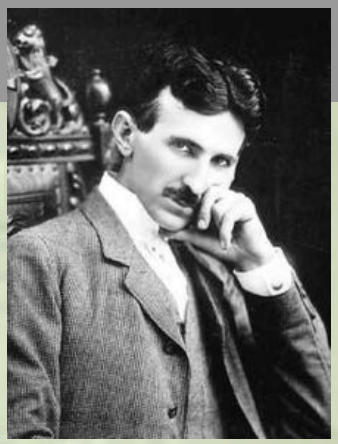
393

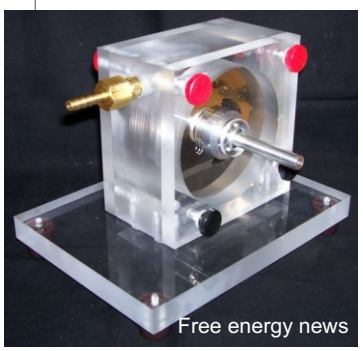
Tesla Turbine MOTORS



Nikola Tesla

Free energy news

Http://www.sredmond.com/disk_turbine.htm



Free link

Http://www.instructables.com/id/Build-a-15,000-rpm-Tesla-Turbine-using-hard-drive-/

 # 393 The Tesla Turbine Air Motor

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Thank you
David Waggoner
Owner

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www.FuellessPower.com

www.FuellessUSA.com

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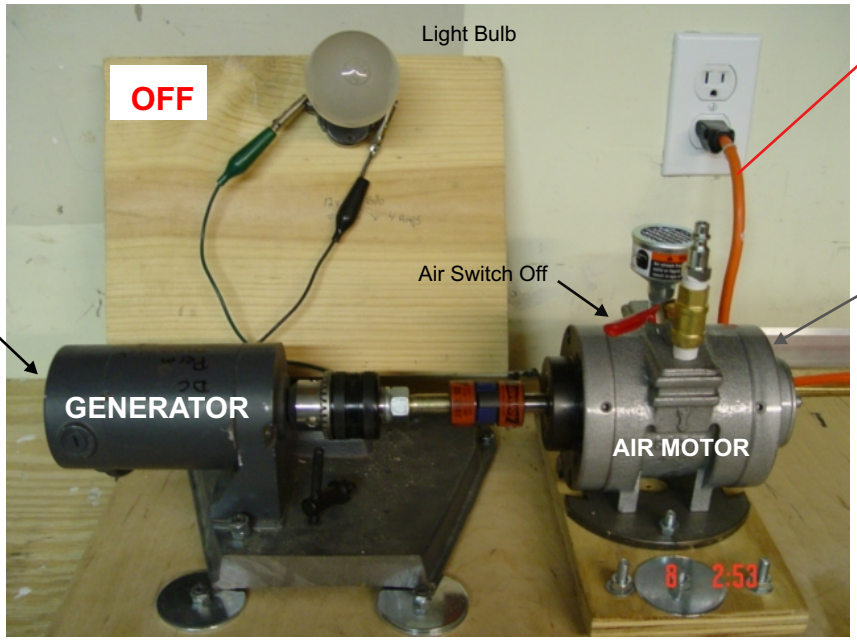
Did You Know that?

Air Motors Can Generate Electricity?

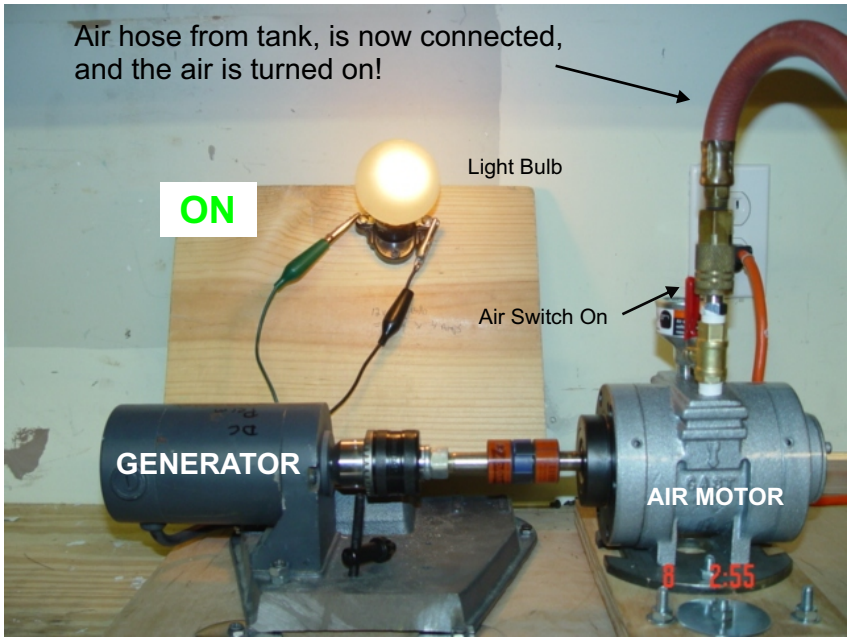


90 vdc Perm Magnet motor using as a 120 vdc generator (low rpm type)

Notice: Orange extension cord is not connected to the air motor, light or generator in any way. Honest! Forgot to unplug it for the photo.

Air Motor

Yes, air motors can also run AC or DC generators!



FREE AIR

Air motor is powered by compressed air, which can be pumped in tank using an air hand pump, windmill, or by using an exercise bike connected to a compressor pump with a large rubber pulley. Use a 1 hp x 5 cfm pump. Www.Grainger.com

You could also buy a portable 15 gallon air tank that can hold 150 psi or more, and fill it up for free at a gas station or other.

Our Air Motor .80 hp x 1000 rpm running our 120 vdc generator

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From Air Tools to Air Cars!

What powers these awesome motors is simply compressed air!

Powering motors with compressed air is a much more high efficient way to get around. They can be designed as super high efficient motors or as free energy motors. Some designers are even claiming they can be built as perpetual motion machines.

Disk turbine air motors are the best, and produce much less noise during operation than the vane type paddle air motors. The rpms you can get from an air motor is enormous! The disk turbine air motors out perform the vane type motors, but they are more expensive to buy. It is best to build your own disk air motor. Vane type motors are louder, cheaper and more readily available than the disk turbine air motors. I would recommend building both from scratch. They are not that hard to build and can be done with a simple drill press and some common home tools. Making a good rotor shaft is an important part of the disk motors, but can be done right at home, Or you can get a special keyed rotor shaft made at any machine shop, which is not that expensive at all. The air motor is one of the toughest and most versatile power devices available to design engineers. Air motors are great for industrial applications as well as for back yard researchers.

“Air motors are more compact and light weight than electric motors”

An air motor weights only about 1/4 as much as an electric motor of the same output, and occupies only 1/6 of the space. Air motors develop much more power relative to their size and weight than most other motor types. Torque increases with the load! The torque and output of an air motor can be adjusted very easily by changing the working pressure. The speed can also be adjusted by adjusting the air flow.

The air motor is a work horse!
Air motors can be stalled or jammed without overheating and sustaining damage to the motor. Electric motors simply can not do that! Air motors are ideal for industrial hazardous environments. Why? Because unlike electric motors or gasoline motors they do not generate sparks or fumes.

Air motors can be easily reversed!
Air motors can be ran in either direction.
They can be easily reversed using a directional air valve. (www.Granger.com)
See photo 1. More info on next page.

Photo 1

Keywords: Solenoid Air Control Valves

Pneumatics & Hydraulics > Valves > Solenoid Air Control Valves

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Www.Grainger.com Keywords: Solenoid Air Control Valves

Valve Solenoid 1/8 In

Ported Body Solenoid Valve, NPT Port 1/8 Inch, Valve Type Direct Solenoid, Actuator/Return Solenoid/spring, Maximum Operating Pressure 120 PSI, Air Flow 6.9 CFM, Coil 12 VDC, Coefficient of Volume 0.2, Maximum Temperature 0-180 Degrees Fahrenheit, Length 2.8 Inches, Height 1.2 Inches, Width 1.1 Inches, 4 Way.

Grainger Item # 6JJ40 Price (ea.) $50.65

Brand INGERSOLL-RAND/ARO
Mfr. Model # P211SC-012-D

ISolenoid Air Control Valve Type Premair,

4 Way Body Ported with Speed Control
Actuator/Return Solenoid/Spring NPT Port (In.) 1/8

Coil 12VDC
CFM 6.9 Cv 0.2
Max. Temp. Range (F) 32 to 125 Max.

Operating PSI 120
Design Compact, Fast Response Time ARO Model Number P211SC-012-D

Length (In.) 2.8 Width (In.) 1.1 Height (In.) 1.2

6.9 CFM (Quantity of air output)
Maybe good for small piston engines as well.

Premair Valves
3-way and 4-way, 2-position function valves are compact to save space, while providing exceptional air flow. Direct acting response time. Standard manual override. 4-way models available with built-in cylinder speed control. Can be stacked or used as stand alone Lead wire connection
3 coil options-AC and DC

I have not personally tried this air valve, but it seems like you could also use this electric 12 VDC air valve to control the air flow to a gasoline piston engine chamber. David Waggoner

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From Air Tools to Air Cars!

Air motors are simple to install!

Air motors can run in any position. The motors and the required air lines are easy to install, and can replace any electric motors application, aa well as some gasoline type motors. These type motors are virtually unaffected by heat, vibration or corrosion. They are strong, and can even sustain knocks, shocks or blows to them. Their performance in hostile environments cannot be matched by any other type of motor

Types of air motors used today

There are several types of air motors. The most commonly used are the vane, the piston and the disk turbine motors. *Note: Any gasoline type piston engine can be converted to run on compressed air.*

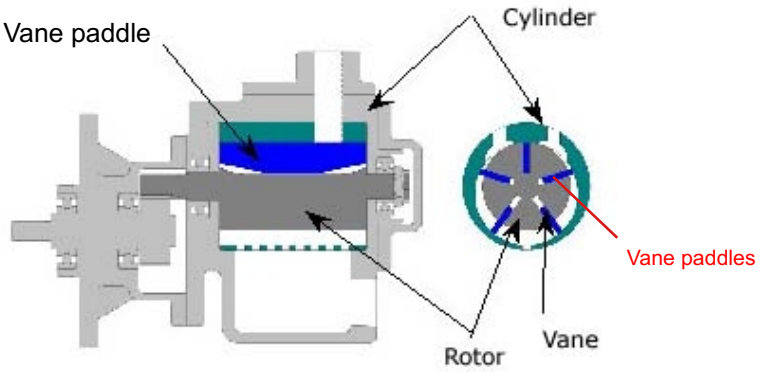
Vane motors (paddle wheel type), are produced with power ratings up to 5,000 watts!
The vane air motor has a basic design and consists of only a few components, making it easy for any back yard tinkerer to build. I am sure you could easily build one out of PVC pipe and PVC 1/4" plastic sheeting which can be purchased at screen printing and sign companies, or sign supply companies, plastic supply companies, online or locally. PVC pipe of course can be purchased at your local plumber supply or hardware store.

Some **Vane motors** use a small amount of added oil into the compressed air to lubricate the air vane paddles. There are vane motors that do not use oil at all. The disk type do not need oil as well. I prefer to build and use the type that uses no oil at all. Lubrication free motors do not need any oil added to the air. These type of vane motors are designed with special low friction material and have permanent lubricated bearings. Air motors can reach as high as 20,000 rpm, so it is wise to use step down gear reducers, which can also be purchased at www.Grainger.com.

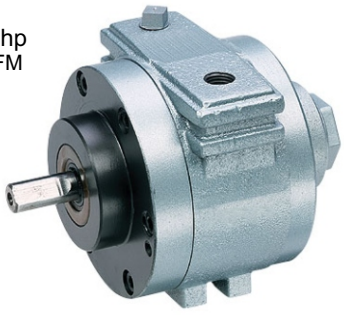
Http://www.coleparmer.com/catalog/product_index.asp?cls=43408

Free energy news

Large HP Vane Air Motor



0.82 hp
41 CFM



Oilless Air Motor
EW-70030-24 500 - 2000 rpm
Counter clock wise is cheaper.
Made by Cole-Parmer Co.
1-800-323-4340

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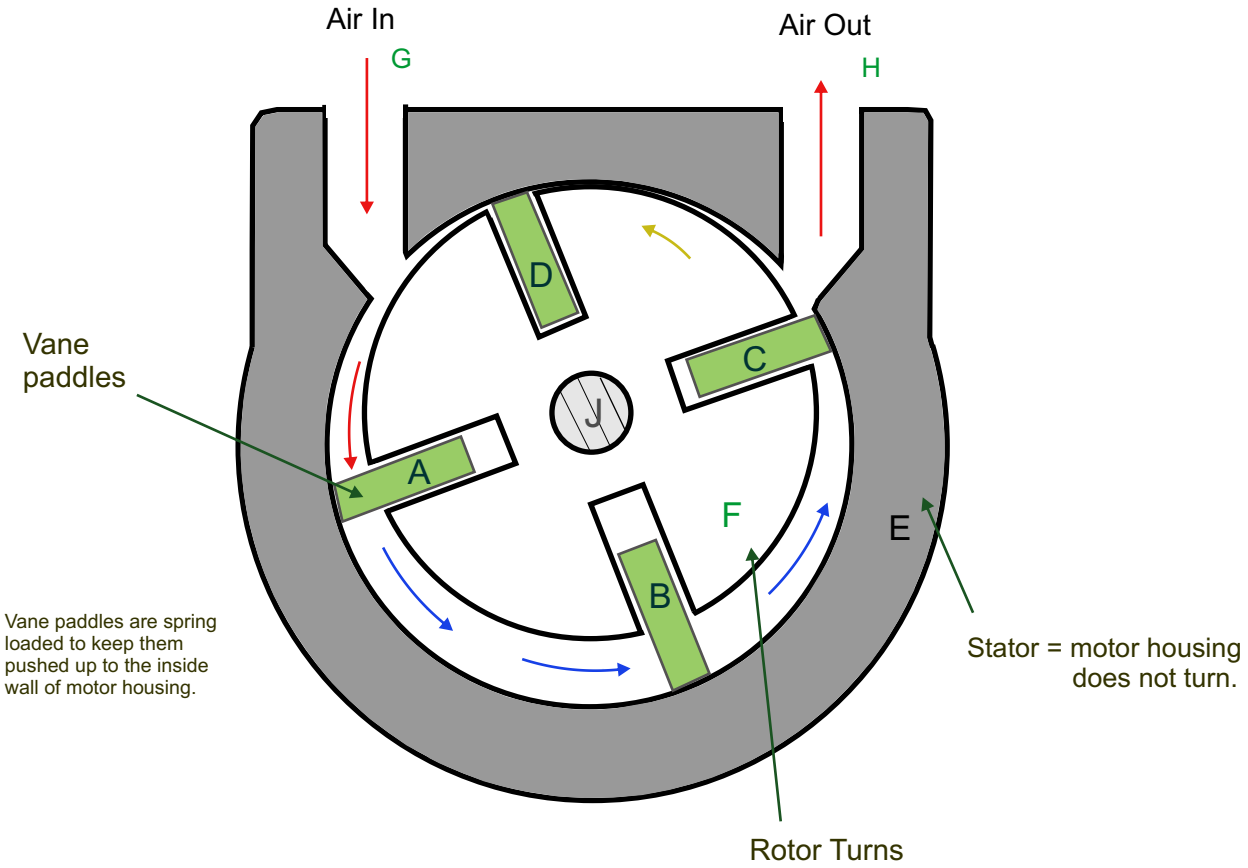
Vane Type Air Motor

Air pressure runs into the air in, port - G (for example 70 psi). 70 psi of pressure quickly pushes its way into the vane chamber and pushes the vane paddle - A, turning the entire rotor wheel - F, causing motor rotation. As paddle - A is pushed into the 7:00 position, paddle - D moves into position to then get caught and pushed by the 70 psi air in, to repeat the process. Paddles can be pushed up against the walls of the motor housing by using push springs or by allowing the centrifugal force to push them out while spinning. By using the centrifugal force method, there is no need for springs.



If the motor material is made up of material that does not rust or corrode, the air motor could then be used as a steam engine or as a hydroelectric water motor! Although water turbines are much more efficient for generating electricity from water pressure. Water sources: creeks, rivers, dams, man made water towers. The water towers can be located high on a hill top as well.

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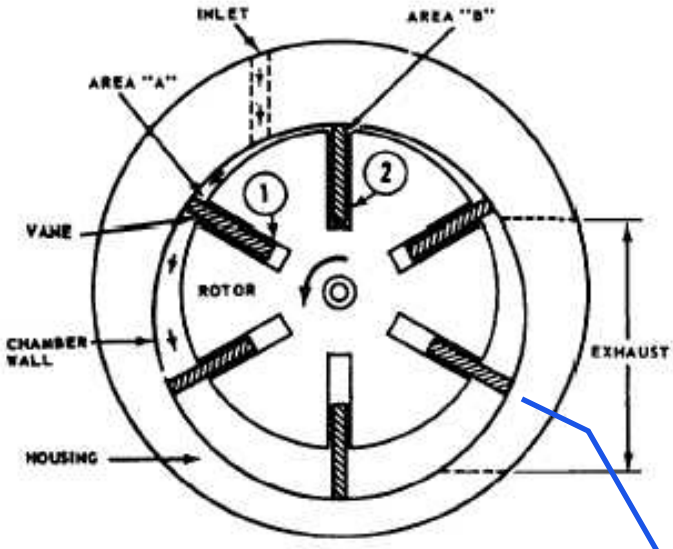
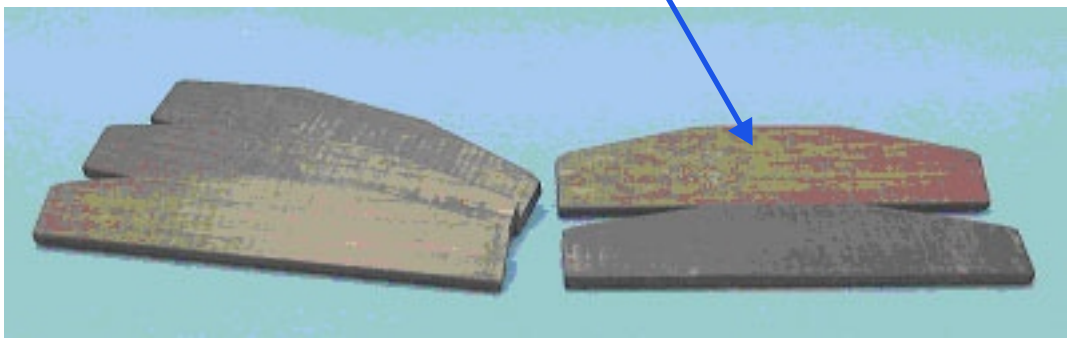
From Air Tools to Air Cars!



Free energy news

Newly developed carbon fiber vanes



Because the power source of the Oil-less Air Motor is compressed air and does not contain an oil mist, refilling, collecting the anti-pollution measure of the oil is unnecessary. Therefore, this type of air motor is widely used. Newly developed carbon fiber material (AC300R) is used as for the vane material of these new Oil-less Air Motors. By taking advantage of the longer carbon fiber paddle, the life of a this type of vane motor is three times as long as the older models.

Features of Oil-less Air Motor: The oiling mist device used in older model air motors, is unnecessary. There is no environmental pollution by the Oil-less Air Motors. The labor saving of maintenance becomes clear, because of the new vane, long life material of the AC300R used. Life of the vanes are three times longer than the older model air motors. The replacement cycle of the vane is greatly extended.
http://www.osakagas.co.jp/rd/use/105e.html

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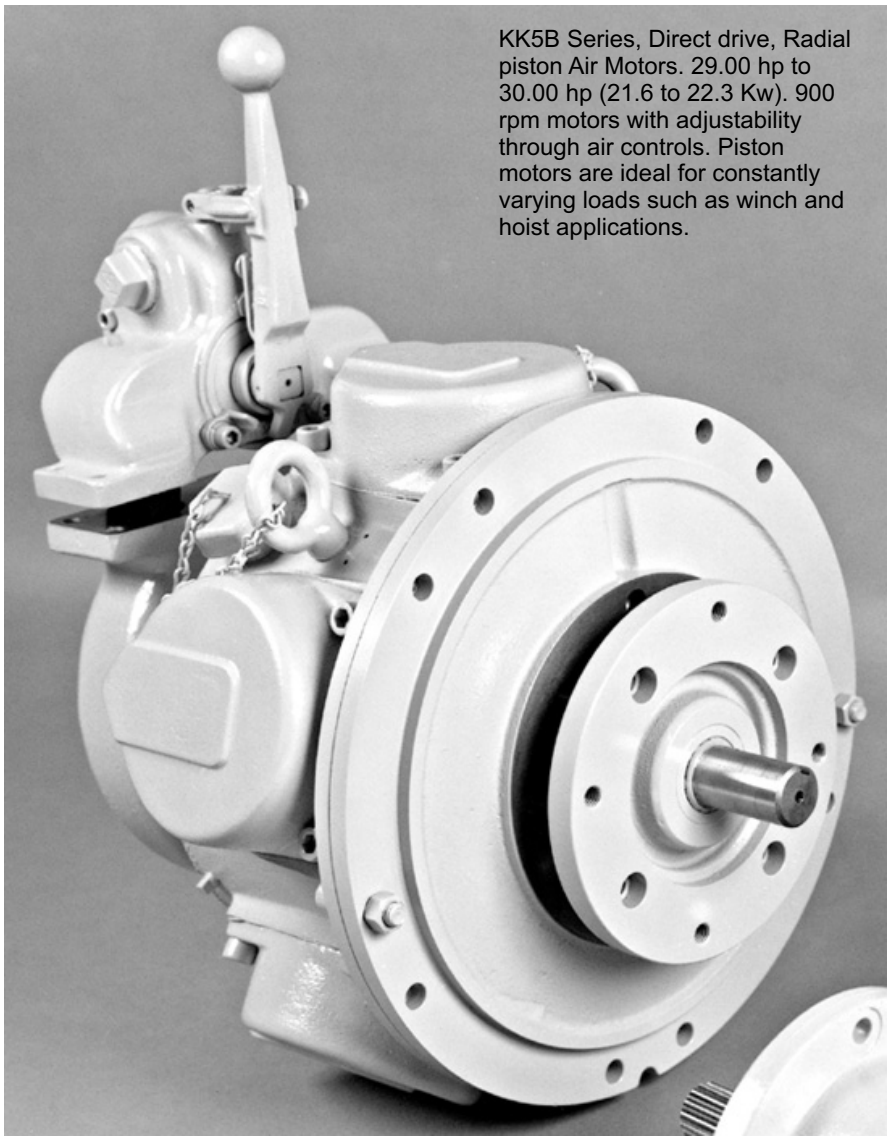
From Air Tools to Air Cars!

30 HP Piston Type Air Motor



You can purchase piston air motors already made, but they are expensive. Seems to me it would be cheaper to convert a 6 cylinder car to run on air. The more pistons, the smoother and quieter these motor are! And piston motors that are driven by compressed air have much more horsepower at lower speeds than vane type motors.

http://www.irtools.com/IS/category.asp-en-4616

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From Air Tools to Air Cars!

Solenoid Air Control Valve

This air control valve maybe a good choice to use to turn on and off the air in a piston engine or a gasoline engine when timed correctly. Rated at 12 vdc. To move or push a piston downward in the first or third stroke position. An air control valve can be used in the spark plug area or the intake area, or possibly both. See a great animation of a 4 stroke engine at:

http://auto.howstuffworks.com/engine1.htm

A 110 volt AC inverter can be used to run the 120VAC solenoid. The inverter would run off of the 12 volt car battery and alternator. You can also purchase 12 to 24 VDC solenoids, but 120 VAC is much more high efficient! If this air control valve opens two air ports at the same time, then all you need to run a 4 cylinder piston engine is 2 of these. One Air control valve will push 2 pistons at the same time. Or you could use four, one for the first and one for the 3rd stroke per set of pistons.

Grainger.com Item # 2F983
Manufactured by Ingersoll # A212SS-012-D-G
Retail cost: $71.80 (we do not sell these)

120 volt AC solenoid x **68 CFM** air switch. Turns compressed air on and of when timed with a piston motor. The less CFM used, the longer the air tank will last. The amount of CFM needed to turn the piston depends on the size of the engine and piston area.

What Is CFM?
CFM means, Cubic feet per minute. (CFM) is a unit of measurement of gas flow (most often **airflow**) that indicates how many cubic feet of gas or air pass by a stationary point in one minute. In other words, it is a unit for measuring the rate of flow of a gas or air volume into or out of a space at a given temperature.

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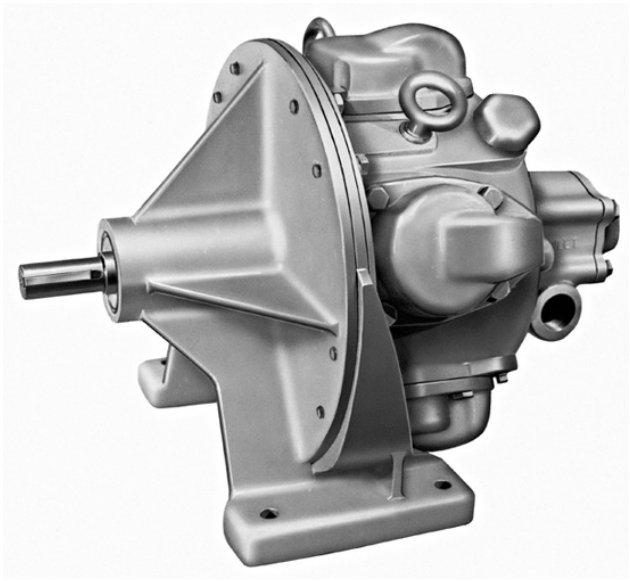
From Air Tools to Air Cars!

Piston Air Motors!
Piston air motors are used in applications requiring high power, high starting torque, and accurate speed control at low speeds. They have either two, three, four, five, or six cylinders arranged either axially or radially within a housing. Output torque is developed by pressure acting on pistons that reciprocate within the cylinders.
Motors with four or more cylinders provide relatively smooth torque at a given operating speed because power pulses overlap: two or more pistons undergo a power stroke at any time within a revolution. Motors designed with overlapping power strokes and accurate balancing are vibration-free at all speeds.
Power developed by a piston motor depends on the inlet pressure, the number of pistons, and piston area, stroke, and speed. At any given inlet pressure, more power can be obtained from a motor that runs at a higher speed, has a larger piston diameter, more pistons, or longer stroke. Speed-limiting factors are the inertia of the moving parts (which has a greater effect in radial- than in axial-piston motors) and the design of the valve that controls inlet and exhaust to the pistons.

The Main Objective?
The main objective in designing an air motor system to run a car or a home generator is, to buy or design an air motor that produces the most horse power, while using very low CFM air consumption! The less air used the better!
The motor can then power an air compressor pump, that is rated at a low rpm and high free air CFM. At about 500 to 680 rpms. The air motor drives the air pump, and the air pump fills a 2nd large air tank. When the air is used up in the first tank the second tank is switched over and used to run the air motor. This can all be setup to switch automatically.



CC to KK Series, Direct drive and EE Series, Geared, Radial piston Air Motors. 2.05 hp to 25.00 hp (1.53 to 18.64 Kw). 92 rpm to 1500 rpm with adjustability through air controls. Piston motors are ideal for constantly varying loads such as winch and hoist applications, and may also be good for small transportation vehicle.

Web Links:

http://www.irtools.com/IS/category.asp-en-4616

Http://www.neumek.com/e/p001.htm

Http://www.airturbinetools.com/

Http://www.tdi-turbotwin.com/51h.php

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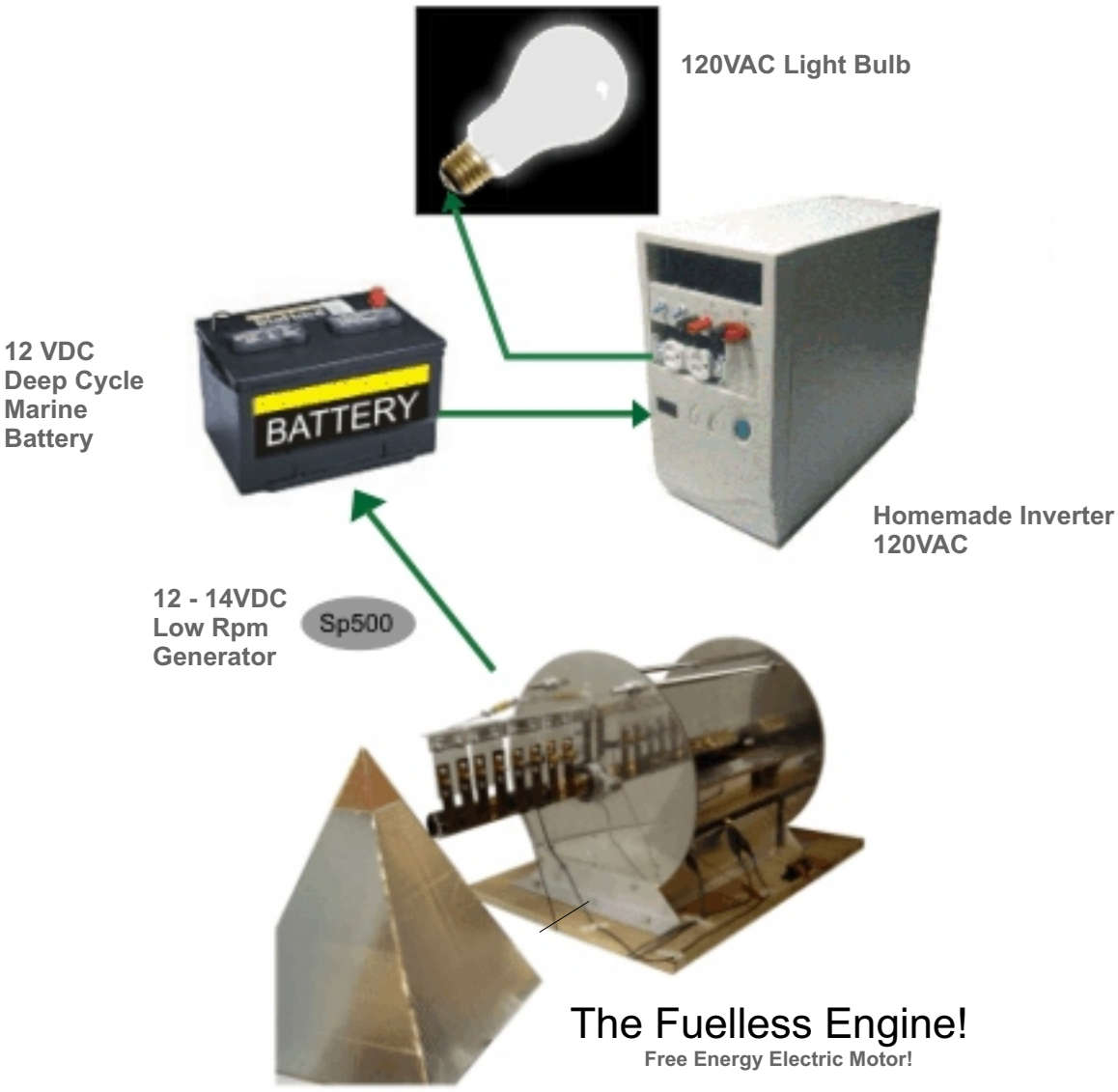
Our **Fuelless Engine** is by far the best choice. Our step by step plans are easy to follow and are loaded with illustrations as well as digital color photos. The photos below show our **Fuelless Engine** to a 14VDC Sp500 generator. The generator charges the 12 volt deep cycle marine battery or car battery. The 12VDC battery is then connected to our homemade inverter with computer tower case (you can, purchase inverter's already made). The inverter steps up the 12 VDC to 115VAC to run any 120 volt appliance or lighting in your home.
Our website links: www.Fuelless.com or www.FuellessUSA.com or www.FuellessPower.com



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Air motors can be built to many different shapes and sizes!
From manufactured air motors to homemade motors that anyone can make out of wood, PVC pipe or other. Air turbines motors are widely used for mill cutting in many industries. The air turbine motor you see in photo 2, is a 25,000 rpms x 1.4 hp mode, and can be mounted right into the chuck of any drill press. A movable mill table can be added to any home based drill press to achieve professional machine shop results. Air turbines operate at constant speeds, maintaining constant high speed under variable load with no gears, vanes, or brushes. Maintenance free, requiring no lubrication, provide a finer finish and faster feed rates. Patented low vibration, super quiet, oil-free, direct drive spindles for faster production and greater durability. Integrated CAT40, BT40, and HSKA-63 tool holders available for increased accuracy. Here are supplier and manufacture links for the air turbine motors.

Http://www.jlindustrial.com/CGI/JISRCH?No=10&N=4294966578#
http://www.airturbinetools.com/videos.html

It would be very interesting to try and fit a speed reducer gear box to this motor, this would greatly increase the horsepower output. Get it down to 3600 rpms, then connect a 120VAC x 20,000 watt belt driver generator and you would have a super high efficient way to produce electricity for your home. But I am not sure the gear box could handle 25,000 rpms? You could build a special high rpm generator using our Sp500 Generator design.

Photo 2

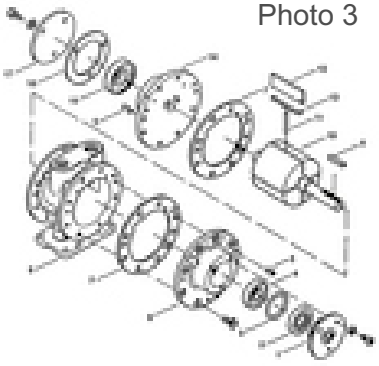
This end fits in the chuck of the drill press.

Air Turbine Motor for Drill press
Super High Efficient!

Photo 1

Vane type air motor large hp

Photo 3



Exploded view of vane air motor

Photo 4

Vane type air motor low hp

Photo 5

Air motor from toy airplane

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From Air Tools to Air Cars!

51H Air Turbine Motor

TDI Model 51H Turbine-driven pneumatic motor is designed for industrial applications

No Drive Air Lubrication.
No Fugitive Exhaust.

The 51H operates on non-lubricated drive air. The mess, expense, and hassle of oily air lubrication systems are eliminated. Hazardous effects of fugitive emissions and the related environmental damage are also eliminated with the 51H.

Less Air
The 51H requires 33-50% less air to operate over competitive pneumatic models. Operating at 150 psig (10BAR), the 51H yields 165 hp (124 Kw). Three gear ratios are available.

165 Horse Power!

Question? Can this be used for a car?

Answer: Not sure, never tried it yet? The rpms maybe to high, would need to gear it down for a vehicle. Of course the rpms can also be adjustable by regulating the amount of air into the air turbine motor. But lowering the air pressure would also lower some of the horsepower.

Http://www.mtigroup.com.au/turbine-motor-p-60.html

http://www.tdi-turbotwin.com/51h.php

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From Air Tools to Air Cars!

The plastic safety caps come off.

Oil-less Air Motor .80 HP x 2000 RPM x 41 CFM
Rotary vane type, 80 psi - running torque = 26 lbs

NOTICE: We are not responsible for anything in these plans or any other of our plans. You build at your own risk. These plans are not step by step like some of our more expensive plans, such as our Fuelless Engine plans. But you will have a load of fun building and playing with this stuff!

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FREE ELECTRICITY!

Faster and easier than pumping the air into the tank by hand.

Use a pulley here!

Convert a bicycle into a pedal powered pulley system, to turn a high efficiency compressor pump. When horsepower rises, simply gear down to make it easier to peddle. Convert a 10 speed bike.

Google.com

Keywords. Pedal powered air compressor

3 hp x 8.2 CFM
Air compressor pump

One way air valves

1/4”

One way air valves

Grainger.com Item # 5X780 Cost $10.77

One way air valves should be used from the air pump output to the tank air input.

A high rpm (about 3000 - 10,000 rpm) x low cfm air motor can also be used to run the air pump since1700 rpms are needed. That means that the air motor is then working for itself to help produce some or all of its compressed air energy.

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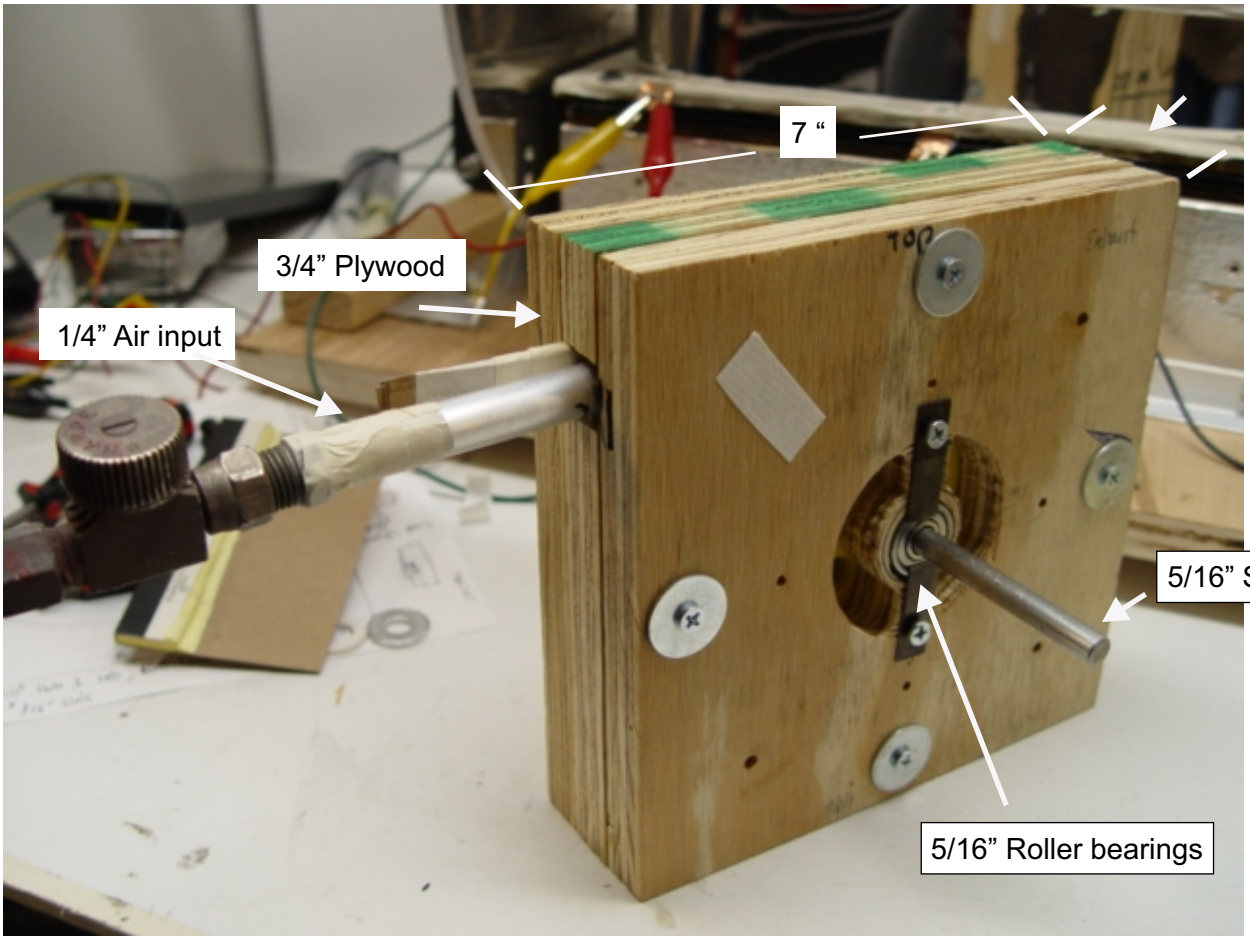
Air Turbine Disk Motor

Rated at about 10,000 rpms x 1 hp

Build your own homemade air motor



Sorry these plans are not step by step like many of our other plans, we have not yet had the time. But this is an awesome air motor that we just threw together to test the air disks. It really works. You will have loads of fun building it and running it I am sure. We will add some photo’s which may help you build this unique air motor.

NOTICE: We are not responsible for anything in these plans or any other of our plans. You build at your own risk. These plans are not step by step like some of our more expensive plans, such as our Fuelless Engine plans. But you will have a load of fun building and playing with this stuff!

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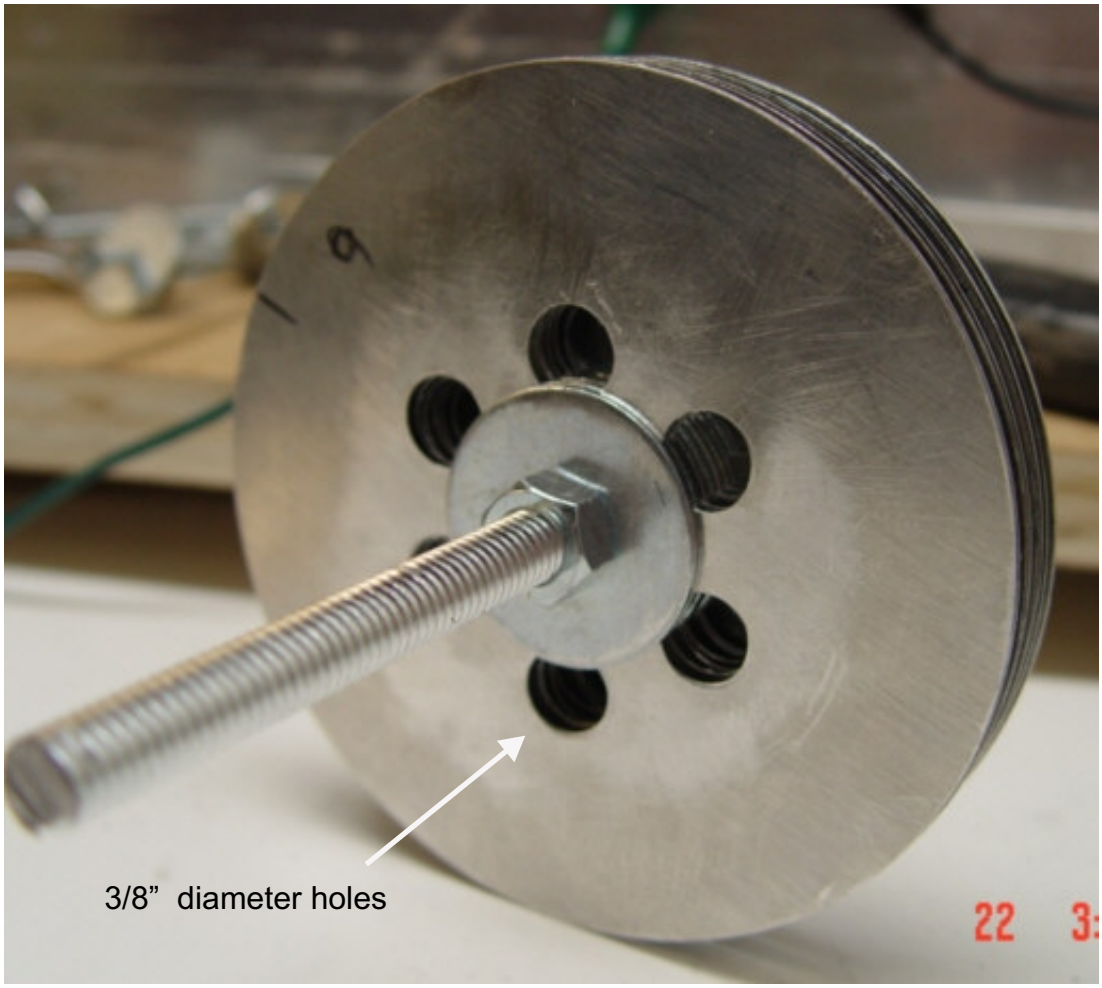
Air disks fit inside of the air motor housing.



4 15/16" Diameter disks x about 23 gauge thick steel

qty - about 10

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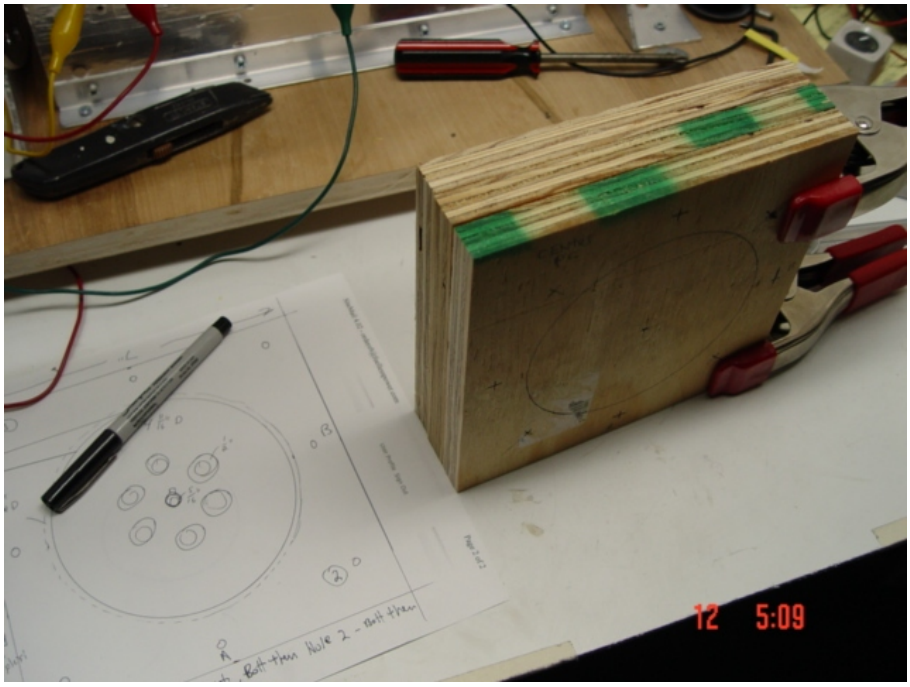
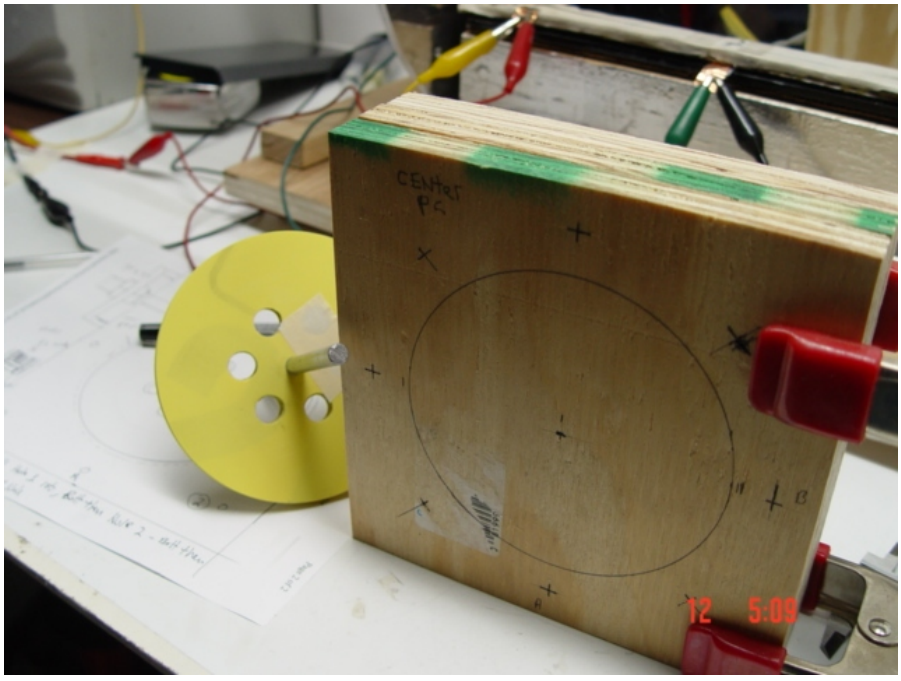
Polyethylene would be a great 2nd choice for the housing rather than wood.



Make plywood pieces same size, drill holes thru all at the same with all 4 plywood pieces clamps together.



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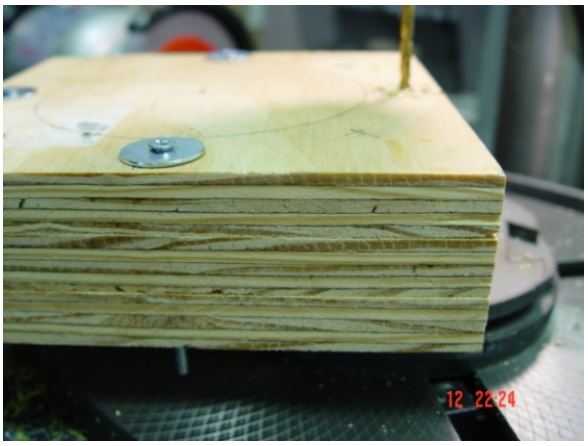
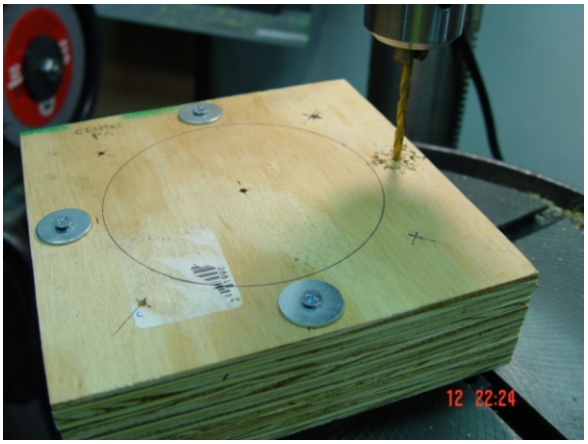
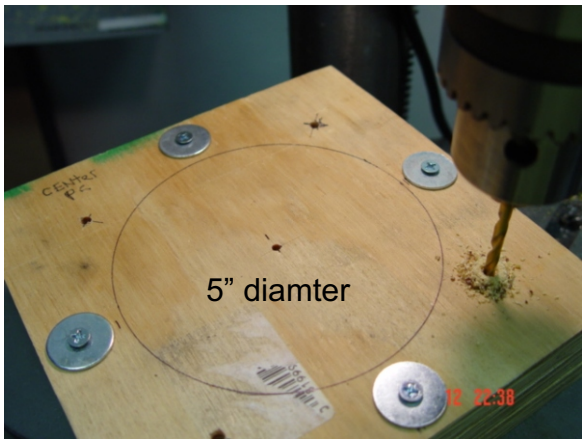
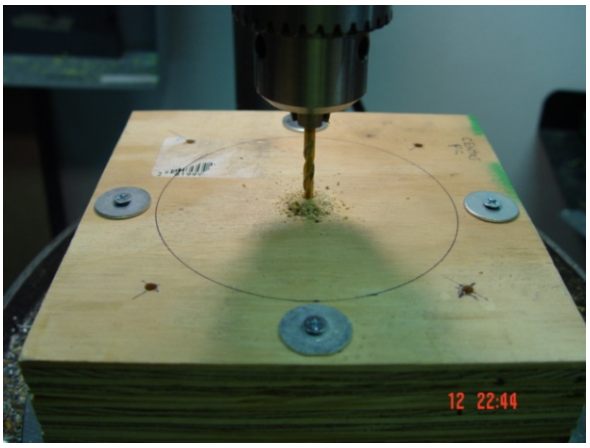
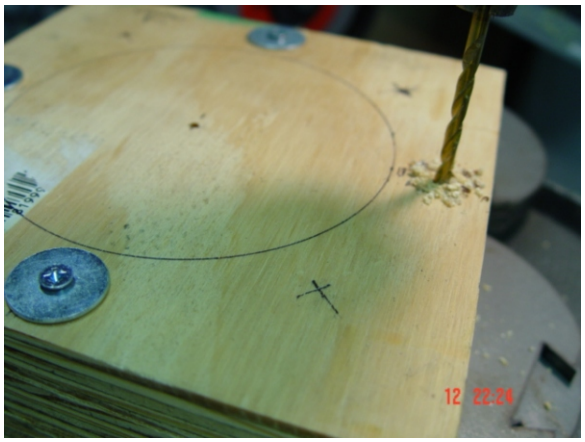


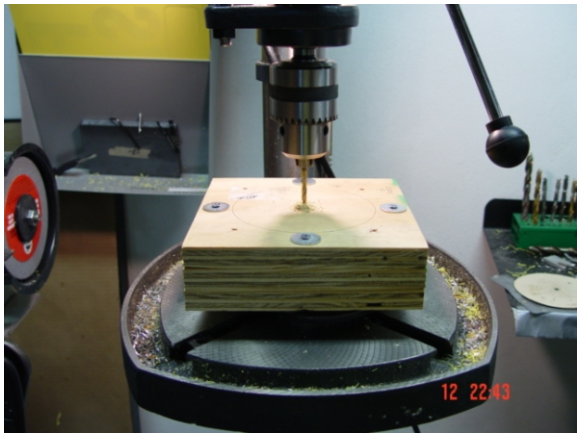






Drill bolt holes





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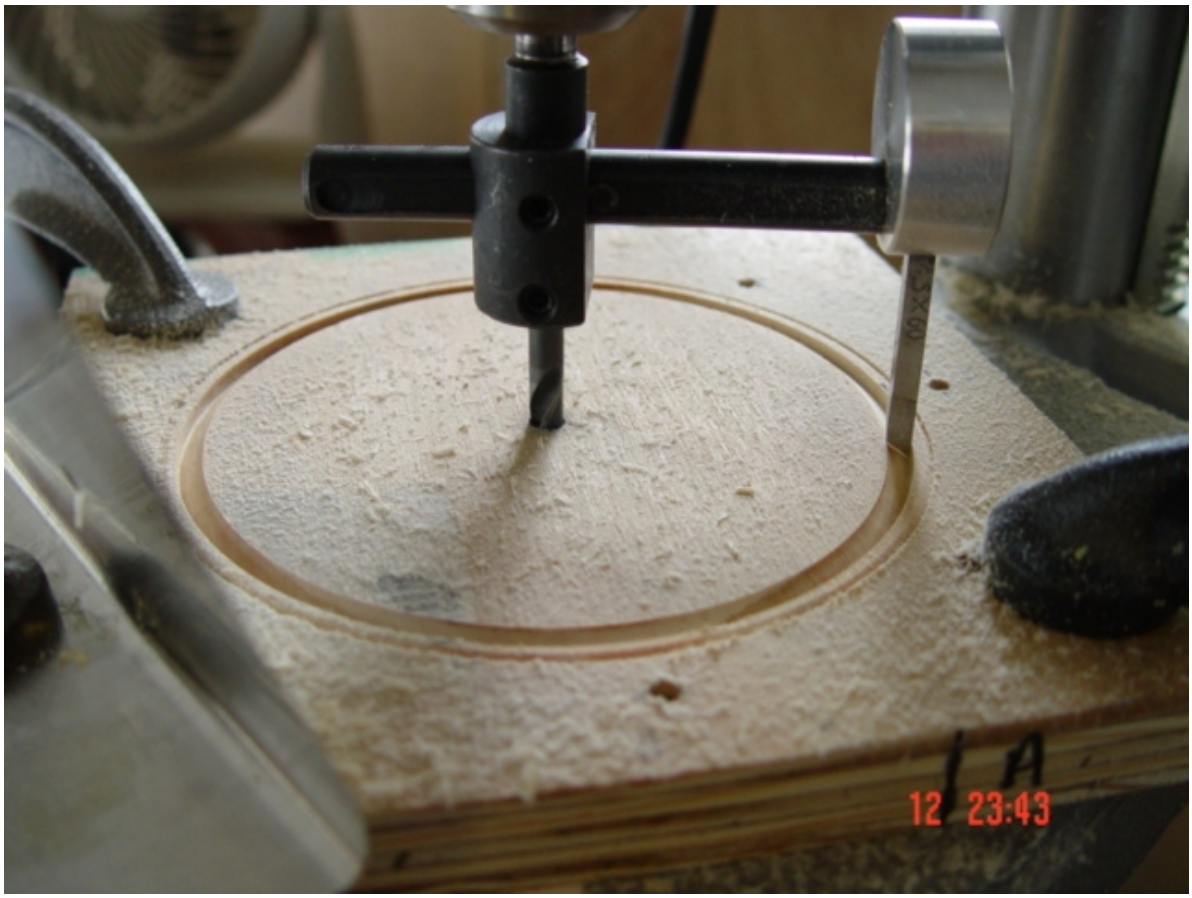
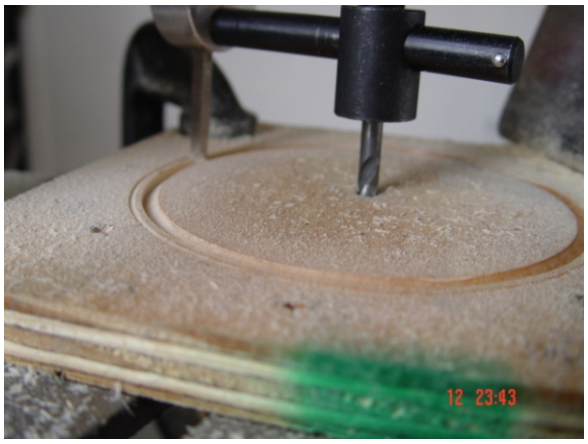
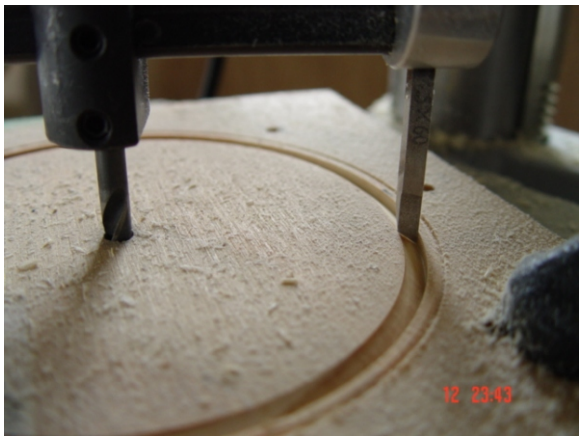
Remove clamps and cut out 5” diameter holes on 2 of the plywood pcs.
Use a drill press circle cutter from sears.com







WARNING: Turn and cut 100 rpms or less! Read the warnings and instructions that came with your drill press circle cutter from www.Sears.com

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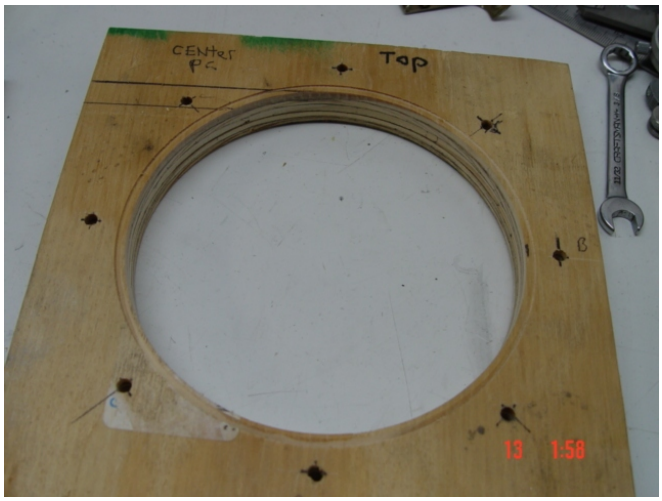

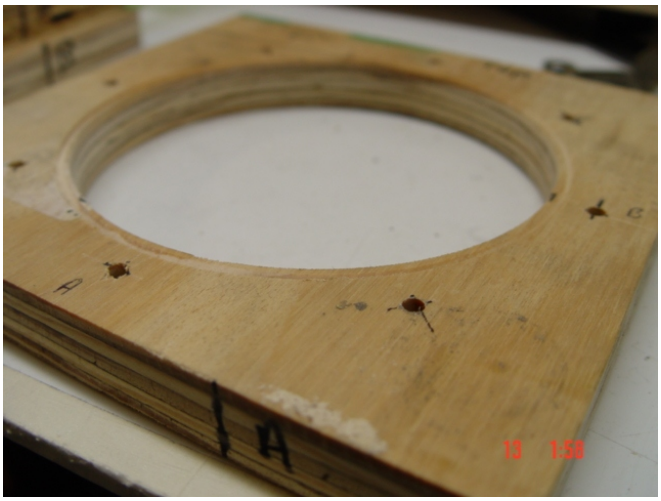

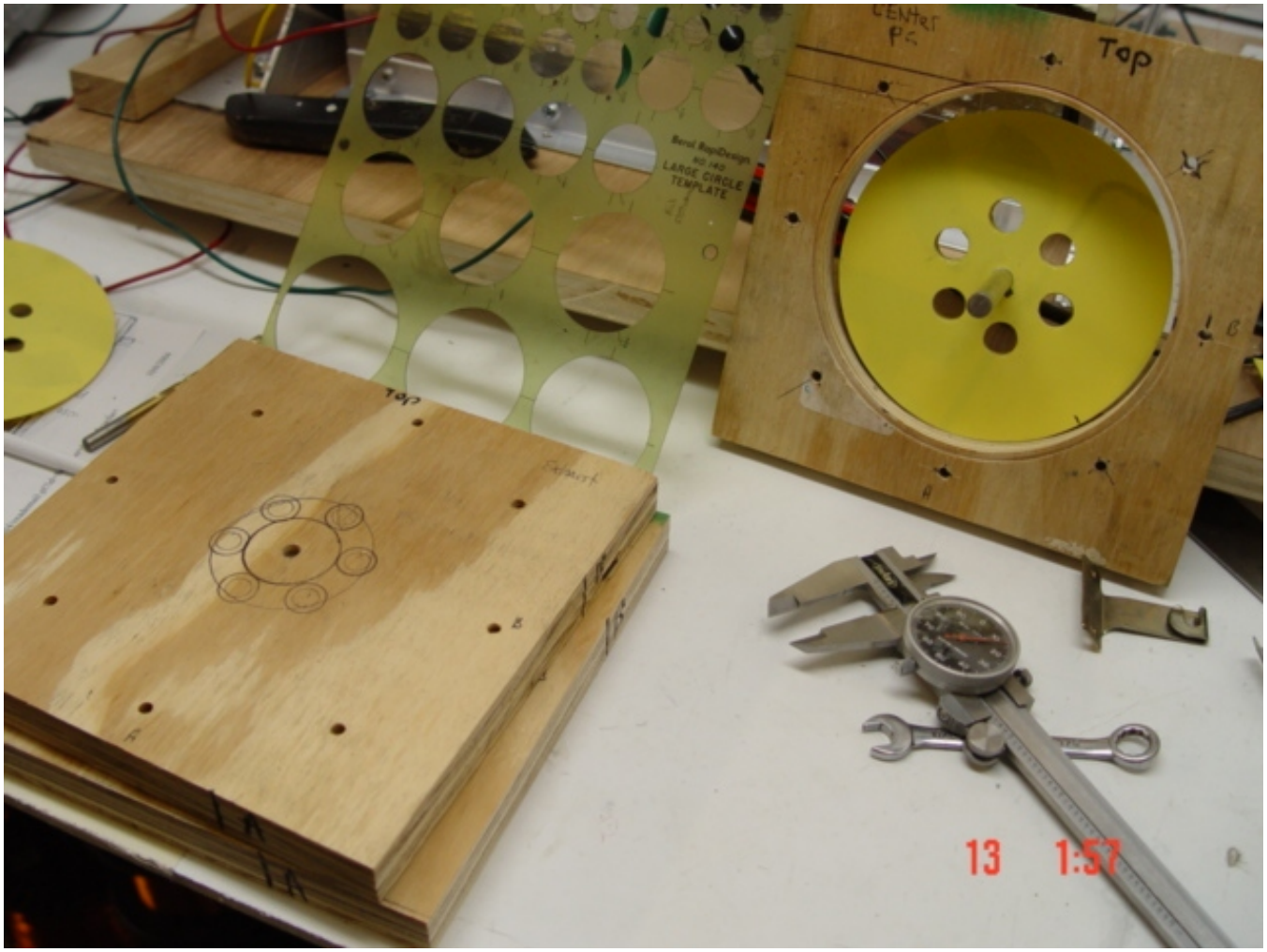

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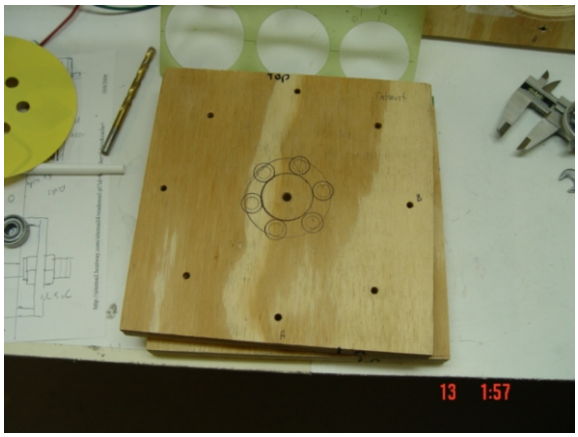

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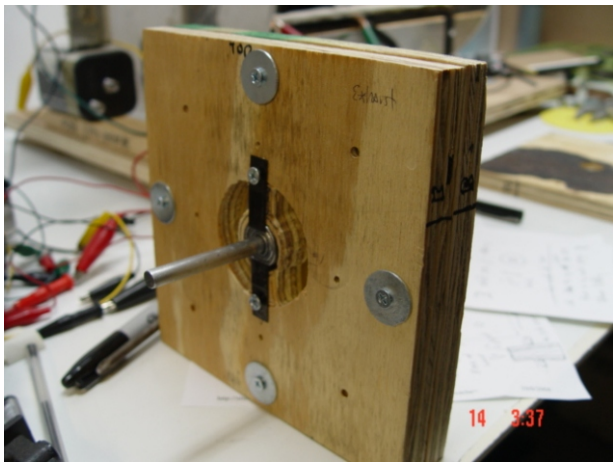
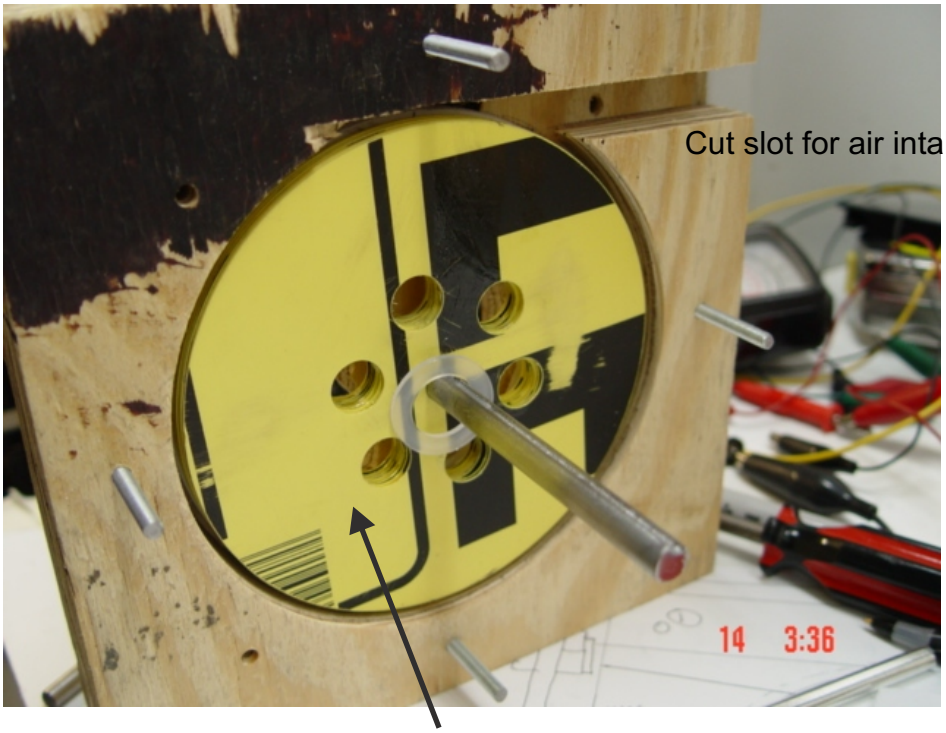


Center board, air intake



Plastic disks for testing and size tests only.

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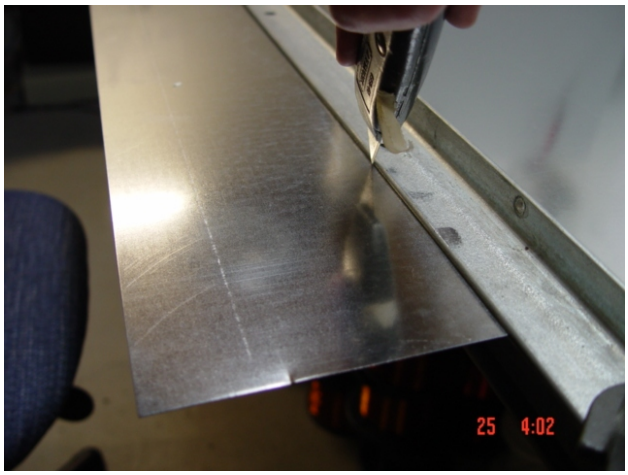
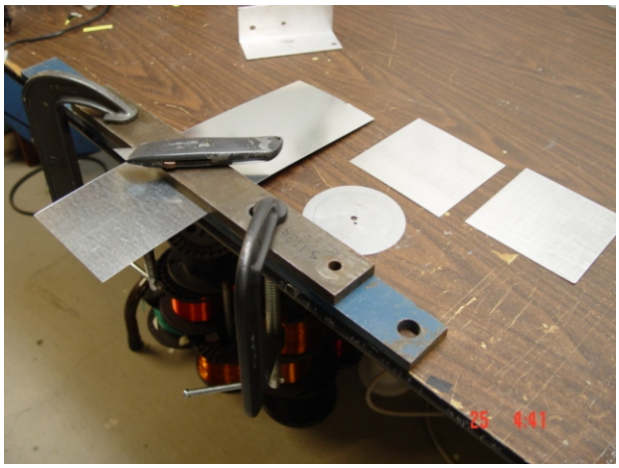
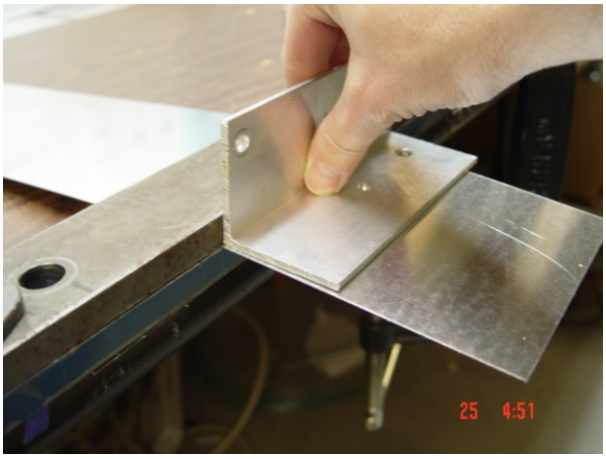
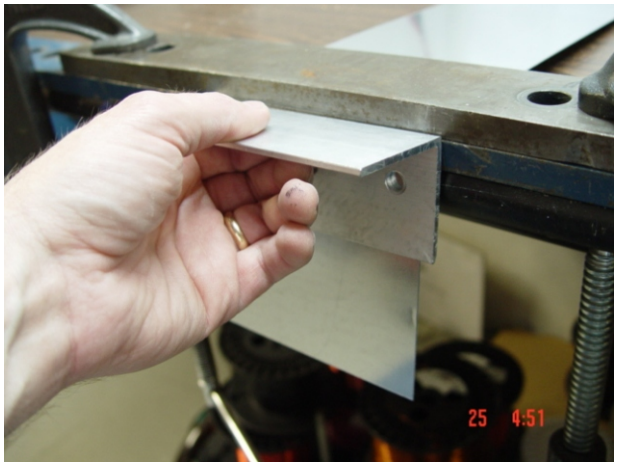
Cutting small sheet metal squares for drill press circle cutting. Use about 22 guage sheet metal.



Use exacto knife to score it, then bend back and forth to break.







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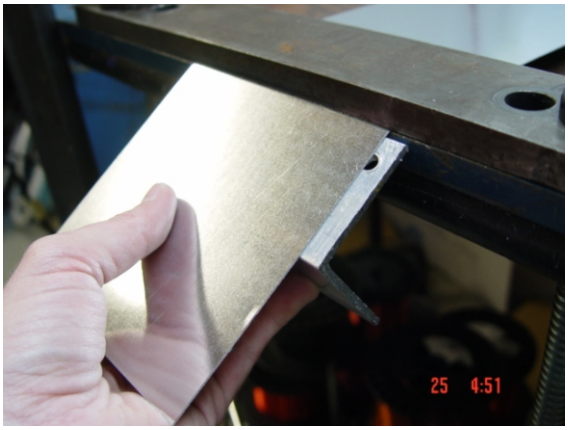
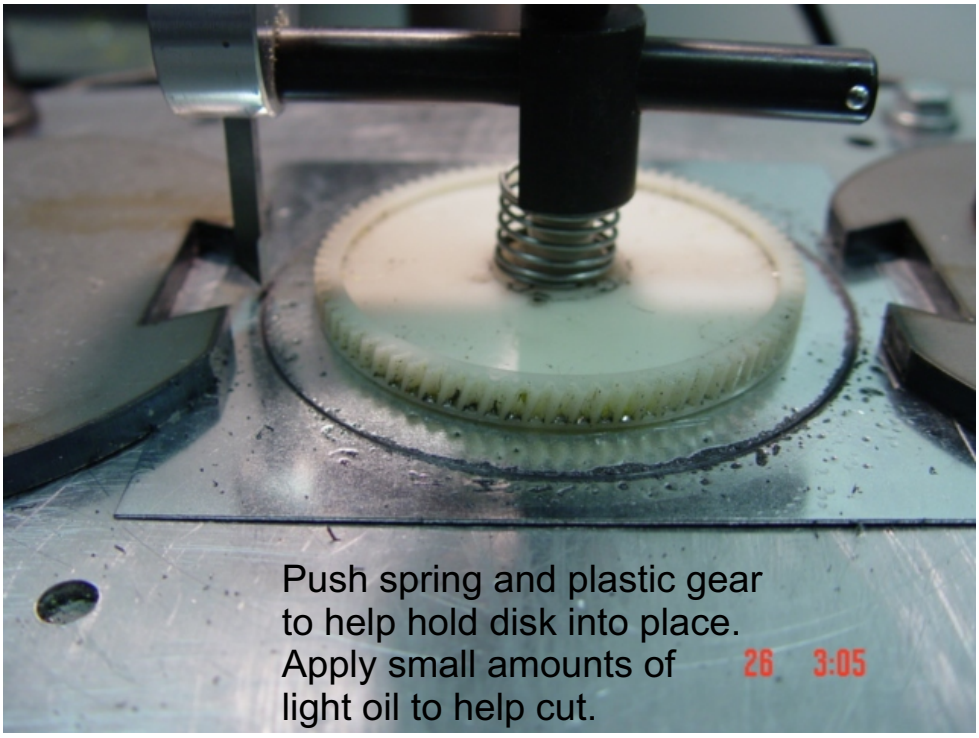
Work back and forth with aluminum angle until the metal breaks at score line.



Secure 1 piece of square sheet metal onto drill press table using metal and clamps.



Turn and cut metal at about 100 rpms or less. Cut about 1/32” deep cuts, one at a time until you cut thru. Don't try to cut all at once.

WARNING: Turn and cut 100 rpms or less! Read the warnings and instructions that came with your drill press circle cutter from www.Sears.com

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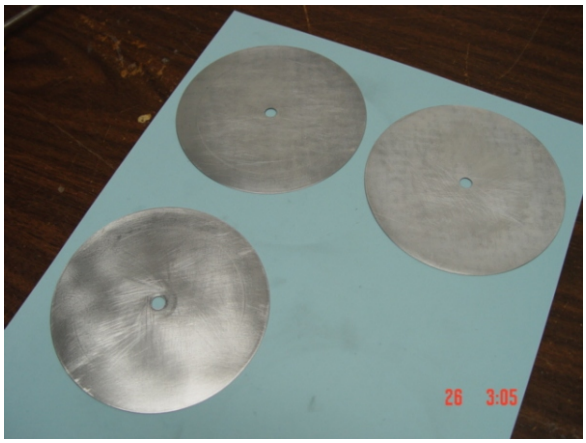

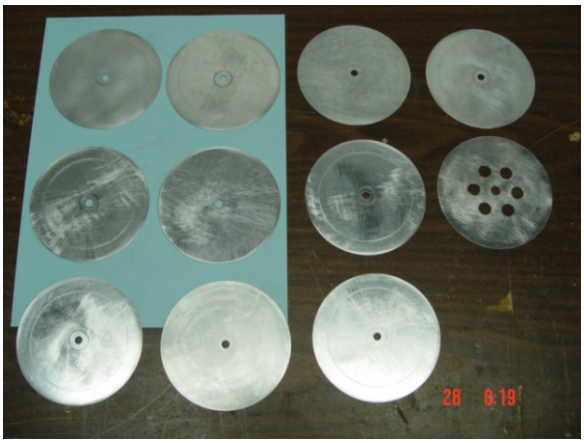

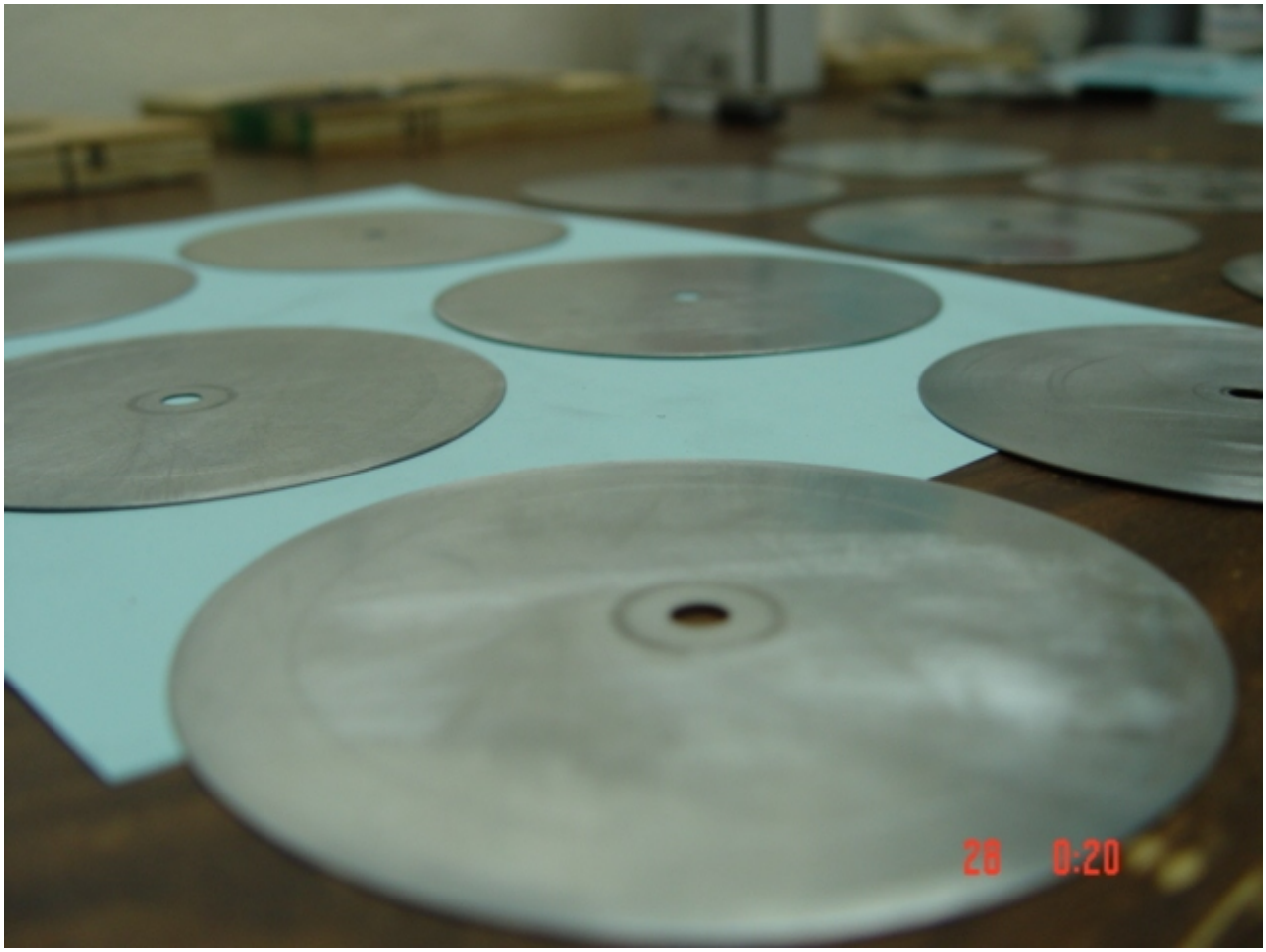

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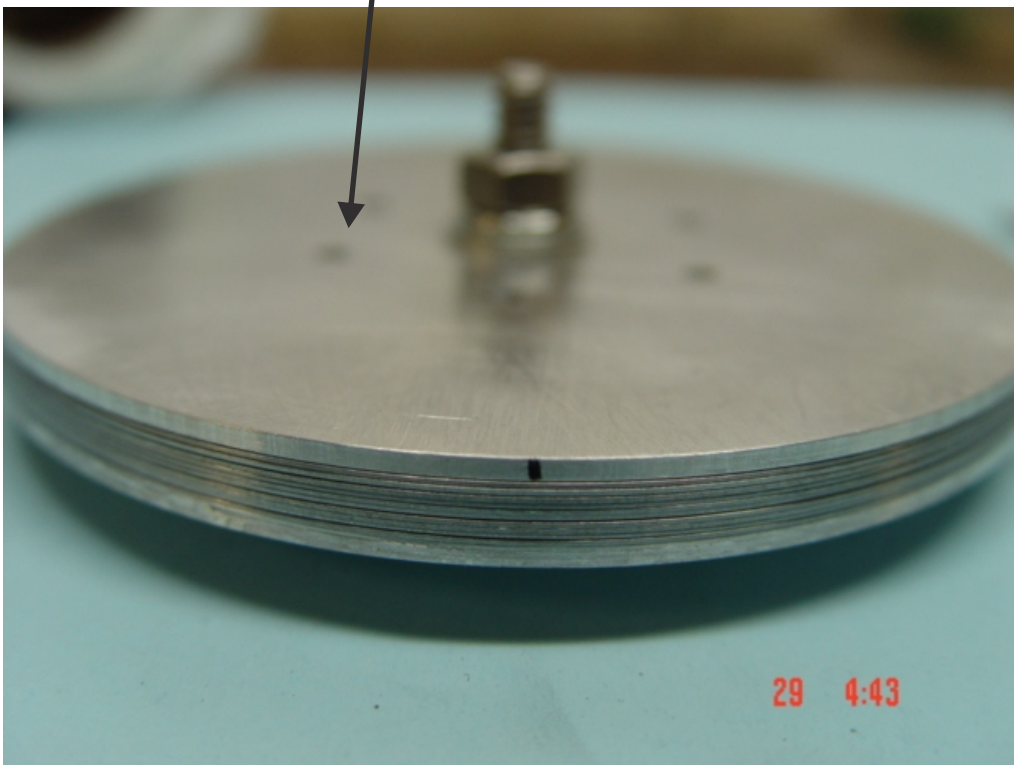
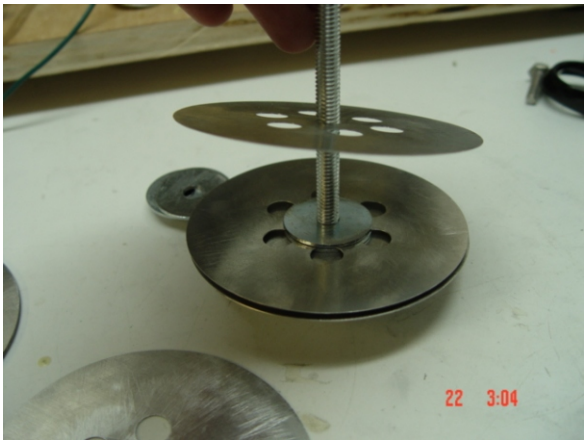
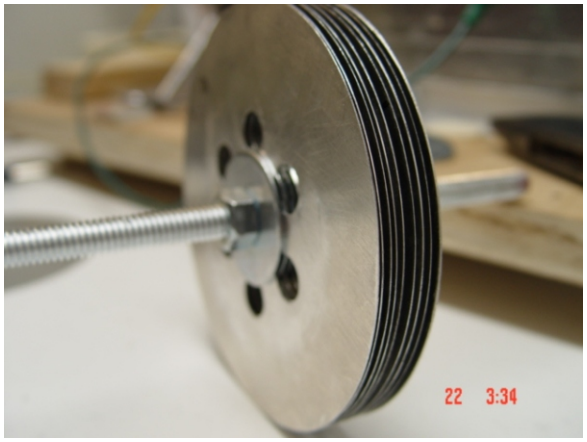
Cut 2 thick aluminum disks for the ends to hold the sheet metal disks into place. Mark your 3/8" holes Qty 6 in all. And drill holes all at once thru each one at the same time.







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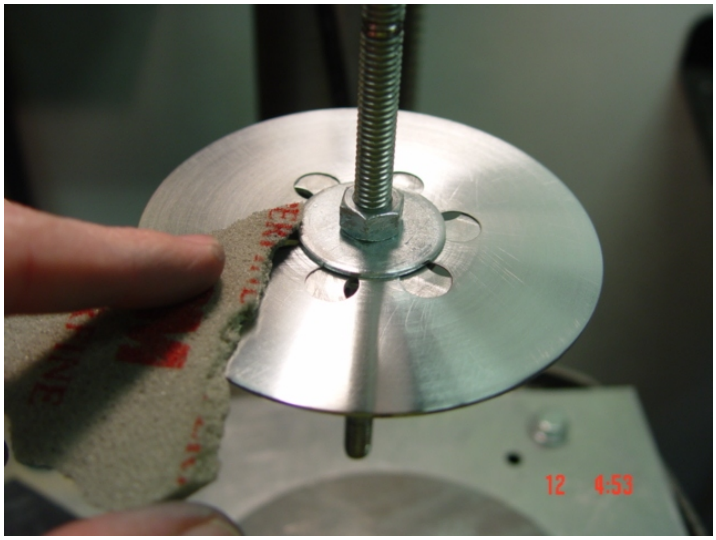
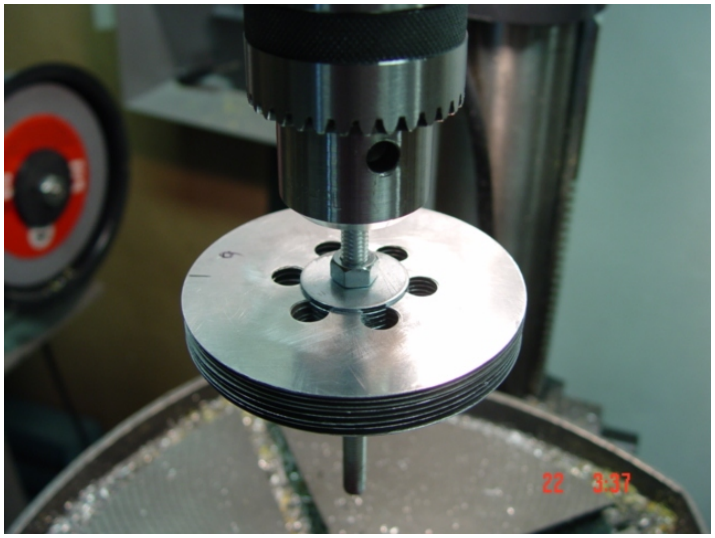
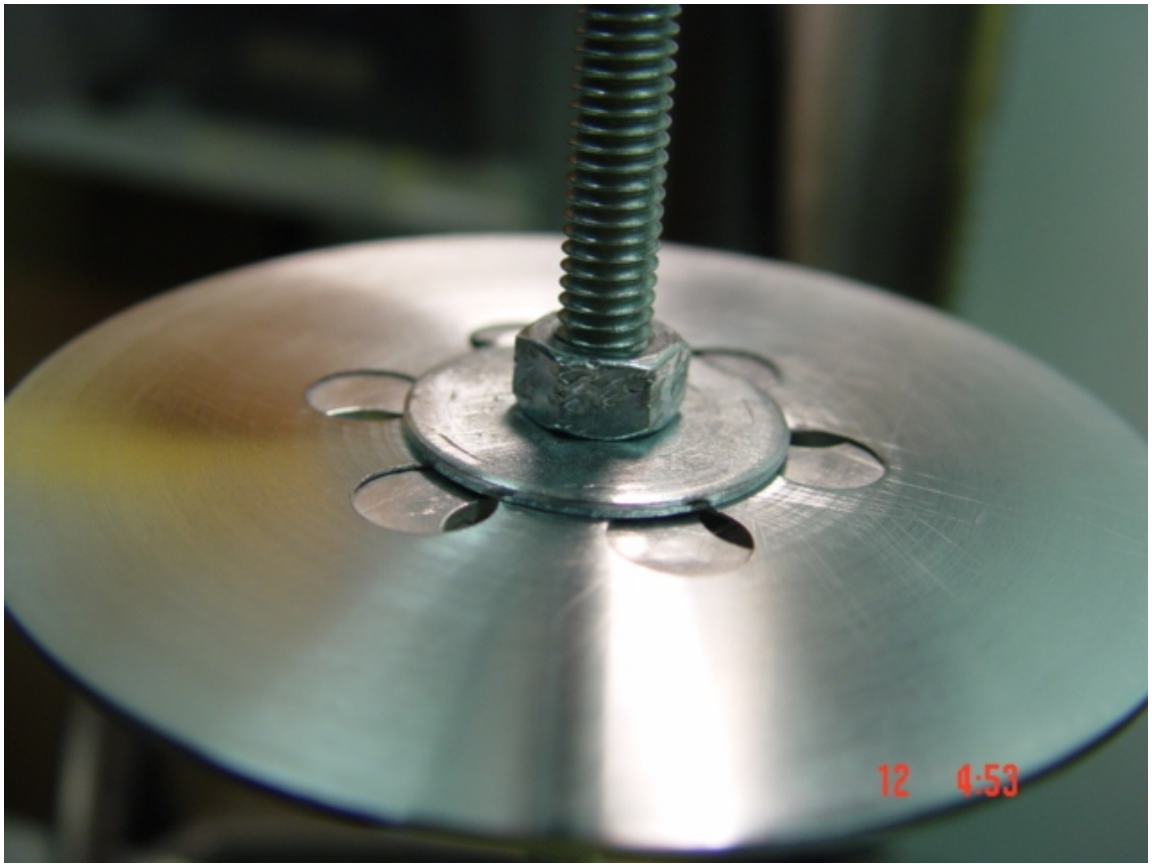




Use fine sand paper to sand and polish



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If this looks like a quickie project it was. Our Fuelless Engine and Sp500 are 100 times better! The are our main line plans.

Cut small washer spacers 22 gauge

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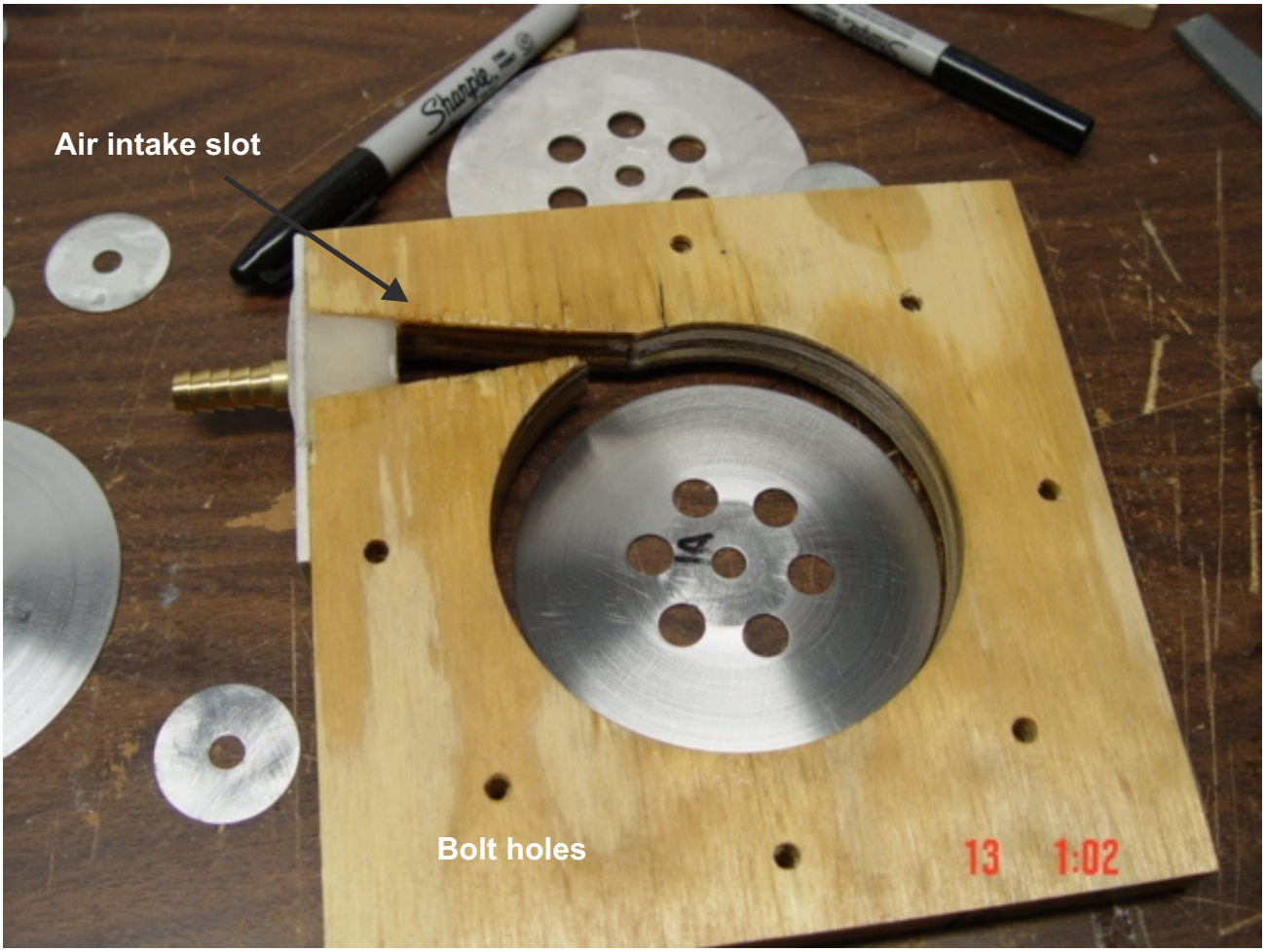
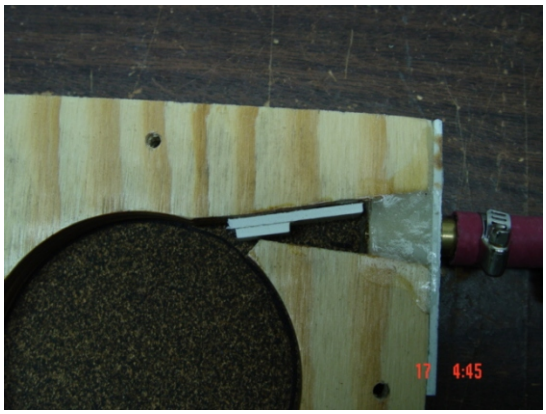
Glue a 1/4” connector into air intake slot. Use silicon caulk 100% or 2 part epoxy. Make the input as a small jet stream type of valve, you can use epoxy or other ro make it smaller at the end of air intake.





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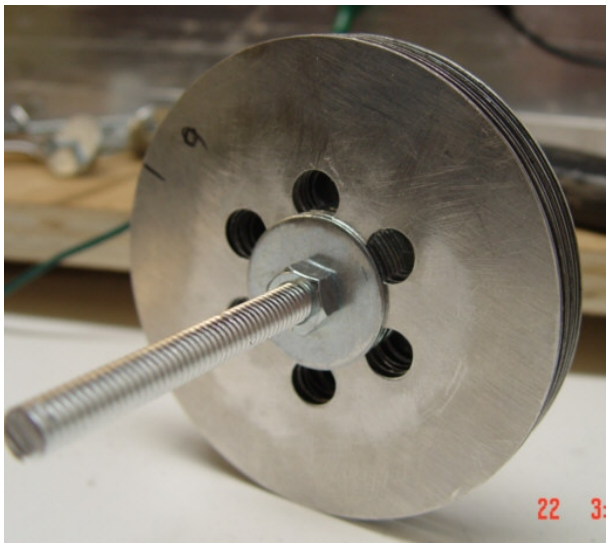
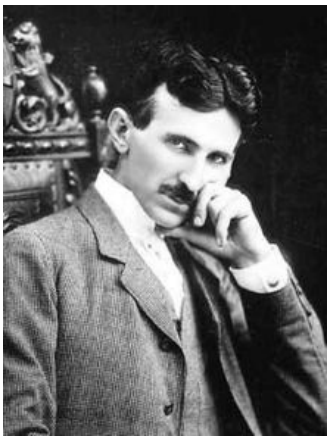
Assemble the unit. Cut 3 thin cork square pieces to place between the plywood so air can not escape. Place the assembled disks into the center plywood air intake area. Use long bolts and large washers with lock washers and nuts to fasten all of the 4 plywood pieces together. Make sure the 2 bearings are secure. Use a 1/4" air regulator to slowly apply air pressure to the air motor. Air motor will spin very quickly and with great power at about 40 to 50 psi.

Caution: Test unit first by slowly applying small amounts of pressure. Such as 10 to 20 psi.



Tesla Turbine MOTOR



Nikola Tesla

US Patent

Tesla TURBINE

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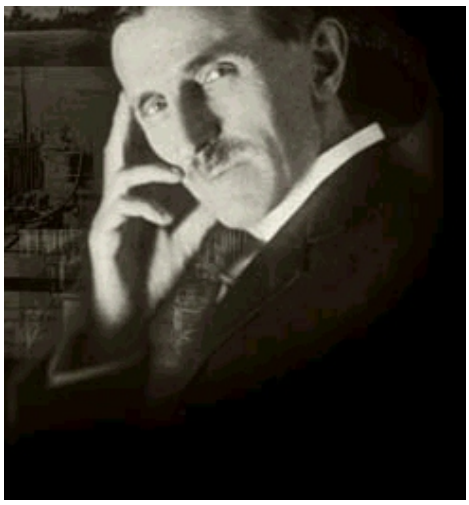
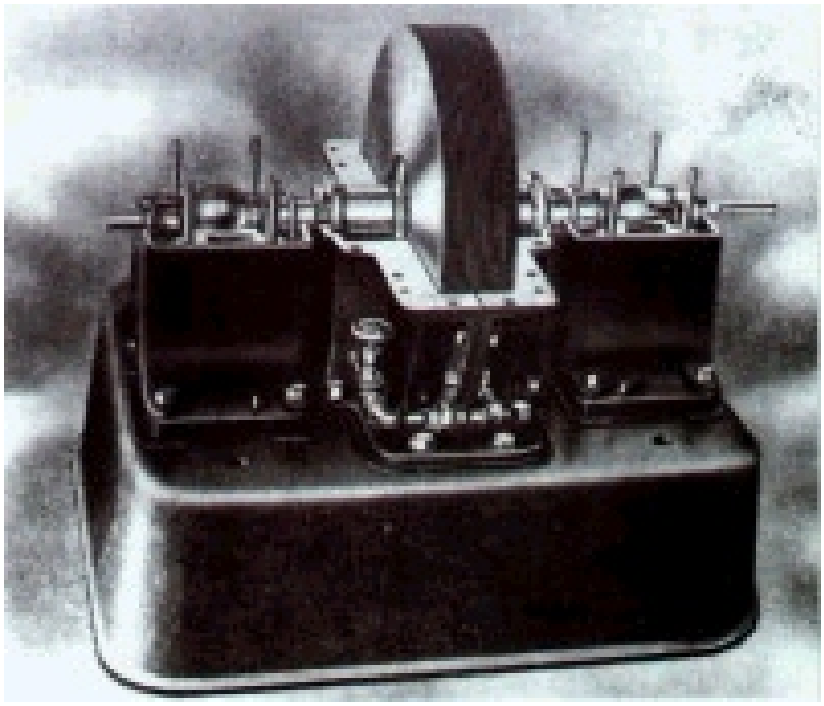
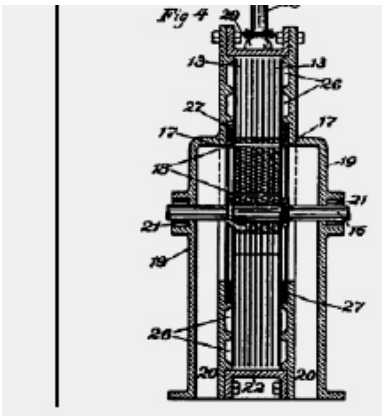
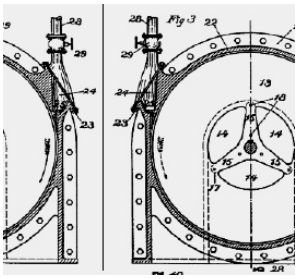
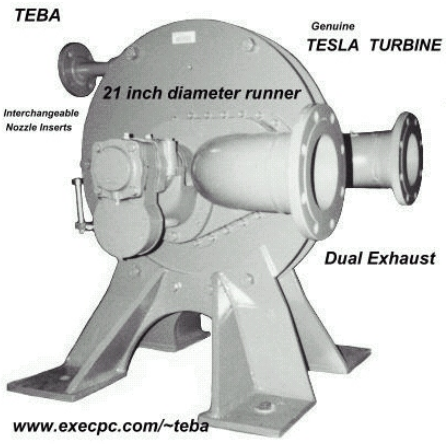








If you are really serious about building a Tesla Turbine
Contact these guys from TEBA



N. TESLA.

TURBINE.

APPLICATION FILED JAN. 17, 1911.

1,061,206.

Patented May 6, 1913.

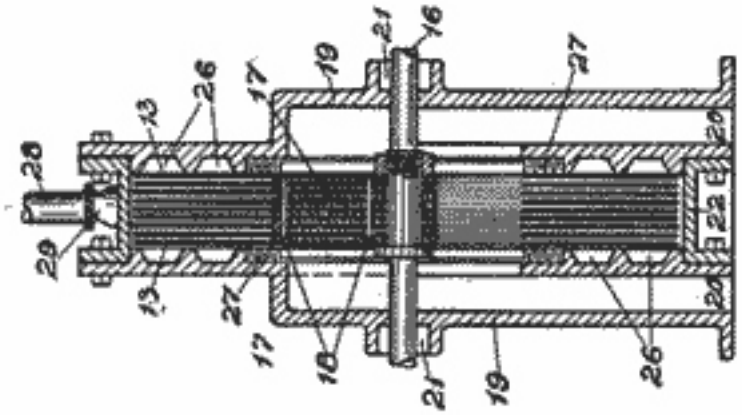


Fig. 2.

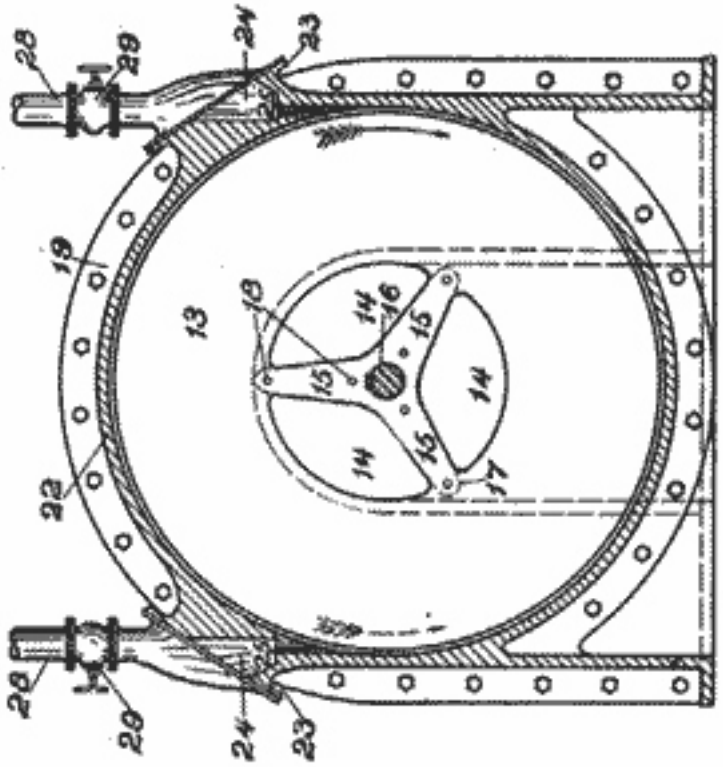


Fig. 1.

Witnesses:
R. Diez Quintero
Wm. Kohleber

Nikola Tesla, Inventor

By his Attorneys
Howson Howson Cooper & Hayward

US PATENT TESLA TURBINE MOTOR

1,061,206. Specification of Letters Patent. Patented May 6, 1913. Original application filed October 21, 1909, Serial No. 523,332. Divided and this application filed January 17, 1911. Serial No. 603,049,

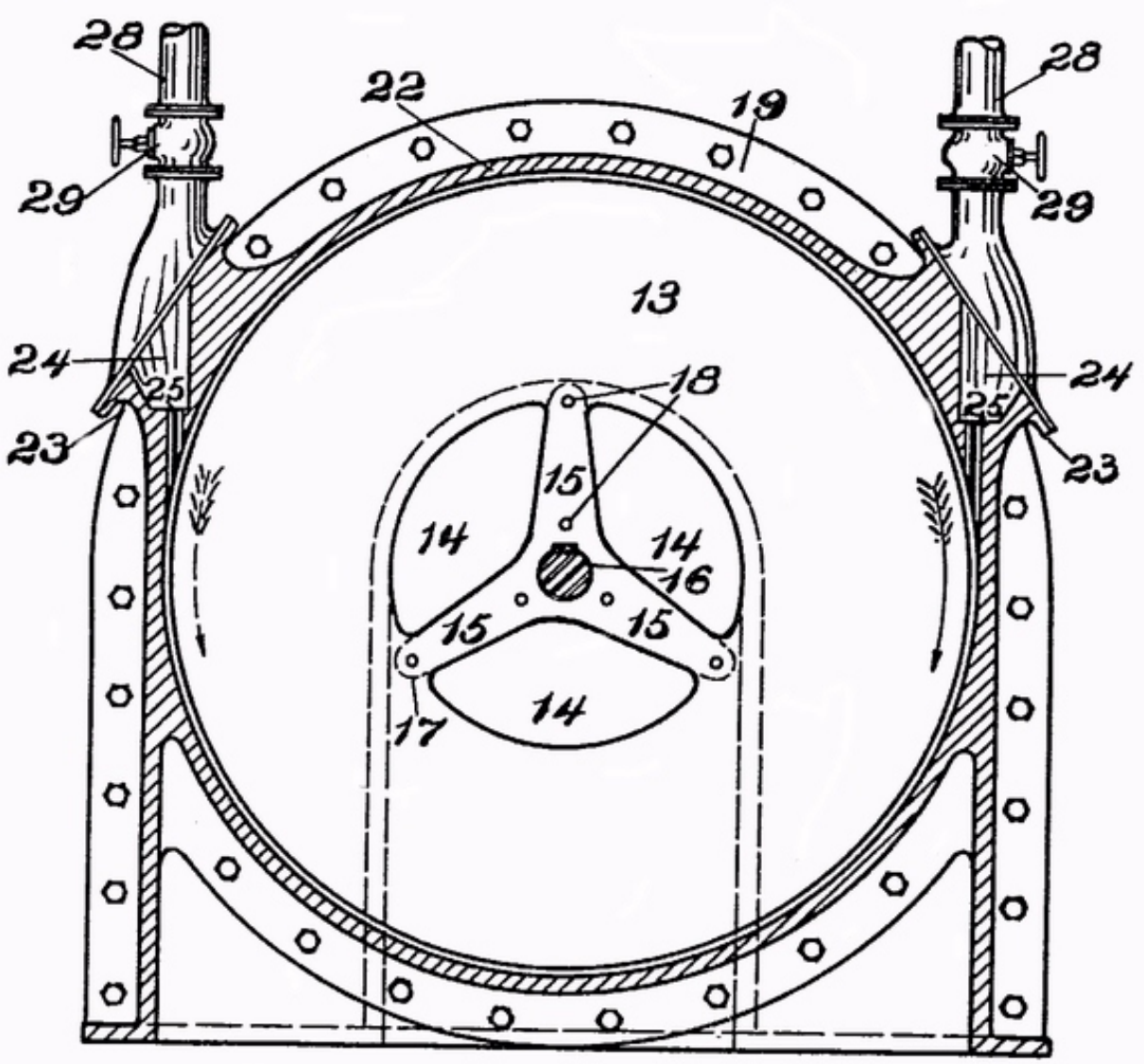


Fig. 1.

US PATENT TESLA TURBINE MOTOR

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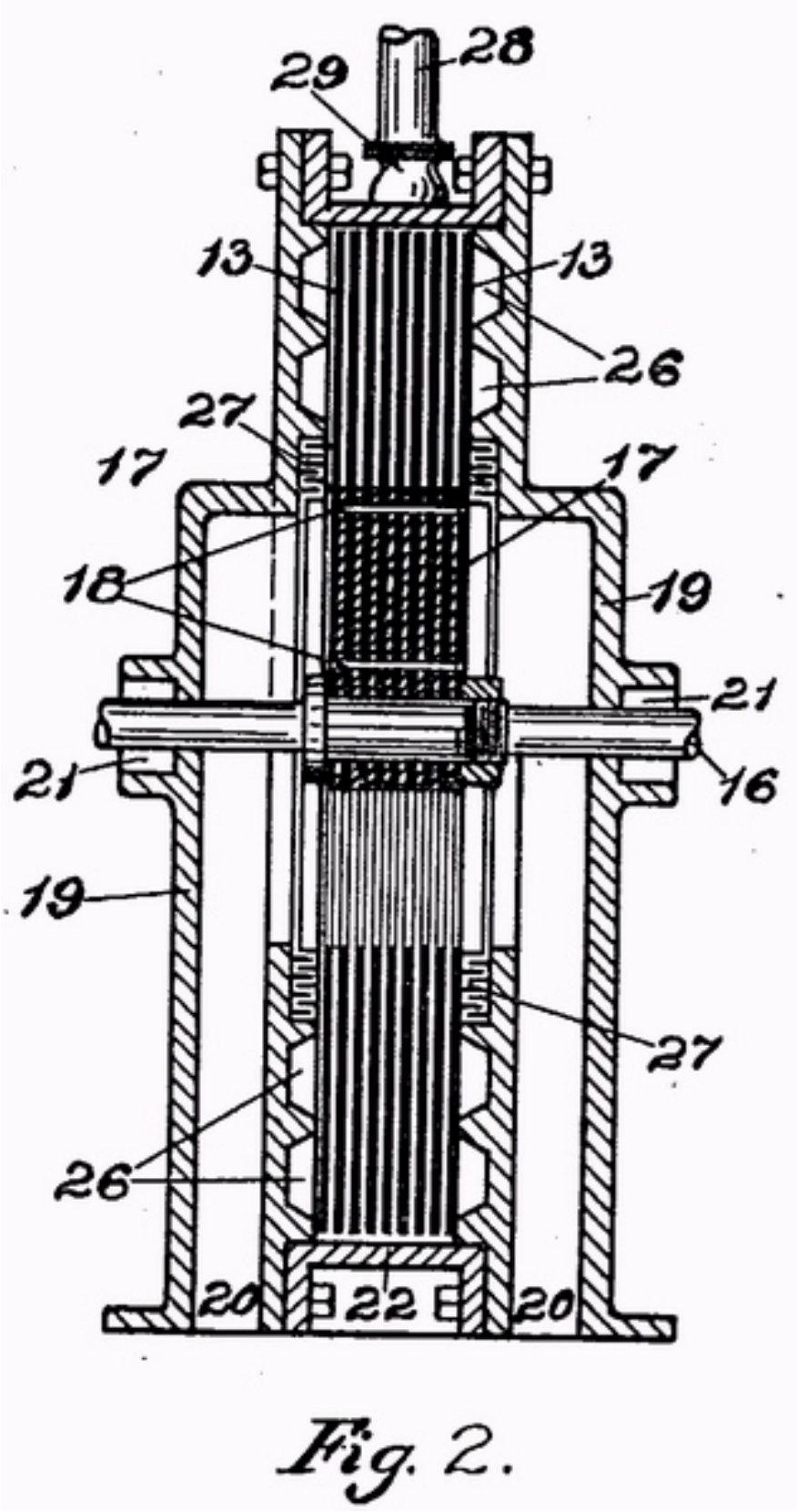

Fig. 2.

US PATENT TESLA TURBINE MOTOR

1,061,206. Specification of Letters Patent. Patented May 6, 1913. Original application filed October 21, 1909, Serial No. 523,332. Divided and this application filed January 17, 1911. Serial No. 603,049,

To all whom it may concern:
Be it known that I, Nikola Tesla, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Rotary Engines and Turbines, of which the following is a full, clear, and exact description.
In the practical application of mechanical power, based on the use of fluid as the vehicle of energy, it has been demonstrated that, in order to attain the highest economy, the changes in the velocity and direction of movement of the fluid should be as gradual as possible. In the forms of apparatus heretofore devised or proposed, more or less sudden changes, shocks, and vibration are unavoidable. Besides, the employment of the usual deices for imparting to, or deriving energy from a fluid, such as pistons, paddles, vanes, and blades, necessarily introduces numerous defects and limitations and adds to the complication, cost of production and maintenance of the machines.
The object of my invention is to overcome these deficiencies and to effect the transmission and transformation of mechanical energy through the agency of fluids in a more perfect manner and by means simpler and more economical than those heretofore employed. I accomplish this by causing the propelling fluid to move in natural paths or stream lines of least resistance, free from constraint and disturbance such as occasioned by vanes or kindred devices, and to change its velocity and direction of movement by imperceptible degrees, thus avoiding the losses due to sudden variation while the fluid is imparting energy.
It is well known that a fluid possesses, among others, two salient properties, adhesion and viscosity. Owing to these a solid body propelled through such a medium encounters a peculiar impediment known as "lateral" or skin resistance, which is twofold, one arising from the shock of the fluid against the asperities of the solid substance, the other from internal forces opposing molecular separation. As an inevitable consequence a certain amount of the fluid is dragged along by the moving body. Conversely, if the body be placed in a fluid in motion, for the same reasons, it is impelled in the direction of movement. These effects, in themselves, are of daily observation, but I believe that I am the first to apply them in a practical and economical manner in the propulsion of fluids or in their use as motive agents.
In an application filed by me October 21st, 1909, Serial Number 523,832 of which this case is a division, I have illustrated the principles underlying my discovery as embodied in apparatus designed for the propulsion of fluids. The same principles, however, are capable of embodiment also in that field of mechanical engineering which is concerned in the use of fluids as motive agents, for while in certain respects the operations in the latter case are directly opposite to those met with in the propulsion of fluids, and the means employed may differ in some features, the fundamental laws applicable in the two cases are the same. In other words, the operation is reversible, for if water or air under pressure be admitted to the opening constituting the outlet of a pump or blower as described, the runner is set in rotation by reason of the peculiar properties of the fluid which, in its movement through the device, imparts its energy thereto.
The present application, which is a division of that referred to, is specially intended to describe and claim my discover above set forth, so far as it bears on the use of fluids as motive agents, as distinguished from the applications of the same to the propulsion or compression of fluids.
In the drawings, therefore, I have illustrated only the form of apparatus designed for the thermo-dynamic conversion of energy, a field in which the applications of the principle have the greatest practical value.
Figure 1 is a partial end view, and Fig. 2 a vertical cross-section of a rotary engine or turbine, constructed and adapted to be operated in accordance with the principles of my invention.

1,061,206. Specification of Letters Patent. Patented May 6, 1913. Original application filed October 21, 1909, Serial No. 523,332. Divided and this application filed January 17, 1911. Serial No. 603,049,

The apparatus comprises a runner composed of a plurality of flat rigid disks 13 of suitable diameter, keyed to a shaft 16, and held in position thereon by a threaded nut 11, a shoulder 12, and intermediate washers 17. The disks have openings 14, adjacent to the shaft and spokes 15, which may be substantially straight. For the sake of clearness, but a few disks, with comparatively wide intervening spaces, are illustrated.

The runner is mounted in a casing comprising two end castings 19, which contain the bearings for the shaft 16, indicated but not shown in detail; stuffing boxes 21 and outlets 20. The end castings are united by a central ring 22, which is bored out to a circle of slightly larger diameter than that of the disks, and has flanged extensions 23, and inlets 24, into which finished ports or nozzles 25 are inserted. Circular grooves 26 and labyrinth packing 27 are provided on the sides of the runner. Supply pipes 28, with valves 29, are connected to the flanged extensions of the central ring, one of the valves being normally closed.

For a more ready and complete understanding of the principle of operation it is of advantage to consider first the actions that take place when the device is used for the propulsion of fluids for which purpose let it be assumed that power is applied to the shaft and the runner set in rotation say in a clockwise direction. Neglecting, for the moment, those features of construction that make for or against the efficiency of the device as a pump, as distinguished from a motor, a fluid, by reason of its properties of adherence and viscosity, upon entering through the inlets 20, and coming in contact with the disks 13, is taken hold of by the latter and subjected to two forces, one acting tangentially in the direction of rotation, and the other radially outward. The combined effect of these tangential and centrifugal forces is to propel the fluid with continuously increasing velocity in a spiral path until it reaches a suitable peripheral outlet from which it is ejected. This spiral movement, free and undisturbed and essentially dependant on the properties of the fluid, permitting it to adjust itself to natural paths or stream lines and to change its velocity and direction by insensible degrees, is a characteristic and essential feature of this principle of operation.

While traversing the chamber inclosing the runner, the particles of the fluid may complete one or more turns, or but a part of one turn, the path followed being capable of close calculation and graphic representation, but fairly accurate estimates of turns can be obtained simply by determining the number of revolutions required to renew the fluid passing through the chamber and multiplying it by the ratio between the mean speed of the fluid and that of the disks. I have found that the quantity of fluid propelled in this manner is, other conditions being eq1ual, approximately proportionate to the active surface of the runner and to its effective speed. For this reason, the performance of such machines augments at an exceedingly high rate with the increase of their size and speed of revolution.

The dimensions of the device as a whole, and the spacing of the disks in any given machine will be determined by the conditions and requirements of special cases. It may be stated that the intervening distance should be the greater, the larger the diameter of the disks, the longer the spiral path of the fluid and the greater its viscosity. In general, the spacing should be such that the entire mass of the fluid, before leaving the runner, is accelerated to a nearly uniform velocity, not much below that of the periphery of the disks under normal working conditions, and almost equal to it when the outlet is closed and the particles move in concentric circles.

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Considering now the converse of the above described operation and assuming that fluid under pressure be allowed to pass through the valve at the side of the solid arrow, the runner will be set in rotation in a clockwise direction, the fluid traveling in a spiral path and with continuously diminishing velocity until it reaches the orifices 14 and 20, through which it is discharged. If the runner be allowed to turn freely, in nearly frictionless bearings, its rim will attain a speed closely approximating the maximum of that of the adjacent fluid and the spiral path of the particles will be comparatively long, consisting of many almost circular turns. If load is put on and the runner slowed down, the motion of the fluid is retarded, the turns are reduced, and the path is shortened.

Owing to a number of causes affecting the performance, it is difficult to frame a precise rule which would be generally applicable, but it may be stated that within certain limits, and other conditions being the same, the torque is directly proportionate to the square of the velocity of the fluid relatively to the runner, and to the effective area of the disks, and inversely, to the distance separating them. The machine will, generally, perform its maximum work when the effective speed of the runner is one-half that of the fluid; but to attain the highest economy, the relative speed or slip, for any given performance, should be as small as possible. This condition may be to any desired degree approximated by increasing the active area of and reducing the space between the disks.

When apparatus of the kind described is employed for the transmission of power certain departures from similarity between transmitter and receiver are necessary for securing the best results. It is evident that when transmitting power from one shaft to another by such machines, any desired ratio between the speeds of rotation may be obtained by a proper selection of the diameters of the disks, or by suitably staging the transmitter, the receiver, or both. But it may be pointed out that in one respect, at least, the two machines are essentially different. In the pump, the radial or static pressure, due to centrifugal force, is added to the tangential or dynamic, thus increasing the effective head and assisting in the expulsion of the fluid. In the motor, on the contrary, the first named pressure, being opposed to that of supply, reduces the effective head and the velocity of radial flow toward the center. Again, in the propelled machine a great torque is always desirable, this calling for an increased number of disks and smaller distance of separation, while in the propelling machine, for numerous economic reasons, the rotary effort should be the smallest and the speed the greatest practable. Many other considerations, which will naturally suggest themselves, may affect the design and construction, but the preceding is thought to contain all necessary information in this regard.

In order to bring out a distinctive feature, assume, in the first place, that the motive medium is admitted to the disk chamber through a port, that is a channel which it traverses with nearly uniform velocity. In this case, the machine will operate as a rotary engine, the fluid continuously expanding on its tortuous path to the central outlet. The expansion takes place chiefly along the spiral path, for the spread inward is opposed by the centrifugal force due to the velocity of the whirl and by the great resistance to radial exhaust. It is to be observed that the resistance to the passage of the fluid between the plates is, approximately, proportionate to the square of the relative speed, which is maximum in the direction toward the center and equal to the full tangential velocity of the fluid. The path of least resistance, necessarily taken in obedience to a universal law of motion is, virtually, also that of least relative velocity. Next, assume that the fluid is admitted to the disk chamber not through a port, but a diverging nozzle, a device converting wholly or in part, the expansive into velocity-energy The machine will then work rather like a turbine, absorbing the energy of kinetic momentum of the particles as they whirl, with continuously decreasing speed, to the exhaust.

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The above description of the operation, I may add, is suggested by experience and observation, and is advanced merely for the purpose of explanation. The undeniable fact is that the machine does operate, both expansively and impulsively. When the expansion in the nozzles is complete, or nearly so, the fluid pressure in the peripheral clearance space is small; as the nozzle is made less divergent and its section enlarged, the pressure rises, finally approximating that of the supply. But the transition from purely impulsive to expansive action may not be continuous throughout, on account of critical states and conditions and comparatively great variations of pressure may be caused by small changes of nozzle velocity.

In the preceding it has been assumed that the pressure of supply is constant or continuous, but it will be understood that the operation will be, essentially the same if the pressure be fluctuating or intermittent, as that due to explosions occuring in more or less rapid succession.

A very desirable feature, characteristic of machines constructed and operated in accordance with this invention, is their capability of reversal of rotation. Fig 1, while illustrative of a special case, may be regarded as typical in this respect. If the right had valve be shut off and the fluid is rotated in the direction of the dotted arrow, the operation, and also the performance remaining the same as before, the central ring being bored to a circle with this purpose in view. The same result may be obtained in many other ways by specially designed valves, ports, or nozzlesfor reversing the flow, in the description of which is omitted here in the interest of simplicity and clearness. For the same reasons but one operative port or nozzle is illustrated which might be adapted to a volute but does not fit best a circular bore. It will be understood that a number of suitable inlets may be provided around the periphery of the runner to improve the action and that the construction of the machine may be modified in many ways.

Still another valuable and probably as unique quality of such motors or prime movers may be described. By proper construction and observance of working conditions the centrifugal pressure, opposing the passage of the fluid, may, as already indicated, be made nearly equal to the pressure of supply when the machine is running idle. If the inlet section be large, small changes in the speed of revolution will produce great differences in flow which are further enhanced by the concomitant variations in the length of the spiral path. A self regulating machine is thus obtained bearing a striking resemblance to a direct-current electric motor in this respect that, with great differences of impressed pressure in a wide open channel the flow of the fluid through the same is prevented by virtue of rotation. Since the centrifugal head increases as the square of the revolutions, or even more rapidly, and with modern high grade steel great peripheral velocities are practable, it is possible to attain that condition in a single stage machine, more readily if the runner be of large diameter. Obviously this problem is facilitated by compounding, as will be understood by those skilled in the art. Irrespective of its bearing on economy, this dependency which is, to a degree, common to motors of the above description, is of special advantage in the operation of large units, as it affords a safeguard against running away and destruction. Besides these, such a prime mover possesses many other advantages, both constructive and operative. It is simple, light, and compact, subject to but little wear, cheap and exceptionally easy to manufacture as small clearances and accurate milling work are not essential to good performance. In operation it is reliable, there being no valves, sliding contacts or troublesome varies. It is almost free of windage, largely independent of nozzle efficiency and suitable for high as well as for low fluid velocities and speeds of revolution.

It will be understood that the principles of construction and operation above generally set forth, are capable of embodiment in machines of the most widely different forms, and adapted for the greatest variety of purposes. In my present specification I have sought to describe and explain only the general and typical applications of the principle which I believe I am the first to realize and turn to useful account.

US PATENT TESLA TURBINE MOTOR

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What I claim is:

A machine adapted to be propelled by a fluid consisting in the combination with a casing having inlet and outlet ports at the peripheral and central portions, respectively, of a rotor having plane spaced surfaces between which the fluid may flow in natural spirals and by adhesive and viscous action impart its energy of movement to the rotor, as described.

A machine adapted to be propelled by a fluid, comprising a rotor composed of a plurality of plane spaced disks mounted on a shaft and open at or near the same , an inclosing casing with a peripheral inlet or inlets, in the plane of the disks, and an outlet or outlets in its central portion, as described.

A rotary engine adapted to be propelled by adhesive and viscous action of a continuously expanding fluid comprising in combination a casing forming a chamber, an inlet, or inlets tangential to the periphery of the same, and an outlet or outlets in its central portion, with a rotor composed of spaced disks mounted on a shaft, and open at or near the same, as described.

A machine adapted to be propelled by fluid, consisting in the combination of a plurality of disks mounted on a shaft and open at or near the same, and an inclosing ring casing with ports or passages of inlet and outlet at the peripheral and central portions, respectively, the disks being spaced to form passages through which the fluid may flow, under the combined influence of radial and tangential forces, in a natural spiral path from the periphery toward the axis of the disks, and impart its energy of movement to the same by its adhesive and viscous action thereon, as set forth.

A machine adapted to be propelled by a fluid comprising in combination a plurality of spaced disks rotatably mounted and having plane surfaces, an inclosing casing and ports or passages of inlet and outlet adjacent to the periphery and center of the disks, respectively, as set forth.

A machine adapted to be propelled by a fluid comprising in combination a runner composed of a plurality of disks having plane surfaces and mounted at intervals on a central shaft, and formed with openings near their centers, and means for admitting the propelling fluid into the spaces between the disks at the periphery and discharging it at the center of the same, as set forth.

A thermo-dynamic converter, comprising in combination a series of rotatably mounted spaced disks with plane surfaces, an inclosing casing, inlet ports at the peripheral portion and outlet ports leading from the central portion of the same, as set forth.

A thermo-dynamic converter, comprising in combination a series of rotatably mounted spaced disks with plane surface and having openings adjacent to their central portions, an inclosing casing, inlet ports in the peripheral portion, and outlet ports leading from the central portion of the same, as set forth.

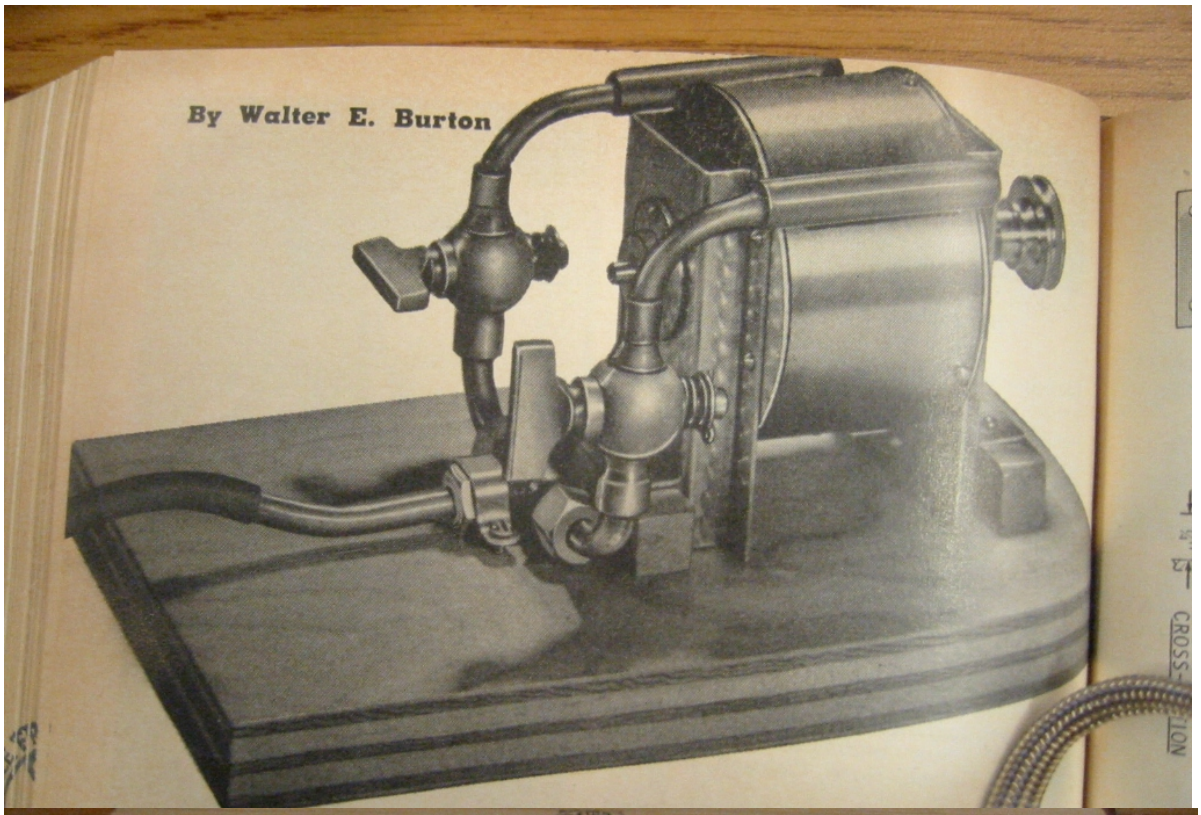
In testimony whereof I affix my signature in the presence of two subscribing witnesses.

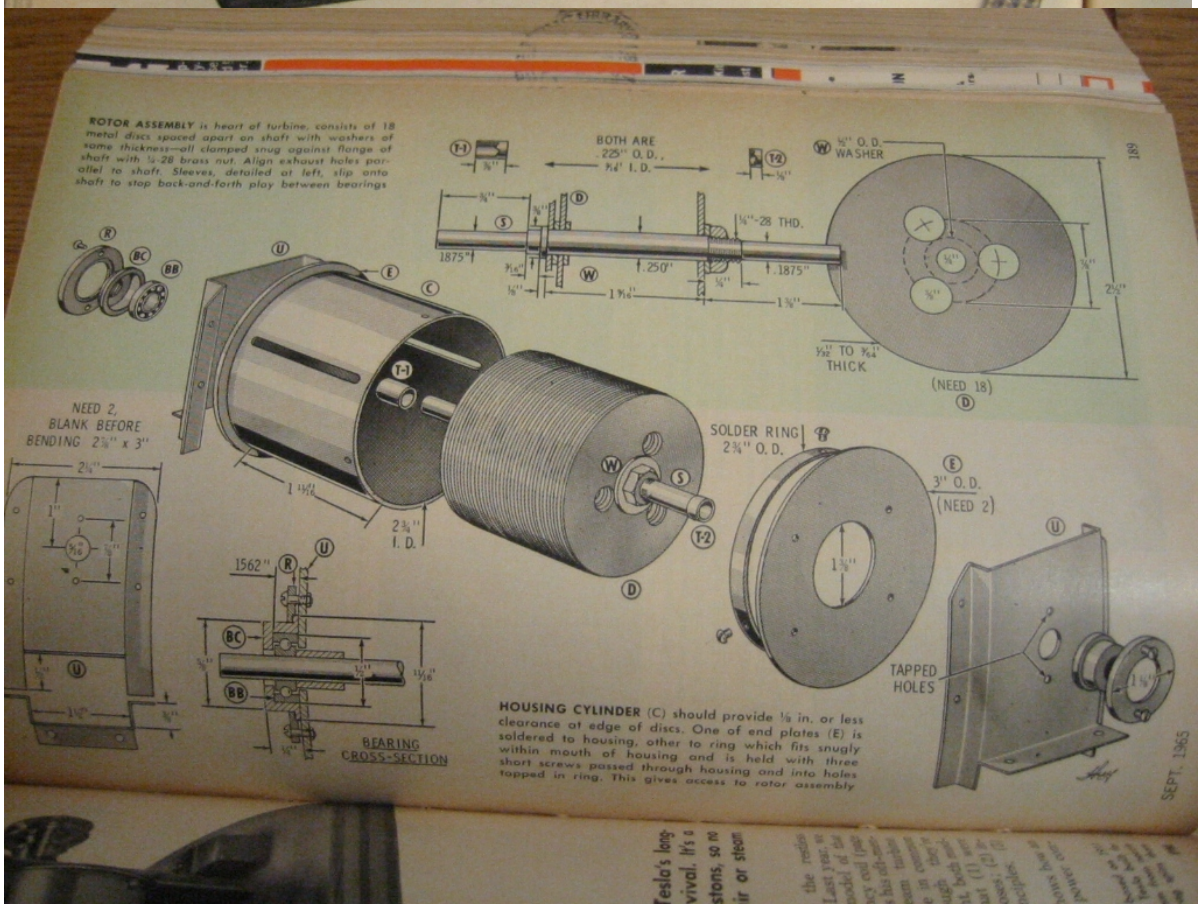
NIKOLA TESLA

Witnesses:

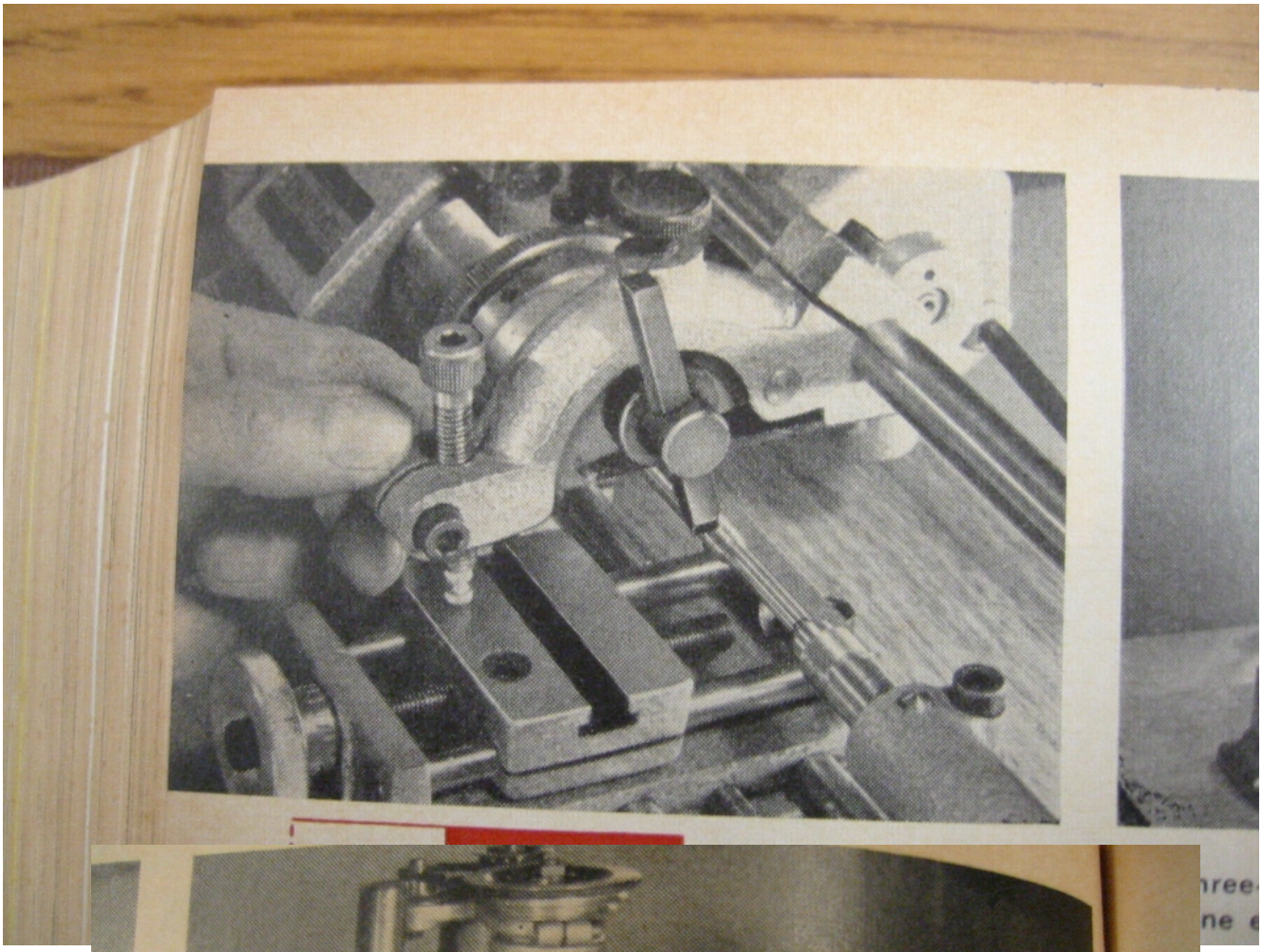
M. Lawson Dyer

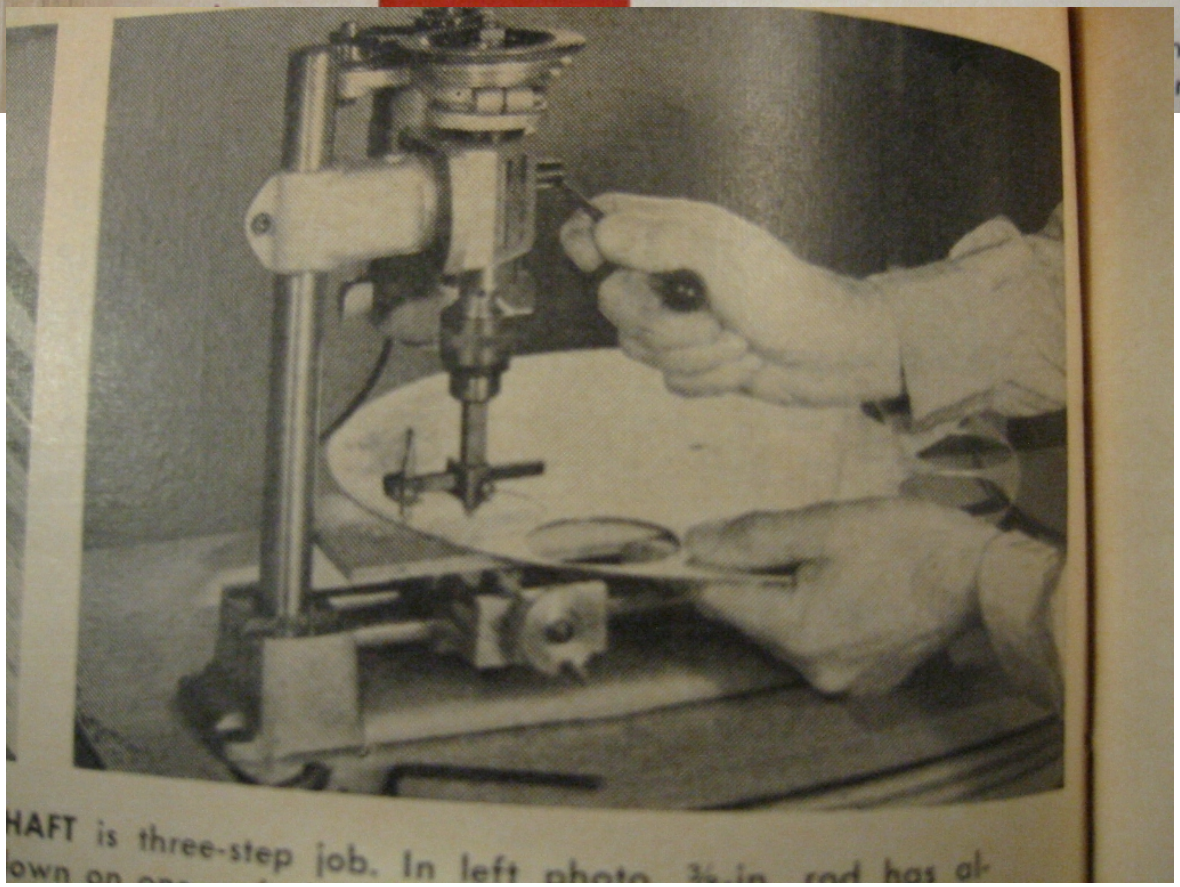
WM. Bohleber



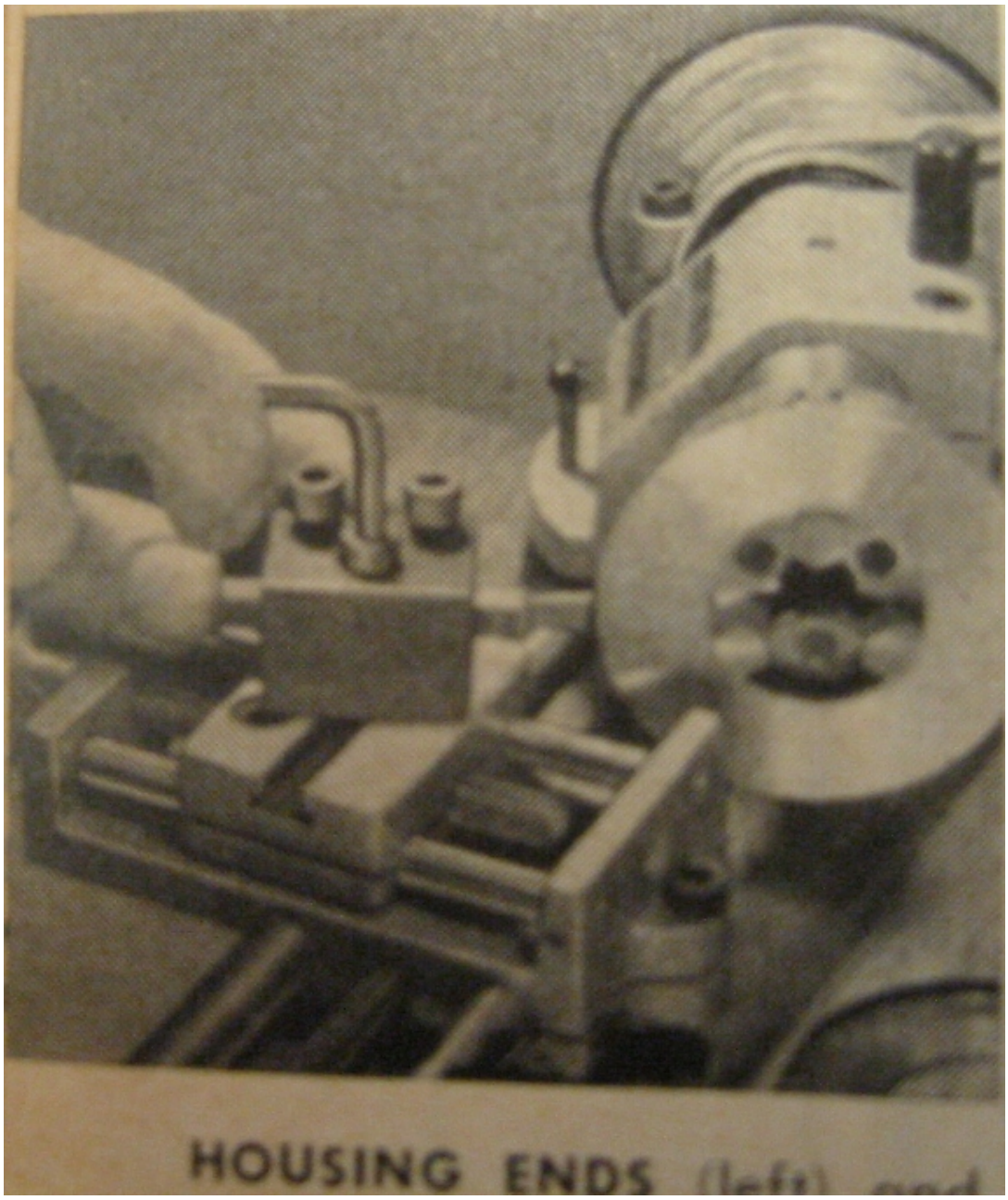


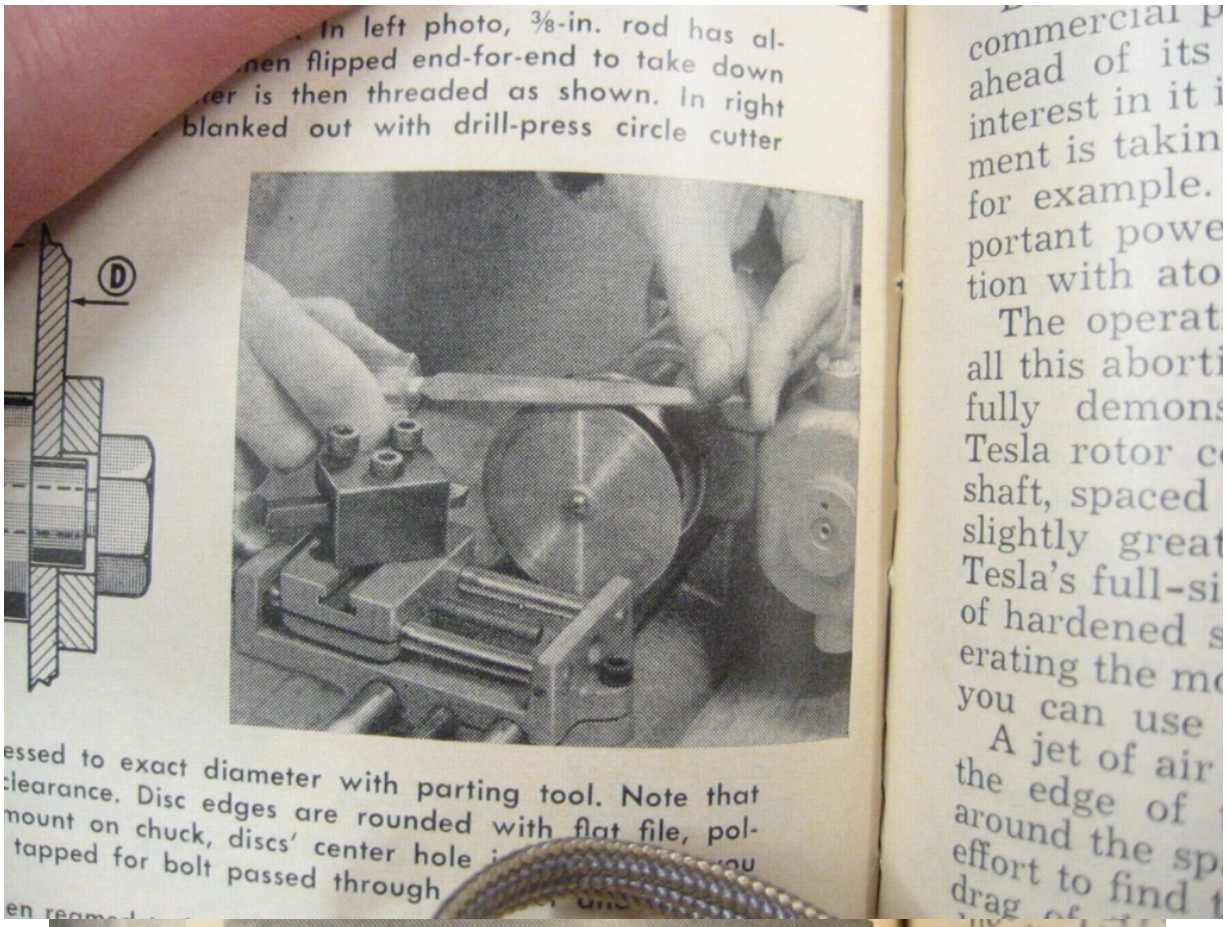
Photos from a very old magazine I think from the 1940's





HAFT is three-step job. In left photo





In left photo, ⅜-in. rod has al-
nen flipped end-for-end to take down
er is then threaded as shown. In right
blanked out with drill-press circle cutter

essed to exact diameter with parting tool. Note that
clearance. Disc edges are rounded with flat file, pol-
mount on chuck, discs' center hole
tapped for bolt passed through

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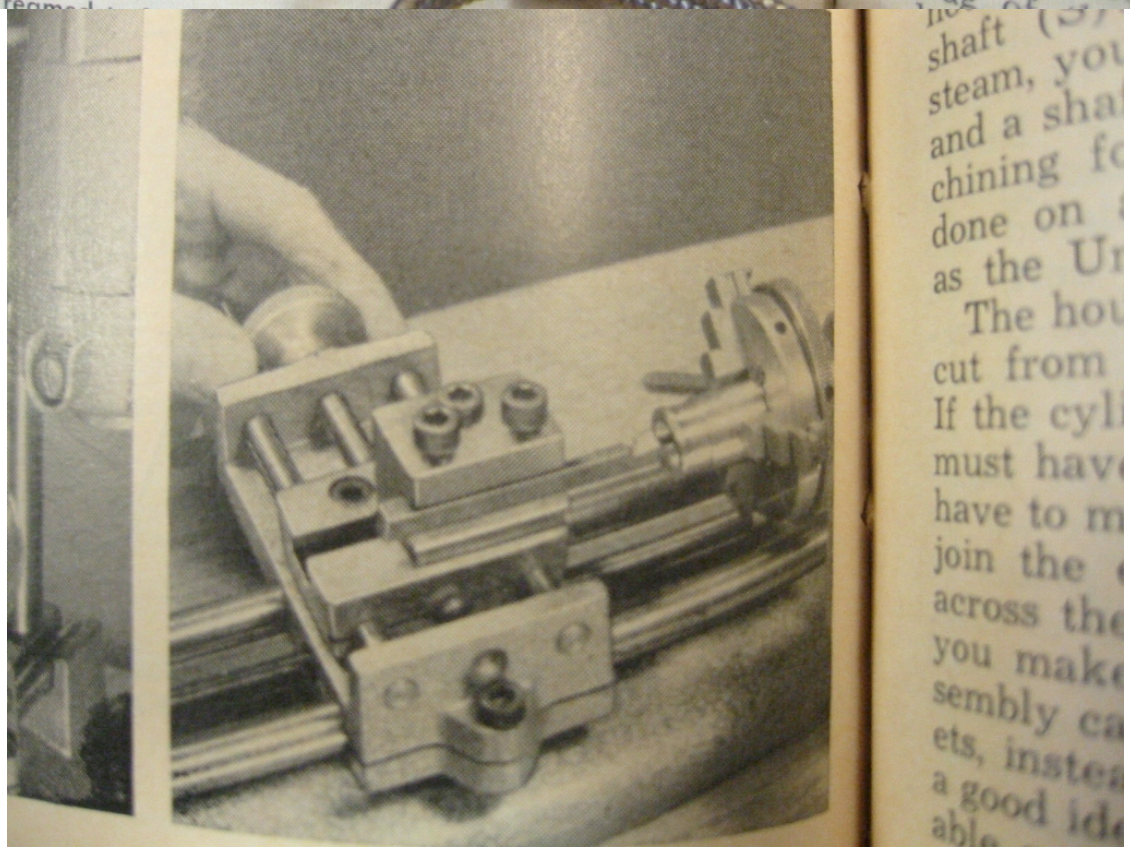
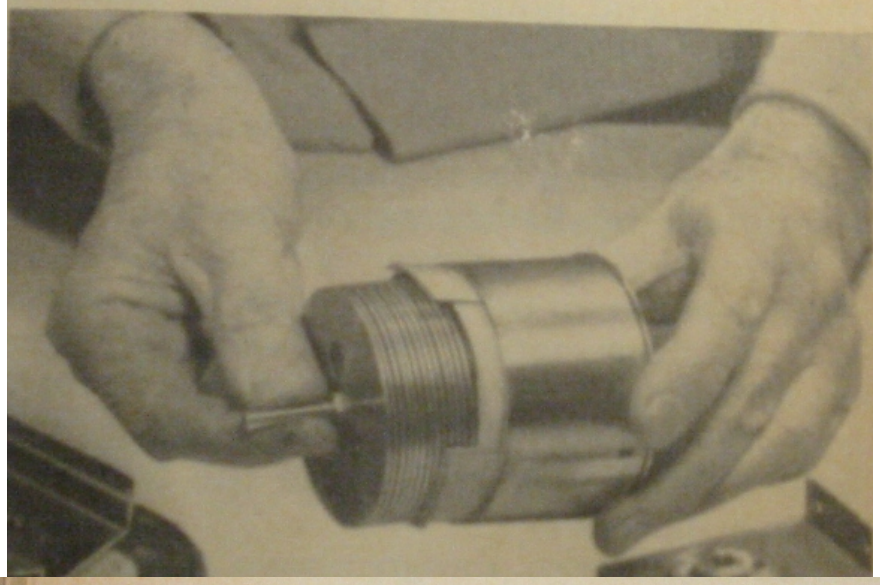
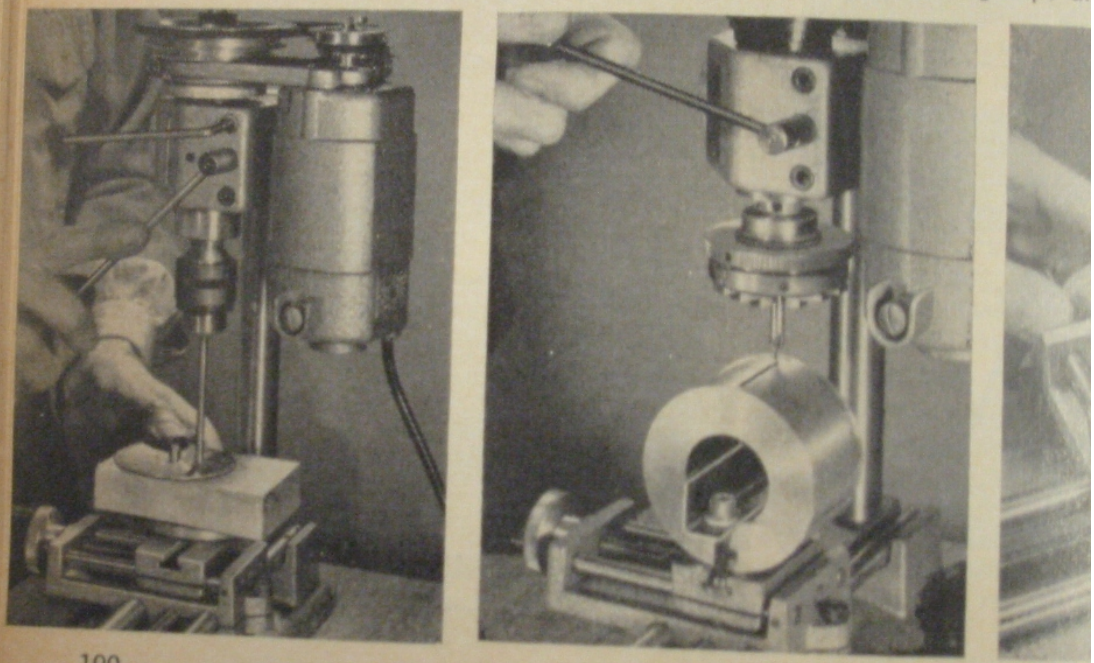


CENTER ROTOR in housing with cardboard shims, then position uprights (with bearings already mounted) against endpieces and mark latter for mounting holes. Disassemble, remove shims, drill and tap holes



EXHAUST PORTS were drilled (left) with ¼-in. bit, then reamed to ⅜ in. Simple distance from center (120° spacing isn't critical). Air-jet slots were cut (center) with center bit, then using bit as milling cutter to clean out webs. Note housing. Slots were later filed to accept jet nozzles. At right, bearing caps a



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