

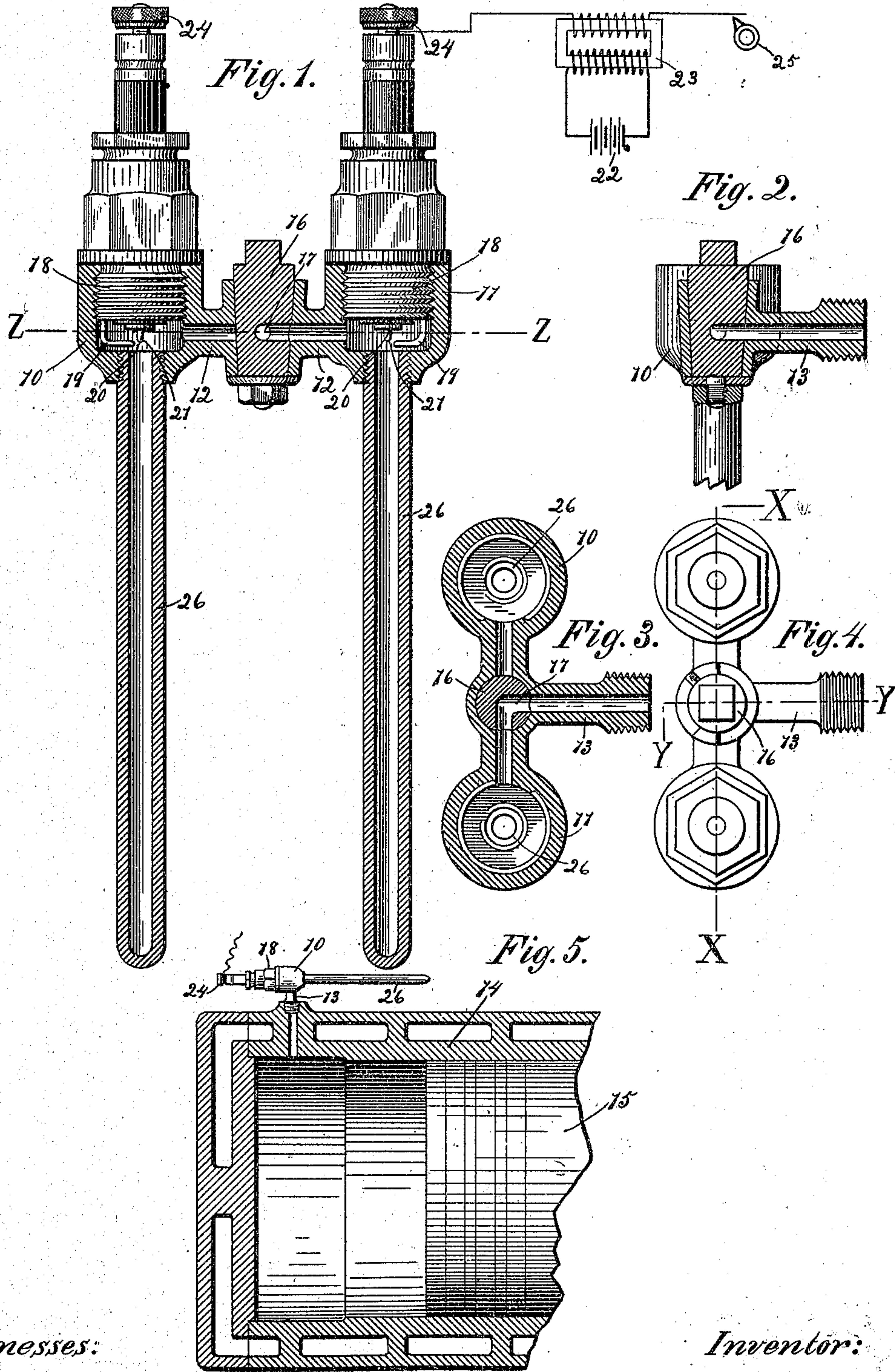
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W. H. COTTON,  
ELECTRICAL IGNITING APPARATUS.

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NO MODEL.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## ELECTRICAL IGNITING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 735,213, dated August 4, 1903.

Application filed February 28, 1902. Serial No. 96,108. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER H. COTTON, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Electrical Igniting Apparatus, of which the following is a specification and which are illustrated in the accompanying drawings, forming a part thereof.

This invention relates to an electrical igniting apparatus which is particularly adapted for use in connection with explosion-engines.

In the employment of the ordinary electric igniter difficulty is encountered by reason of the depositing of carbon, oil, or other foreign matter on the electrodes, that tends to interfere with the operation of the sparking device. This accumulation of foreign matter necessitates cleaning of the electrodes at frequent intervals to keep the points clean and effective, and whether the electrodes be removed for cleaning or the end attained in some other manner the stopping of the engine is in any event necessary.

One of the objects of my invention is to overcome this difficulty and to provide a device the parts of which shall be so arranged that the accumulating of carbon on the electrodes will be prevented and whereby they may always be kept clean and effective. Provision is also made for effectually dislodging the spent gases or products of combustion from the neighborhood of the electrodes, so that the explosive mixture of each compressed charge will be permitted a free circulation around the electrodes and a uniform and regular ignition insured.

The invention further contemplates an arrangement of two sets of sparking devices designed to be thrown alternately into service, so that in case of an accident to one pair of the electrodes or any of its parts the igniting device thereof may be thrown out of service and the other employed.

The invention comprises a pair of sparking chambers in each of which is located an igniting device, a connection between the sparking chambers and the cylinder of an explosion engine, a valve in the connection for opening communication with the chambers

from the cylinder in alternation, and an auxiliary gas-chamber for and communicating with each of the sparking chambers.

The invention consists of the arrangement and combination of parts as hereinafter fully described, particularly designated in the appended claims, and as illustrated in the accompanying drawings, in which—

Figure 1 is a sectional view substantially on the line X X of Fig. 4, some of the parts being shown in full lines and illustrating the two sparking plugs in position. Fig. 2 is a section on the line Y Y of Fig. 4. Fig. 3 is a section on the line Z Z of Fig. 1, the sparking electrodes being removed. Fig. 4 is a plan view of the apparatus complete, and Fig. 5 illustrates the apparatus as it appears in position on the cylinder of an explosion-engine.

Preferably I employ, as shown, two igniters, the sparking electrodes of each being located in cups 10 11, forming the sparking chambers therefor, which chambers are connected by a tube 12, communicating through a nipple 13 with the explosion-chamber of the engine, into the wall of which the nipple is designed to be screwed, as shown in Fig. 5, where 14 designates an explosion-engine cylinder and 15 the piston thereof. Located at the junction of the nipple 13 with the tube 12 is a valve 16, which is designed to open communication of the explosion-chamber with the sparking chambers 10 and 11 in alternation. The precise arrangement of the parts—that is to say, the sparking chambers 10 11, tube 12, nipple 13, and valve 16—is not material, and any construction whereby the ends sought may be attained will come within the scope of the invention. In the arrangement illustrated the chambers 10 and 11 are located at opposite ends of the tube 12, and the oscillating valve 16 is a three-way valve through the medium of which, as will be seen on reference to Fig. 3, the duct of the nipple 13, leading from the explosion-chamber of the engine, may be thrown at will into communication with either end of the passage in the tube 12, connecting the chambers 10 and 11.

Any suitable sparking devices may be employed, whether the electrodes thereof are both fixed or both movable or one fixed and the other movable, the invention not being



limited to any particular type. Those shown are of ordinary construction, and each consists of a plug 18, which carries a fixed electrode 19, and a stem 20, suitably secured within and insulated from the plug 18 and having fixed thereto the other electrode, 21, the chambers 10 11 being internally threaded to receive the plugs 18.

In Fig. 1 I have shown diagrammatically an electrical circuit and which comprises the battery 22, in circuit with the primary coil of a transformer 23, one terminal of the secondary coil thereof being designed to be secured by the thumb-nut 24 of either of the stems 20 and the other grounded in the engine through the medium of a circuit-breaker 25, which is so timed in its action as to induce a spark at the electrode with which the opposite terminal is in circuit just at the proper moment of compression of the charge in the cylinder. Any other arrangement of circuit and circuit-breaker may, of course, be employed.

Extending from and opening into each of the sparking chambers 10 11 and having its outer end closed is a tube 26 of any desired shape and suitable length. The object of this tube is to provide a chamber for the burned gases left in the sparking chamber and passage from the preceding explosion and which are forced into the tube of the chamber in communication with the engine-cylinder and away from the sparking points by the new charge of explosive mixture which is being compressed, so that the explosive mixture may freely circulate around the electrodes, thereby insuring the firing of the same when the spark leaps across from one point to the other. The sparking points are so disposed that they are in line with the passage in the tube 12.

It will be observed that the passage in the tube 12 is small relatively to the chambers 10 and 11. The purpose of this minute passage is to cause the exhausting burned gases and the portion of the new charge following the same to issue in the form of a small strong blast against the electrode-points, whereby the friction of the blasts against the electrodes will effectually clean them of any carbon or other foreign matter that may have adhered thereto and always maintain them in a bright condition.

By the employment of the two independent sparking devices it is possible to keep the engine running continuously under all circumstances, as only one is in service at a time. Should anything happen to that one, it is only necessary to turn the valve 16 so as to put the other chamber in communication with the cylinder and transfer the terminal of the circuit from the sparking device with which it is in connection to the other.

The device may be readily adapted to any engine, it being only necessary to provide a small threaded passage in the wall of the cylinder, into which the nipple 13 may be screwed.

In the operation of the device the gas is forced, when the piston is making its compressing stroke, through the nipple 13 and into the sparking chamber in communication with the engine-cylinder, the burned gases in the passages being driven into the end of the tube thereof and away from the said sparking chamber. At the proper moment the electrical circuit is closed and the compressed charge exploded by the spark generated in the sparking chamber and the expansion-cycle then takes place. On the return or exhaust stroke of the engine-piston the burned gases will exhaust from the device to the same pressure as the cylinder of the engine, leaving a certain quantity of incombustible gas in the passages of the igniter, and this will be forced back into the tube of the igniting-chamber in service on the next compression-cycle in the manner heretofore explained, permitting a free circulation of the newly-compressed charge about the sparking electrodes. The friction of the gases rushing in and out of the device prevents accumulation on the electrodes and keeps the electrodes bright and operatively effective.

I claim as my invention—

1. In an igniting apparatus for explosive-engines, in combination, an explosion-chamber, a pair of sparking chambers, electrodes in each chamber, a tube connecting the sparking chambers, a nipple providing communication between the tube and the explosion-chamber, a valve for opening communication between the explosion and the sparking chambers in alternation, and means for creating a spark at the electrodes in the chamber in communication with the explosion-chamber.

2. In an igniting apparatus for explosive-engines, in combination, an explosion-chamber, a pair of sparking chambers, electrodes in each chamber, a tube between the chambers and the passage of which is in line with the electrodes, a nipple extending from the tube and adapted to be fixed in the wall of the explosion-chamber, a three-way valve at the junction of the tube and the nipple designed to connect the passage of the nipple with the passage at either end of the tube, a tube extending from each sparking chamber, and means for creating a spark at the electrodes in the chamber in communication with the explosion-chamber.

3. As an article of manufacture, a pair of sparking chambers, electrodes in each chamber, a tube connecting the sparking chambers, a nipple extending from the tube and for securing the same in the wall of an explosive-engine cylinder, and a valve located in the tube and for throwing the sparking chambers into communication with the nipple in alternation.

4. As an article of manufacture, a pair of cups, a plug removably secured in each cup and provided with sparking electrodes, a tube connecting the cups and having a contracted passage in line with the electrodes of each



plug, a nipple extending from the tube for securing the device in the wall of an explosive-engine cylinder, an elongated tube opening into each cup and closed at its outer end, and a valve in the connecting-tube for throwing the sparking chambers into communication with the explosion-chamber in alternation.

5. In an igniting device for explosive-engines, in combination, an explosion-chamber, a pair of sparking chambers, a pair of electrodes in each chamber, means for producing a spark at each pair of electrodes, a tube connecting the sparking chambers and having a contracted passage in line with the said pairs of electrodes whereby a blast is projected against the electrodes, connection between the tube and the explosion-chamber, and a valve in the tube for throwing the sparking chambers into communication with the explosion-chamber in alternation.

6. In an igniting device for explosive-engines, in combination, an explosion-chamber,

a pair of cups, a plug removably secured in each cup and provided with sparking electrodes, an electric circuit adapted to be connected up with the electrodes of either of said plugs, a tube connecting the cups, connection between the tube and the explosion-chamber, an elongated tube opening into each cup and closed at its outer end, and a valve in the tube for throwing the sparking chambers into communication with the explosion-chamber in alternation.

7. As an article of manufacture, a cup, a plug removably secured in the cup and provided with sparking electrodes, a tube opening into the cup and having a contracted passage in line with the electrodes and adapted to be attached in the wall of an explosive-engine cylinder, and an auxiliary chamber opening into the cup and closed at its outer end.

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