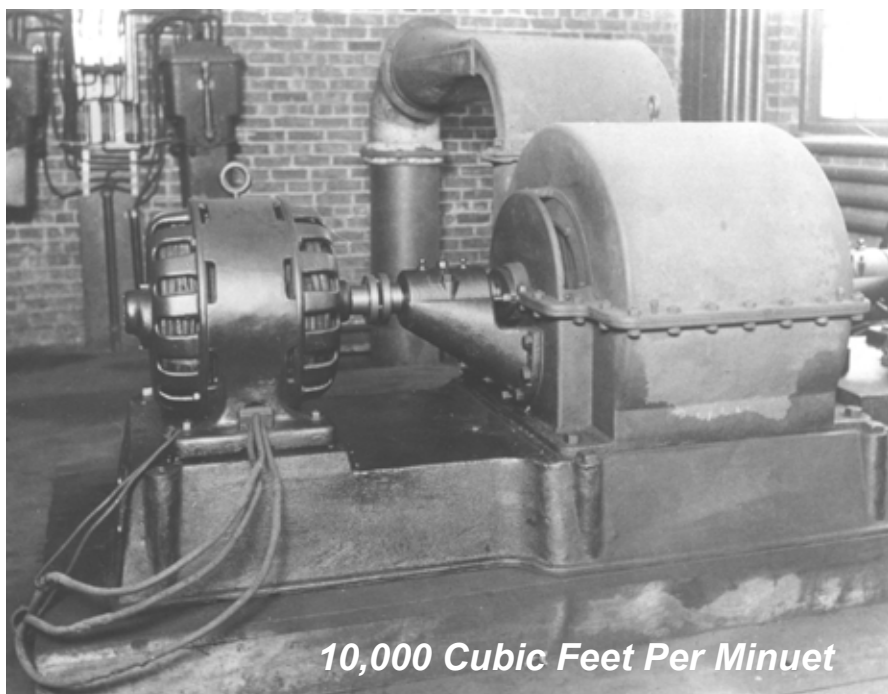
***Tesla's Dual 18 Inch Turbine Test Dyne***



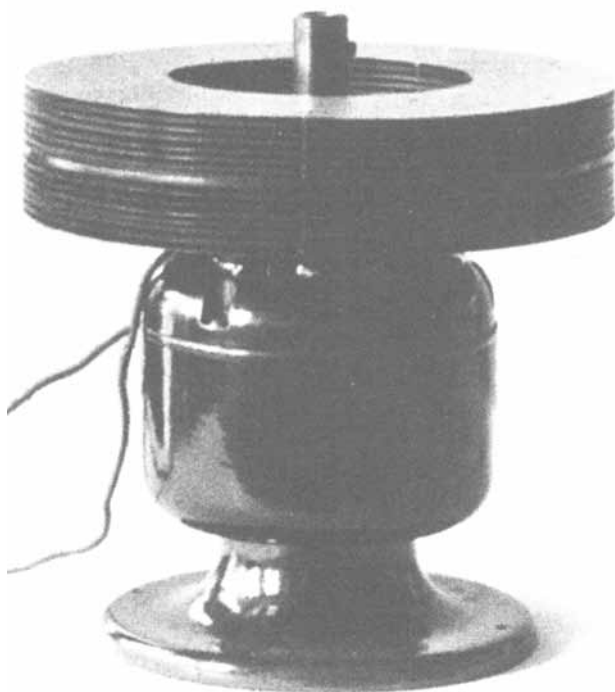
***Tesla's Dual Turbine Test Dyne  
Covers Removed***

# ***Tesla's Demonstration Pump and Reservoir***

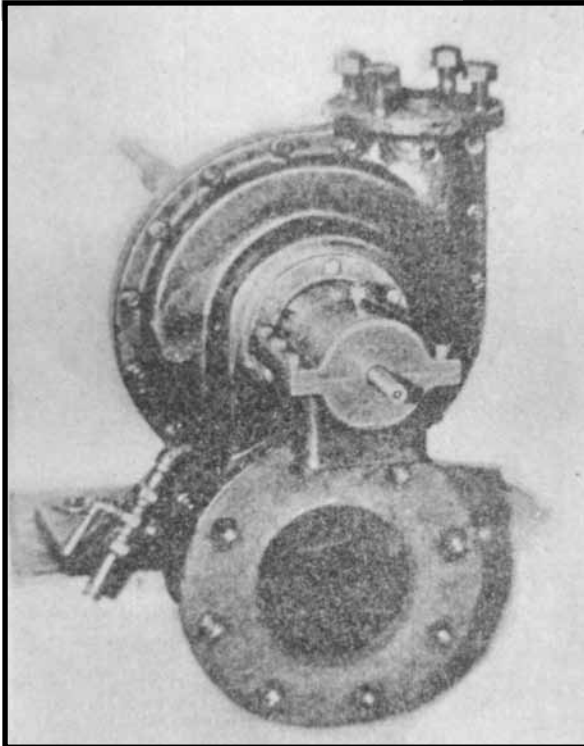
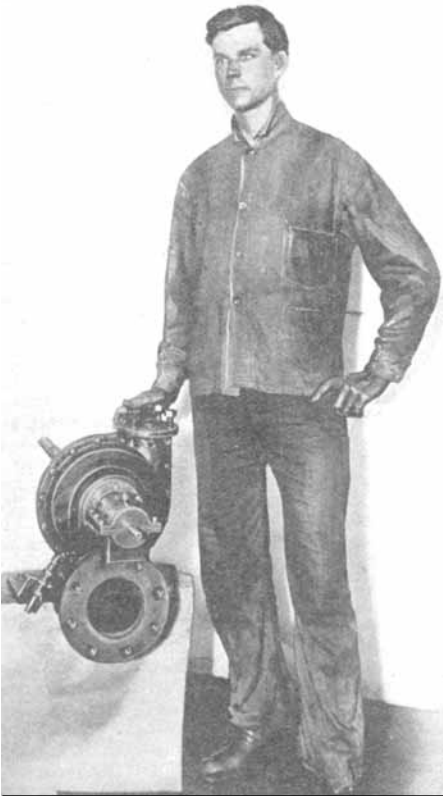




*10,000 Cubic Feet Per Minuet*

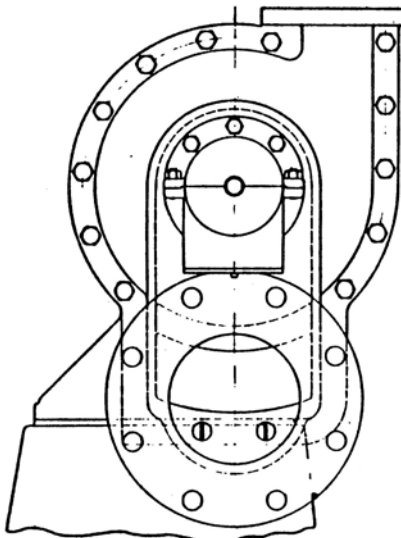


***Tesla Air Blowers***

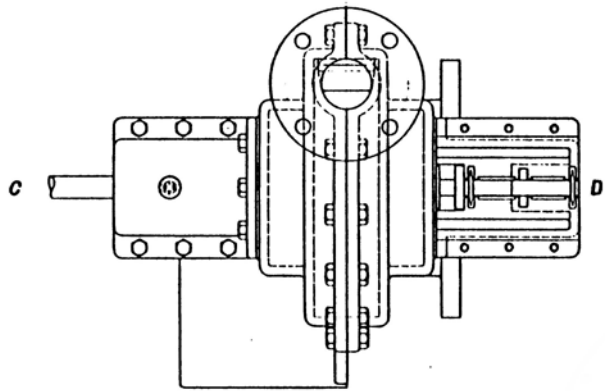


***Tesla 110 H.P.  
Turbine  
Employing 9.75  
inch  
Runner.***

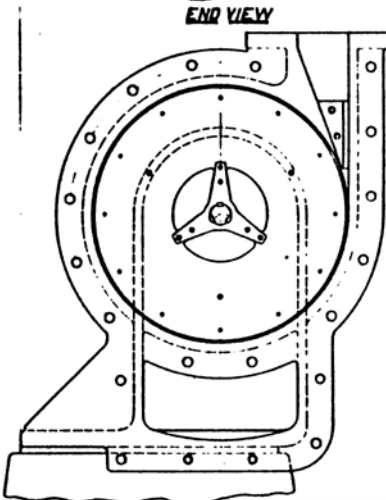
***Tesla stated this  
turbine could  
easily produce  
1,000 H.P. with  
sufficient steam  
volume and  
appropriate shaft.***



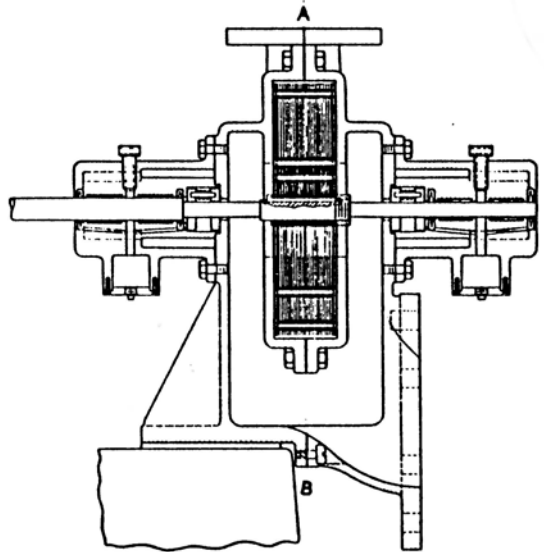
END VIEW



PLAN VIEW



INSIDE VIEW AT A-A

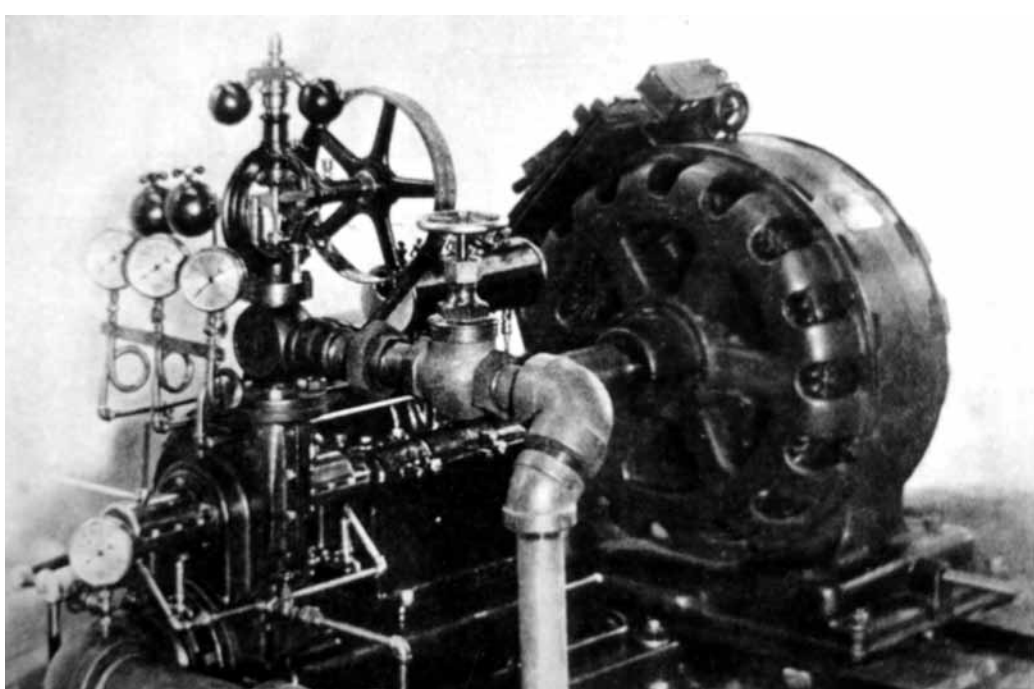


SECTION AT C-C

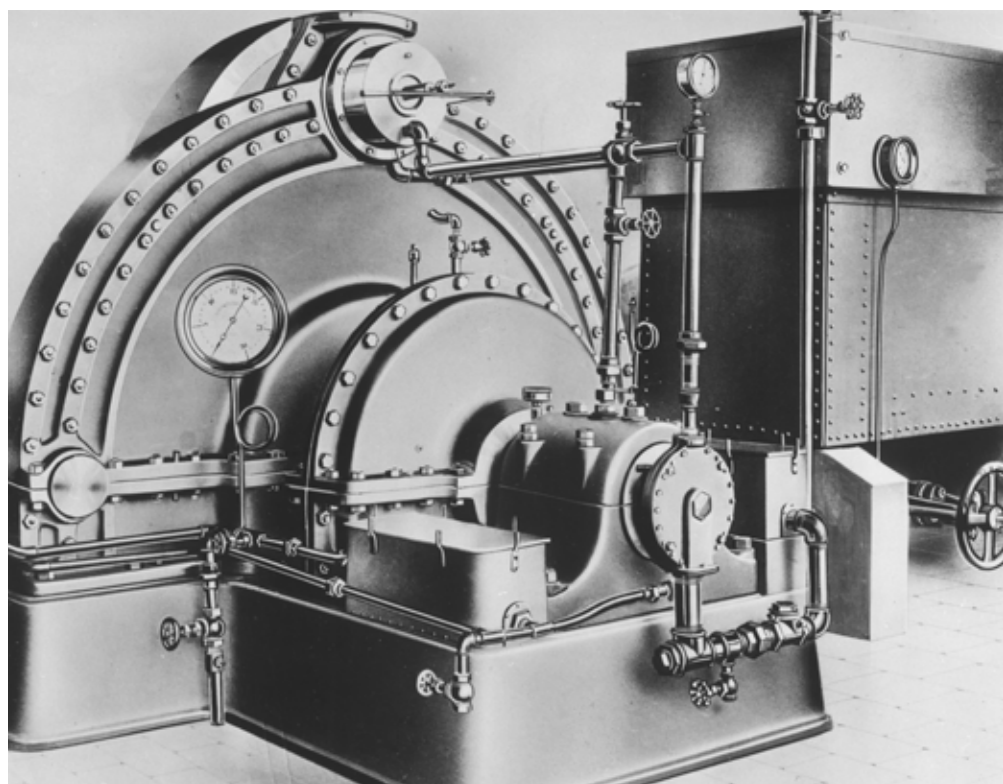
# Assembly Drawing 110 HorsePower Tesla Turbine Engine

<b>TESLA TURBINE</b>	
<b>ASSEMBLY DRAWING</b>	
Made in U.S.A. Date: Jan 25th, 1910 Drawn by J. Thomson.	

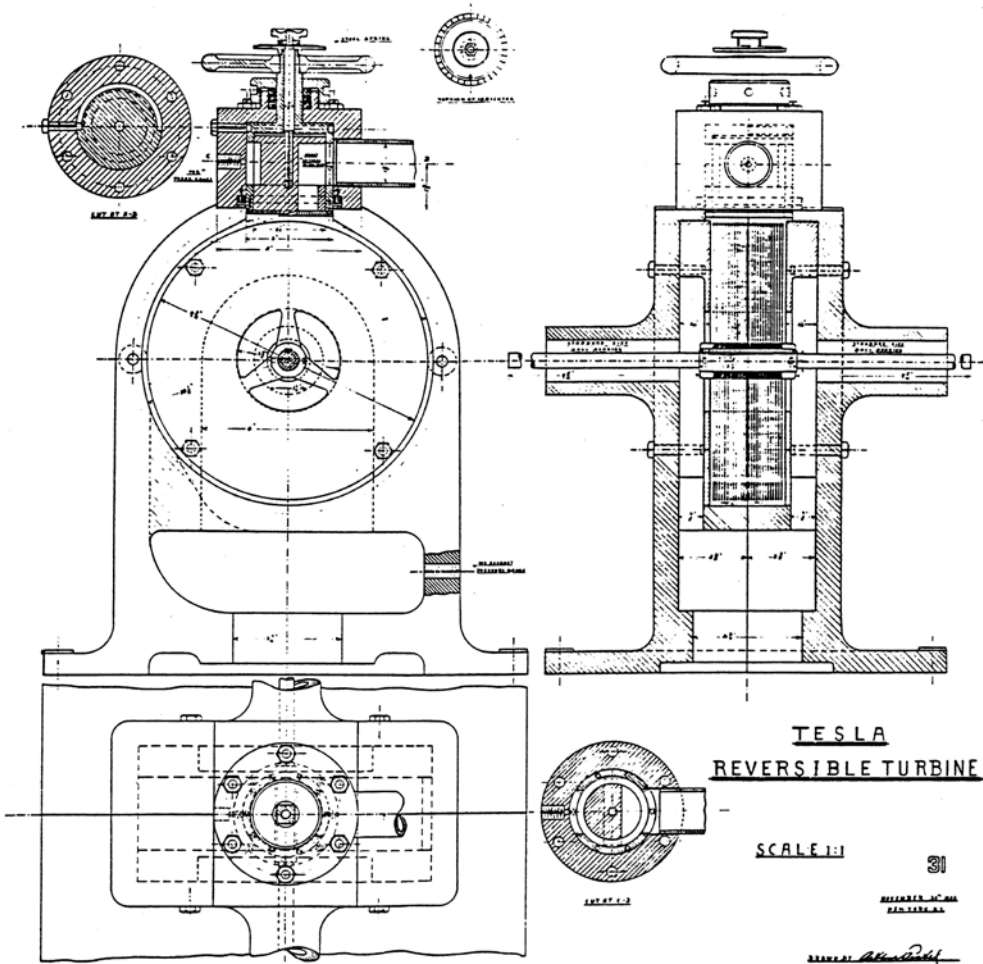
My gas turbine will be the finest thing in the world for a flying machine because it makes it possible to attain as much as 4 or 5 HP for each pound of weight. I have been hard at work on a design of the flying machine and it is going to be something very fine. It will have no screw propeller or inclined plane, rudder or vane—in fact nothing of the old, and it will enable us to lift much greater weights and propel them in the air with ever so much greater speed than has been possible so far.



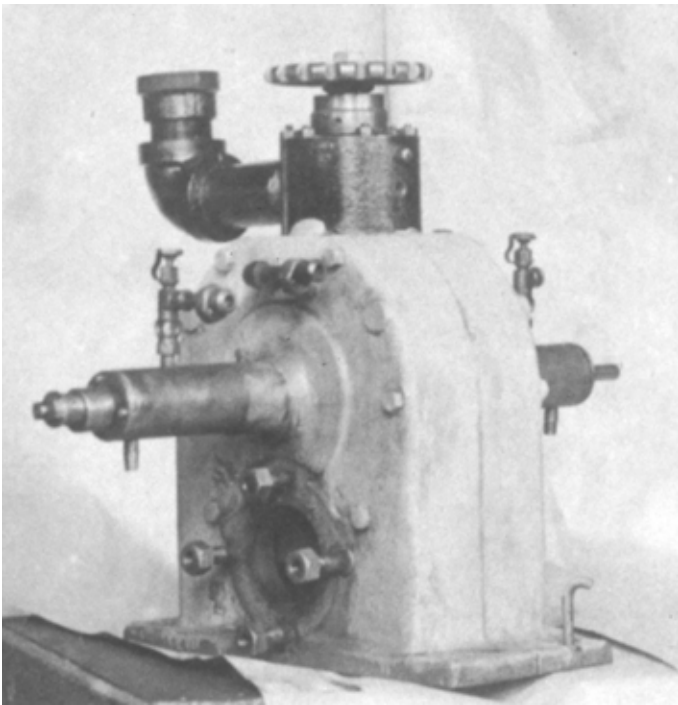
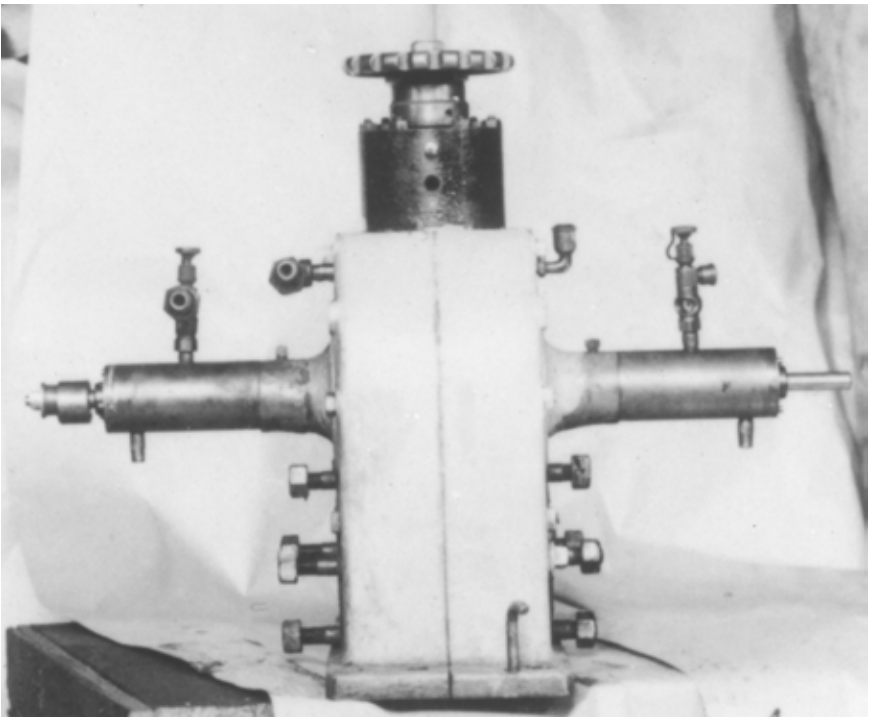
***110 H.P. Tesla Turbine Powering  
50 K.W. Tesla Polyphase Alternator***



***Tesla's 600 H.P. Turbo Pump***



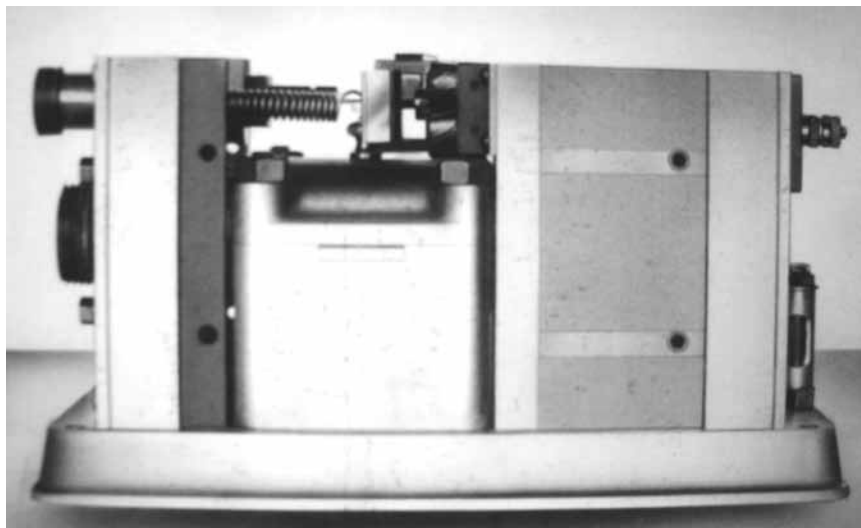
***Tesla Reversible 100 H.P. Turbine***



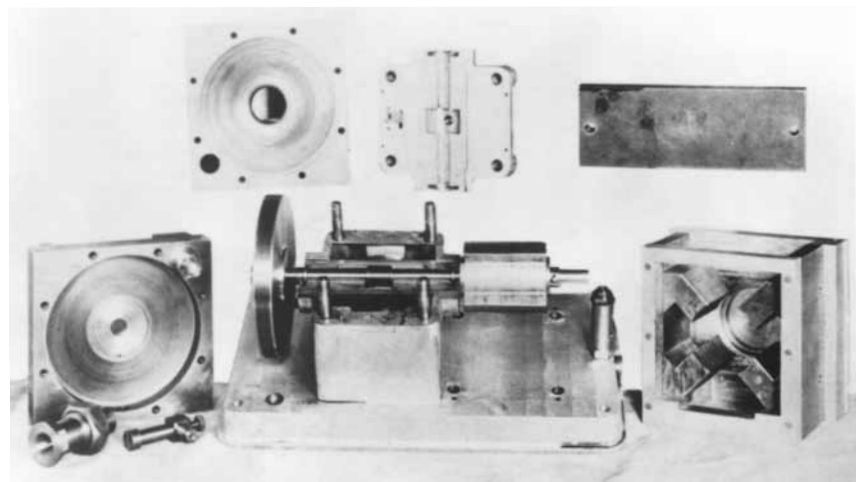
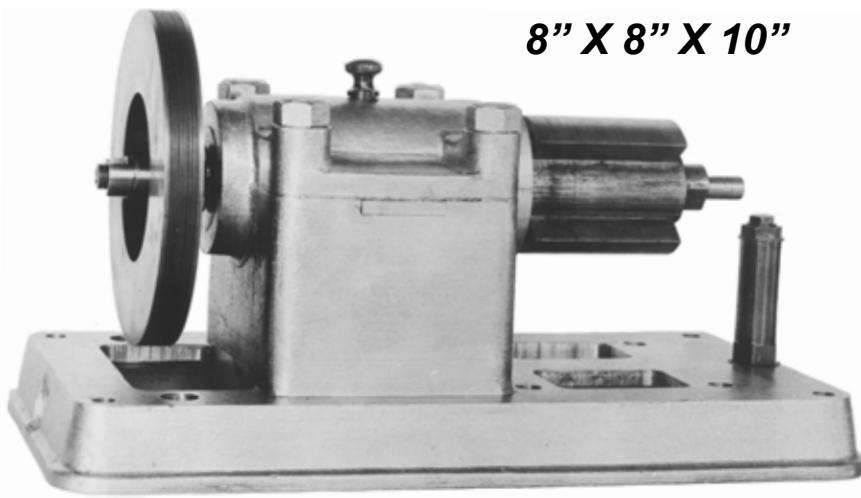
***Tesla Reversible 100 H.P. Turbine***



# Tesla Low Power Six Inch Turbine rated at 1 K.W.



*8" X 8" X 10"*





**Original Tesla - Dynamically Switchable  
Turbine or Pump**

# Tesla Bladeless Torque Converter

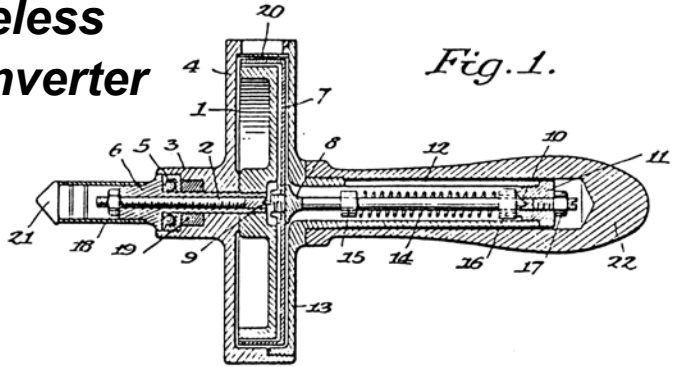


Fig. 1.

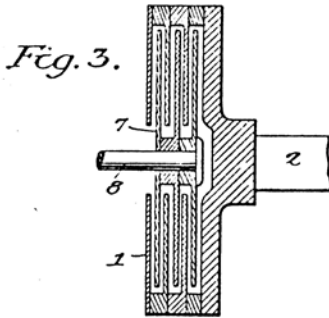


Fig. 3.

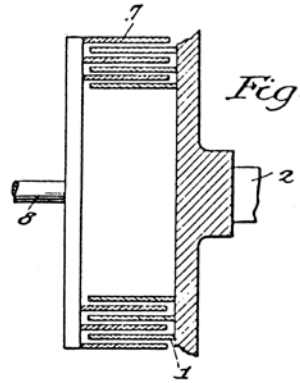


Fig. 4.

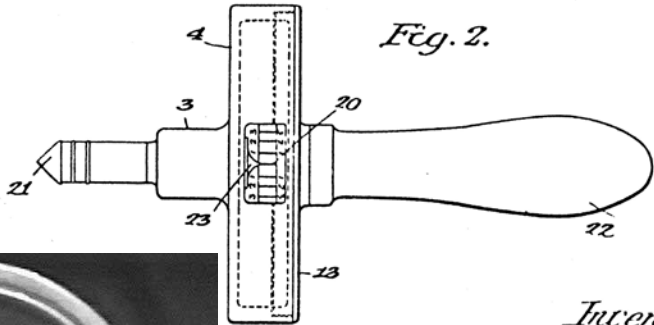
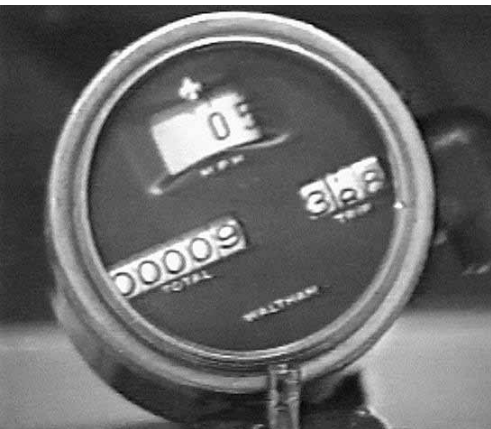


Fig. 2.

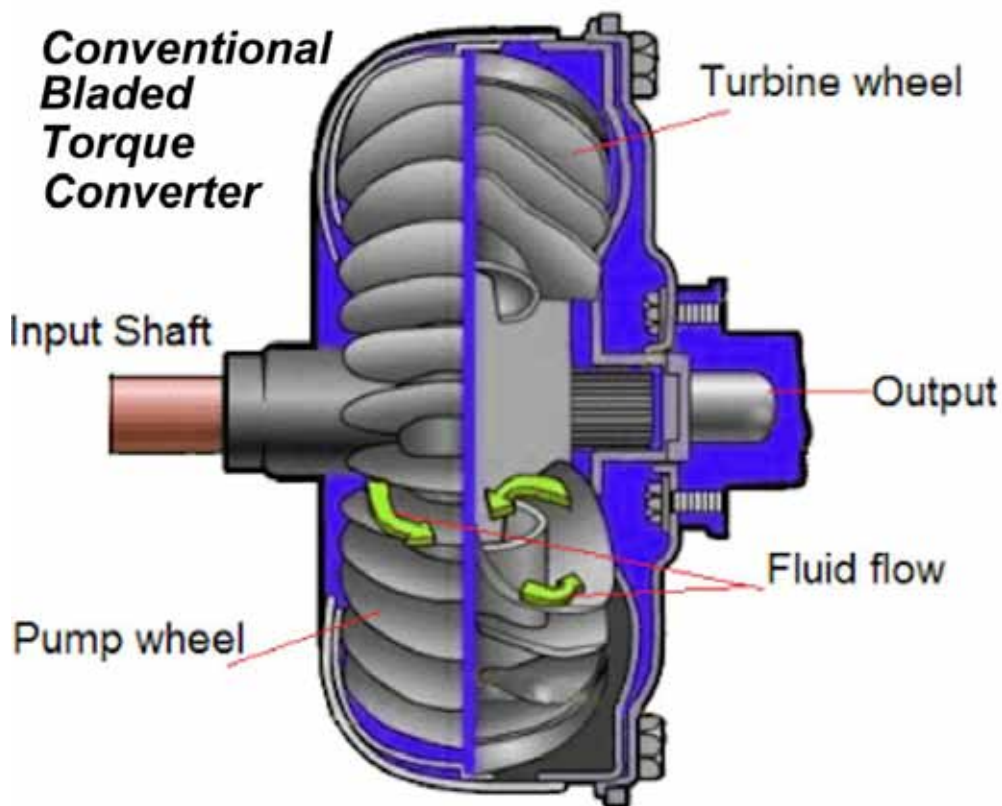
*Inventor:*  
Nikola Tesla  
Solicitor  
Waltham



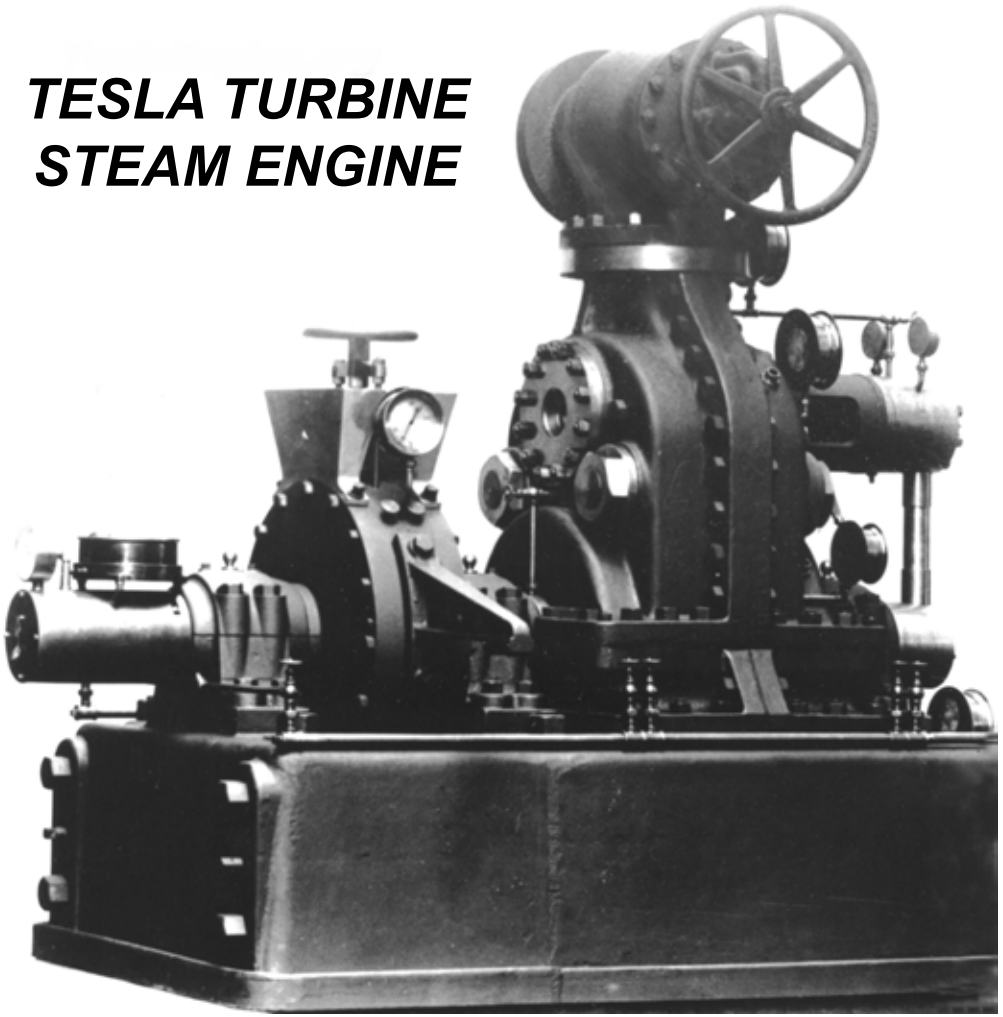
**Tesla's Patent Licensed to  
Waltham Watch Company  
For Early Automobile  
Speedometer/Odometer**



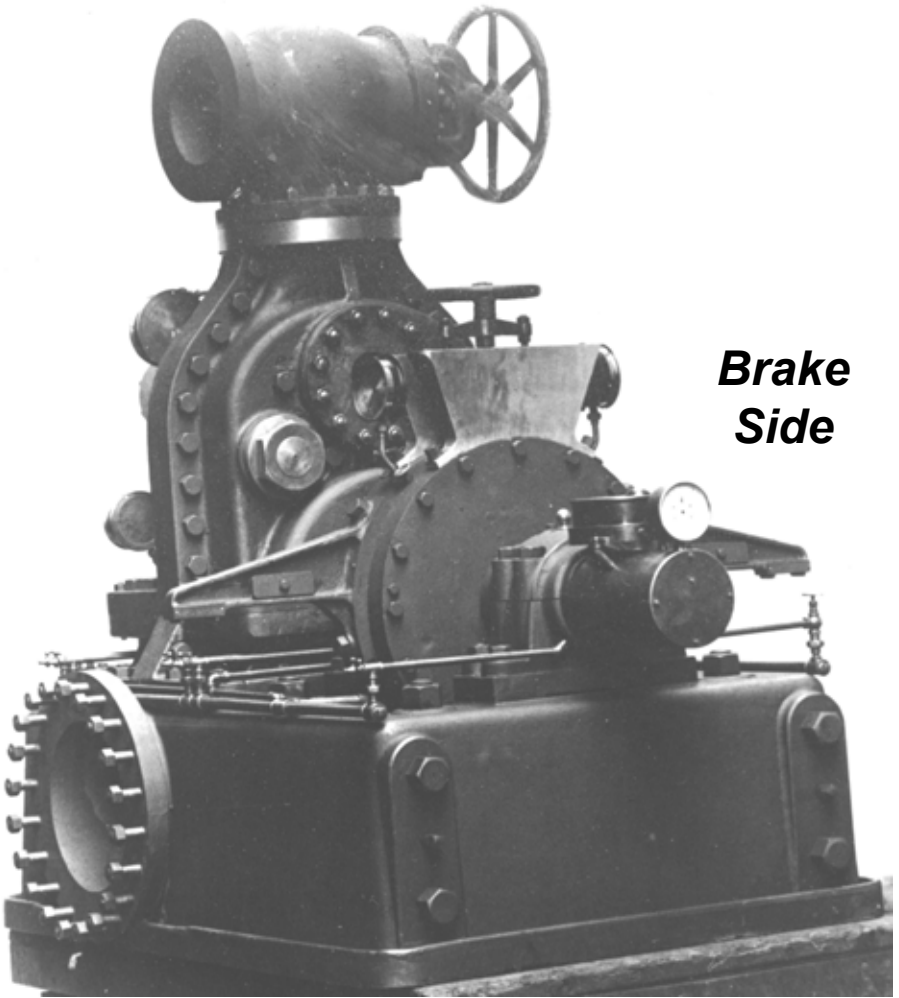
**Conventional  
Bladed  
Torque  
Converter**



***TESLA TURBINE  
STEAM ENGINE***

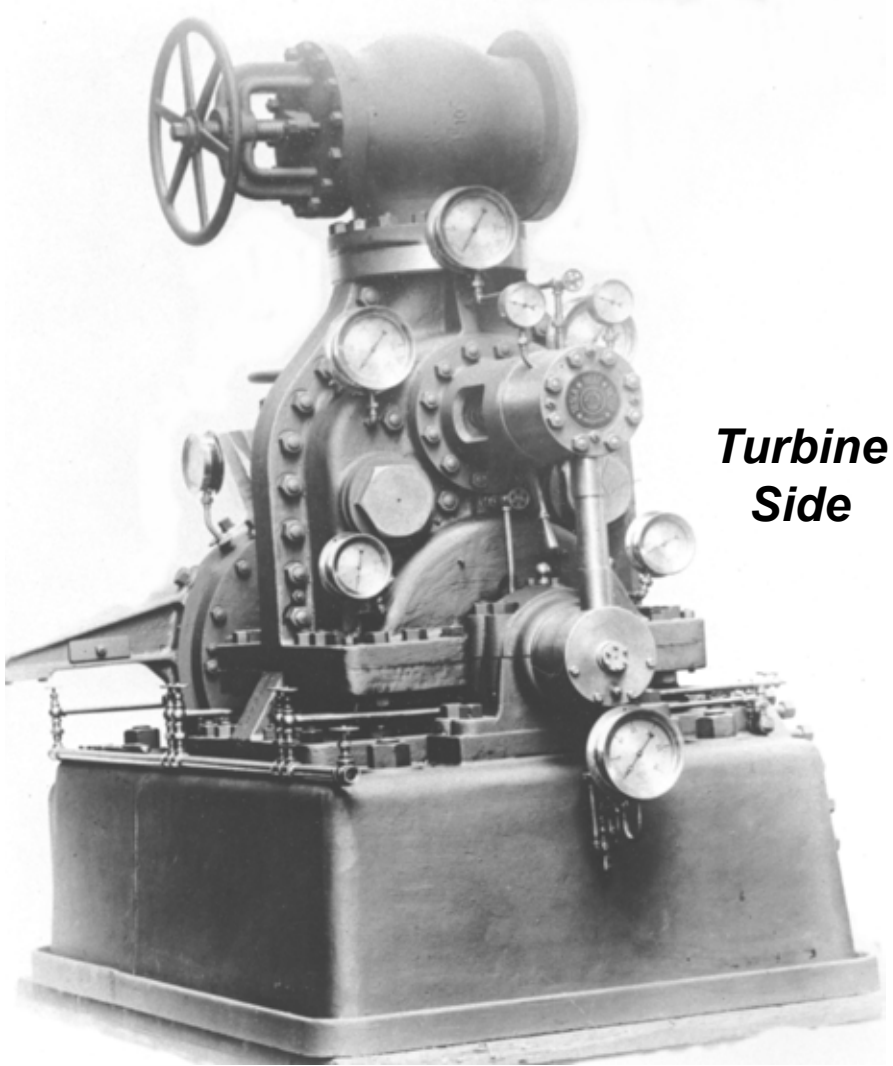


***Tesla's 5,000 H.P. Test Dyne  
Employing Tesla Brake***



***Brake  
Side***

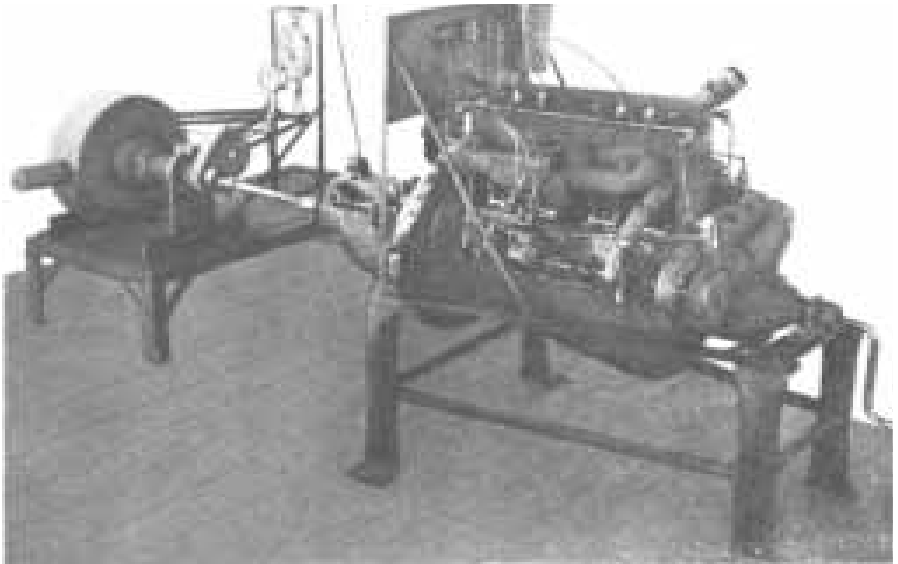
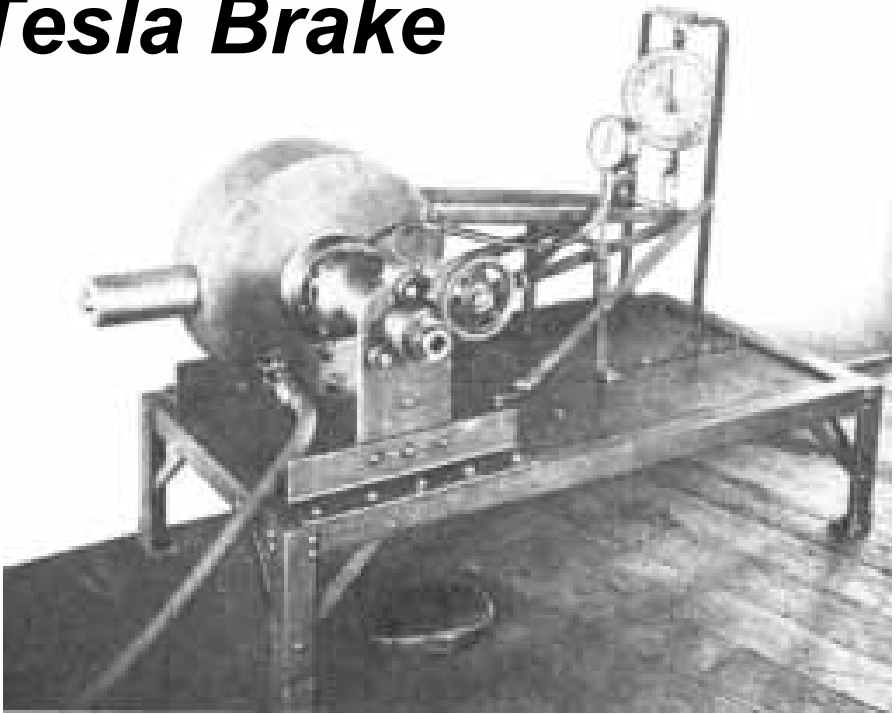
***Tesla's 5,000 H.P. Test Dyne  
Employing Tesla Brake***



***Turbine  
Side***

***Tesla's 5,000 H.P. Test Dyne  
Employing Tesla Brake***

# ***Tesla Brake***



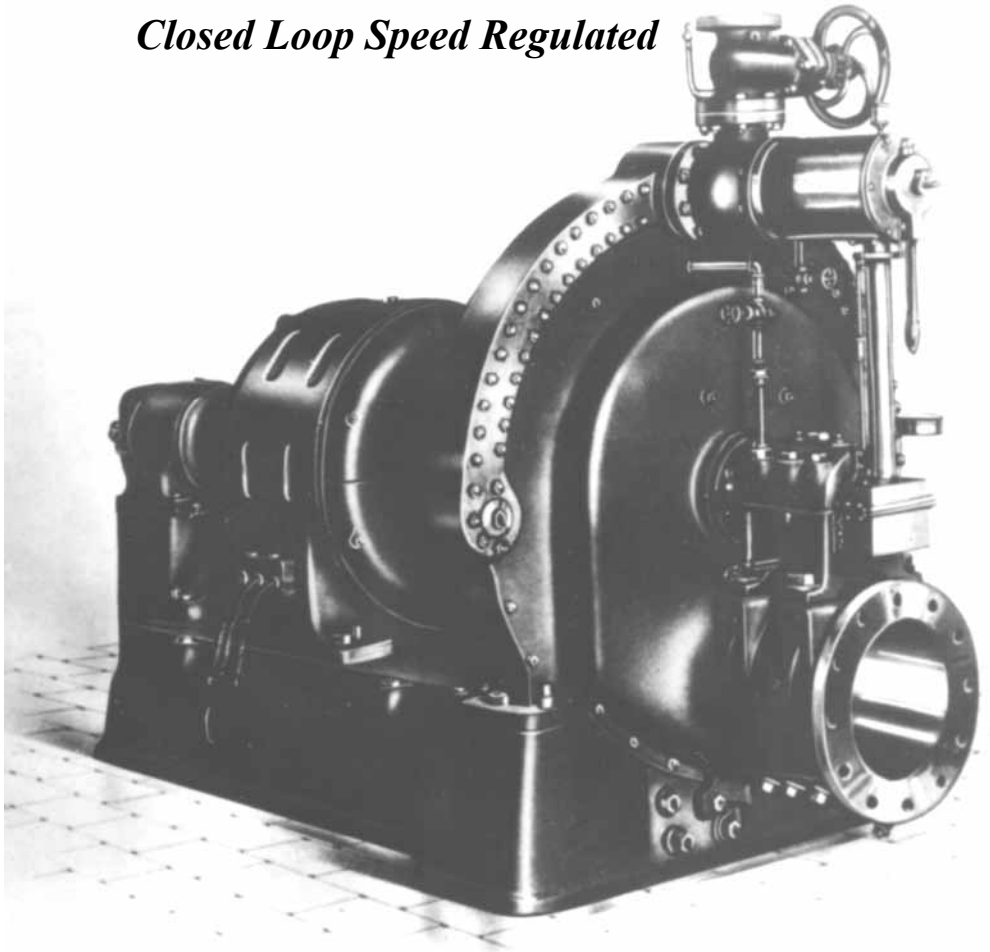
***Tesla Disk Brake Measuring  
V8 Engine's Torque  
Speed X Torque = Power***



# *Tesla's Turbo-Alternator*

*Line Synchronous*

*Closed Loop Speed Regulated*

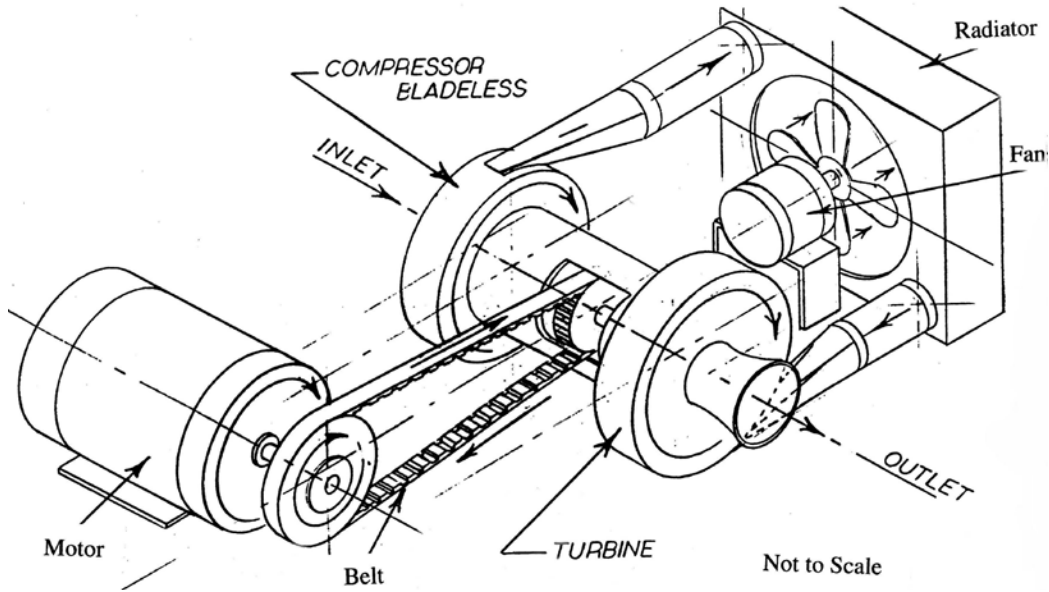


**“All attempts to considerably extend the thermal range have failed chiefly because of the inability of bucket structures to withstand the action of intense heat.”**

*Nikola Tesla*

**“As an Air Compressor it is Highly Efficient and will make air conditioning possible on a scale heretofore unimagined.”**

***Nikola Tesla***



***Refrigerant Free  
Air Conditioning***



***Jake Possell***



*Director and Editor Jeff Hayes greets Presenter Jake Possell to the 1990 International Tesla Society Conference*



**Jake Possell  
Founder of  
General  
Ener-Tech**

# Year of the Phalanx: Tesla and the Dragon

January 1986

By Jim Crogan

This is one dragon that Bruce Lee or Merlin the Magician probably never envisioned.

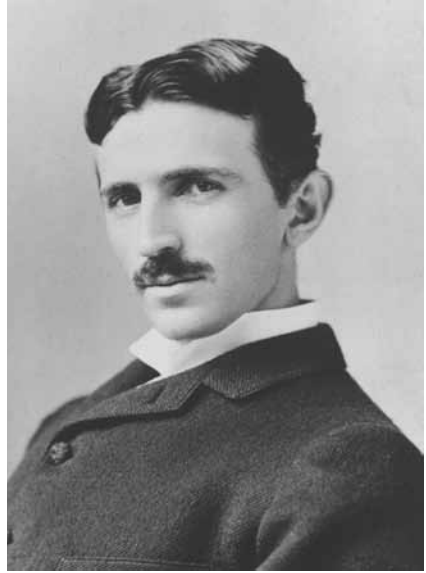
Looking at this particular Dragon, one might easily be tempted to grab the keys, strap on a helmet, slip into a flight suit and start hunting down the nearest Jedi. This strange looking craft seems more likely to be found at Disneyland or on set of "Star Wars IV" than inside a small hangar in Long Beach. Yet that's exactly where you'll find this soon-to-be high flying

Dragon or -- as it's officially known in the corridors of Phalanx Corporation-- the MP-18.

This two-year-old Delaware corporation, headquartered in Long Beach, is tucked beneath the looming presence of the gigantic McDonnell Douglas aircraft plant on East Wardlow Road. Inside Phalanx, a small but dedicated band of engineers and business people have grown accustomed to the naysayers, the wisecracks and the jokes about their strikingly new design for the delta-winged, vertical take-off and lift (VTOL) jet airplane. They seem to accept it all with humor and grace. Perhaps, because for them, it's no longer a question of if it will fly but how soon.

The heart of any aircraft is its engine, and unquestionably the heart of the MP-18 in its parent company, is the energy and force generated by the jet's designer, corporate Chief Executive Officer and board chairman William Moody, Jr. For the past two years, the creation and eventual first flight of the design which has evolved into the Dragon, has been the all-consuming passion of the 53-year-old, bespectacled, pipe-smoking, stocky, six-foot, four inch, architect and Massachusetts Institute of Technology (MIT) graduate.

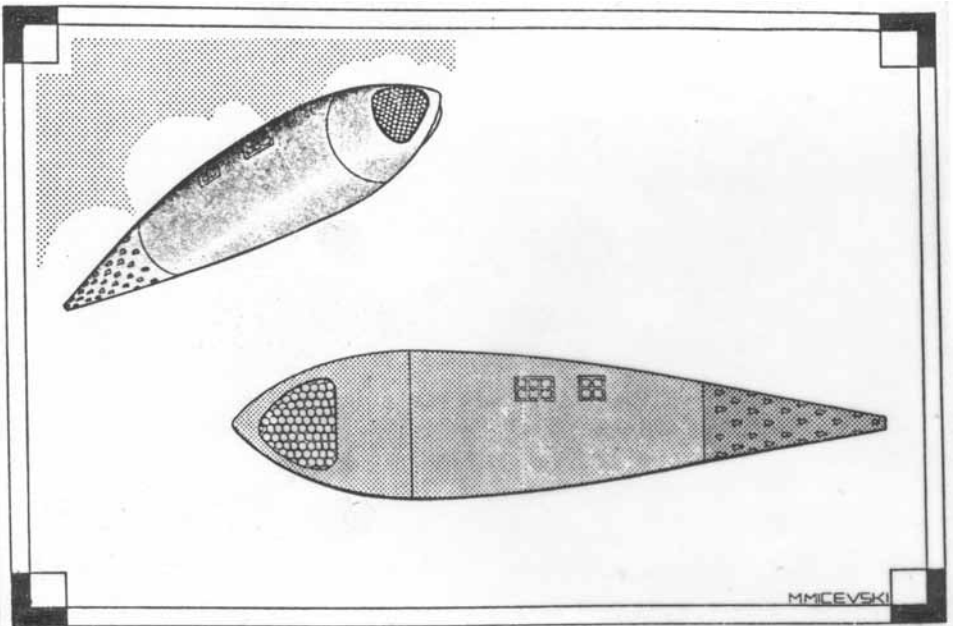
"The development and production of the Dragon could be as significant to the aircraft industry as the Model T was to the automobile," said Moody....



*Nikola Tesla*



***Phalanx Dragon***



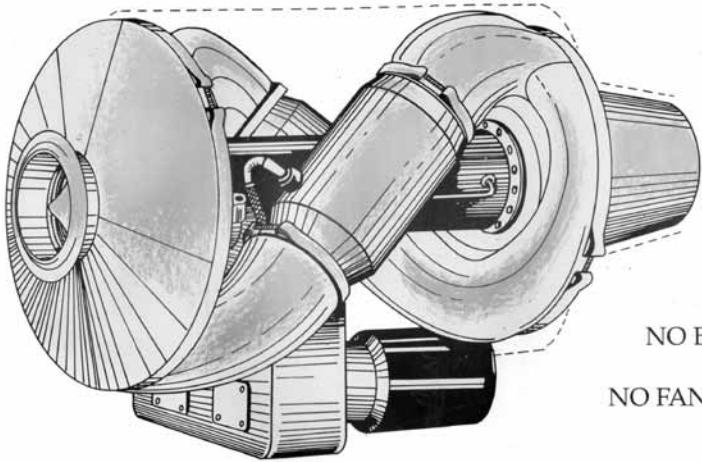
***Tesla's Vision of a  
Turbine Powered Flying Machine***

# TURBO *Telesis*

1417 South Gage Street • San Bernardino, CA 92408  
714/ 799-8059 • FAX 714/ 796-7721

## Boundary Layer Vortex Turbo Jet Engine

SAFE  
SIMPLE  
QUIET  
POWERFUL  
EFFICIENT



NO BLADES

NO FANS

### SPECIFICATIONS:

- Thrust 1,200 lbs
- Weight 150 lbs
- Specific Fuel Consumption .9 lb/hp/hr
- Size - 15 in. diameter x 30 in. long overall
- TBO - 2,500 hrs. Hot Sec 750 hrs

### ACCESSORIES:

- Starter/Generator 12v / 24v
- Fuel Pump/Engine Oil Pump

### PROVISIONS FOR:

- Hydraulic Pump
- Vacuum Pump
- Air Conditioning Pump

REPRESENTED BY:

***TeslaEngine.org***

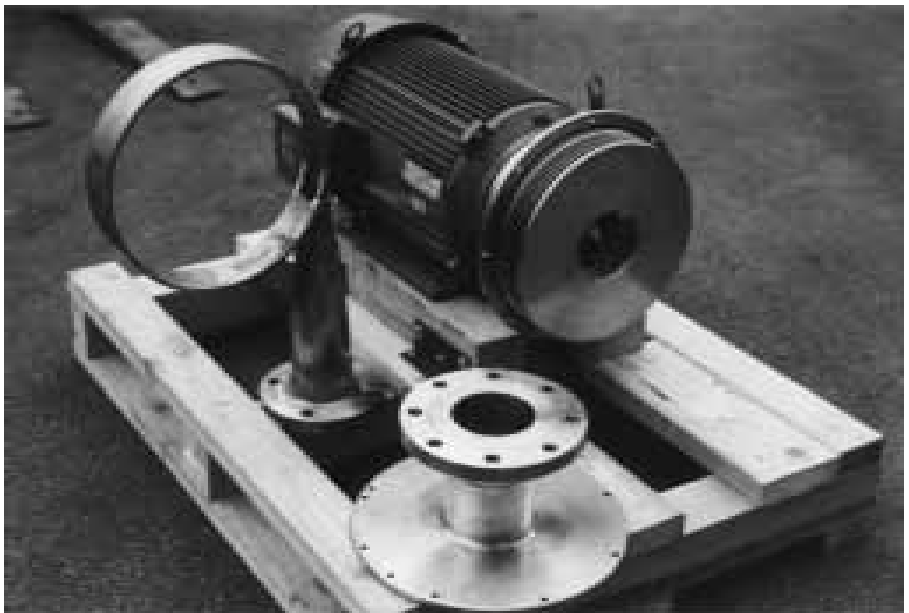
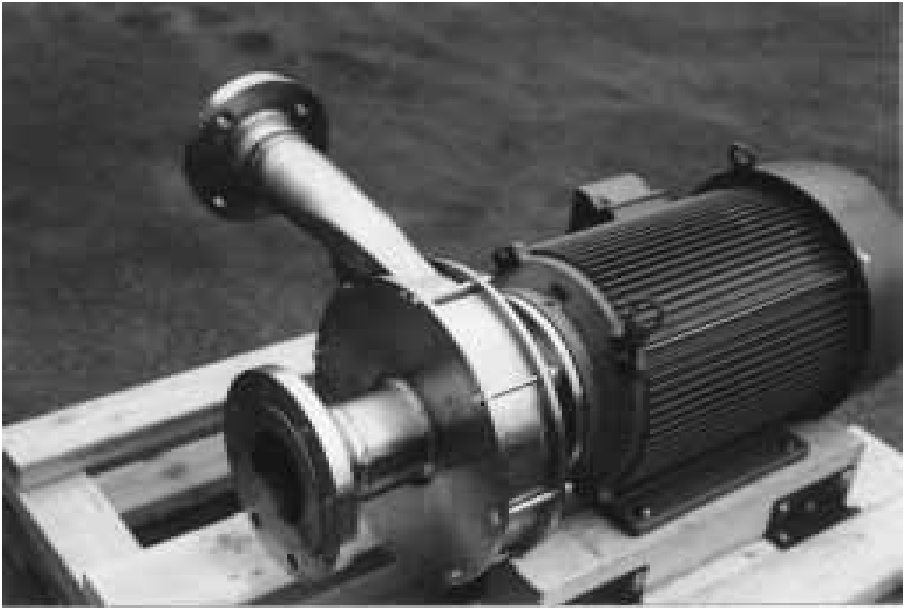
# ***Jake Possell's Vision for a Tesla Turbine Jet Engine***

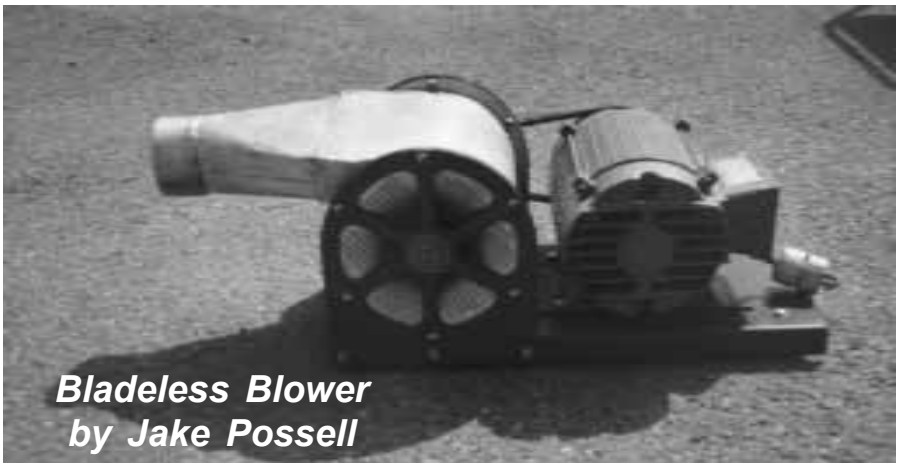


**Bladeless Pumps by Jake Possell**

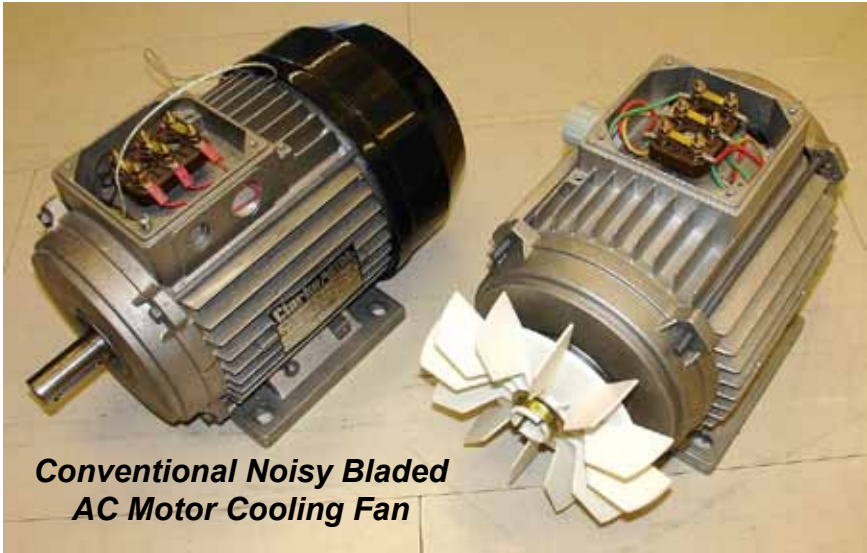


# Bladeless Pumps by Jake Possell





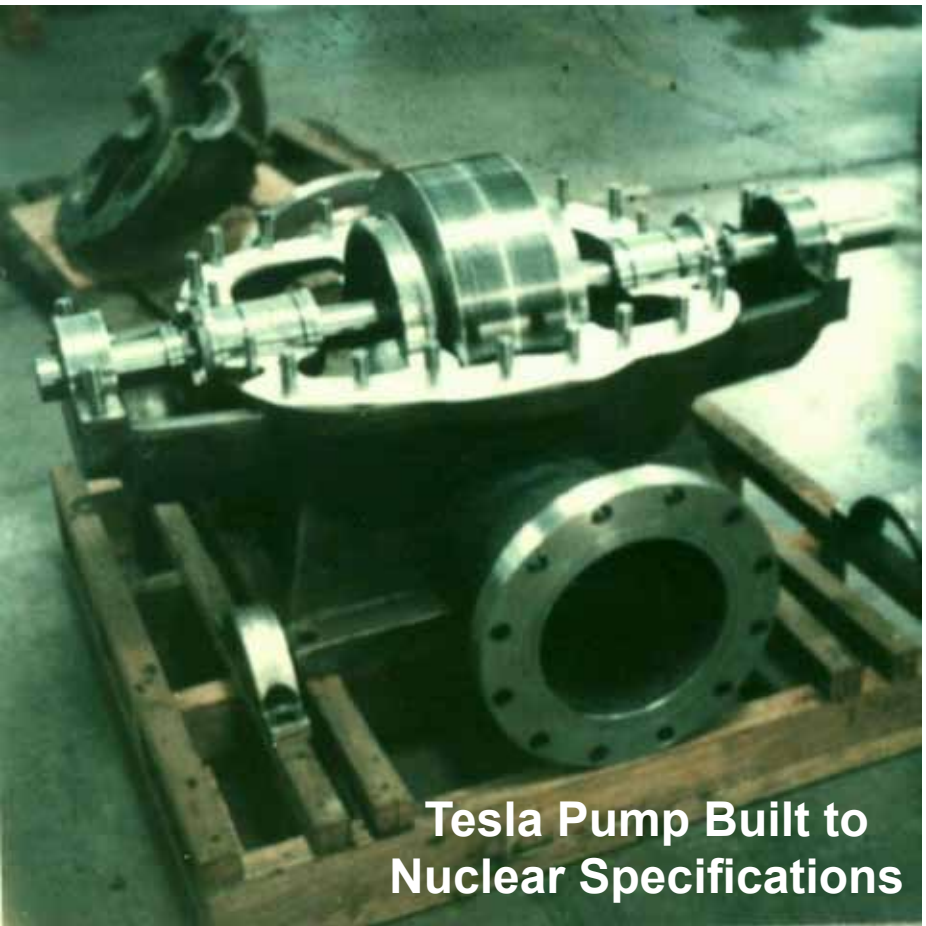
***Bladeless Blower  
by Jake Possell***



***Conventional Noisy Bladed  
AC Motor Cooling Fan***



***Replacement Quite Fan***

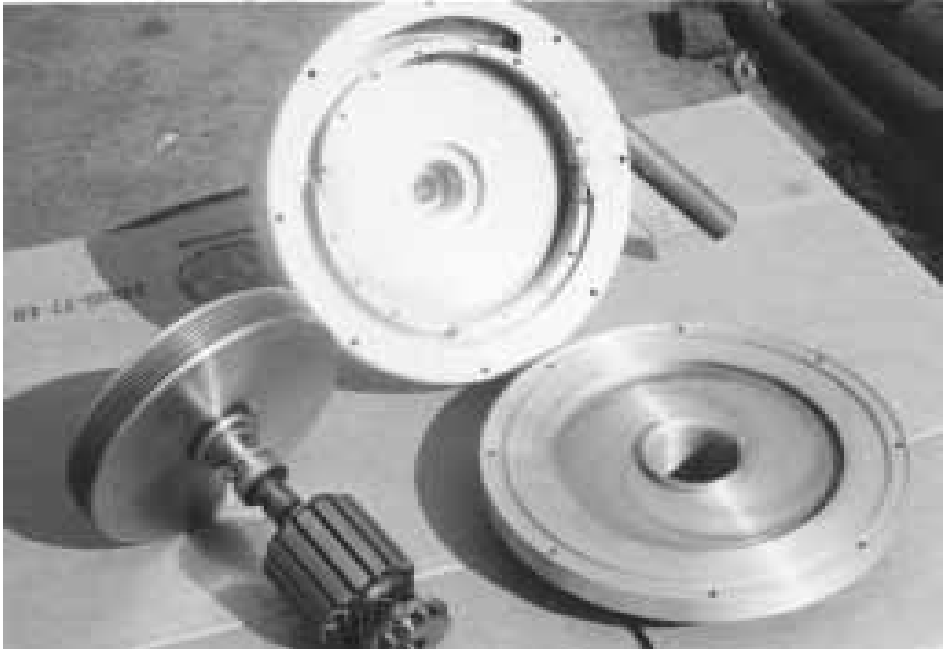


**Tesla Pump Built to  
Nuclear Specifications**

***Only A Tesla IS CAPABLE Of Surviving  
Boiling Water Pumping***

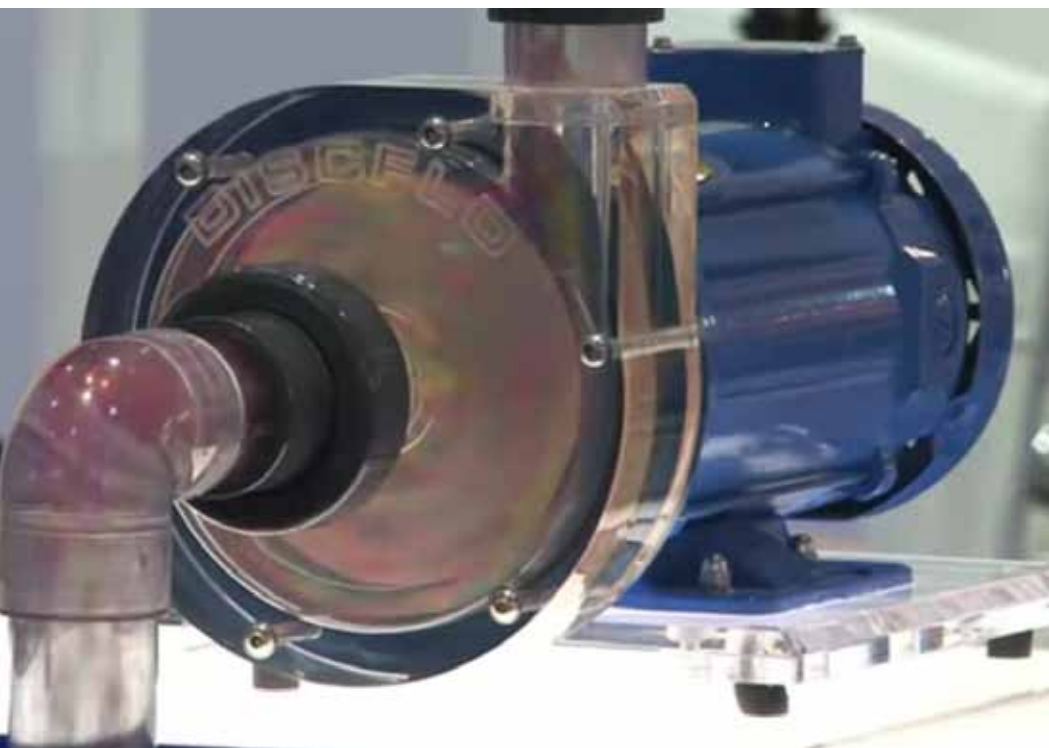


# *Turbine Housing Design of Jake Possell*





*DiscFlo Founder Max Gurth*



**Bladeless Pumps by DiscFlo Inc**

# DISCFLO PUMPS

- High Viscosity Crudes
- Coal Slurries
- Sewage Sludge
- Fly Ash
- Dredging & Dewatering
- Paper Pulp
- Ore & Mineral Concentrates
- Diatomaceous Earth
- Sand & Gravel
- Phosphoric Acid
- Petrochemicals & Resins
- Glass Char
- Drilling Muds
- Wood Fibre Slurries
- Food & Wine Products
- Salt Brines
- Latex Slurries
- Clay Slurries
- Lime Slurries
- Paint
- Shear Sensitive Emulsions
- Starch
- Low NPSH Solvents
- Gas Entrained Yeast
- Dye Crystals
- Titanium Dioxide
- Oily Wastes

## The Proven Cost Effective Answer To Difficult Pumping Problems

The BOUNDARY LAYER/VISCOUS DRAG pumping principle encapsulated in the Discflo Corporation pump is the answer to many of today's most difficult material transfer problems. It combines the simplicity of centrifugal pump construction with the materials handling properties of the positive displacement pump — bridging gaps and offering solutions to pumping problems previously unavailable. Discflo's disc pump is a practical and economical answer to the high cost of pumping abrasive, viscous, shear sensitive and delicate materials.



Discflo's disc pump is among the most versatile process pumps available. Proven successful installations show superior performance in handling:

- SEVERELY ABRASIVE MATERIALS with minimal wear and virtually no performance loss as a result of rotor wear.
- DELICATE AND SHEAR RATE SENSITIVE MATERIALS such as latex, polymer emulsions, crystalline compounds, titanium dioxide resin beads, etc., with little or no damage or deterioration to the material.

- HIGHLY VISCOUS FLUIDS up to 400,000 SSUs — including thixotropic, dilatant and pseudoplastic materials.
- HIGH SOLIDS CONTENT FLUIDS (up to 80 + % by volume).
- HEAVILY AIR/GAS ENTRAINED MATERIALS without vapor lock, cavitation or vibration.
- LARGE SOFT SPHERICAL AND STRINGY SOLIDS up to 5" in diameter without clogging or malfunctioning.

**A NEW DIMENSION  
FOR POWER**

### Customized Pump Configurations



Submersible



Over & Under



Vertical In-Line

- Acetic Acid —  $\text{CH}_3\text{COOH}$   
(Up to 50%)
- Acetone —  $\text{CH}_3\text{COCH}_3$   
(Up to 50%)
- Aluminum Hydroxide —  $\text{Al}(\text{OH})_3$
- Aluminum Sulfate —  $\text{Al}_2(\text{SO}_4)_3$   
(Up to 50%)
- Ammonium Chloride —  $\text{NH}_4\text{Cl}$
- Barium Chloride —  $\text{Ba Cl}_2$
- Benzene —  $\text{C}_6\text{H}_6$
- Bromine Water —  $\text{Br}_2/\text{H}_2\text{O}$   
(HOBr)
- Calcium Hydroxide —  $\text{Ca}(\text{OH})_2$   
(Up to 50%)
- Chlorine —  $\text{Cl}$
- Copper Sulfate —  $\text{CuSO}_4$
- Ethylene Glycol —  $(\text{CH}_2\text{OH})_2$
- Ferrous Sulfate —  $\text{FeSO}_4$
- Glycerol —  $(\text{CH}_2\text{OH})_2\text{CHOH}$
- Heptane —  $\text{C}_7\text{H}_{16}$
- Hydrochloric Acid —  $\text{HCl}$   
(Up to 37%)
- Hydrogen Peroxide —  $\text{H}_2\text{O}_2$   
(Up to 30%)
- Magnesium Hydroxide —  
 $(\text{Mg}(\text{OH})_2)$
- Nitric Acid —  $\text{HNO}_3$   
(Up to 50%)
- Potassium Ferrocyanide —  
 $\text{K}_4(\text{Fe}(\text{CN})_6) \cdot 3\text{H}_2\text{O}$
- Sodium Bicarbonate —  $\text{NaHCO}_3$
- Sodium Hypochlorite —  $\text{NaOCl}$   
(Up to 12½%)
- Sulfuric Acid —  $\text{H}_2\text{SO}_4$   
(10% to 98%)
- Trichloroacetic Acid —  $\text{CCl}_3\text{COOH}$   
(Up to 50%)
- Xylene —  $\text{C}_6\text{H}_4(\text{CH}_3)_2$
- Zinc Sulfate —  $\text{ZnSO}_4$

## Solving Those Special Problems With Corrosive And Abrasive Fluids

In response to the explosive growth in the field of aggressive fluids, Discflo has developed a full line of non-metallic pumps. When combined with its revolutionary non-impinging Disc technology, the new Discflo non-metallics solve the problems of pumping corrosive and abrasive fluids in a whole new way.



## Discflo Advantages

- No Close Tolerances
- Non-Impinging
- Non-Pulsating
- Non-Clogging
- Little to No Shearing
- Little to No Maintenance
- Little to No Downtime



**Concrete pumping**

## Disc pump design handles difficult slurries

JAMES L. REDD, Senior Project Engineer, Texaco Chemical Co.  
WILLIAM P. STADIG, Houston Regional Editor

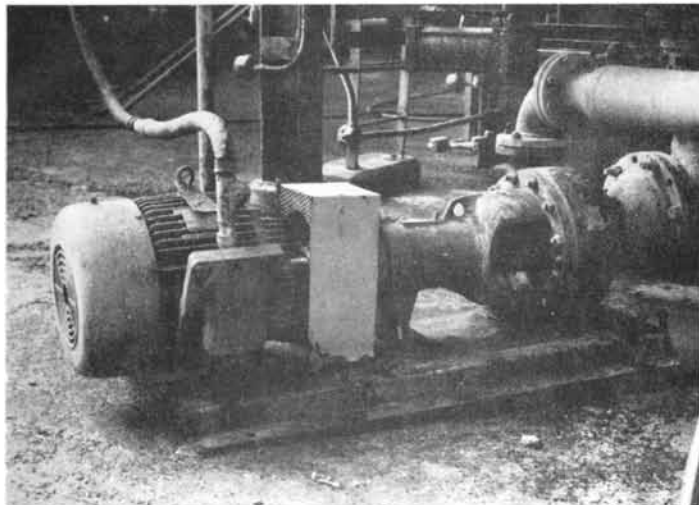


Figure 1 Disc pumps at Texaco's Port Arthur, Tex., plant have cut maintenance costs \$65,000 annually

### Problem

For over 10 years, at Texaco Chemical's motor oil and gasoline additive processing plant in Port Arthur, TX, the pumps used to transfer filter cake slurry to disposal containers experienced frequent failures and excessive repair costs. And as the demand for their calcium sulfonate detergent additives increased, the plant could not tolerate the lost production.

In the final production step, additives containing unreacted solids are mixed with diatomaceous earth and filtered in plate and frame filter presses. After solvent wash, the filters are manually cleaned.

The contents of the trough are screw conveyed to a ribbon blender-dryer where live steam is injected to drive off residual solvent, and sufficient pale oil is added to create a pumpable slurry. Occasionally the consistency of the mass was gummy, almost like peanut butter. At other times, the steam condensate would not mix well with the oily cake, creating two liquid phases. In any case, it was a very difficult fluid to handle.

The slurry was routed to disposal containers, i.e., roll-off boxes, using progressive cavity type positive displacement pumps that were close-coupled to the discharge end of the dryers. Since it

was impossible to strain out entrapped material from the thick slurry, solid foreign matter would gouge the steel rotor and/or tear the elastomeric rotor. Shut-downs were required once or twice a week, at an average cost of \$650 for parts and labor. A 2-week run was considered good. In addition, there were 4 to 5 hours of lost production.

Disposal costs for the sludge were also very high under the original pumping system. Because the waste slurry cake is sent to a landfill, it must be mixed with solidifying agents first. The higher the concentration of oil in the slurry, the more agents are required and the larger the final volume going to the landfill.

### Solution

In an effort to resolve their problems, the plant engineers decided to use a disc pump that could handle a wide viscosity range and have an open design that tolerates and passes foreign matter. (See Figure 1)

For a trial, the engineers first installed a 3 x 2" disc pump (with five 14" diameter discs) on a reactor product transfer line to feed 100 gpm of dilute slurry at 60' head to an alternate filter system. Because it performed so well, they ordered two more pumps to replace the original progressive cavity type pumps on the blender-dryer discharge.

The 6 x 4" pumps with two 14" diameter discs have a capacity of 100 gpm at 25' head. They were readily positioned below the dryers, but there was insufficient room to provide a solid foundation. Because they operate at a higher rpm (1800), without gear reduction, a heavier base plate was provided. They are equipped with single mechanical seals, and since it is a non-corrosive service, the pumps are made of carbon steel.

### Results

Since installation in August and September

continued on page 120



out any problems. As noted above, shortly after installing one slurry pump, the base plate was beefed up to minimize bearing wear.

Savings in maintenance costs are estimated at over \$65,000 annually. Thus the cost of the new pumps was recovered within three months. Maintenance requirements have been essentially nil. There have been no mechanical failures or shutdowns to replace worn parts, and no lost production.

The inspection of one pump's internals after nine months of service showed only minor wear from the abrasive action of the slurry, but this has no effect on the pump's efficiency. With the previous pumps, capacity would decrease due to increased clearance between the rotor and stator resulting from abrasion or from damaged internals.

The pump design, which can utilize from two to eight parallel discs to provide fluid propulsion, does not require

open construction readily allows the passage of most extraneous solid materials that pass through the suction piping.

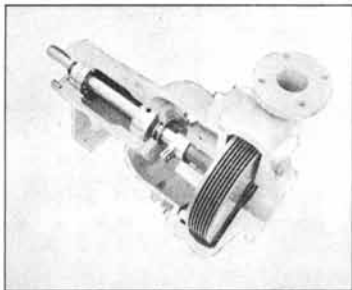
In the case of the transfer pump where intermediate product is routed to an alternate filtering system, it has been observed that the abrasive action of the slurry is very minimal on the disc pump parts. For centrifugal pumps used in similar service, it has been necessary to provide a special coating on the wetted parts to offset abrasion. Also, the fact that shearing action generated by the disc pump is limited is of particular value when transferring product.

The plant engineers are now looking at other retrofit situations where the disc pump may be used to advantage in handling viscous liquids, slurries, or other difficult fluids.

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Discflo pumps are manufactured by Discflo Corporation, 9429 Abraham Way, Santee, CA 92701. Circle 503

## Principles of Operation



Disc pumps utilize a combination of boundary layer forces and viscous drag in pumping fluids. These relatively obscure principles were recognized over 100 years ago by Nicola Tesla, inventor of the AC electric motor and generator, and later incorporated in the development of the first practical working model. However, it was not until the late 1970s that disc pumps were commercialized.

Rather than using vanes, blades, or impellers as in centrifugal pumps, a simple rotating disc generates forces that cause fluids to move in a natural streamline path. (See Figure 2.) Fluid entering the pump through the central orifices of the discs, or rotors, turns and

is directed radially to the outer edges of the discs by a combination of friction and pressure gradients. The fluid that wets the face of the rotating disc forms a frictional resistance force field known as a boundary layer.

This phenomenon may be visualized as numerous parallel stream bands, molecular in width, and each having a slightly lower velocity than the inner band. This is the prime medium through which kinetic energy is transmitted to the mainstream as tangential and centrifugal forces. The same boundary layer force and the intrinsic tendency for a boundary layer fluid to adhere to itself and to other objects create the second phenomenon, viscous drag, or the resistance to shearing.

It is the combination of the boundary layer force fields and the boundary layer adhesion properties of viscous drag that provides the medium through which the mechanical energy of the motor driven disc is transferred, developing fluid propulsion and discharge forces. Thus, as the fluid leaves the realm of the rotating disc and contacts the stationary casing, its kinetic energy is converted into a combination of discharge flow head and pressure head.

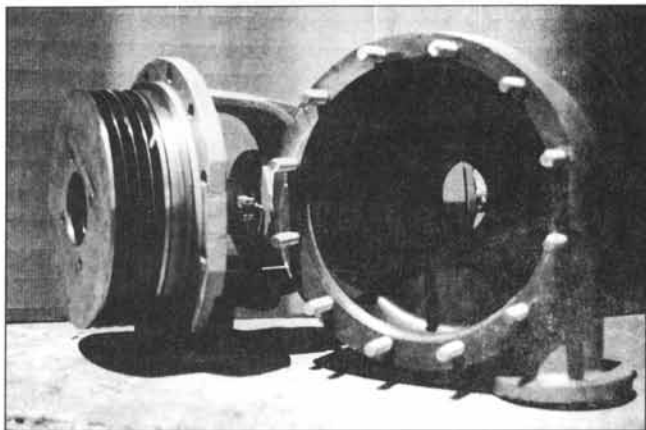
# Disc Pump Saves \$57,000/yr in High Viscosity Waste Service

**RUSS WHITE**  
Maintenance Manager, Rohm and Haas Co.  
**ALEX GERMAIN**  
Associate Editor

*The number of discs in a disc pump can range from 2 to 11, with standard diameters including 8, 14 and 20". An additional feature is a back pull-out design to ease servicing if the discs without disturbing pipe connections.*

The Rohm and Haas, Knoxville, Tenn., plant is a major supplier of paint intermediates for the United States. Their products are high in viscosity, with high solids. Shear sensitivity is also a normal engineering consideration for their fluids.

For a number of years, the plant's worst pumping problem was the cleanup of the spent solids treatment basins. Each of the three basins holds 150,000 gal. Prior to Rohm and Haas' conversion to disc pumps, the monthly cleanup of each basin required four men and two days of work to remove acrylic solids and "elephant skins." Two of the four men were assigned as permanent, working standby just to keep the prior pumps running. Meanwhile, two more men



hosed the solids to the old pumps. The maintenance department reports that they experimented with all types of pumps without success. Engineers were almost positive that no pump would handle this slurry that was so thick a broom handle stood up straight when pushed into the solution.

In 1985, Rohm and Haas Co. purchased a disc pump, which uses a combination of "boundary layer" forces and "viscous drag" to develop fluid propulsion. A simple-shaped rotating disc forces fluids in natural streamlines to the outer edges of the discs. The wetted face of the discs become a thin film of frictional resistance, the boundary layer. Tendency of the boundary layer to adhere to itself and the fluid provides the

viscous drag. But the boundary layer also serves as a medium through which kinetic energy is transmitted to the mainstream.

Downtime has dropped from two days to three hours, replacement parts from 3000-\$0/year. The total cost savings as a result of using the disc pump is more than \$57,000 annually. In addition, the maintenance department finds similar successes and cost savings in other disc pump applications throughout the plant. It handles very difficult liquids every day while saving significant dollars. ■

Model 604-2D discflo pump—Discflo Corp., 9429 Abraham Way, Santee, CA 92701. Circle 474

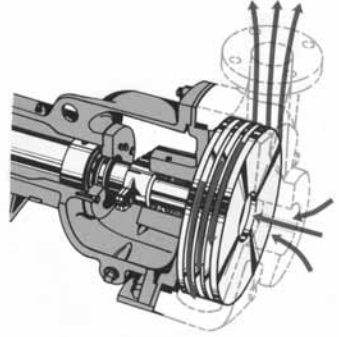
# “A QUANTUM LEAP” TESLA TURBO PUMPING TECHNOLOGY

The DISCFLO Pump is designed to handle tough pumping problems and not constantly break down in the process. The secret lies in its non-impinging disc rotor. In contrast to traditional pumps which impel or push the fluids through the system, the DISCFLO Pump generates powerful centrifugal frictional forces which pull fluids through the system.

First the fluid is drawn through the central orifice of the pump and confined between the parallel discs. As these discs rotate, they generate within the fluid a combination of friction and pressure by which the entire fluid mass begins to rotate. The discs transfer their rotating energy to the fluid through the mechanisms of boundary layer and viscous drag.

Boundary Layer occurs when fluid molecules attach or “lock onto” the surface of the discs. The force of the moving rotor is transmitted to this attached boundary layer of molecules. Viscous Drag involves the further transmitting of this rotating energy from the boundary layer to other layers of fluid molecules until the entire mass of fluid is rotating. Thus the initial boundary layer attracts and “drags” along with it additional layers of molecules - setting in motion numerous parallel stream bands of physically interacting molecules. What is generated is a powerful centrifugal frictional force field which propels the fluid naturally, producing a smooth hydraulic flow profile and a non-pulsating, vibration-free pumping operation.

Moreover, not only does the boundary layer transmit kinetic energy into the fluid, but it acts as a “molecular buffer” between the disc surface and the fluid contents. This protects both the product from the full impact of the disc, and the disc from the full impact of the product - thus eliminating excessive product damage and pump wear!



### Customized Discpacs

Discflo's customized discpacs come in a variety of sizes to meet a wide range of individualized applications - from fine polymers to highly viscous abrasives to large and small solids.

### SUBMERSIBLE & OTHER TESLA PUMP CONFIGURATIONS



Raw sewage lift stations, chemical overflow tanks, wash-down pits, sedimentation basins and degrit chambers are just some of its typical uses.

Other DISCFLO Pump configurations include the Over & Under Pump, and the Vertical Pit Pump (which has no bearings or seals in the wet).

### Service Range

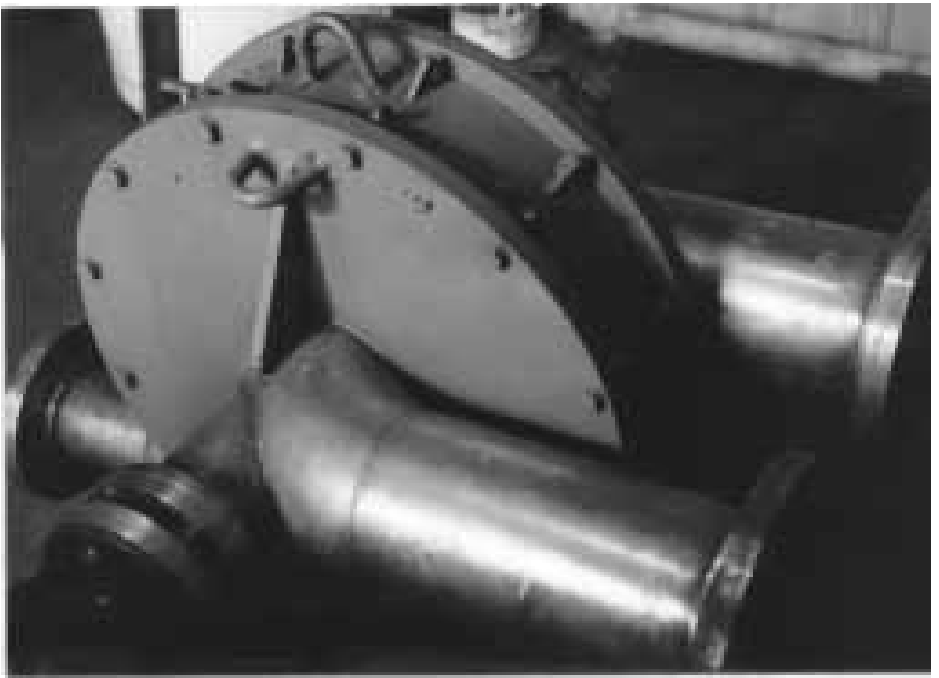
• Hydraulic Flow Capacity	—	— 2 to 7500+ GPM
• Discharge Pressure	—	— 1000 + ft TDH
• Suction Pressure	—	— Low NPSHR
• Operating Temperature	—	— High Temperatures
• Viscosity	—	— 100,000 + CPS
• Drivers	—	— Electric, Diesel, Hydraulic, Air
• Materials of Construction	—	— Most Alloys Available, — Also Comes in Non-Metallic

If you are pumping waste, sewage, sludge or scum from pits, tanks, ponds or pools, you are probably bogged down in problems with suction lift, low NPSHA, foot valve plugging and excessive product damage and pump wear. Well, DISCFLO's Submersible Disc Pump has been designed to solve these major problems associated with pumping from below the surface.

**“One such pump now in operation, with eight disks, eighteen inches in diameter, pumps four thousand gallons per minute to a height of 360 feet!” *NT***



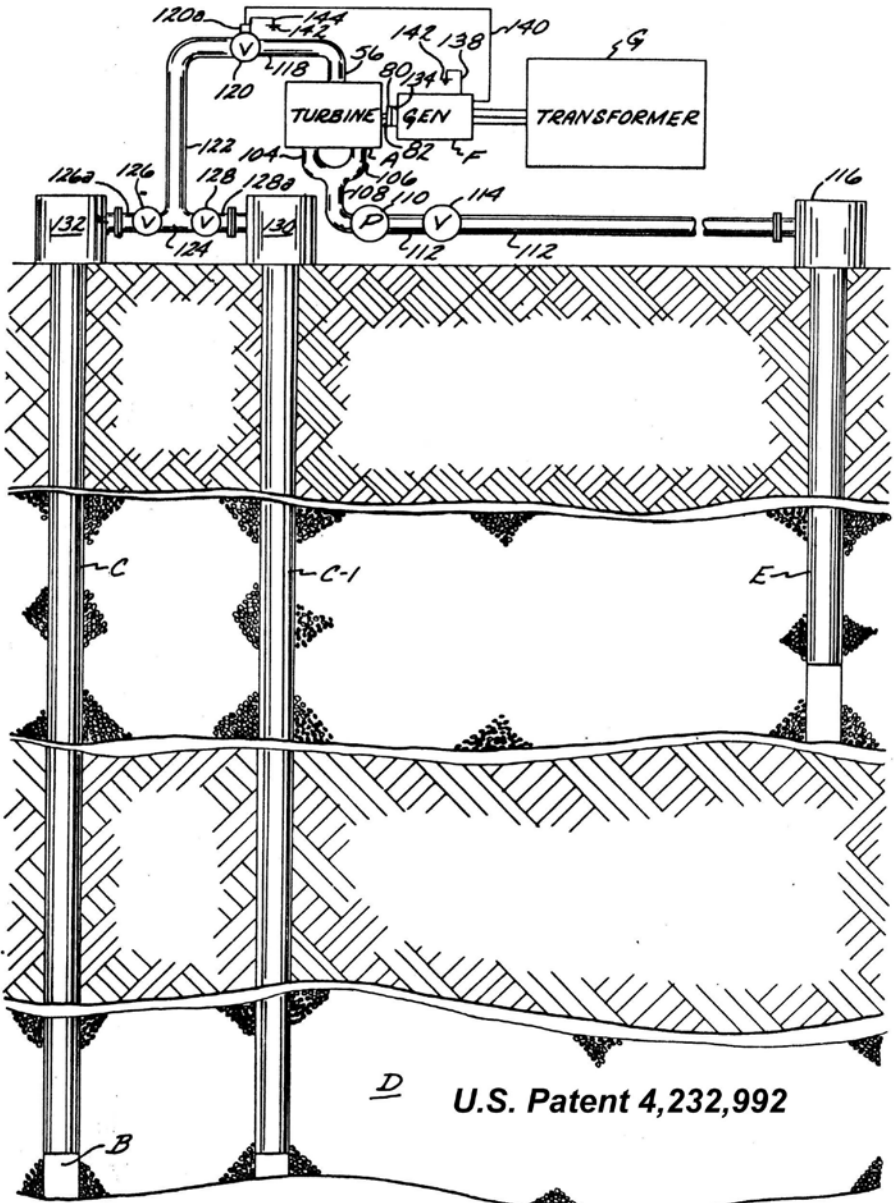
**Sanitary Pump by *TeslaEngine.org*  
Employed by Frey Winery  
Providing Unbruised Sheer Free Wine**



**Salt Brine Geothermal Turbine**

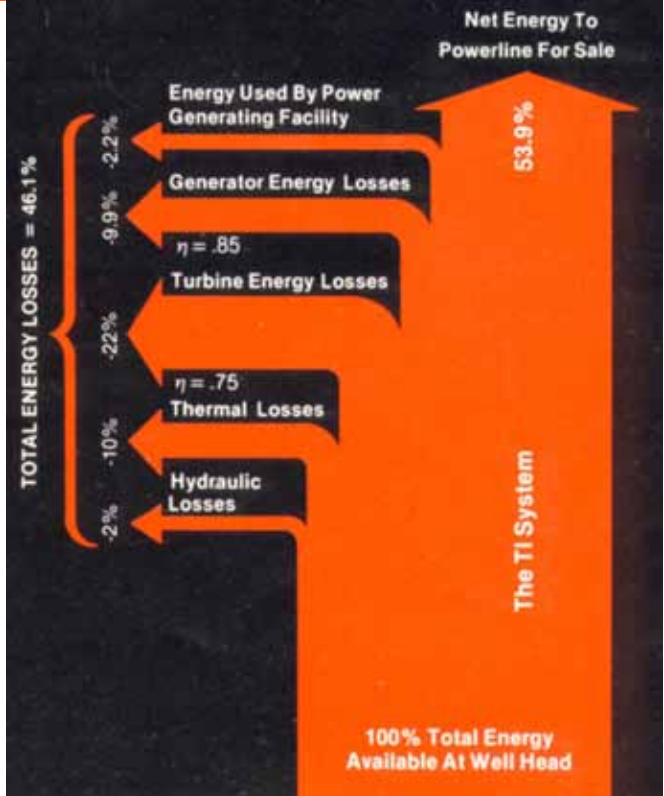
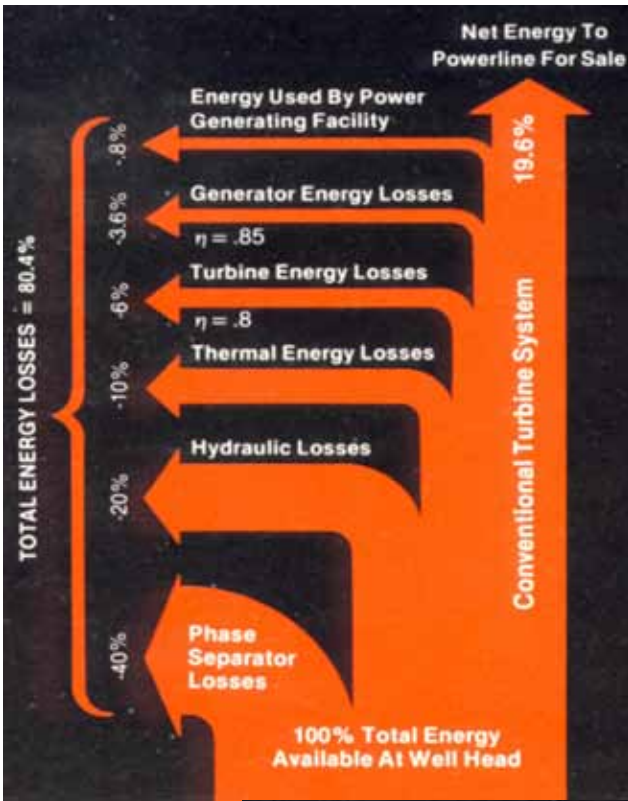


***General Ener-Tech 200 KW  
Salt Brine Geothermal Turbine***



# Salt Brine Geothermal

# Conventional Versus Tesla Geothermal Performance



**Tesla Total Flow Most Efficient**

EVALUATION OF THE GENERAL ENER-TECH DISK TURBINE TEST

AT HEBER, CALIFORNIA, NOWLIN #1 GEOTHERMAL WELL

AND

AN ANALYSIS OF THE DATA

by

Vance E. McClure, Ph.D.

October, 1982



SYNOPSIS OF EXPERIMENTALLY MEASURED AND THEORETICALLY COMPUTED QUANTITIES FOR THE 200 KW DISK TURBINE TEST, HEBER SITE, NOWLIN #1

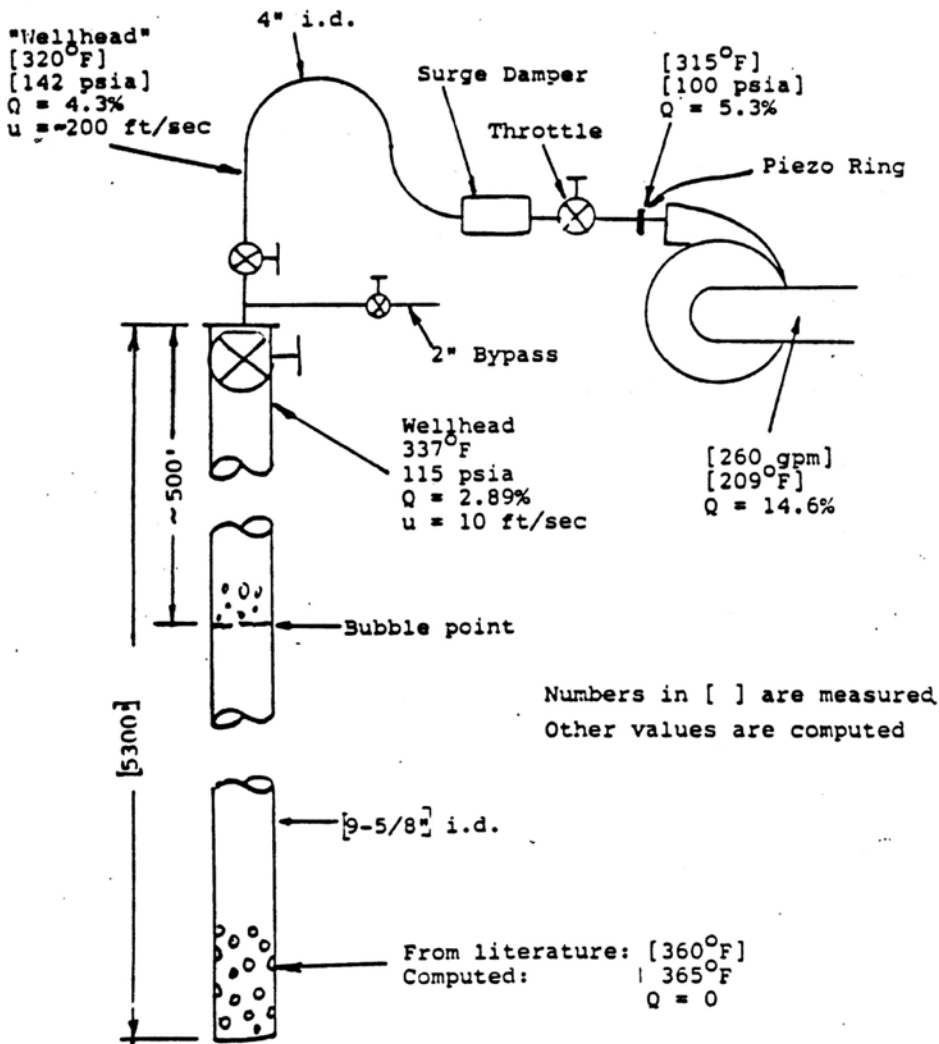


TABLE II

HEBER GEOTHERMAL TEST WELL  
 5300 Foot

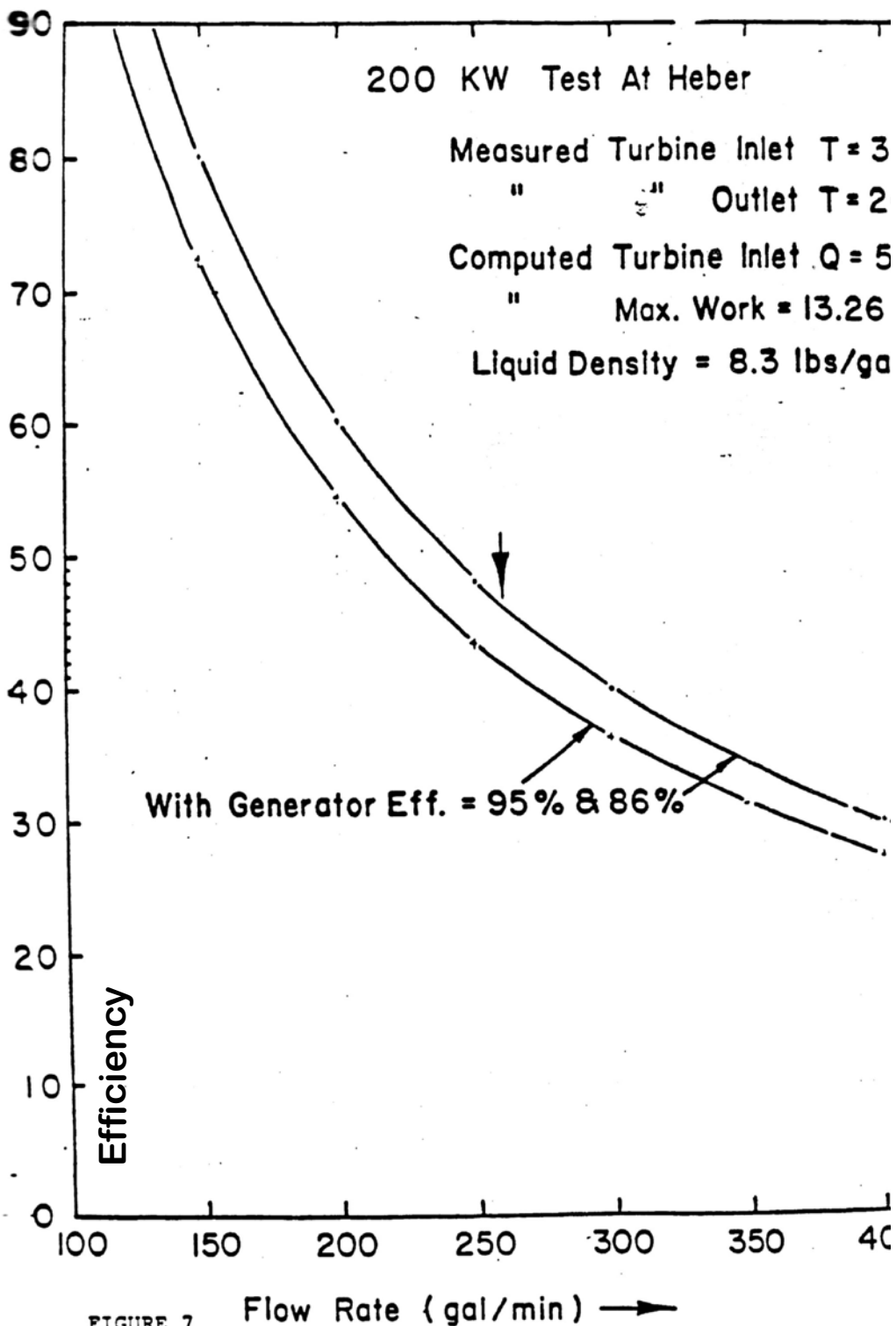


FIGURE 7

EMPIRICAL RESULTS OF HEBER TESTS

APRIL 11, 1981

Well Head Data:

125 psig.-- 325°F                      All lines heavily lagged.

Turbine Data:

Inlet - 93 psig.                      315°F  
Outlet - 0 psig.                      209°F  
Total Flow                      260 gpm. (condensed)

Output of Generator:

200 Kilowatts

Generator Efficiency 86%

Turbine heavily lagged also.

Flow measured volumetrically downstream of turbine.

Effluent: 80% water, 20% steam

58,000 parts per million T.D.S.

# **Multiple Stage Vacuum Pumping**



*Three Stage Tesla Vacuum  
Pump by Jake Possell*

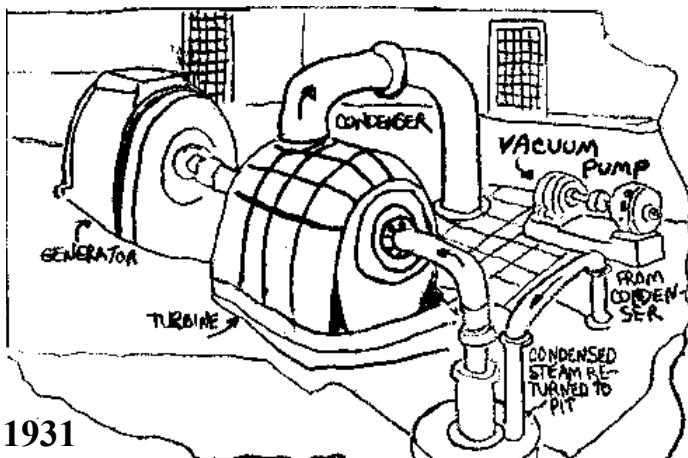
**TESLAENGINE.ORG**

***“This is a disassembled three stage all aluminum bladeless vacuum pump. The vacuum is amplified from one stage to the next creating a very high vacuum output. This pump was installed at a dental office employing 50 dentists and serves as a vacuum source for all 50 dental offices in the building. The quality that is so unique is that contaminants do not cause havoc in this vacuum pump as they do in conventional vacuum pumps that operate with a piston or sliding vane. To demonstrate the effectiveness of the bladeless pump, a salesman will take a hand full of long nails and allow them to be sucked into the intake of the pump. These nails go through the pump without damaging it in any way!”***

***Jake Possell***

# Our Future Motive Power

By  
*Nikola  
Tesla*

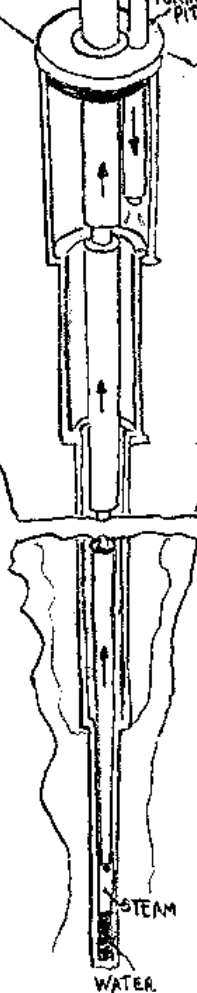


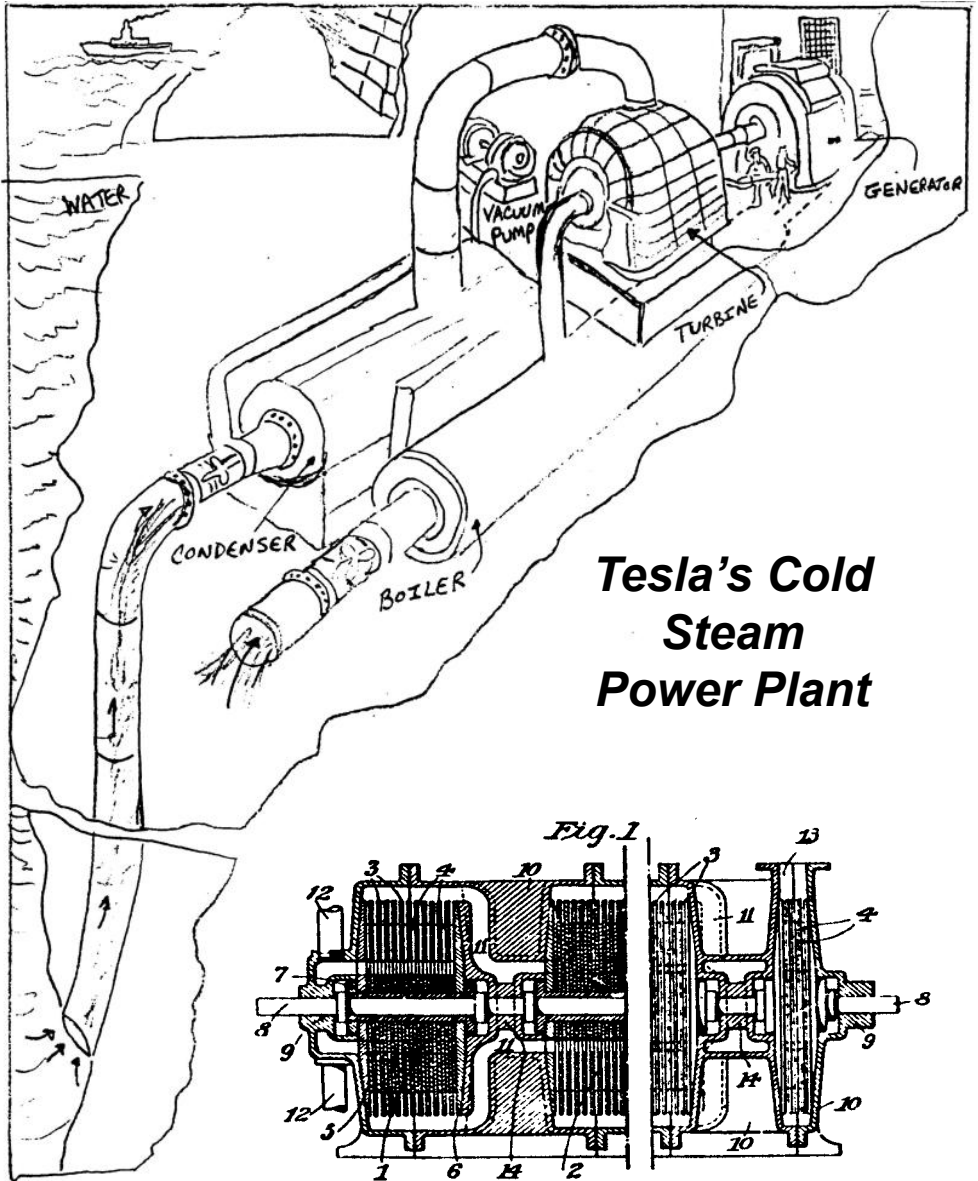
December 1931

Above and to the right, the arrangement of one of the great terrestrial-heat power plants of the future. Water is circulated to the bottom of the shaft, returning as steam to drive the turbines, and then returned to liquid form in the condenser, in an unending cycle.

Internal heat of the earth is great and in comparison with the demands which man can make upon it, is practically inexhaustible: since the heated contents of the earth are sex-trillions of tons.

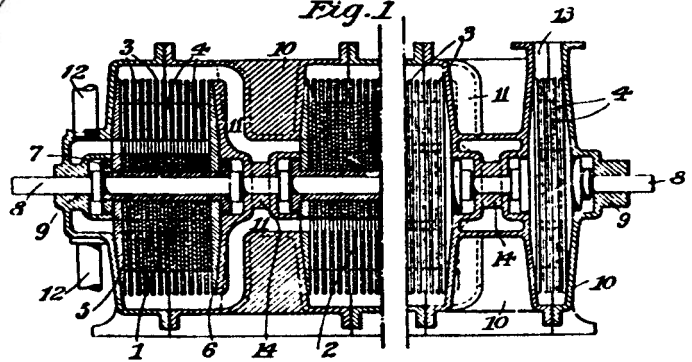
This drawing illustrates the essential parts comprising a boiler at a great depth, a condenser, cooled by river or other water available, on the ground, a turbine coupled to a generator, and a motor-driven high vacuum pump. The steam or vapor generated in the boiler is conveyed to the turbine and condenser through an insulated central pipe while another smaller pipe, likewise provided with a thermal covering serves to feed the condensate into the boiler by gravity. All that is necessary to open up unlimited resources of power throughout the world is to find some economic and speedy way of sinking deep shafts.



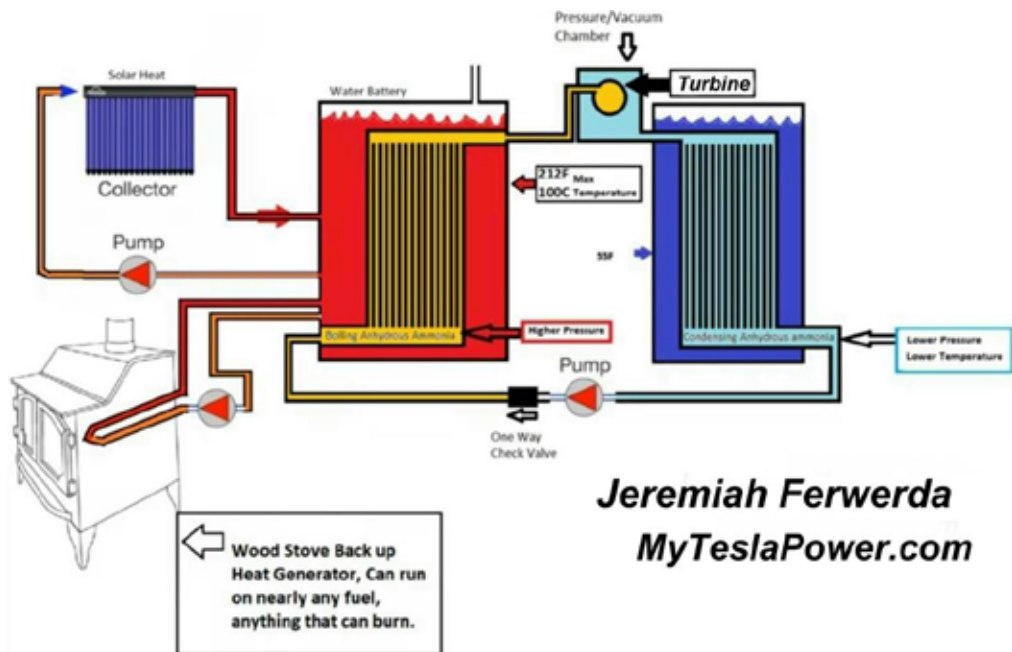


**Tesla's Cold  
Steam  
Power Plant**

*Fig. 1*

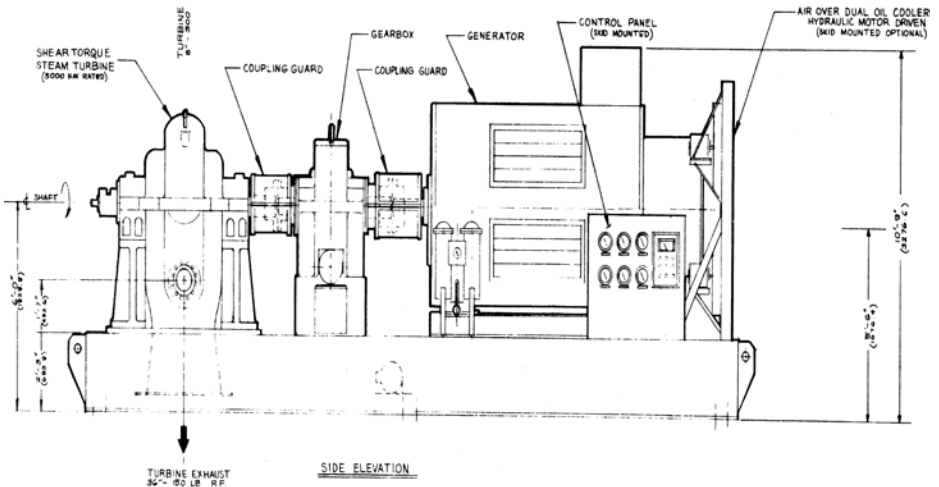


**Tesla Multi Stage Vacuum Pump**





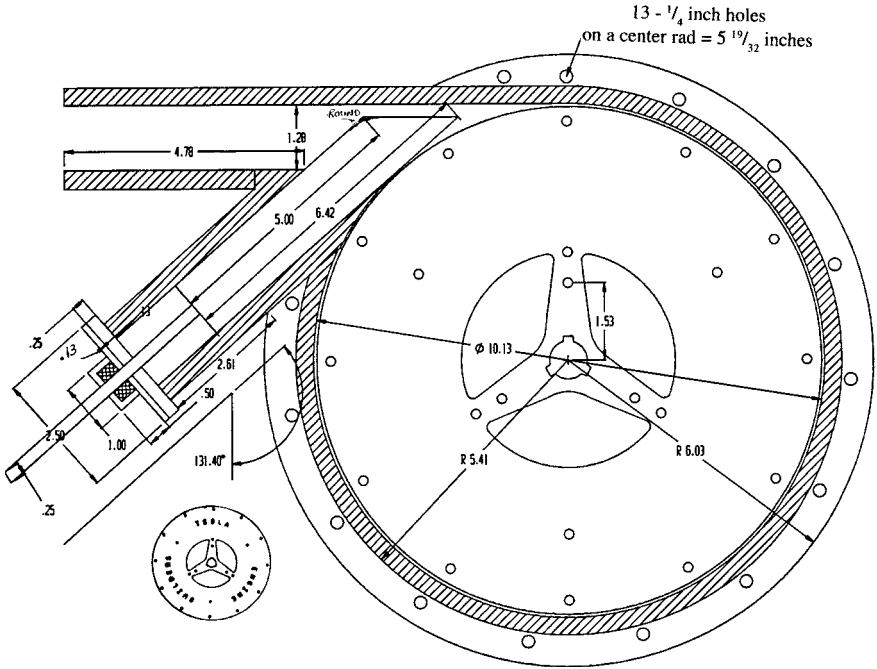
# Salt Brine Geothermal



## Skid Mounted Tesla Turbine/Alternator



# Tesla Variable Nozzle Design



Jan. 3, 1928.

1,655,114

N. TESLA

APPARATUS FOR AERIAL TRANSPORTATION

Filed Oct. 4, 1927

2 Sheets-Sheet: 2

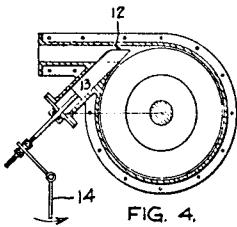


FIG. 4.

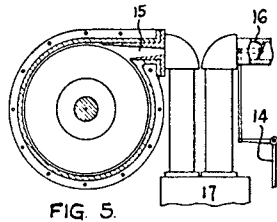


FIG. 5.

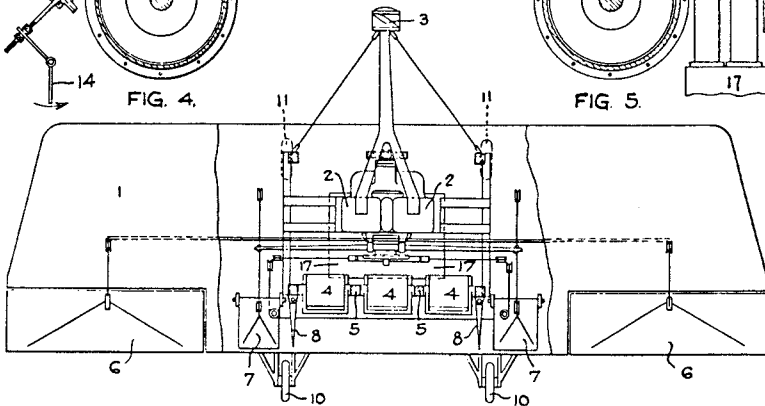


FIG. 3.

INVENTOR.

NIKOLA TESLA.

BY *John P. Tarbo*  
ATTORNEY.

**Tesla Engine Builders Assoc.**  
**TeslaEngine.org**

*Eleven Inch Runner*

*Tesla Turbine*

*Variable Nozzle*

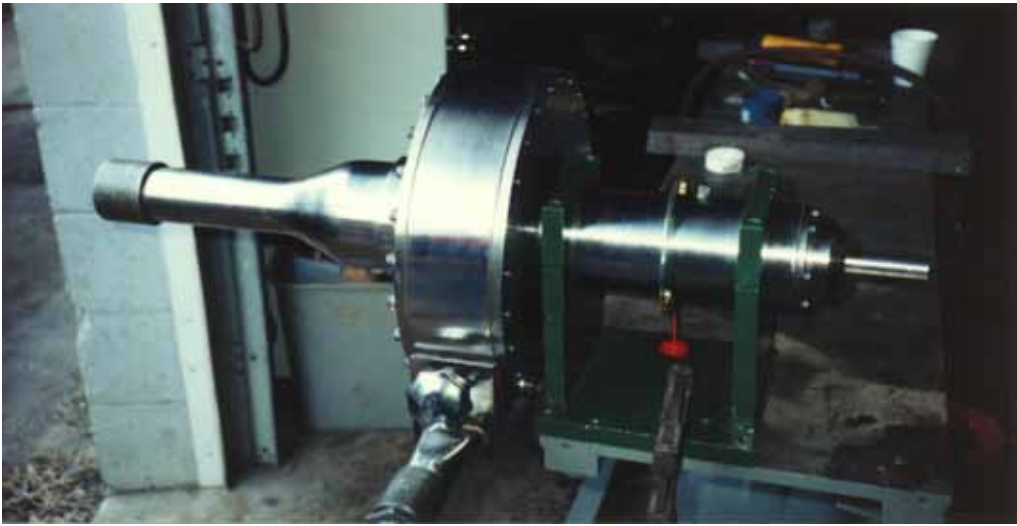
**Tesla Turbine**

*Highest Efficiency  
In Its Class*

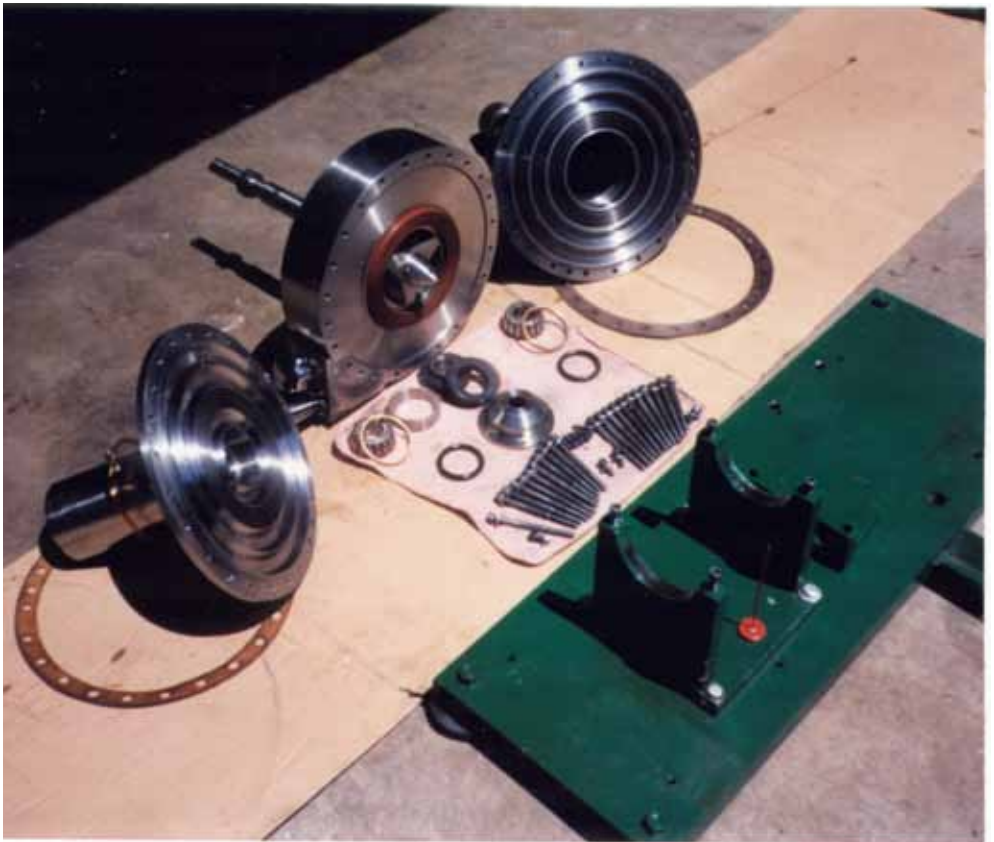
*11" Turbine Runner  
45 lb (runner & shaft)  
37 Discs*

**TeslaEngine.org**

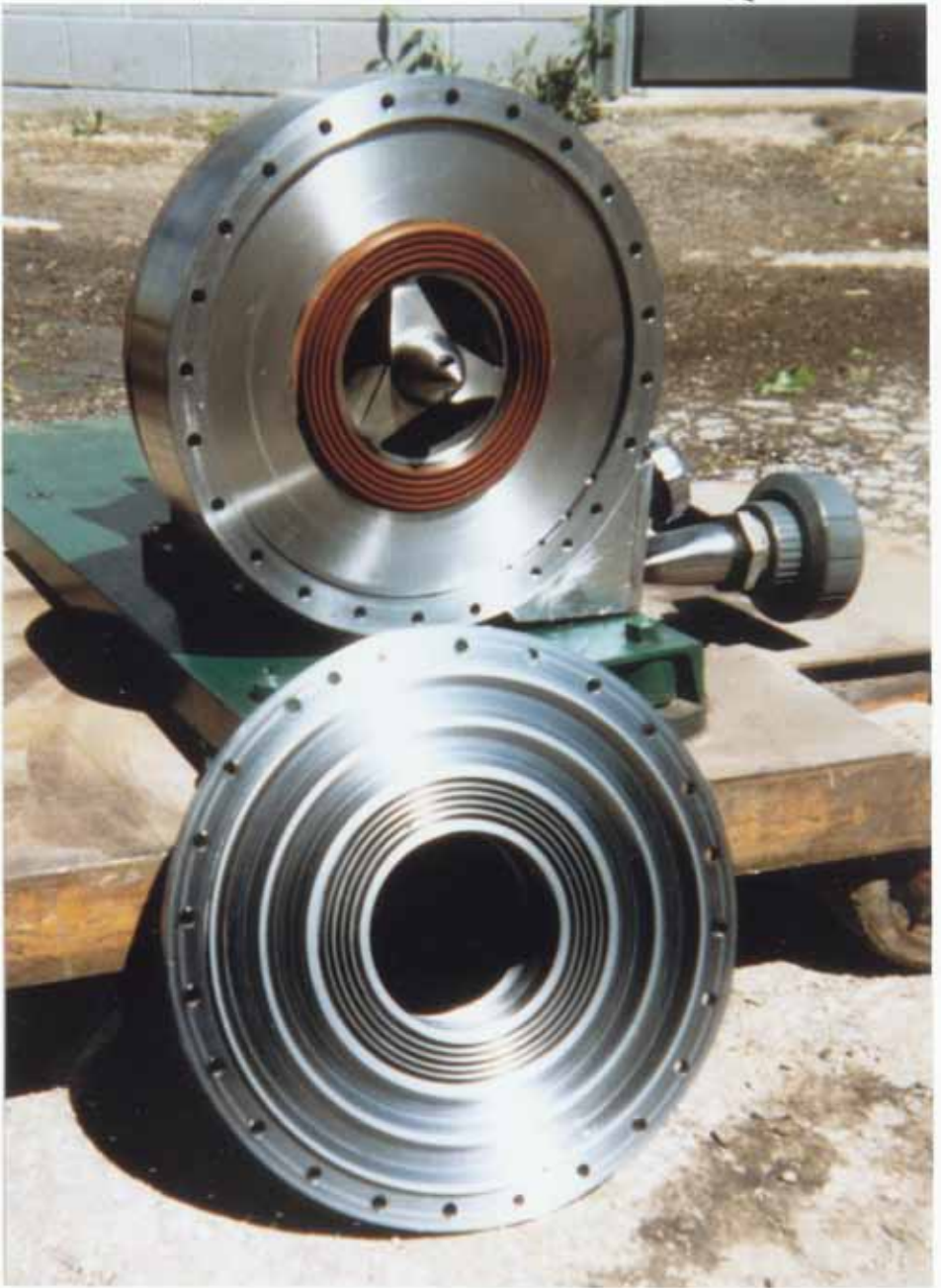
**Tesla Engine Builders Association**



***Eleven Inch Turbine with Variable Nozzle***

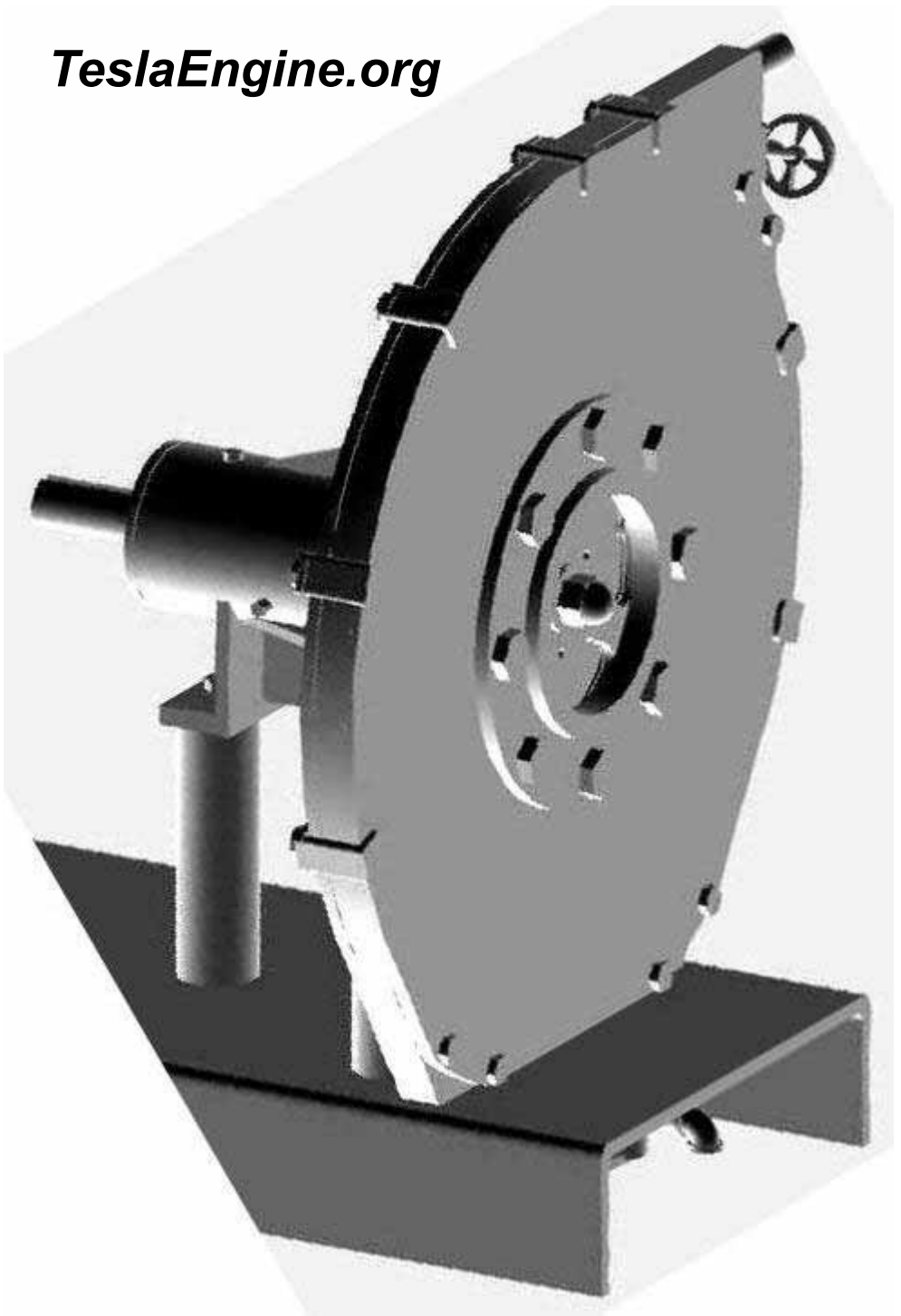


***Turbine Hardware and Components***



**Eleven Inch Tesla Turbine Engine**

***TeslaEngine.org***



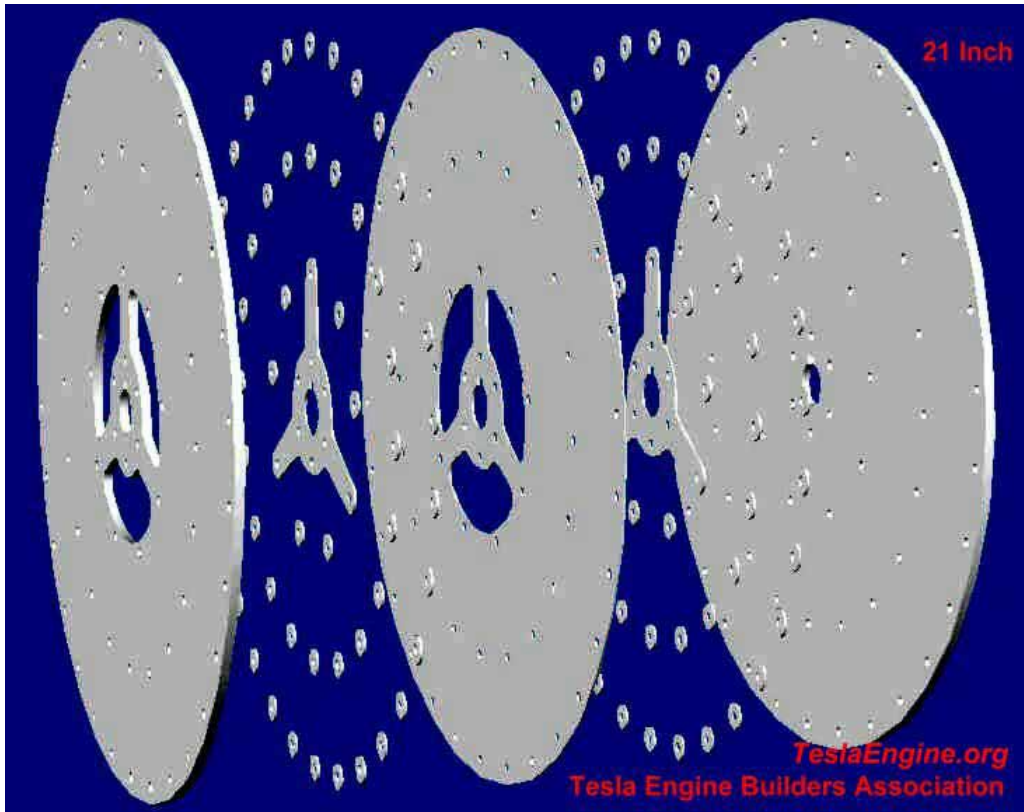
***Twenty One Inch Tesla Turbine***



**TESLA  
TURBINE**

[TeslaEngine.org](http://TeslaEngine.org)

*This turbine was commissioned  
by TEBA*



21 Inch

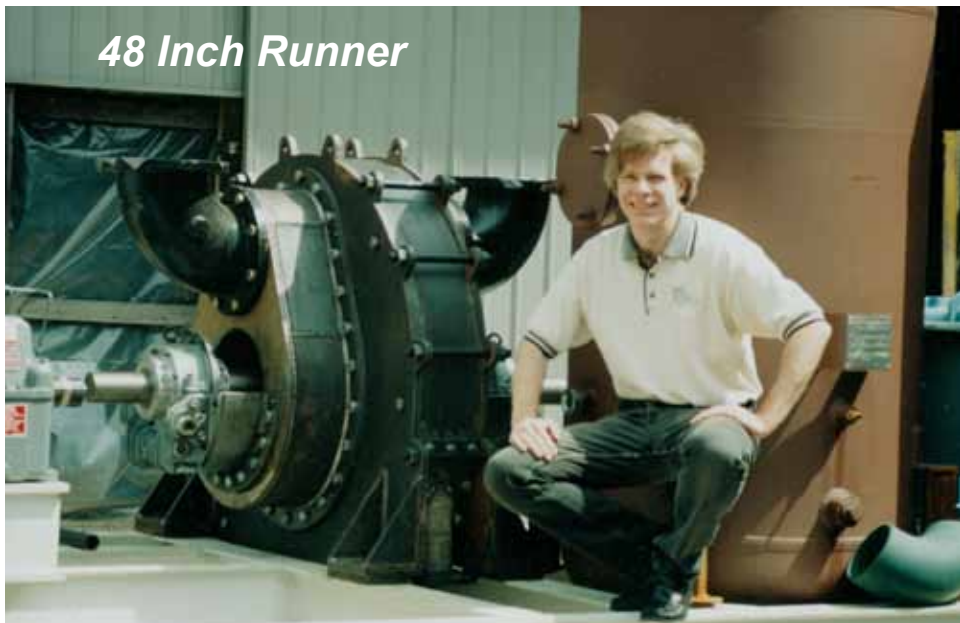
[TeslaEngine.org](http://TeslaEngine.org)

Tesla Engine Builders Association

***Twenty One Inch Tesla Turbine***

# Forty Eight Inch Tesla Turbine

*48 Inch Runner*



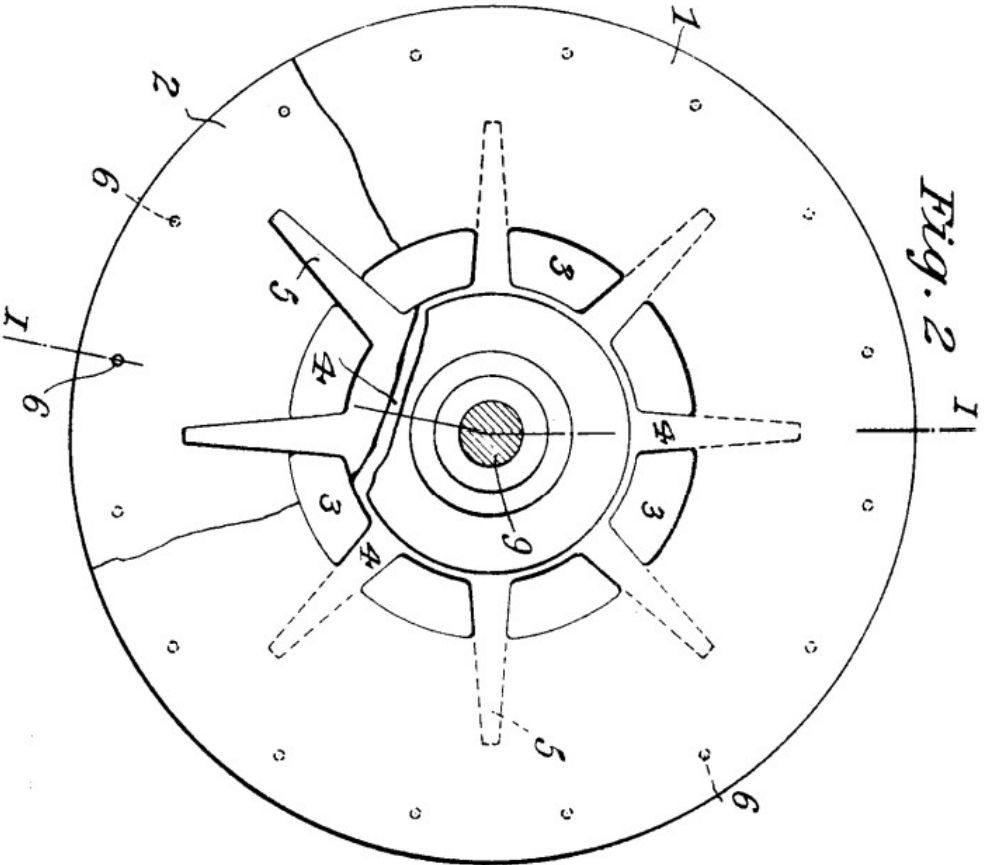
*Jeff Hayes*

***First Turbine  
In History  
Built to  
Tesla's  
Patent  
Specification  
for Large  
Diameter  
Runners***



*Sonny Entrican*

Fig. 2



**Tesla Patent For  
Large Diameter  
Runners**

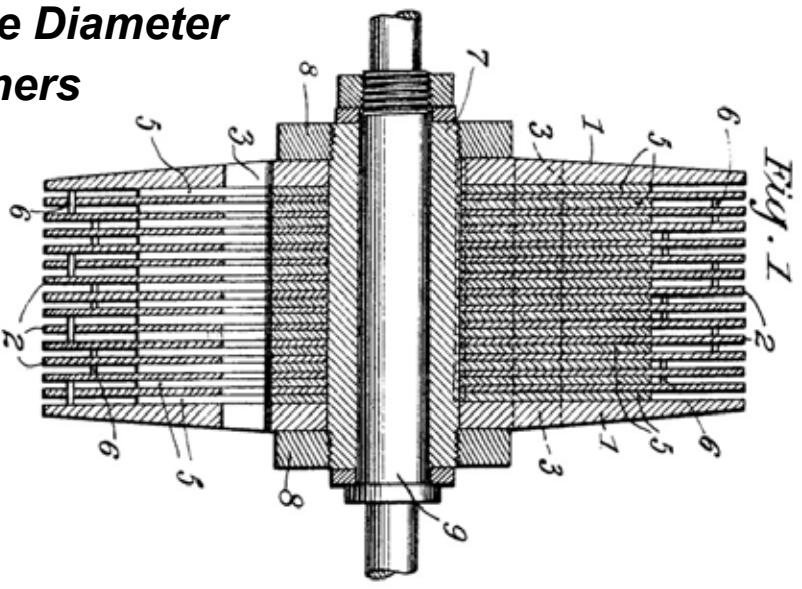
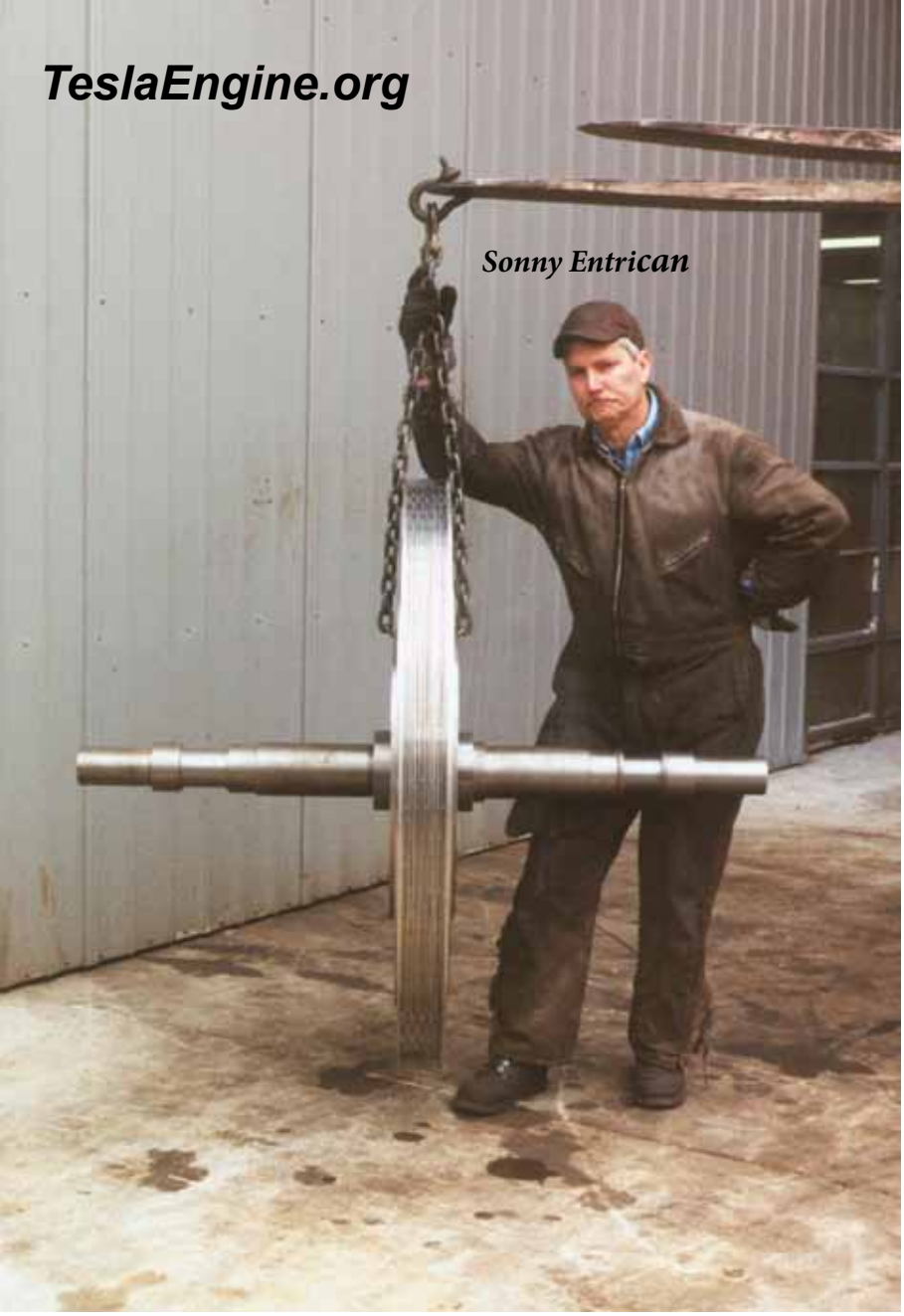


Fig. 1



**TeslaEngine.org**

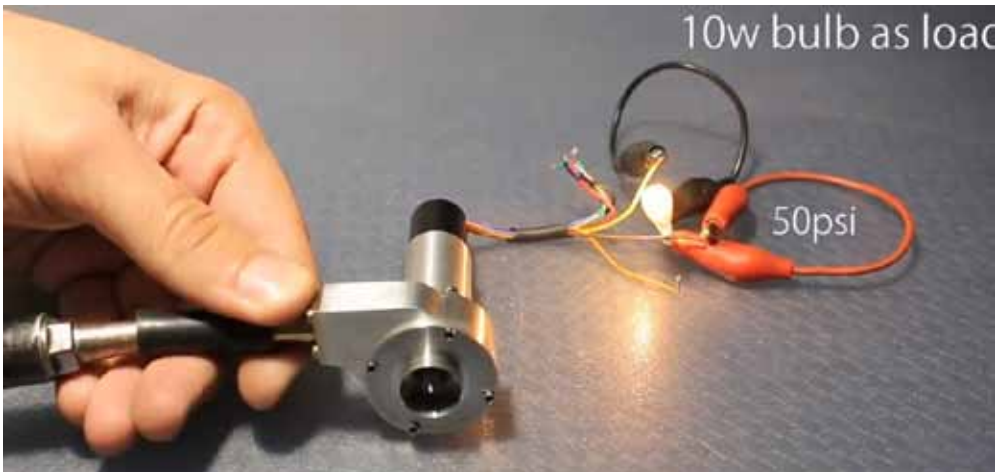
**Sonny Entrican**



**Forty Eight Inch Runner**

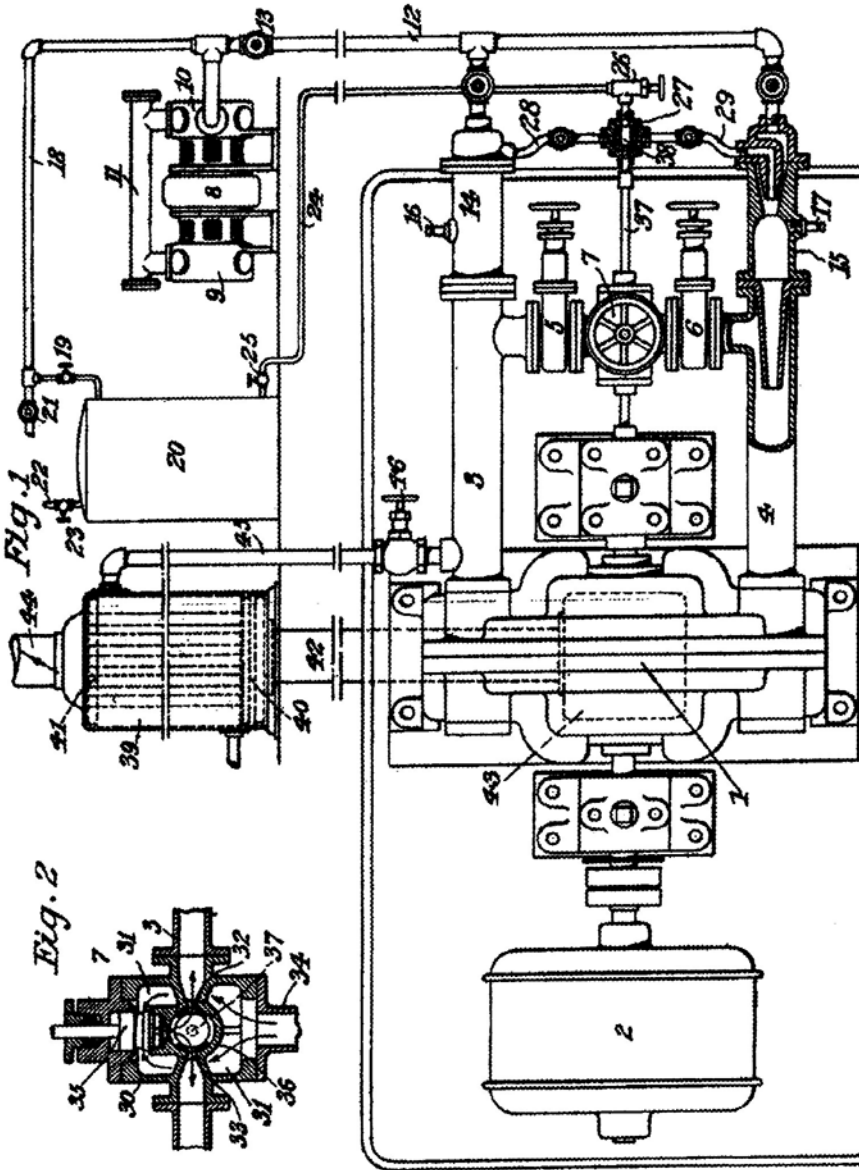


***Miniature Tesla Turbine***



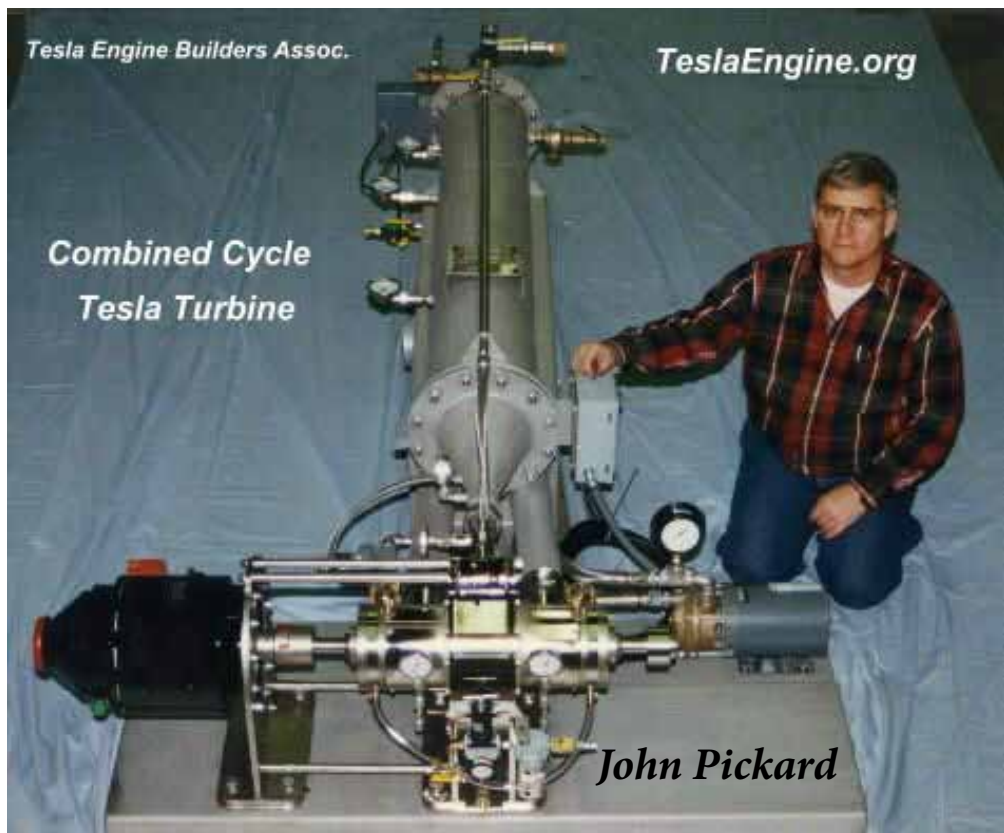
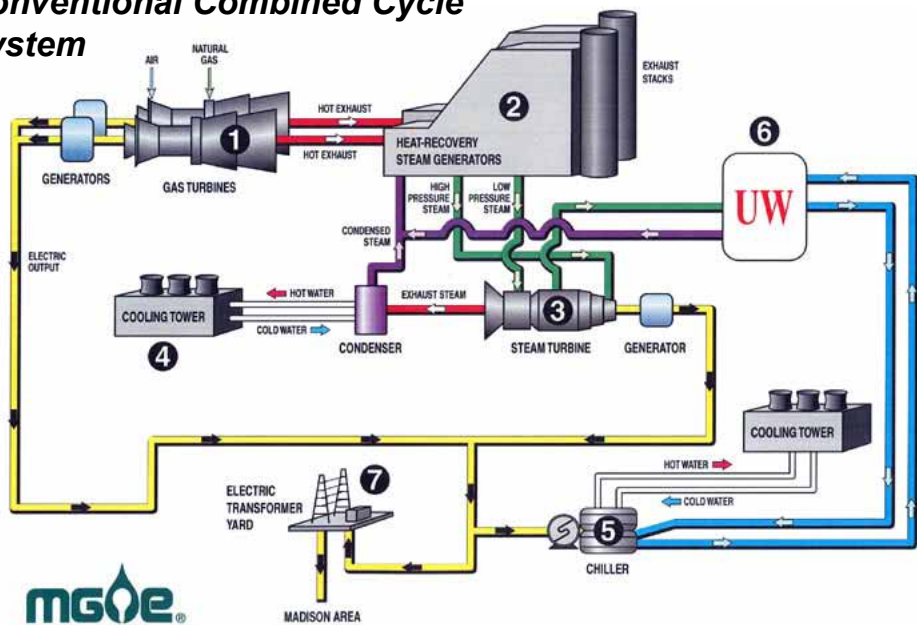
***Shown Illuminating Ten Watt Bulb  
with 50psi Applied Pressure***

# Economic Transformation of the Energy of Steam by Turbines



**Tesla's Combine Cycle Patent Drawing**

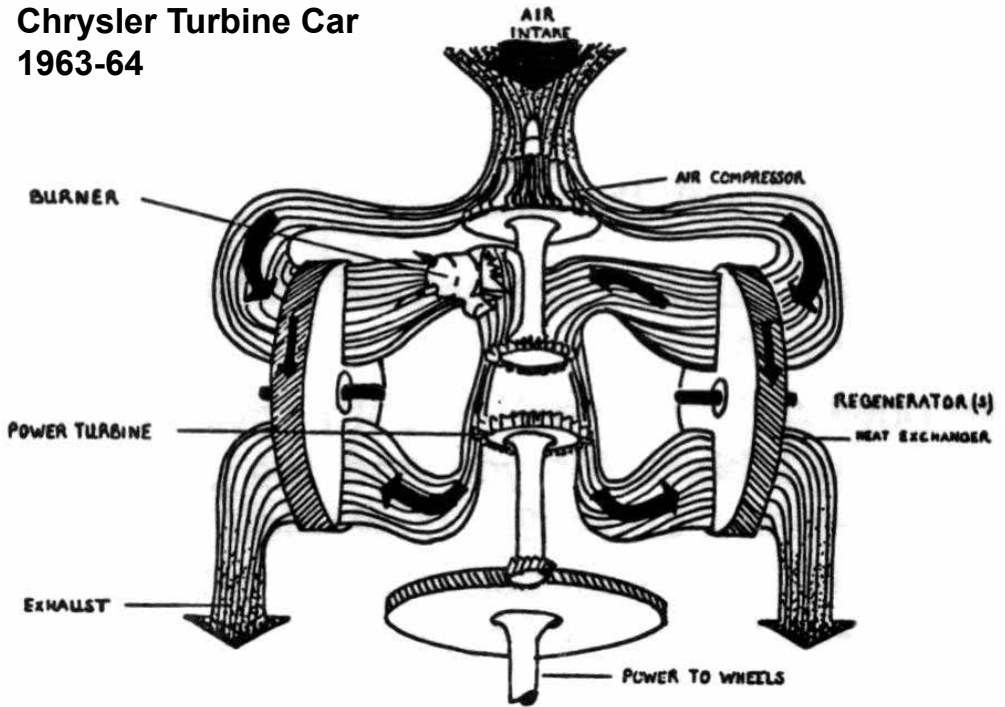
# Conventional Combined Cycle System



**Combined Cycle Tesla Turbine**



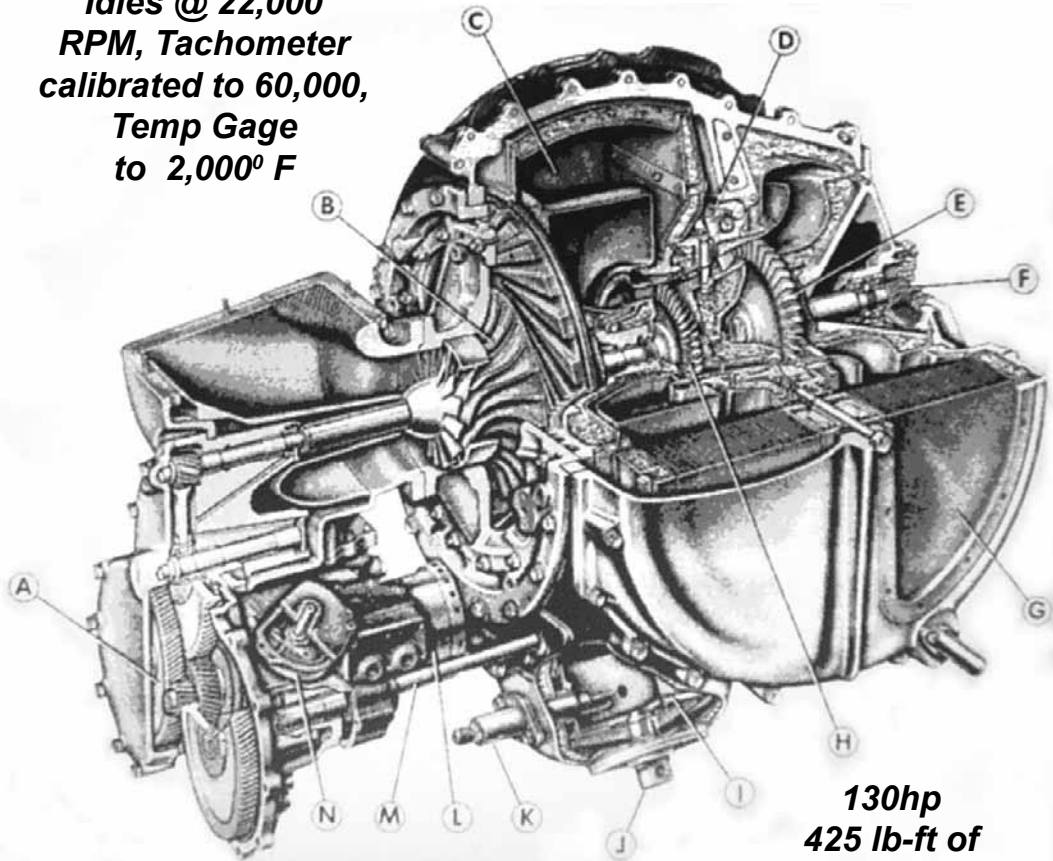
**Chrysler Turbine Car**  
**1963-64**



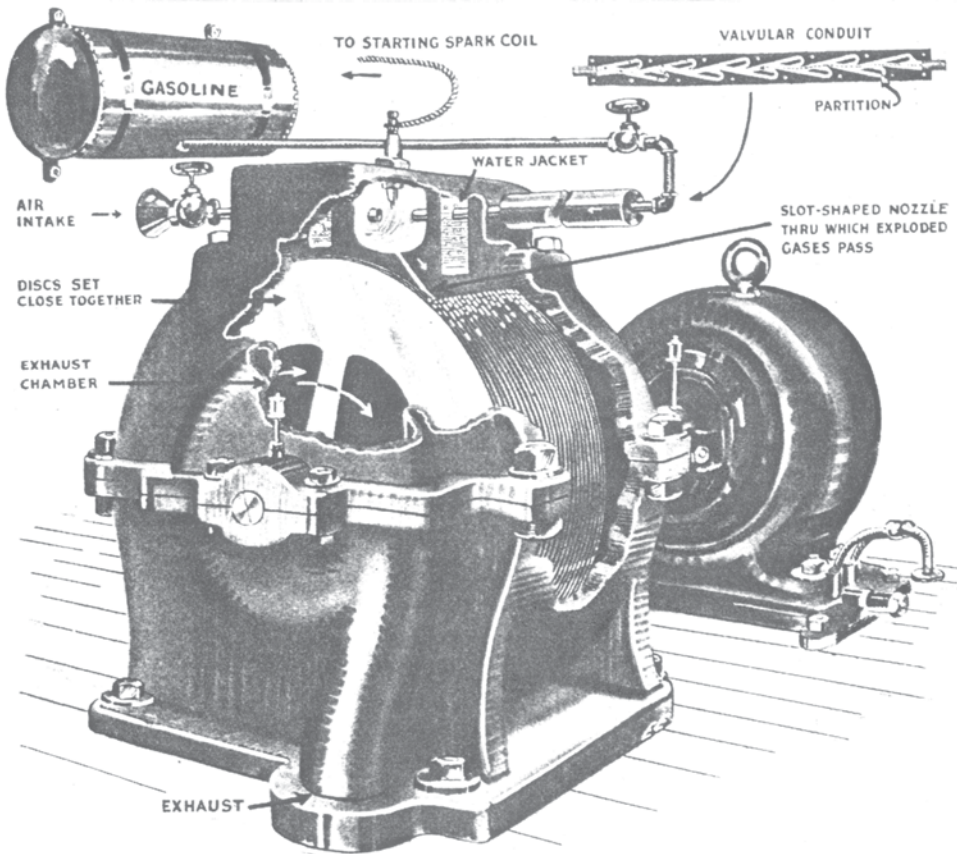
# MAIN COMPONENTS OF THE TWIN-REGENERATOR GAS TURBINE:

**A:** Accessory Drive; **B:** Compressor;  
**C:** Right Regenerator Rotor; **D:** Variable  
Nozzle Unit; **E:** Power Turbine;  
**F:** Reduction Gear; **G:** Left Regenerator Rotor;  
**H:** Gas Generator Turbine;  
**I:** Burner; **J:** Fuel Nozzle; **K:** Igniter;  
**L:** Starter-Generator;  
**M:** Regenerator Drive Shaft;  
**N:** Ignition Unit.

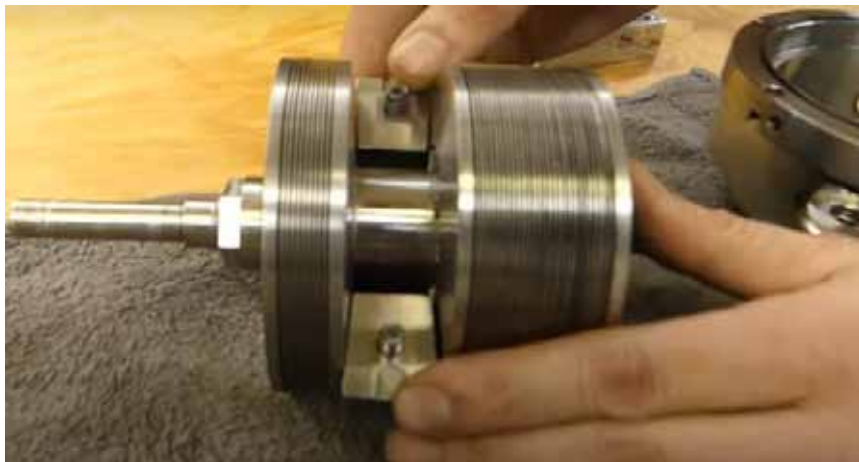
*Idles @ 22,000  
RPM, Tachometer  
calibrated to 60,000,  
Temp Gage  
to 2,000° F*



**130hp  
425 lb-ft of  
Torque**



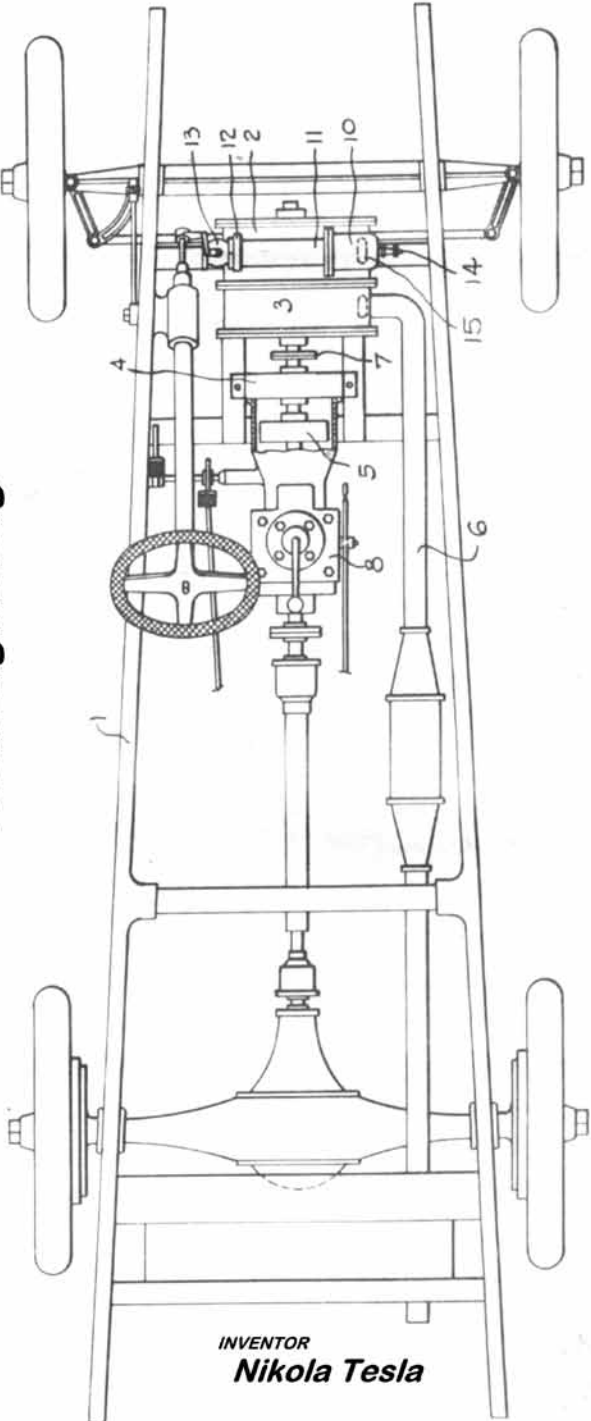
## The Gasoline Tesla Turbine Employing Tesla Valvular Conduit



*Jeremia Ferwerda's Tesla turbine runner  
with vacuum evacuation*

# TESLA TURBINE AUTO PATENT

TeslaEngine.org



INVENTOR  
**Nikola Tesla**





***Tesla Motors Achieves Only Half of  
Tesla's Vision for Vehicles!***

**Tesla again offered Westinghouse the designs of his “commercially superior turbine,” which he assured them would save the firm millions of dollars (*Ed: early 1922*). But he warned that there could be no strings. He could produce the turbines at once but would not consent to agree to “any experimenting whatever.”**

**The response was tiresomely familiar. Board chairman Guy E. Tripp wrote that they could not enter such an agreement because their engineers were negative on the subject, “and of course we must be guided by the opinion of our Engineers.”**

***From “Man Out Of Time”***

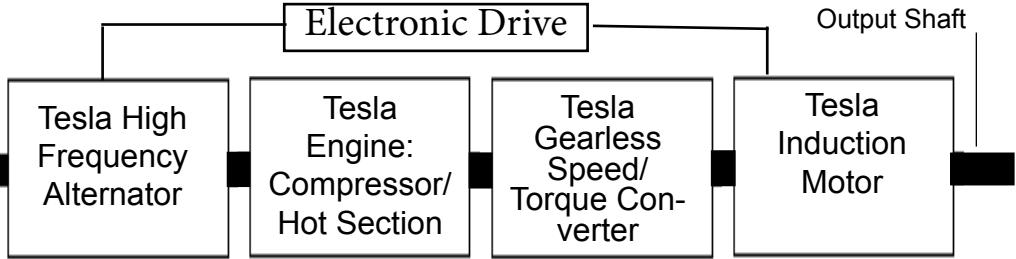
# TESLA'S PLAN FOR PRIME MOVERS

Tesla believed that the future for prime movers should be an engine coupled to an electric drive system (Hybrid) as he is publicly on record as stating in 1904. He insisted that this was the most efficient way to convert energy. Tesla was proven correct with this hybrid system being implemented and proven in our present day rail system with diesel electric locomotion becoming the standard.

Quoting Tesla:

*“During many years the scheme was declared to be impracticable and I was assailed in a manner as vicious as incompetent. In 1900, when an article from me advocating the electric drive appeared in the Century Magazine, Marine Engineering pronounced the plan to be the “climax of asininity,” and such was the fury aroused by my proposals that the editor of another technical periodical resigned and severed his connection rather than to allow the publication of some attacks. A similar reception was accorded to my wireless boat repeatedly described in the Herald of 1898. The patents on these inventions have since expired and they are now common property. Meanwhile insane antagonism and ignorance have been replaced by helpful interest and appreciation of their value.”*

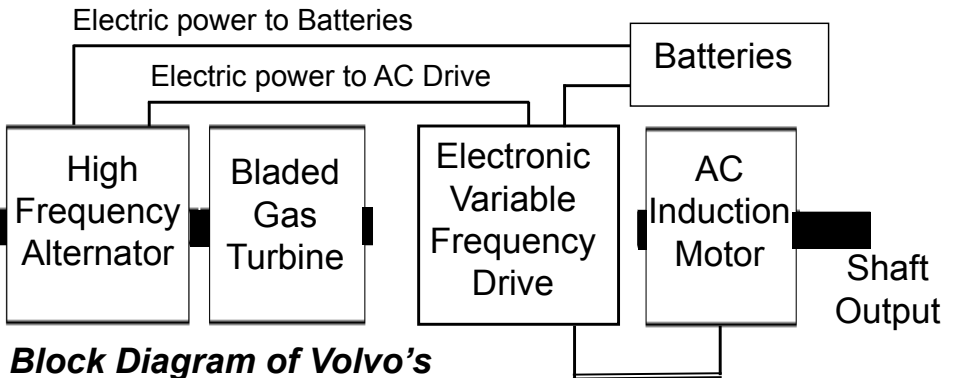
Volvo has recently introduced a concept car that uses just this principle but is using a conventional bladed turbine engine. This engine is coupled to a Tesla high frequency alternator which feeds an electronic “drive” control. The electronic motor control is used to adjust the supply frequency, and therefore the speed, of a Tesla polyphase induction motor. This full size concept car by Volvo is reported to perform very nicely while at the same time attaining 45 miles per gallon at 55 miles per hour. Volvo has coined this vehicle as “The Environmental Concept Car” or ECC. The only mechanical part of the system that is not Tesla’s is the turbine engine.



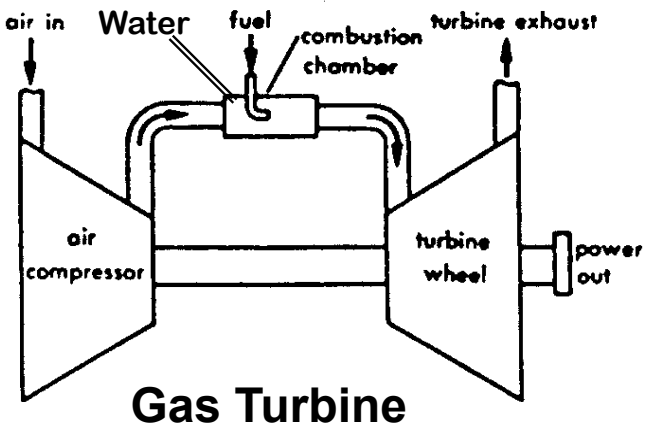
**Concept to eliminate batteries for acceleration using Tesla Torque Converter**



*Volvo E.C.C.*



**Block Diagram of Volvo's Environmental Concept Car**



N. TESLA.

## APPARATUS FOR THE UTILIZATION OF RADIANT ENERGY.

(Application filed Mar 21, 1901.)

(No Model.)

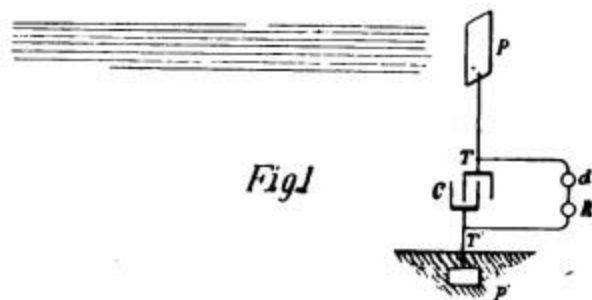


Fig 1

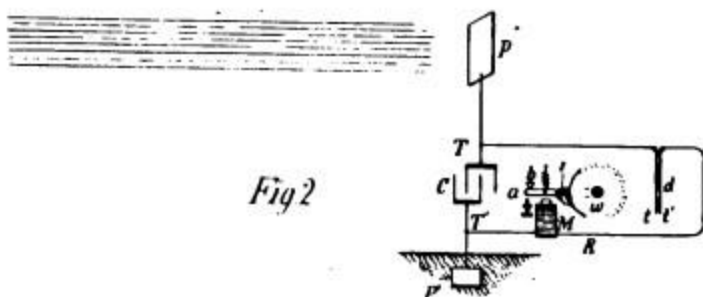


Fig 2

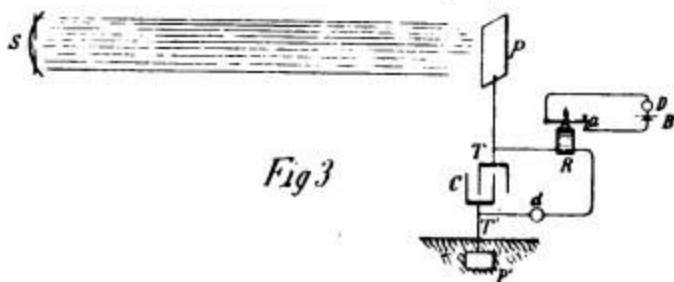


Fig 3

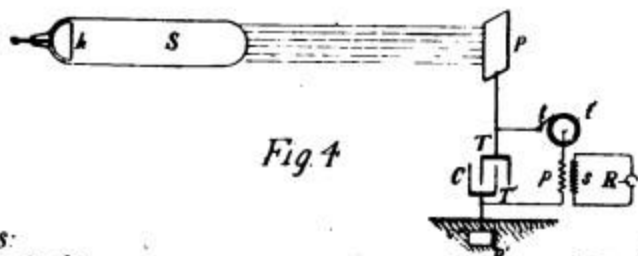


Fig 4

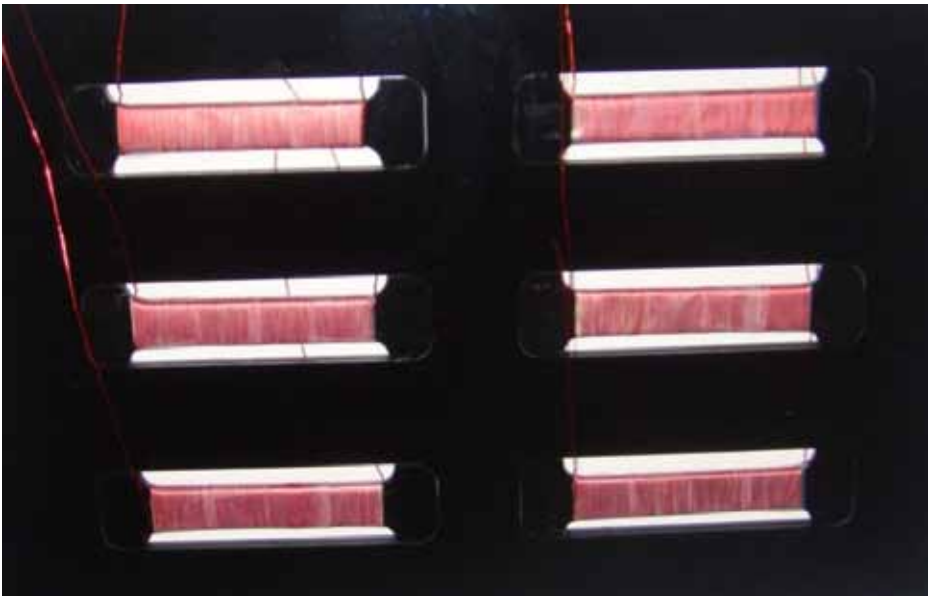
- Witnesses:

*Rudolf Hertz*  
*Dr. Hermann Gyar*

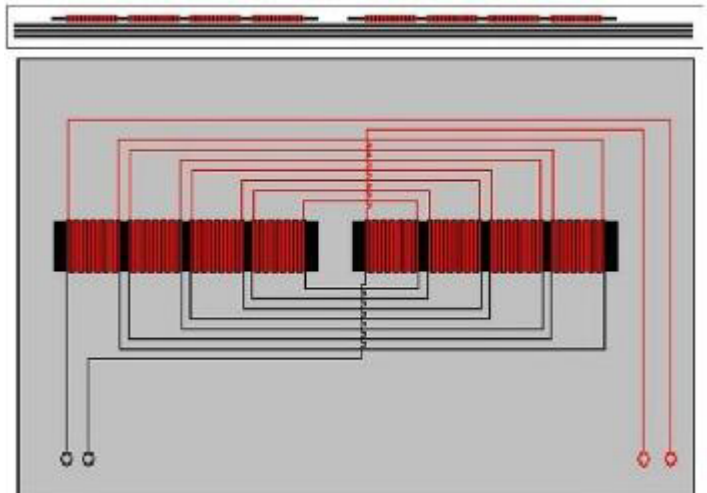
Inventor

*Nikola Tesla*

*Wm. Ken. Page & Cooper Attys.*



Side View: Bismuth sandwiched between aluminum layers



**Z-Power's  
Radiant  
Energy  
Receiver**



*TeslaEngine.org*

***“Truth has no Special Time of its own.  
Its Hour is Now — Always”*** *Albert Schweitzer*