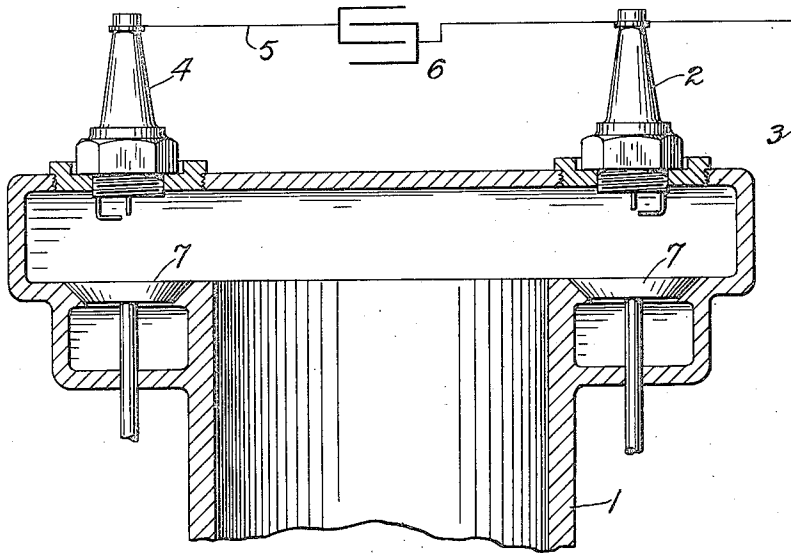


R. MILLER.
ELECTRIC IGNITION OF EXPLOSIVES.
APPLICATION FILED JAN. 21, 1916.

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Inventor
Robert Miller,
per Fred W. Wacker.
Atty.

UNITED STATES PATENT OFFICE.

ROBERT MILLER, OF NEW YORK, N. Y.

ELECTRIC IGNITION OF EXPLOSIVES.

1,235,993.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ROBERT MILLER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electric Ignition of Explosives, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to certain new and useful improvements in the electric ignition of explosives, such for example, as the explosive mixtures in internal combustion engines, blasting machines, and the like. In certain types of these various mechanisms it is extremely desirable for the most efficient results to ignite these explosive mixtures simultaneously at two or more places. The object of my invention, therefore, is to accomplish this result in a simple, effective, reliable, and inexpensive manner.

My device is intended for use with the usual means of producing a high tension spark, such for example, as an ordinary induction coil or magneto, and the usual spark plugs. The invention, therefore, comprises means for attaining the object in view, and particularly includes numerous details and peculiarities in the construction, arrangement, and combination of the various parts, substantially as will be hereinafter described and then more particularly pointed out in the claims.

In the accompanying drawing illustrating my invention, the single figure shown is a vertical section through the end of the cylinder of a gas engine equipped with my device.

1 denotes the cylinder of such an engine. In it the usual high tension spark plug 2 is inserted which may be of any desired kind. A high tension conductor 3 leads from the secondary circuit of a magneto or induction coil to the spark plug 2. 4 denotes a second or extra spark plug, which by means of a conductor 5 and a condenser 6 is placed in inductive relation to the spark plug 2. 7, 7 denote valves in the cylinder heads which may be arranged in any desired and ordinary way. The condenser 6 is preferably of the Leyden jar type. The operation of the whole device may be described as follows: When the high tension current from the secondary winding of the induction coil or magneto is sent into the conductor 3, it will, instead of jumping the

gap of the spark plug 2, immediately charge one side of the condenser 6. This charge in turn tends to induce a charge of opposite polarity on the other side of the condenser 6. When the electrostatic stress due to this action is high enough to break down the resistance of the air gap in plug 4, a spark passes at this gap as this surface becomes charged. The primary charge of the condenser having now reached a high potential, it discharges through the gap of plug 2. The induced charge in the condenser in turn discharges through plug 4 and equilibrium becomes established. This charging and discharging takes place with such enormous rapidity that ignition of the explosive mixture is effected at the two spark plugs gaps simultaneously.

Although I have shown these parts arranged in their relation to the cylinder of a gas engine, yet it should be understood that I have done this simply as a specimen illustration of one way of applying the invention for actual use and that I am by no means to be restricted thereto, but am at liberty to make all the changes necessary to adapt the improvements for use in other devices, and I, therefore, reserve the liberty of making such changes as experience may suggest to be necessary and for applying the invention for various purposes.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a system of spark ignition apparatus for firing a combustible mixture, the combination of a high tension conductor, a condenser charged thereby, and a plurality of ignition points within the combustible mixture, which points are operated by an induced charge.

2. In a device for electrically igniting explosive mixtures, condensing means charged by high tension current, sparking devices disposed within the mixture, which devices are operated simultaneously by the induced charge.

3. In the electric ignition of explosives, the combination of a high tension conductor, a condenser, one side of which is charged thereby, while the other side is in turn inductively charged, an ignition device operated by said induced charge, and another ignition device operated by the primary charge of the condenser.

4. In a system of spark ignition appa-

ratus for firing a combustible mixture, comprising in combination, a high tension circuit, sparking plugs disposed within the combustible mixture and in such high tension circuit, and condensing means placed
5 between said sparking plugs.

5. A system of spark ignition apparatus for firing a combustible mixture, comprising in combination, a high tension circuit, sparking
10 plugs disposed within the combustible mixture, one of which is in such high tension circuit, and condensing means placed between said sparking plugs.

6. The herein-described method of ignition at multiple points, consisting in charging
15 a condenser with a high tension current,

and passing current induced by said high tension current to a plurality of ignition devices within the combustible mixture in such a manner that the said devices may be operated by the induced charge. 20

7. The herein-described method of electrically igniting explosive mixture, which consists of charging a condenser with a high
25 tension current, disposing a plurality of sparking devices within the explosive mixture, and causing said devices to be operated simultaneously by the induced charge from the condenser.

In testimony whereof I affix my signature. 30

ROBERT MILLER.