

COURSE IN GAS ENGINEERING

This Course will consist of a series of practical talks on the theory and practice of the gas, gasoline and oil engine. They will be simple, illustrated where necessary, and of such a nature that the gas engine owner may easily adapt them to his daily engine work.

LESSON V.

The average person naturally understands nothing about electricity, and the only accessory about a gasoline engine in which he has no confidence is this particular part.

A wire, when charged with an electrical current contains a property adverse to the natural state of the wire when not electrified. When a wire has an electrical current flowing through it, magnetic lines of force surround it to a distance consistent to the strength of the current. If the wire is wound in a circular form, in layers, forming a coil, the magnetic lines of force are increased in strength, and if wound around a bar of soft iron an additional increase is gained.

If a bar of soft iron is wound with several turns of insulated (covered) copper wire, and a current of electricity passed through the wire, either from a dynamo or battery, the bar becomes saturated with a property called magnetism, and is capable of attracting particles of steel as long as the electricity flows through the wire, and ceases immediately when the wires are disengaged and the current flow stopped. When the bar of iron is magnetized, one end will attract steel while the other end will repel it.

Induction or jump spark coils and any electrically operated mechanism such as dynamos, etc., are based on the principles or phenomena of electro magnetism as above stated.

A permanent magnet is a piece of special steel, stored or saturated with magnetism for an indefinite time. It will perform the duties of an electro magnet in many instances. Permanent magnets are utilized for the construction of magnetos, and the magnetism contained in the metal lasts generally from 5 to 10 years, according to the grade and work the magneto performs.

In order to first saturate the steel with magnetism, it is necessary to lay it on a direct current dynamo or motor, or rub it on what was originally called a load stone (another permanent magnet). When the magnetism becomes weak the same method of charging is again repeated.

Electric current requires some standard of measurement, therefore it is expressed in volts and amperes. A volt is the unit of pressure or strain, and is similar to the pressure of steam in a boiler, or air in a tank expressed in pounds.

An ampere is the unit rate of flow or amount backing up the volt, and compares with the amount drained from the above referred to boiler or air tank. If a tank or boiler had 100 pounds pressure and discharged the whole contents at once the rate

of flow would correspond to the flow from a battery on short circuit, and to discharge at a low rate for a length of time, would correspond to the drain from a battery through a coil or otherwise.

The drop in pressure during this operation corresponds to the drop in volts when using a battery.

The necessary electric current to fire the charge in an oil engine is got from a battery, a magneto or a dynamo. Inside the cylinder, the current is either broken to get the spark, or is made to jump a small gap, called the spark gap, for the same purpose. Having done its duty in giving the spark, the current is "grounded" on the metal of the engine and, by a path provided, carried back to the place it came from.

There are two ways of firing the discharge by electricity,—make-and-break and jump-spark.

Assume a strong current of electricity running along a wire. Assume the wire broken in one place, with the broken ends touching. Separate the broken ends. As the ends come apart there is a spark, and the current is broken and stops. Bring the broken ends together again, and the current is made again. Bring the ends apart once more, and get a fresh spark. That is the make and break method at work.

Now hold the broken ends close together, but not touching. The force of the current makes it jump the interval or gap, and as it jumps, we get a spark, and this continues until we interrupt the current or circuit. That is the jump-spark.

All wires must be carefully insulated by being covered with some non-conducting material, like silk or rubber. This insulation is needed to prevent the current from escaping in any direction other than that in which it is meant to travel. If the insulation gets worn in any part along the wire, so that part is bared, and the bared part touches, or is near enough to, the engine metal, short circuiting happens. That is to say, the current escapes at the exposed part and hurries back to the place it came from without doing its work. Short circuiting, besides preventing ignition, is bad for batteries.

To get a spark by the make-and-break method, a dry cell battery is used. This battery consists of four or six cells. The cells are canister-shaped vessels of sheet zinc, covered outside with heavy paper for purposes of insulation. The vessels are filled with a paste made of powdered carbon and black oxide of manganese, moistened by some "exciting fluid," like sal-ammoniac, dissolved in water. A carbon pole stands up in the middle of each cell. A brass thumb screw,

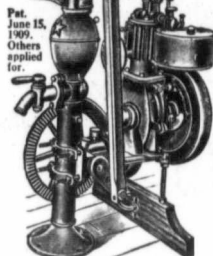
The Handiest Engine Ever Built!

Fits Any Pump

Portable Power for Running Pumps and All Kinds of Light Machinery. Veritable Wonder!

The Fuller & Johnson Farm Pump Engine meets the widespread demand for Portable Power for Farms at the lowest possible cost. It is absolutely unique in design—the handiest engine built.

It comes to the user complete in itself—"everything but the gasoline." Ready for action, anywhere! Requires no cement foundation—no anchor posts—no pump jack—no arms—no belts! Attaches to any regular Force Pump by means of four common nuts. Carries its own standard or base. Has a pulley for running light machinery. The cost for fuel seldom exceeds half a cent a day. No other engine at any price will give you such Power for less.



Dealers! Write for the Agency

Fuller & Johnson
Farm Pump Engine

The Perfect Air Cooled Engine

Here at last is an air-cooled engine without fans or cooling attachments! A revolution in this type of gasoline engines, as fully explained in our book. Cannot freeze or overheat! Made of the same high grade of materials and equal in quality of workmanship to the best automobile engines, by the Fuller & Johnson Mfg. Co., Madison, Wis., U. S. A.

Tremendous Pumping Capacity

The Farm Pump Engine will pump any ordinary well for as many hours per day as desired, at 35 strokes per minute, and on the ten-inch stroke, as follows:

Send Coupon or Postal for Catalog

We want every reader of this paper to know what a great little engine we have built. Our catalog—gladly sent free—tells the exact facts. Send for it at once. (10)

COUPON FOR CATALOG

Please send Catalog of Farm Pump Engine to address below:

(Name)

(Town)

(Province)

(Dealer's Name)

Depth to Water or actual Lift of Water	Diameter of Pump Cylinder	Water Pumped or Collected Per Hour
400 feet	2 1/2 inch	280 gallons
450 feet	2 1/2 inch	240 gallons
500 feet	2 1/2 inch	200 gallons
550 feet	2 1/2 inch	160 gallons
600 feet	2 1/2 inch	120 gallons
650 feet	2 1/2 inch	80 gallons
700 feet	2 1/2 inch	40 gallons

By using one of the shorter strokes you can pump a deeper well, or raise the water a greater distance, with a given size cylinder, than that in table above. By connecting on a piece of common pipe for extra air chamber, it will throw a stream as high as the house, giving valuable fire protection. It supplies power for running any machine that is ordinarily operated by hand-power. (4)

The Stewart-Nelson Co., Ltd.

Dept. 40,

Brandon, Man.



The MELOTTE

IS A

Cream Separator

the most perfect because the least complicated of any dairy machinery on the market. For this reason, it is most easily operated and is popularly known as the

"Easy Running Melotte"

The bowl of this machine is suspended by a steel spindle—ONE support only, only ONE point of friction and cannot get out of balance.

Send for Catalog B. (FREE) to the

Melotte Cream Separator Co.

WINNIPEG

CALGARY

Patronize Those Who

Patronize This Magazine