

# St. Mary's DIESEL OIL ENGINES



St. Charles, Mo.

THE ST. MARYS  
DIESEL OIL ENGINE



MANUFACTURED BY  
THE ST. MARYS OIL ENGINE COMPANY  
ST. CHARLES, MISSOURI  
U. S. A.

# Introductory ~

TO THOUSANDS of power users in the United States and foreign countries the St. Marys Diesel Oil Engine of Economy and Reliable Power needs no introduction. With the cycle of each year's work well done, of power bills reduced to the minimum, its performance has perfected a bond of appreciation between manufacturer and owner, who regard it as an indispensable unit of power and economy.

In 1893 Dr. Rudolph Diesel discovered the principle of the Oil Engine that bears his name. While he was perfecting the principle, which marked a mighty forward step to meet the demand for modern power economy and efficiency, the St. Marys Oil Engine Company was establishing a reputation in America, as leaders in the manufacture of Internal Combustion Engines.

Appreciating the oncoming demand for an engine of great economy and efficiency, the engineers of the St. Marys Oil Engine Company turned their attention to the Diesel Principle.

In the St. Marys Diesel Oil Engine is combined the very best and latest in American Engineering practice, with such features of European design as have become recognized as standard for engines of the Diesel type.

As the result of years of untiring effort and experiment by the St. Marys Oil Engine Engineers there is built into the St. Marys Diesel many distinctive features which make it the preferred of all Diesel Oil Engines—a few of which will be found on page 15 of this catalogue.

The St. Marys Diesel Oil Engine, as a power unit, is in line with the most advanced engineering practice of the present day. In operation, it represents the greatest degree of economy and reliability.

Prospective customers are invited to visit our works and personally inspect engines under construction, or during test; and we will, on request, supply certified copies of such tests.

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THE ST. MARYS OIL ENGINE COMPANY  
St. Charles, Missouri

## Principles of Construction and Operation

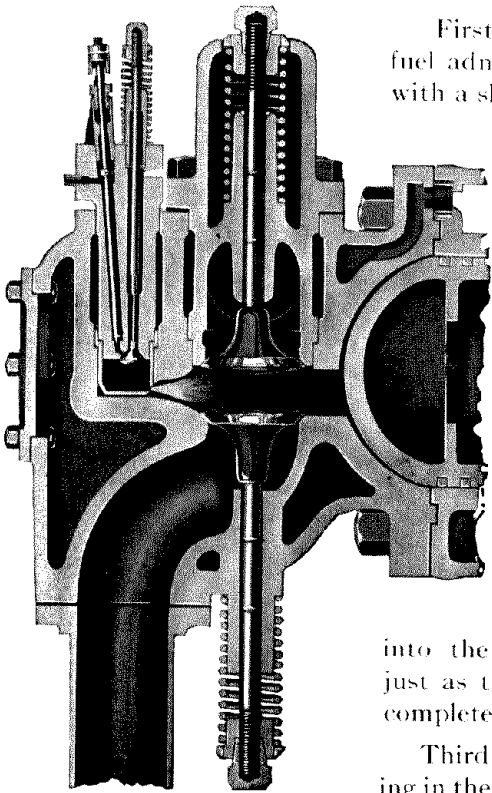
There is no Diesel Oil Engine made with as few parts as the St. Marys; and there is no other engine of equal economy and efficiency.

From icy cold it will start instantly, and to full speed, in less than a minute, and without the aid of torch, hot balls, tubes, or electrical appliances—for there are none—and it operates without a carburetor, magneto or any electrical contraption. The principle of construction of the St. Marys Diesel eliminates all these trouble makers.

St. Marys Diesel Oil Engines are of the four stroke, cycle type. The inlet, exhaust and fuel admission valves are operated mechanically. It runs practically at constant speed and operates equally well under variable or steady loads.

Speed control is maintained under varying loads by means of a flyball type governor. The governor is connected with the fuel admission valve, and automatically varies the amount of fuel in accordance with the load, thus maintaining a constant engine speed.

## The Functions of the Four Cycles of the St. Marys Diesel Oil Engine are as Follows:



First or Intake Stroke. The piston travels outward. The fuel admission valve and intake valve open, and oil, together with a slight amount of air, is admitted into the fuel cup. This fuel cup is a compartment on inner end of fuel valve assemblage, and projects into the combustion chamber. The fuel cup and combustion chamber are in direct communication through small passages. The inlet valve being open admits the proper amount of air to fill the cylinder.

Second or Compression Stroke. On the piston return stroke, moving inward, the intake, exhaust and fuel valves close so that the piston compresses the air in the cylinder sufficiently so that it burns the lighter hydro-carbons of the oil in the fuel cup, raising the pressure in the fuel cup greater than in the cylinder. The fuel cup being in direct communication with the combustion chamber, the greater pressure in the fuel cup sprays the remainder of the oil in the fuel cup into the combustion chamber in a highly atomized form, just as the piston reaches inner dead center, the oil burning completely.

Third or Power Stroke. The fuel oil burning and expanding in the combustion chamber drives the piston outward, which

in turn transmits power through the connecting rod and crankshaft to the flywheel.

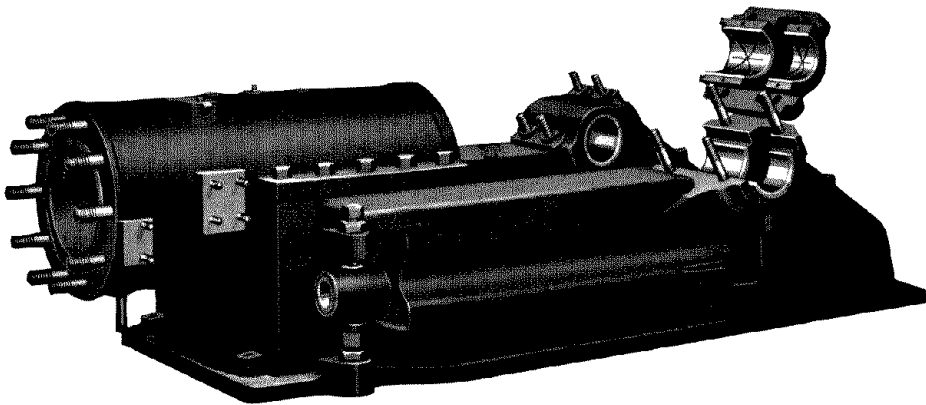
Fourth or Exhaust Stroke. As the piston returns the exhaust valve opens, and the piston discharges or pushes all the burned

gases (within the cylinder) out through the exhaust valve, thus completely scavenging the cylinder of burned gases, completing the four cycles of operation.

## Details of Design and Construction

Service records and tests prove that the design and construction of the St. Marys Diesel are right. The materials are the best. The workmanship of the highest order, and the most exacting requirements for machining

and assembly are rigidly enforced by the factory management. Great care has been taken to assure accessibility to all working parts.



### The Bed Plate

The Bed is a one-piece casting, of the deep box, centre-crank type, presenting a large area to the foundation. It is a massive casting of tough, fibrous iron, heavily ribbed to resist the thrust of the moving parts.

### Main Bearings

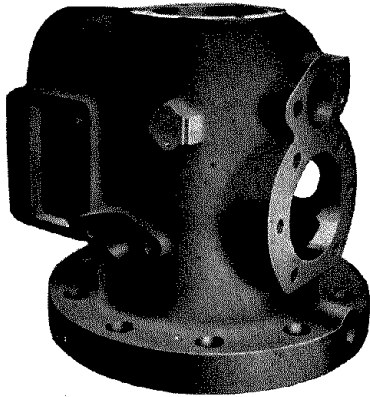
The Main Bearings are cast integral with the bed plate, at an angle of forty-five degrees, to relieve the caps and studs of all strains. They are lined with the best grade of babbitt metal, and provided with grooves for the conveyance of the oil.

### Cylinder

The cylinder is constructed of a semi-steel-iron mixture of fine, close-grained texture, accurately machined and tested. It is cast with a large water jacket space the entire length of same.

### Cylinder Head

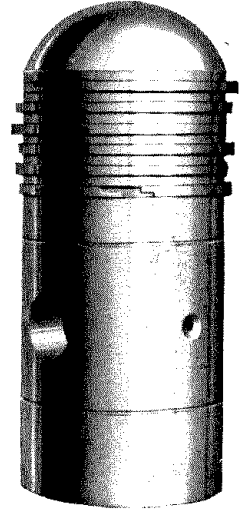
The cylinder head is a semi-steel symmetrical casting thoroughly water-jacketed to protect the surfaces that are exposed to the heat combustion. This head carries the



fuel valve body, the air inlet valve cage, the exhaust valve, the air starting valve cage, and is provided with a safety valve to protect the engine from any undue strains.

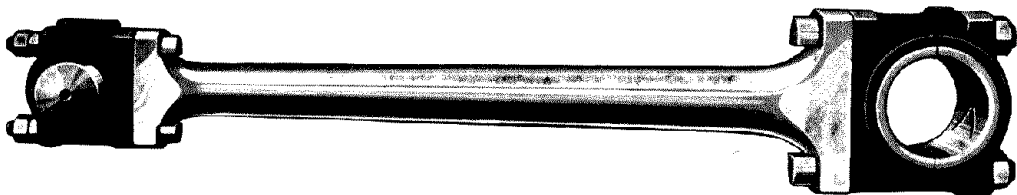
### Piston

The piston is of the trunk type, of ample length (more than twice its diameter). It is as light as duty permits, and is made of a special mixture of hard iron of close texture in which the wear is almost imperceptible. The piston is fitted with six rings and has two oil grooves. This construction eliminates the troublesome crosshead, and the piston barrel is made with an area so great that the pressure due to the angular thrust of the connecting rod and the weight of same is reduced to a minimum.



### Piston Pin

The piston pin is of forged high carbon case-hardened steel, ground to exact size and is of such dimensions as to keep the bearing pressure exceedingly low. It is rigidly fastened in position and ample lubrication is provided.



### Connecting Rod

The connecting rod is a steel forging machined all over and is of the marine type. It carries the bronze adjustable piston pin box at one end and the cast steel habbitted

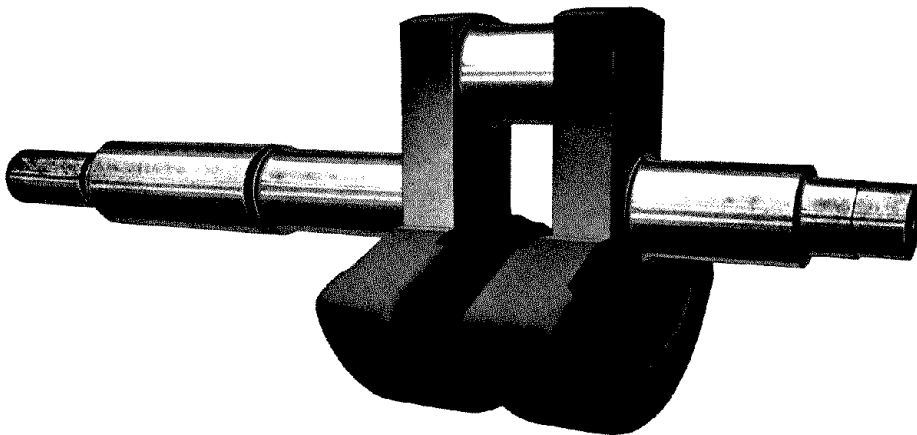
lined adjustable crank pin box at the other end. Both bearing boxes are made in halves and fitted together with steel shims, providing easy and close adjustment.



## Crank Shaft

The crankshaft is a solid forging of the highest grade open-hearth steel, made to formula, and of such physical and chemical characteristics as to be especially suitable for oil engine service. It is unusually liberal in every dimension. The crank pin and main bearing surfaces are so large as to hold the pressure per square inch well within conservative practice, and the cross-sectional area of each crank throw affords factors of safety

beyond any ordinary requirements. Long radius re-enforcing fillets are provided at the points where the ends of the crank pin and straight portions of the shaft join the crank throws, thus escaping the weakness incident to sharp corners. The crank shaft throws are fitted with heavy counterbalance weights which absorb any tendency to vibrate, relieve the stresses on the main bearing and assist in maintaining a steady turning movement.



Special Electric Crank Shaft

### Inlet and Exhaust Valves

The horizontal construction permits a simple valve gear arrangement, the motion being transmitted from a single cam on the lay shaft to the inlet and exhaust valve by rolling contact levers, which our experience has demonstrated to be the quickest and most durable valve gear known. The exhaust valve is placed in the bottom of the cylinder head between the fuel cup and the cylinder, so that any dirt in the fuel oil will drop out through

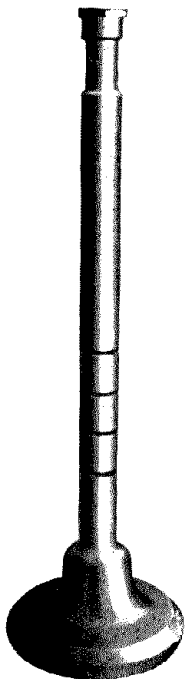
the exhaust without reaching the lubricated cylinder wall. This location is also favorable for scavenging any dirt out of the cylinder during exhaust stroke.

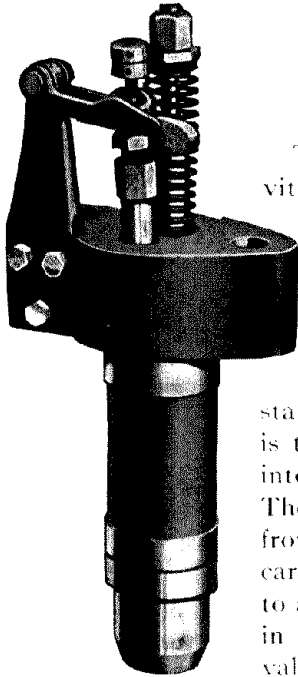
### Lubrication

The cylinder, piston and all moving parts are constantly oiled by a force-feed oiler of large capacity.

### Governor

The governor is of the high speed, fly-ball type, very powerful and sensitive. It varies the feed on the fuel valve which accurately measures the amount of fuel delivered to the primary cup on each working stroke of the engine according to the requirements of the load and the predetermined speed; the variation from the latter under changes from one-fourth load to full load, and vice versa, are very slight.





### Fuel Valve Body and Cup

These parts are the vital ones of the engine and yet very simple. The fuel cup is turned from a solid bar of .40 carbon steel, finished to our standards. Its function is to inject the fuel oil into the main cylinder. The fuel valve is turned from a piece of high carbon steel and ground to a looking-glass finish in its seat in the fuel valve body. The fuel

valve body is made of tough cast iron and machined to micrometer finish.

### Horizontal Construction

The horizontal engine is particularly rigid on account of the large surface of the bed plate in contact with the foundation and the low center of gravity. Of particular interest to the prospective purchaser is the accessibility of all parts from the engine room floor, which is possible only with the horizontal type. Ease of inspection, even while the engine is in operation, is further facilitated by placing each part in plain view and giving independent adjustments where necessary. The convenience of the horizontal type will be readily seen in the ease with which the connecting rod boxes may be adjusted or the piston taken out by simply removing the crank oil guard without disturbing any other parts.

### Standard Equipment

We furnish as standard equipment: Air compressor, air receiver, pressure gauge, pop valve, water circulating pump, mechanical oiler, cast iron muffler, day fuel service tank, driving pulley, combination pulley for driving air compressor and water pump, complete set of wrenches, instruction book and equipment box.

### Service

This is the day of service. It is not sufficient for a manufacturer to merely market his product, he must follow up the sale with service.

The St. Marys Diesel SERVICE has been devised to render the greatest benefit to its customers. Although centered in the home

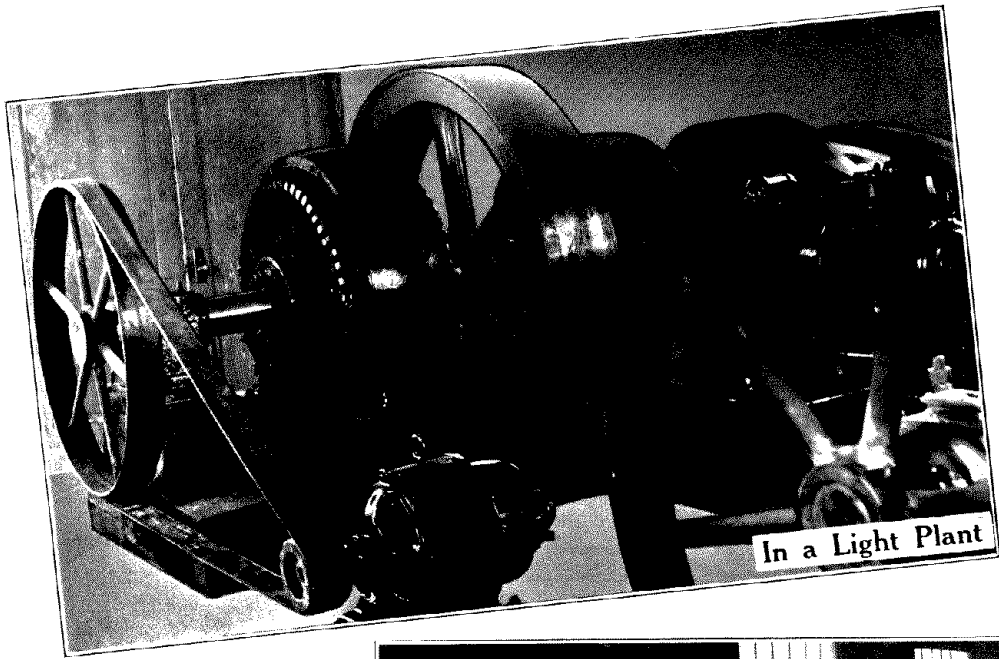
office, branch offices or distributing points carry a line of repair parts and a service man is constantly available.

### Adaptability

A St. Marys Diesel Oil Engine can be installed for nearly every industry: Central stations generating electricity, municipal water supplies, mine work and mine pumping, cement mills, flour mills, cotton, silk and woolen mills, machine shops, irrigation and reclaiming pumping stations, ice plants, cotton gins, cotton oil mills, pumping stations for oil pipe lines, and many others.

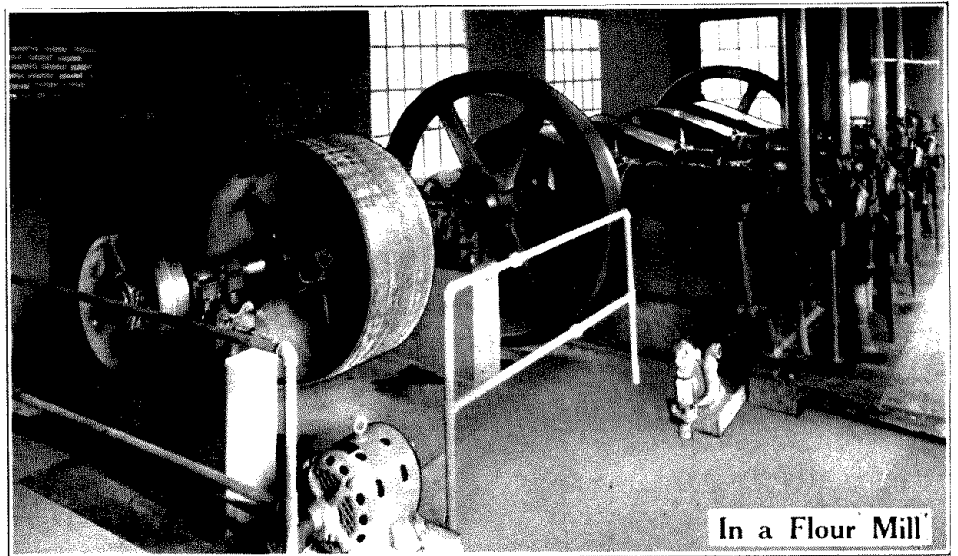
The speed of the St. Marys Diesel Oil Engine is such that it can be either direct connected or be used with a speed reduction or increasing gear for direct connected drive. A clutch or plain pulley can be used with belt or rope drive.



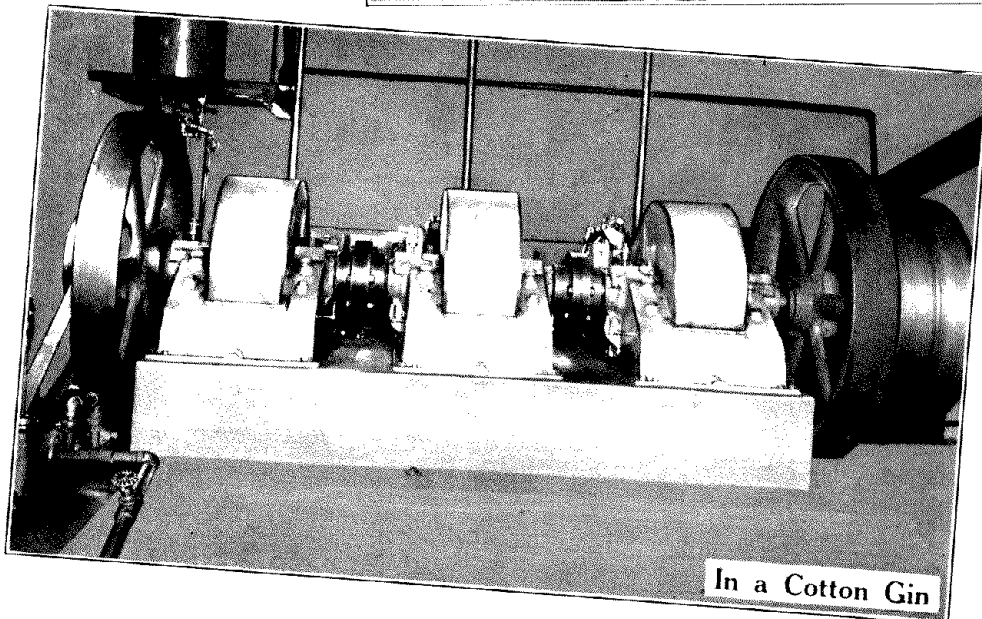


In a Light Plant

Miscellaneous  
 St. Mary  
 Installations



In a Flour Mill

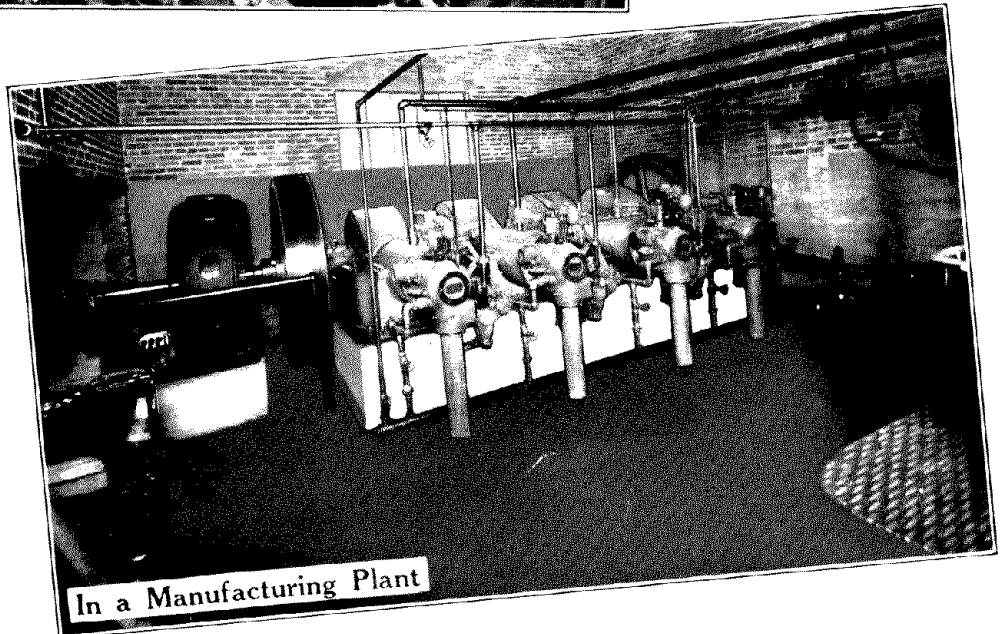
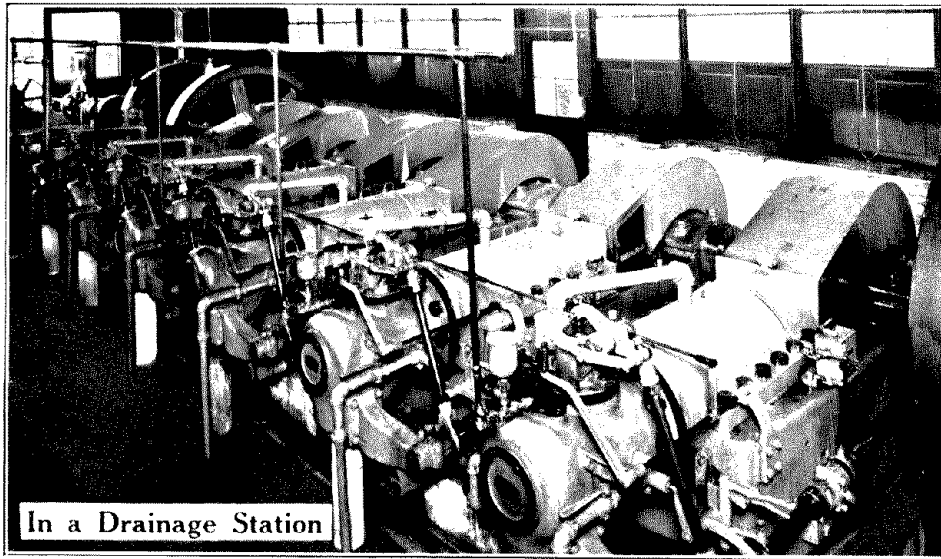
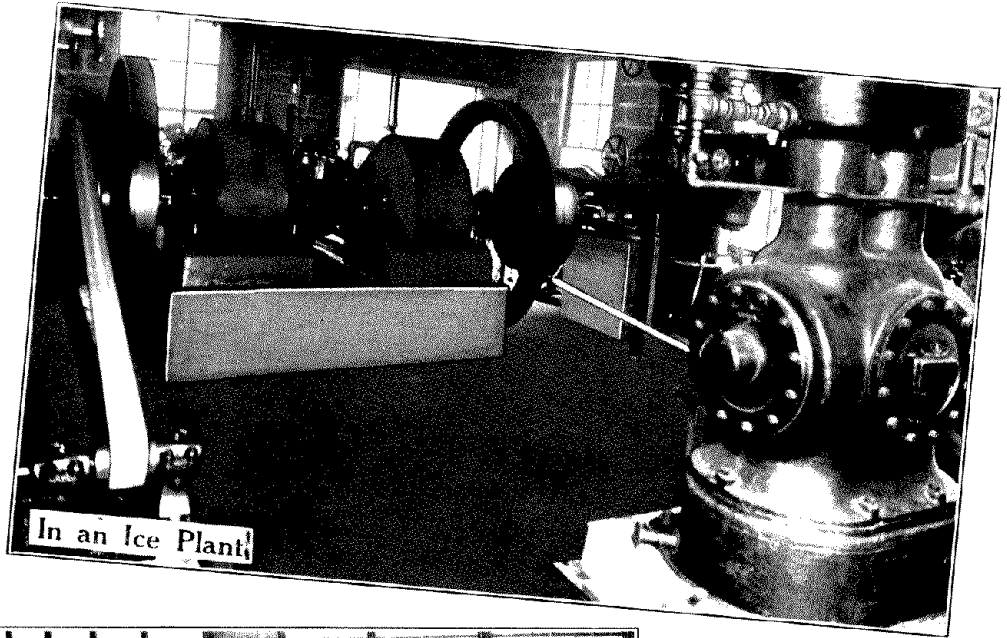


In a Cotton Gin

**WHERE POWER**

The remarkable speed of the ST. M. made it one of the Oil Engines of record and reliable power. Installations of ST. M. Engines increase in industrial plants. New savings are made

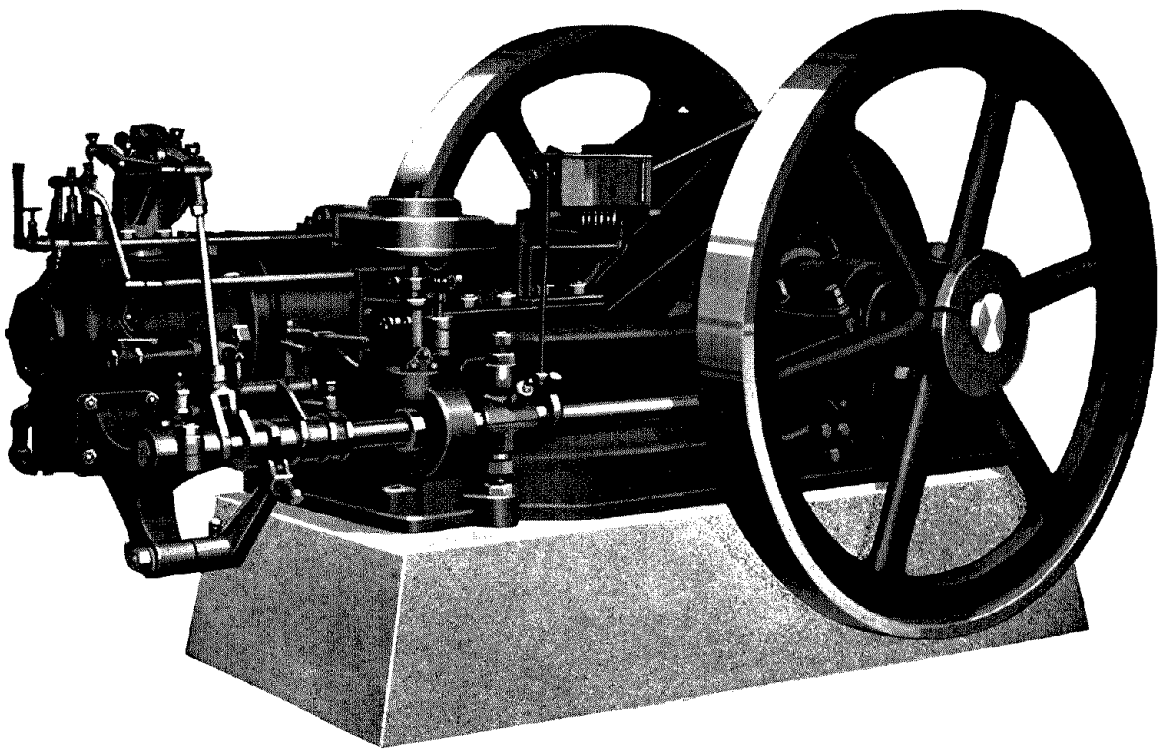
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ARYS DIESEL Oil  
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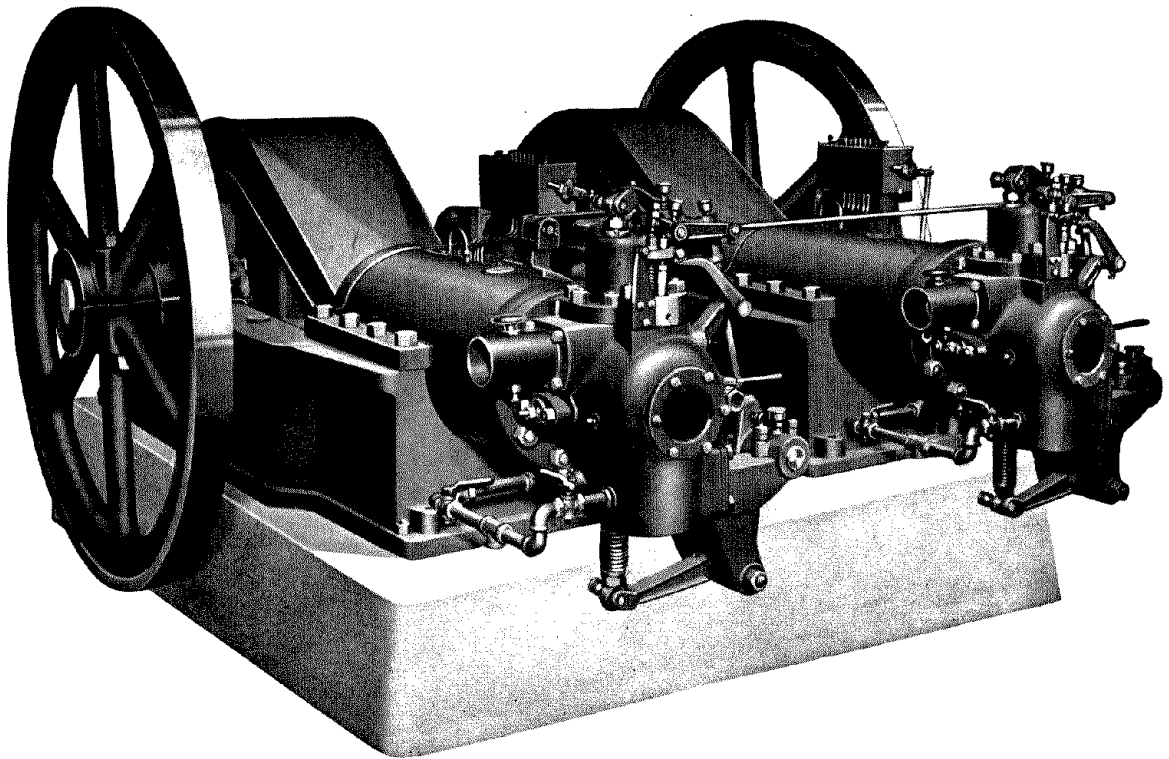
St. Marys Standard One Cylinder  
Diesel Oil Engine



**Buy the Modern Power Unit — A St. Marys Diesel Oil Engine**

Why renew an old boiler? Apply the renewing price to the purchase of a Standard St. Marys Diesel Oil Engine. The boiler will burn up your money. The St. Marys Diesel will make you money, by saving it. Burning coal under boilers is now regarded as a criminal waste by the heads of many great engineering corporations.

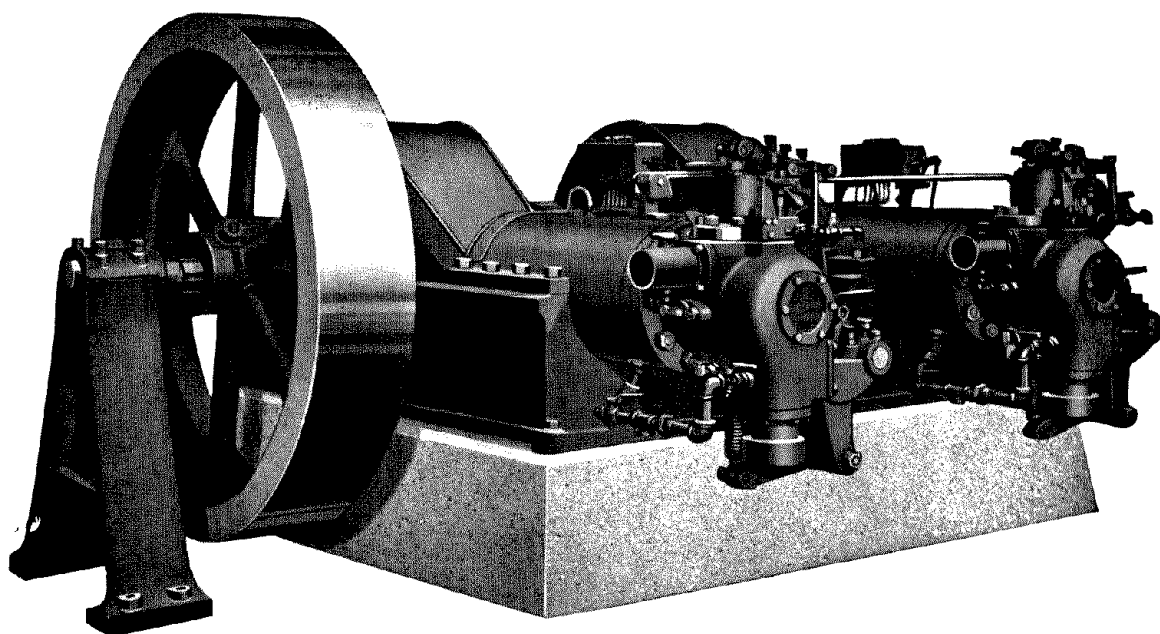
## St. Marys Standard Two Cylinder Diesel Oil Engine



### **Why the St. Marys is the Preferred Diesel**

Economy, plus Reliable Power, and freedom from repair costs make the St. Marys the preferred in ALL-WAYS of all engines. It gives more power for less money, because it lowers fuel, labor and maintenance costs. When not running, no fuel is being consumed—and it is ready for action, on the minute—when needed.

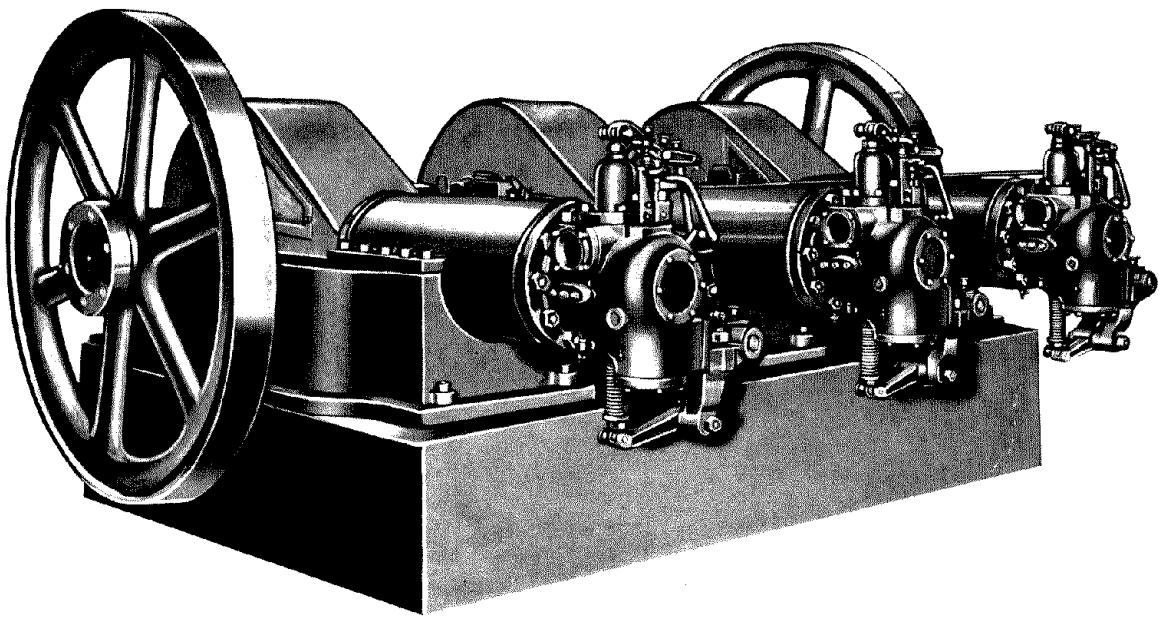
# St. Marys Special Electric Two Cylinder Diesel Oil Engine



## The St. Marys Diesel Lowers Fire Insurance Costs

The St. Marys Diesel Oil Engine has been accepted by the National Board of Fire Underwriters, of Chicago. The heat of compression ignites the fuel, and perfect combustion results. There are no hot balls, blow torches, or tubes required for starting; or electrical apparatus of any kind required for its operation.

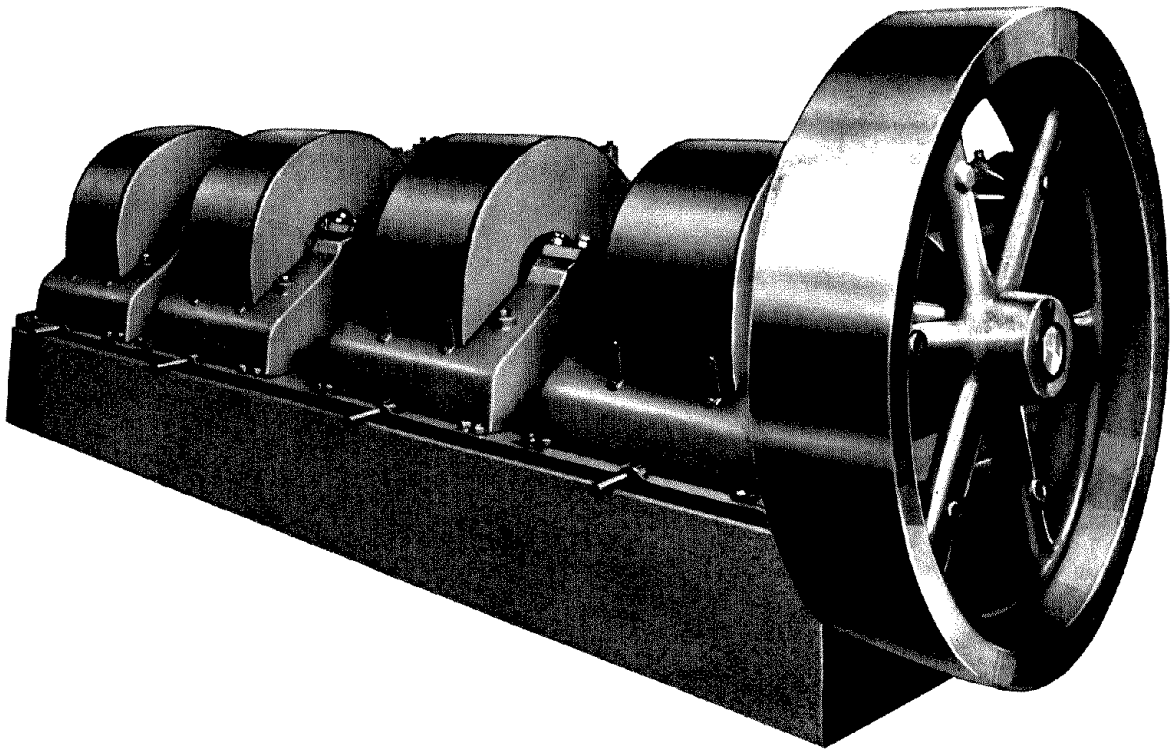
## St. Marys Standard Three Cylinder Diesel Oil Engine



### **An Even Flow of Power**

An even flow of dependable power is a distinctive feature of the St. Marys Diesel Oil Engine. Add, or take away 50% of the load, and there is no perceptible variation of speed. And this remarkable engine is built, seemingly, never to wear out. The design is simple, and it is made so sturdy. There are no intricate parts.

St. Marys Special Electric Four Cylinder  
Diesel Oil Engine



**A Durable Engine**

There are St. Marys Diesel Engines now in operation that have been running every day for ten years, without the expenditure of a dollar for repairs, or the replacement of worn out or broken parts. A remarkable endorsement of the practical experience of the engineers of the St. Marys Oil Engine Company.



## Twenty-Five Distinctive Features of the St. Marys Diesel Oil Engine

- No. 1. There are no batteries to freeze up or run down.
- No. 2. No battery wires to break or become disconnected.
- No. 3. No ignition to corrode or get out of time.
- No. 4. No carburetor to adjust or get out of order.
- No. 5. No danger of fire from having gasoline around.
- No. 6. No waiting, or trouble hunting, when ready to start.
  
- No. 7. No hot tubes to become too hot or too cold or to blow out.
- No. 8. No ignition devices, torches, hot metal or electric wires.
- No. 9. No crosshead and stuffing box to keep in line.
- No. 10. Pre-ignition is absolutely impossible as combustion is positively timed and there are no carbon deposits to become incandescent.
- No. 11. No high pressure air compressor with intercoolers.
- No. 12. No water injection.
  
- No. 13. All heated parts completely water-jacketed.
- No. 14. All water jackets accessible for inspection and cleaning.
- No. 15. Stresses on crankshaft and main bearing are better distributed in horizontal construction.
- No. 16. Also all parts can be reached from engine-room floor.
- No. 17. Also no need of ladders or overhead crane.
- No. 18. Also positive lubrication of piston, as only one mechanical single feed on top side is required, whereas with vertical engine it is necessary to inject oil onto the piston at several points in the circumference of the cylinder bore.
  
- No. 19. The combustion is perfect.
- No. 20. Will burn any Diesel fuel oil.
- No. 21. Combustion is positive and complete, making back-firing impossible in the exhaust pipe.
- No. 22. Temperature of cold or heat does not reduce power.
- No. 23. Lowest fuel and lubrication consumption.
- No. 24. Fuel consumption is in direct proportion to load, is automatic and always right.
- No. 25. No delays in starting—the St. Marys Diesel starts, on the oil on which the engine operates, from icy cold to full operation, instantly.

**St. Marys Diesel Oil Engines are Sold on the Following  
Fuel and Workmanship Guarantee**

**Fuel Guarantee**

*The St. Marys Diesel Oil Engine is guaranteed to operate on .45 of a pound of fuel oil per H. P. hour, providing the fuel possesses at least 19,000 B. T. U. per pound, flows freely past the needle valve and has a Baume gravity of 28° or better, and is free from all impurities, such as water, ashes, sand and grit.*

**Workmanship Guarantee**

*The workmanship and material used in all St. Marys Diesel Engines are guaranteed against imperfections for one year from the date of shipment.  
Any defective part will be replaced free of charge, providing the part is sent back to the factory with charges prepaid.*

**Economy Table**

COMPARISON OF COST ON BASIS OF 300 DAYS OF 10 HOURS EACH

Comparison given only for single cylinder units. To obtain cost for two or more cylinder units, multiply the cost of operating the single cylinder unit by the number of cylinders in the unit for which cost is desired.

ST. MARYS DIESEL OIL ENGINE						GASOLINE ENGINE			
Based on Fuel Consumption of .45 pound per H. P. hour for 20, 25, 30 and 35 H. P. cylinders; and .45 pound per H. P. hour for 40 and 60 H. P. cylinders. Oil weighing approximately 7.5 pounds per gallon.						Based on Fuel Consumption of 1 pound per H. P. hour Gasoline weighing 6.6 pounds per gallon.			
H. P.	Gallons per 3,000 Hours	\$0.03 per Gallon	\$0.05 per Gallon	\$0.07 per Gallon	\$0.09 per Gallon	Gallons per 3,000 Hours	\$0.20 per Gallon	\$0.25 per Gallon	\$0.33 per Gallon
20	3,990	\$119.70	\$199.50	\$279.30	\$359.10	9,090	\$1,818.00	\$2,272.50	\$2,999.70
25	4,998	149.94	249.90	349.86	449.82	11,361	2,272.20	2,840.25	3,749.63
30	6,000	180.00	300.00	420.00	540.00	13,635	2,727.00	3,408.75	4,499.55
35	6,999	209.97	349.95	489.93	629.91	15,909	3,181.80	3,977.25	5,249.97
40	7,200	216.00	360.00	504.00	648.00	18,000	3,600.00	4,500.00	5,940.00
60	10,800	324.00	540.00	756.00	972.00	29,700	5,940.00	7,425.00	9,801.00

GASOLINE—KEROSENE						ELECTRIC MOTOR			STEAM POWER				
Based on on One Gallon in Fifteen Gasoline for Starting and Manufacturing. Consumption per H. P. Hour: Gasoline 1 pound, Kerosene 1 pound.						Figuring Efficiency of Motor at 90%			Coal per ton of 2,000 pounds, 12 pounds per H. P. Hour. Cost figures include part-time Engineer-Fireman at \$3.00 per day. Basis, full load. For simple non-condensing engines of automatic cut-off or similar type. To obtain cost of operation with coal at any other price per ton, multiply the number of tons given in column by the price per ton, then add \$900.00 for Engineer-Fireman services.				
H. P.	G. \$0.20 per Gallon	K. \$0.08 per Gallon	G. \$0.25 per Gallon	K. \$0.10 per Gallon	G. \$0.33 per Gallon	K. \$0.14 per Gallon	\$0.02 per K.W.	\$0.04 per K.W.	\$0.06 per K.W.	Tons per 3,000 Hrs.	\$4.00 per Ton	\$6.00 per Ton	\$8.00 per Ton
20	\$ 799.92	\$ 998.90	\$1,387.74	\$ 994.80	\$1,989.60	\$2,984.40	360	\$2,340.00	\$3,060.00	\$3,780.00			
25	999.90	1,248.63	1,734.68	1,243.50	2,487.00	3,730.50	450	2,700.00	3,600.00	4,500.00			
30	1,199.88	1,498.35	2,081.61	1,492.20	2,984.40	4,476.60	540	3,060.00	4,140.00	5,220.00			
35	1,399.86	1,748.08	2,428.55	1,740.90	3,481.80	5,222.70	640	3,460.00	4,740.00	6,020.00			
40	1,599.84	1,997.80	2,775.48	1,989.60	3,979.20	5,968.80	720	3,780.00	5,220.00	6,660.00			
60	2,399.76	2,996.70	4,163.22	2,984.40	5,968.80	8,953.20	1,080	5,220.00	7,380.00	9,540.00			