A. C. MERTEN.

ELECTRIC IGNITER.

APPLICATION FILED FEB. 17, 1915.

1,177,718.

Patented Apr. 4, 1916.

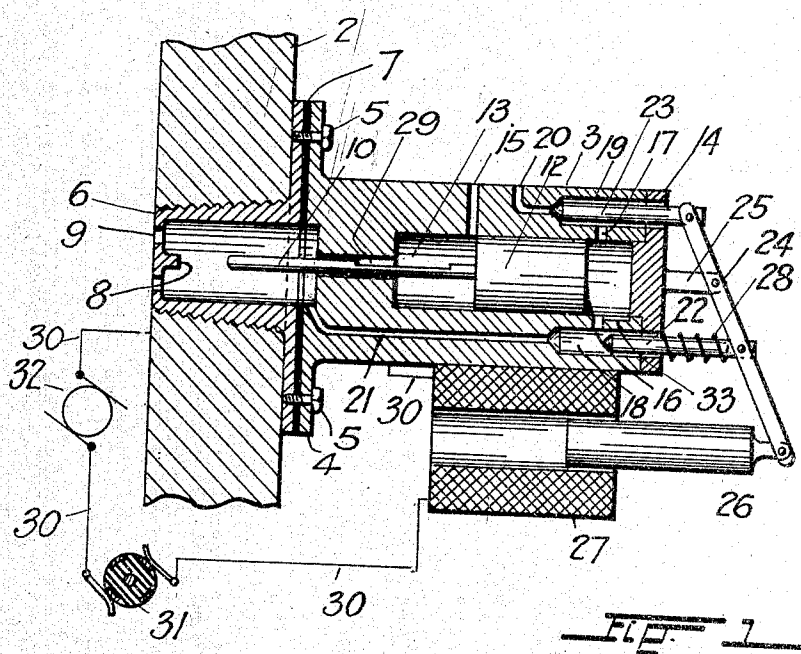


Fig. 1

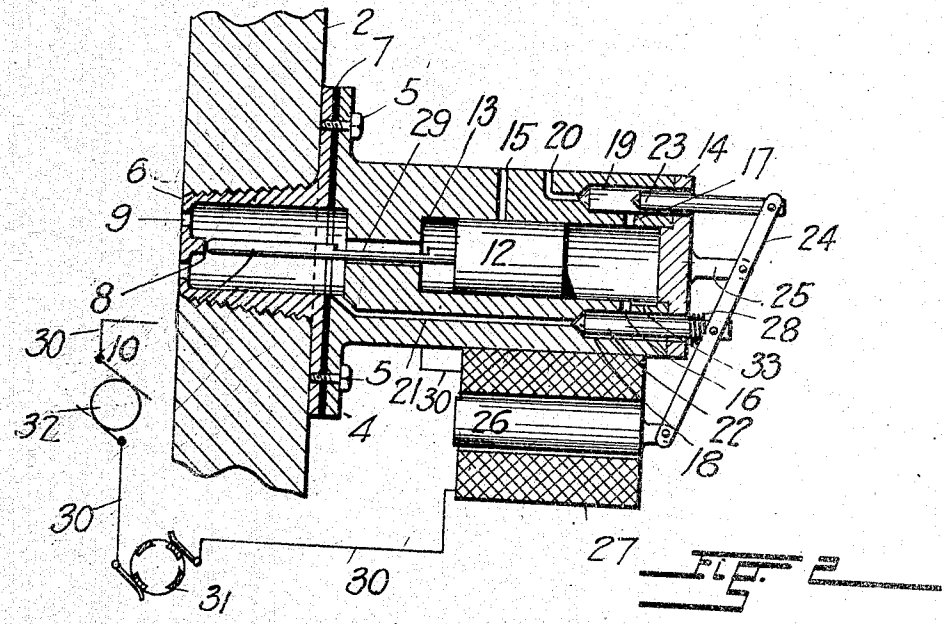


Fig. 2

WITNESSES:

J. H. Cuns

L. Rhoades

INVENTOR.

A. C. Merten.

BY

ATTORNEY.

UNITED STATES PATENT OFFICE.

ARTHUR C. MERTEN, OF WESTCLIFFE, COLORADO.

ELECTRIC IGNITER.

1,177,718. Specification of Letters Patent. Patented Apr. 4, 1916.

Application filed February 17, 1915. Serial No. 8,861.

To all whom it may concern:

Be it known that I, ARTHUR C. MERTEN, a citizen of the United States, residing at Westcliffe, in the county of Custer and State of Colorado, have invented certain new and useful Improvements in Electric Igniters, of which the following is a specification.

This invention relates to electric igniters for explosion engines, and more particularly to make-and-break igniters of the type in which the relative positions of the contact members or electrodes are controlled by the pressure exerted by the compressed charge in the cylinder of the explosion engine to which the device is attached.

It is the object of my invention to provide an igniter of the character described which is of simple and economical construction, and effective and reliable in operation.

A further object of my invention is to provide an igniter which is operable in connection with a direct current generator.

An embodiment of my invention is illustrated in the accompanying drawings in the various views of which like parts are similarly designated, and in which,

Figures 1 and 2 illustrate a longitudinal section taken through my improved igniter, the operative parts having been shown in Fig. 1 in the position they occupy when the electrodes are separated, and in Fig. 2 in the position to which one of them is moved by the pressure within a cylinder of an explosion engine to which the device is attached, to effect a conductive engagement of the electrodes.

Referring to the drawings by numerical reference characters, 2 designates a cylinder of an explosion engine which at one of its ends has an opening within which the igniter is secured. The igniter comprises a body member 3 on which its operative parts are assembled and which is preferably made of cylindrical form. The body has at one of its ends, an integral flange 4 to which is secured by means of bolts 5, a flanged member 6 formed to provide an exteriorly threaded plug which in practice is inserted into the coöperatively threaded opening of the cylinder. The two connected members are insulated from each other by means of a washer 7 of nonconductive material which is placed between their flanges. The member 6 is hollow and it has at its outer end an inwardly projecting lug 8 which serves as one of a pair of electrodes between which the spark is produced. The member has furthermore, at the same end, a plurality of openings 9 which are formed around its electrode to admit gases compressed in the cylinder to which the igniter is secured, into its interior. The opposite end of the member is open to admit the second electrode 10 which is movably mounted on the body member 3.

The electrode 10 consists of a rod slidably fitted in an axial bore of the body member and secured at its inner end to a piston 12 which is mounted for reciprocation in an axial chamber 13, which at the outer end of the body member is closed by means of a cap 14. The piston chamber communicates adjacent its forward end, with the atmosphere by means of a port 15, and it is connected adjacent its opposite end by means of ports 16 and 17 with two valve-chambers 18 and 19 formed in the wall of the body member at opposite sides of the piston chamber. The valve chamber 19 connects with the atmosphere by means of an outlet 20 for the exhaust of fluid from the piston chamber, and the other valve chamber 18 is by means of a passage 21 connected with the interior of the member 6 for the admission of gases to the piston chamber.

Fitted for sliding movement in the two valve chambers, are two plunger valves 22 and 23 which at their outer ends are pivotally connected with the arms of a lever 24 supported upon a central lug 25 on the cap 14. The lever connects at one of its extremities with the core 26 of a solenoid 27 which for convenience is secured exteriorly of the body member of the igniter. A spring 28 coiled around the valve 22 between the cap 14 and the lever 24 yieldingly maintains the parts in their normal position during the periods of deënergization of the solenoid.

The rod 10 which constitutes the moving electrode, has a flattened portion 29 which when in the operation of the igniter the electrode is moved in engagement with its stationary correlative, provides a passage in the bore in which the rod is slidably fitted for the connection of the interior of the member 6 with the space of the piston cham-

ber forward of the piston. The solenoid coil and the electrodes are connected in a circuit 30 which includes a timer 31 of suitable construction and a generator 32. It will be observed that by these electric means, the igniter can be operated from a direct current generator or batteries and I desire it understood that while by reason of the simplicity of its construction the solenoid shown in the drawings is preferable, an electro-magnetic appliance of different character may be employed with satisfactory results.

In the operation of my improved igniter, the parts normally occupy the position illustrated in Fig. 1, in which the piston is positioned between the port 15 and the two ports 16 and 17 which in consequence are all uncovered, the electrodes 8 and 10 are separated, the valve 23 closes the exhaust port 17, the admission port 16 is uncovered by the valve 22 and the solenoid 27 is deënergized. The parts are held in this position by the action of the spring 28 until the compression of the charge in the cylinder 2 causes a portion of the compressed gases to enter the part of the piston chamber behind the piston along a course which includes the openings 9, the interior of the member 6, the passage 21, the valve chamber 18 and the admission port 16. The piston is in consequence moved forwardly to the position shown in Fig. 2 in which it closes the air inlet port 15. The air which was previously admitted to the space of the piston chamber in front of the piston, is by movement of the latter compressed to return the piston to its original position when the charge of compressed gases at its opposite side is exhausted. This takes place when by energization of the solenoid through the medium of the constantly rotating timer 31, its core 26 is moved inwardly against the action of the spring 28 and the position of the two valves is in consequence reversed to respectively close the admission port 16 and open the exhaust port 17. The compressed air in front of the piston in co-action with the compressed gases admitted through the passage formed by the flattened portion 29 of the movable electrode, causes the piston to move rearwardly to its former position and at the same time separate the two electrodes which during the forward movement of the piston were brought in engagement. The separation of the electrodes produces a spark in the air gap between them, which ignites the charge in the cylinder 2. At the time the piston has returned to its normal position, the solenoid is again deënergized by action of the timer and the spring 28 returns the core and the valves to their original positions.

To prevent the piston from striking the head the exhaust port 17 is covered by the piston 12 on its return stroke before the completion of its stroke, thus maintaining sufficient exhaust to cushion the piston. A by-pass 33 is cut in the cylinder to permit the gas to get behind the piston when the port 16 is covered by the piston.

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

1. In an electric igniter, two electrodes mounted for communication with the interior of a cylinder of an explosion engine, a piston chamber normally communicating at one of its ends with said cylinder, a piston in the piston chamber, connected with one of said electrodes for moving the same toward the other electrode by fluid pressure in the said end of the chamber, and cooperative with the chamber for producing by its said movement, a counteracting pressure in the opposite end of the same, the said actuative electrode being adapted to establish communication between the cylinder and the opposite end of the piston chamber, when moved toward the other electrode, electro-magnetic means for releasing the piston from said fluid pressure whereby to separate the electrodes, and means in circuit with the said electro-magnetic means to intermittently energize the same.

2. In an electric igniter, a body adapted for attachment to a cylinder of an explosion engine, two electrodes mounted on said body for communication with the interior of a cylinder to which it is attached, said body having a piston chamber, a passage for connecting the same at one of its ends with the interior of the said cylinder, an exhaust-passage at the same end of the chamber, and a port for connecting the opposite end of the same with the atmosphere, a piston in the chamber, connected with one of said electrodes for moving the same toward the other electrode by fluid pressure and adapted to cover the last mentioned port during its said movement whereby to trap the air in the corresponding end of the chamber, valves controlling the flow of fluid through the said passages, and electro-magnetic means for the operation of said valves to alternately open and close the respective passages by intermittent energization.

3. In an electric igniter, a body adapted for attachment to a cylinder of an explosion engine, two electrodes mounted on said body for communication with the interior of a cylinder to which it is attached, said body having a piston chamber, a passage for connecting the same at one of its ends with the interior of the said cylinder, and an exhaust passage at the same end of the chamber, a piston in the chamber, connected with one of said electrodes for moving the same toward the other electrode by fluid pressure, means for providing a pressure

in the opposite end of the chamber, by the said movement of the piston, valves controlling the flow of fluid through the said passages, and electro-magnetic means for the operation of said valves to alternately open and close the respective passages by intermittent energization.

4. In an electric igniter, a body adapted for attachment to a cylinder of an explosion engine, two electrodes mounted on said body for communication with the interior of a cylinder to which it is attached, said body having a piston chamber, a passage for connecting the same at one of its ends with the interior of the said cylinder, and an exhaust port at the same end of the chamber, means for providing a pressure in the opposite end of the chamber by the said movement of the piston, a piston in the chamber, connected with one of the electrodes for moving the same toward the other electrode by fluid pressure, valves controlling the flow of fluid through the said passages, a lever operatively connected at opposite sides of its fulcrum with said valves, and electro-magnetic means for the operation of said lever.

5. In an electric igniter, a body adapted for attachment to a cylinder of an explosion engine, two electrodes mounted on said body for communication with the interior of a cylinder to which it is attached, said body having a piston chamber, a passage for connecting the same at one of its ends with the interior of the said cylinder, and an exhaust port at the same end of the chamber, means for providing a pressure in the opposite end of the chamber by the said movement of the piston, a piston in the chamber, connected with one of the electrodes for moving the same toward the other electrode by fluid pressure, valves controlling the flow of fluid through the said passages, a lever operatively connected at opposite sides of its fulcrum with said valves, and a solenoid the core of which is operatively connected with the said lever.

6. In an electric igniter, a body adapted for attachment to a cylinder of an explosion engine, two electrodes mounted on said body for communication with the interior of a cylinder to which it is attached, said body having a piston chamber, a passage for connecting the same at one of its ends with the interior of the said cylinder, and an exhaust port at the same end of the chamber, means for providing a pressure in the opposite end of the chamber by the said movement of the piston, a piston in the chamber, connected with one of the electrodes for moving the same toward the other electrode by fluid pressure, valves controlling the flow of fluid through the said passages, a spring-controlled lever operatively connected at opposite sides of its fulcrum with said valves, and electro-magnetic means for moving said lever against the action of its spring.

7. In an electric igniter, a body composed of two insulated parts, one of which is adapted for attachment to a cylinder of an explosion engine, and has interiorly an electrode, and means for placing the same in communication with the interior of a cylinder to which the body is attached, the other part having a piston chamber, a passage connecting the same at one of its ends with the interior of the other part, and an exhaust passage at the same end of the chamber, a second electrode, a piston in the chamber in connection with the said second electrode for moving the same toward the other electrode by fluid pressure, means for providing a pressure in the opposite end of the chamber by the said movement of the piston, valves controlling the flow of fluid through the said passages, and electro-magnetic means for the operation of said valves to alternately open and close the respective passages, by intermittent energization.

8. In an electric igniter, a body adapted for attachment to a cylinder of an explosion engine, two electrodes mounted on said body for communication with the interior of a cylinder to which it is attached, said body having a piston chamber, a passage for connecting the same at one of its ends with the interior of the said cylinder, a piston in the chamber connected with one of said electrodes for moving the same toward the other electrode by fluid pressure, means for providing a pressure in the opposite end of the chamber, by the said movement of the piston, and electro-magnetic means for effecting the escape of fluid from the first end of the chamber at determinate periods.

9. In an electric igniter, a body adapted for attachment to a cylinder of an explosion engine, two electrodes mounted on said body for communication with the interior of a cylinder to which it is attached, said body having a piston chamber, a passage for connecting the same at one of its ends with the interior of the said cylinder, a piston in the chamber connected with one of said electrodes for moving the same toward the other electrode by fluid pressure, means for providing a pressure in the opposite end of the chamber, by the said movement of the piston, and intermittently energized electro-magnetic means for effecting the escape of fluid from the first end of the chamber at determinate periods.

10. In an electric igniter, two electrodes mounted for communication with the interior of the cylinder of an explosion engine, means for moving one of said electrodes toward the other by fluid pressure in the cylinder, against a counteracting pressure, and electro-magnetic means for reducing

the said fluid pressure whereby to effect a return movement of the electrode by the said counteracting pressure.

11. In an electric igniter, two electrodes mounted for communication with the interior of the cylinder of an explosion engine, means for moving one of said electrodes toward the other by fluid pressure in the cylinder, against a counteracting pressure, electro-magnetic means for reducing the said fluid pressure whereby to effect a return movement of the electrode by the said counteracting pressure, and means in a circuit with the said electro-magnetic means to intermittently energize the same.

12. In an electric igniter, two electrodes mounted for communication with the interior of a cylinder of an explosion engine, a piston chamber communicating at one of its ends with said cylinder, a piston in said chamber connected with one of said electrodes for moving the same toward the other electrode by fluid pressure in the said end of the chamber, and coöperative with the chamber for producing by its said movement, a counteracting pressure in the opposite end of the same, and electro-magnetic means for reducing the said fluid pressure whereby to effect a return movement of the piston by the said counteracting pressure.

13. In an electric igniter, a body adapted for attachment to a cylinder of an explosion engine, two electrodes mounted on said body for communication with the interior of a cylinder to which it is attached, said body having a piston chamber, a passage for connecting the same at one of its ends with the interior of the said cylinder and an exhaust passage at the same end of the chamber, a piston in the chamber connected with one of said electrodes for moving the same toward the other electrode by fluid pressure in the said end of the chamber and coöperative with the chamber for producing by its said movement, a counteracting pressure in the opposite end of the same, valves controlling the flow of fluid through the said passages, and automatic means for the operation of said valves whereby to reduce the said fluid pressure and effect a return movement of the piston by the said counteracting pressure.

14. In an electric igniter, two electrodes mounted for communication with the interior of a cylinder of an explosion engine, a piston chamber communicating at one of its ends with said cylinder, a piston in said chamber connected with one of said electrodes for moving the same toward the other electrode by fluid pressure in the said end of the chamber, and coöperative with the chamber for producing by its said movement a counteracting pressure in the opposite end of the same, and automatic means free from connection with the movable electrode for reducing the said fluid pressure whereby to effect a return movement of the piston by the said counteracting pressure.

15. In an electric igniter, two electrodes mounted for communication with the interior of the cylinder of an explosion engine, means for moving one of said electrodes toward the other by fluid pressure in the cylinder, against a counteracting pressure, and automatic means separate from the cylinder and the movable electrode for reducing the said fluid pressure whereby to effect a return movement of the electrode by the said counteracting pressure.

In testimony whereof I have affixed my signature in presence of two witnesses.

ARTHUR C. MERTEN.

Witnesses:
H. T. FISCHER,
Q. W. HERRIATT.