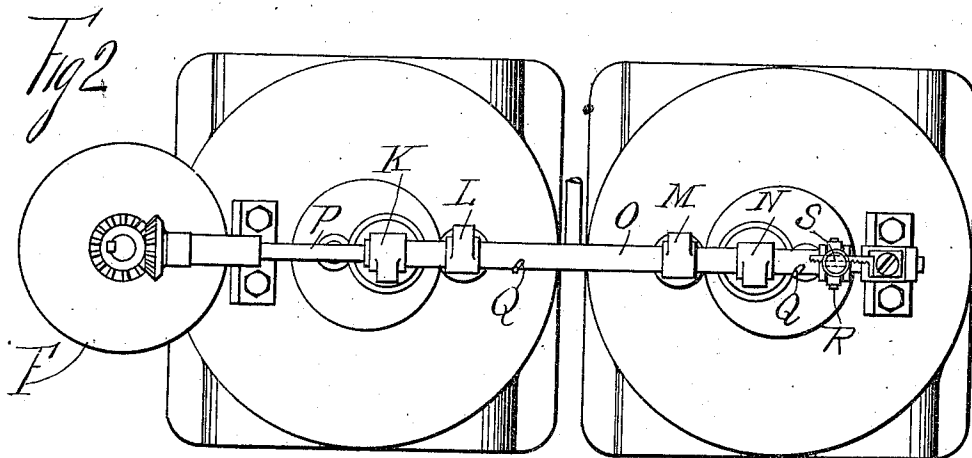
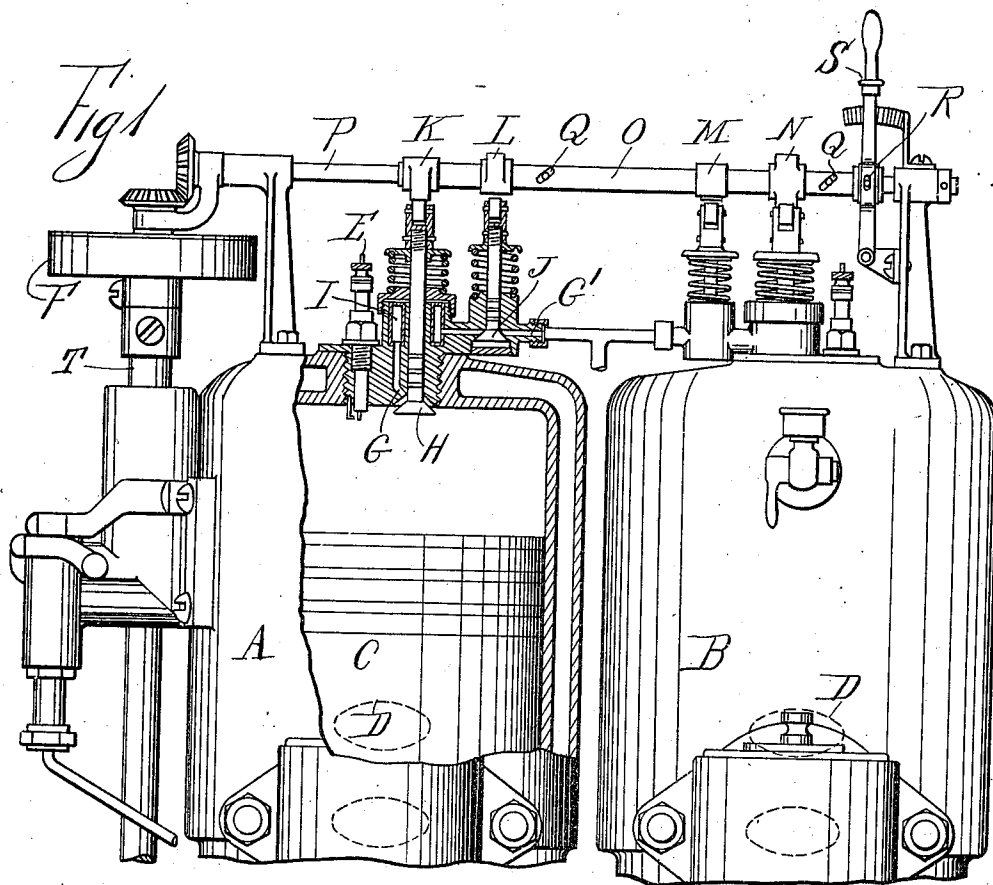


J. H. STRINGHAM.
METHOD OF IGNITION IN EXPLOSIVE ENGINES.
APPLICATION FILED JULY 29, 1910.

1,000,454.

Patented Aug. 15, 1911.



Witnesses:
German Gustow,
Kearney R. Wiley.

Inventor
John H. Stringham
By his Attorney *Sturges*

UNITED STATES PATENT OFFICE.

JOHN H. STRINGHAM, OF JERSEY CITY, NEW JERSEY.

METHOD OF IGNITION IN EXPLOSIVE-ENGINES.

1,000,454.

Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed July 29, 1910. Serial No. 574,436.

To all whom it may concern:

Be it known that I, JOHN H. STRINGHAM, a citizen of the United States, residing in Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Methods of Ignition in Explosive-Engines, of which the following is a specification.

My invention provides a new method for ignition in explosive engines. The difficulties connected with faulty ignition in such engines are well known and various different expedients have been suggested for securing satisfactory ignition. I have found that it is practicable to accomplish the object by making use of the products of combustion of one explosion in the cylinder to ignite the succeeding explosion therein by trapping a portion of such products and thereafter releasing them to ignite the next succeeding charge. According to my method, after the first explosion (which is ignited by the use of the usual spark plug or other convenient device) ignition is effected by the use of the combustion products. I have found my method to be remarkably efficient in practice and it does away with many of the difficulties now experienced and with many expensive devices now used.

In carrying out my method it is desirable to trap some of the combustion products at the time of the explosion when they are very hot and under high pressure, this pressure making the more certain their subsequent return to the cylinder to ignite the next charge (which will thus be under less pressure) and the heat—in practice the trapped products appear as flame—insuring the ignition. It is desirable, too, to provide an inclosed space of proper character to hold the trapped combustion products until they are released. Only a small amount need be trapped and the space may be constructed and arranged in various ways according to the particular circumstances under which the method is applied. I prefer to use a passage entering the cylinder and leading to a chamber from which another passage leads to the main exhaust or the outside air, as may be most convenient. Preferably, the passages and chamber are lined with a heat resisting material, such as asbestos, and cooling means, as a water jacket, may also be employed if desired. Any convenient means may be used for opening and closing the space within which the combustion products

are trapped. I have found that it is desirable to effect the opening and closing of the trap on the cylinder side by a valve at the entrance to the cylinder, this being preferable because it avoids any space or pocket in which gases or products of combustion might collect and produce premature explosion of the charge. All the other walls of the trap might be made solid, but it is decidedly better to have an opening therein in which a valve is seated in order to secure circulation through the trap and thus keep it properly clean and in the best working order. The means for opening and closing the trap may be of various kinds, an arrangement of cams connected with the shaft being very satisfactory because admitting of accurate timing. I find that particularly when the precautions thus indicated are observed the method is entirely reliable and ignition is effected more certainly and more economically than by any other method of which I am aware.

The method is applicable to all kinds of explosive engines, whatever the construction or number of cylinders, but for purposes of exposition I select and show in the accompanying drawing an illustrative application of the method to a two-cylinder engine of a usual type. It will be understood that the drawing is illustrative only and designed merely to make plain a preferred way of practicing my invention, which admits of wide variation without departing from its scope.

In the accompanying drawing, Figure 1 is an elevation, partly in section, of a two-cylinder engine with one form of mechanism which may be used in practicing the method shown, and Fig. 2 is a top view of the same.

A and B indicate the cylinders, C the piston, D the main exhaust, E the electric spark plug, and F an electric timer, which is shown to indicate how the invention may be applied without interfering with constructions now in use.

G indicates a passage entering the cylinder and opened and closed by the trapping valve H.

I indicates a chamber connected with the cylinder by the passage G.

G' indicates a passage connecting the chamber I with the main exhaust or outside air.

J indicates the valve located in the passage G'.

The trap shown in the drawing is accordingly made up of the chamber I and the passages G and G', which are closed respectively by the valves H and J.

5 K and L are cams mounted on the hollow cam-shaft O, the cams being so shaped and arranged on the shaft that the opening and closing of the valves are properly timed.

P is a cam-rod extending through the 10 cam-shaft O and adjustably connected therewith by the slots and pins Q, the eccentric R and the actuating mechanism S enabling the ignition to be advanced or retarded. The cam-rod P is operatively connected with the shaft T, which is connected 15 with the main shaft of the engine.

In this form of application of my method the first explosion is ignited by an electric spark from the spark plug E. At the time 20 the valve H is held open by the cam K until after the valve J has been opened by the cam L and shut by its spring, the opening of the valve J being merely for the purpose of permitting some circulation through the trap. 25 The trapping valve H is closed by its spring after the valve J has closed and just before the main exhaust valve opens. There are thus trapped hot combustion products of high temperature and high pressure which 30 are held in the trap provided until the next charge of gas is compressed and ready for ignition in the cylinder, when the valve H is opened by the cam K, the hot products of combustion ignite the charge in the cylinder, 35 and the operation is repeated. The drawing shows also a like trap and operating devices for the application of my method to the second cylinder, the two being so connected that the explosions are properly timed with 40 reference to each other, and it is obvious that the method may be applied to an engine having any number of cylinders.

It will be understood that various modifications may be made in the apparatus illustrated without departing from the scope of 45 my invention. The forms of explosive engines are numerous and in applying the method it will be desirable to adjust it to the particular engine and the particular purposes for which it is used.

I claim:—

1. A method of securing ignition in explosive engines comprising taking a portion 45 of the combustion products of an explosion,

holding them separated from the cylinder 55 during the compression of the next charge, and returning them to the cylinder to ignite said charge.

2. A method of securing ignition in explosive engines comprising taking a portion 60 of the combustion products from the cylinder before the opening of the main exhaust valve therein, holding the same under high pressure, and returning the same to the cylinder to ignite the succeeding charge.

3. A method of securing ignition in explosive engines comprising taking a portion 65 of the combustion products of the explosion while under high pressure, holding the same separated from the cylinder during the compression of the next charge, and returning the same to the cylinder to ignite said charge.

4. A method of securing ignition in explosive engines comprising taking a portion 75 of the combustion products of the explosion, holding the same in a receptacle, returning said products from the receptacle to the cylinder, passing a current of gas through the receptacle to cleanse the same, taking and 80 holding in the receptacle the combustion products of the succeeding explosion and returning them from the receptacle to the cylinder.

5. A method of securing ignition in explosive engines comprising taking a portion 85 of the combustion products of the explosion, before they are exhausted from the cylinder, holding the same separated from the cylinder during the compression of the next 90 charge, returning them to the cylinder to ignite said charge, passing a current of gas through the instrumentality used to hold said products apart from the cylinder to cleanse the same, taking a portion of the combustion 95 products of the explosion of said charge, holding the same separated from the cylinder during the compression of the next succeeding charge, and returning said products to the cylinder to ignite said succeeding 100 charge.

Signed at New York city, in the county of New York and State of New York, this 28th day of July, 1910.

JOHN H. STRINGHAM.

Witnesses:

HERMAN GUSTOW,
KATHRYN M. KILEY.