

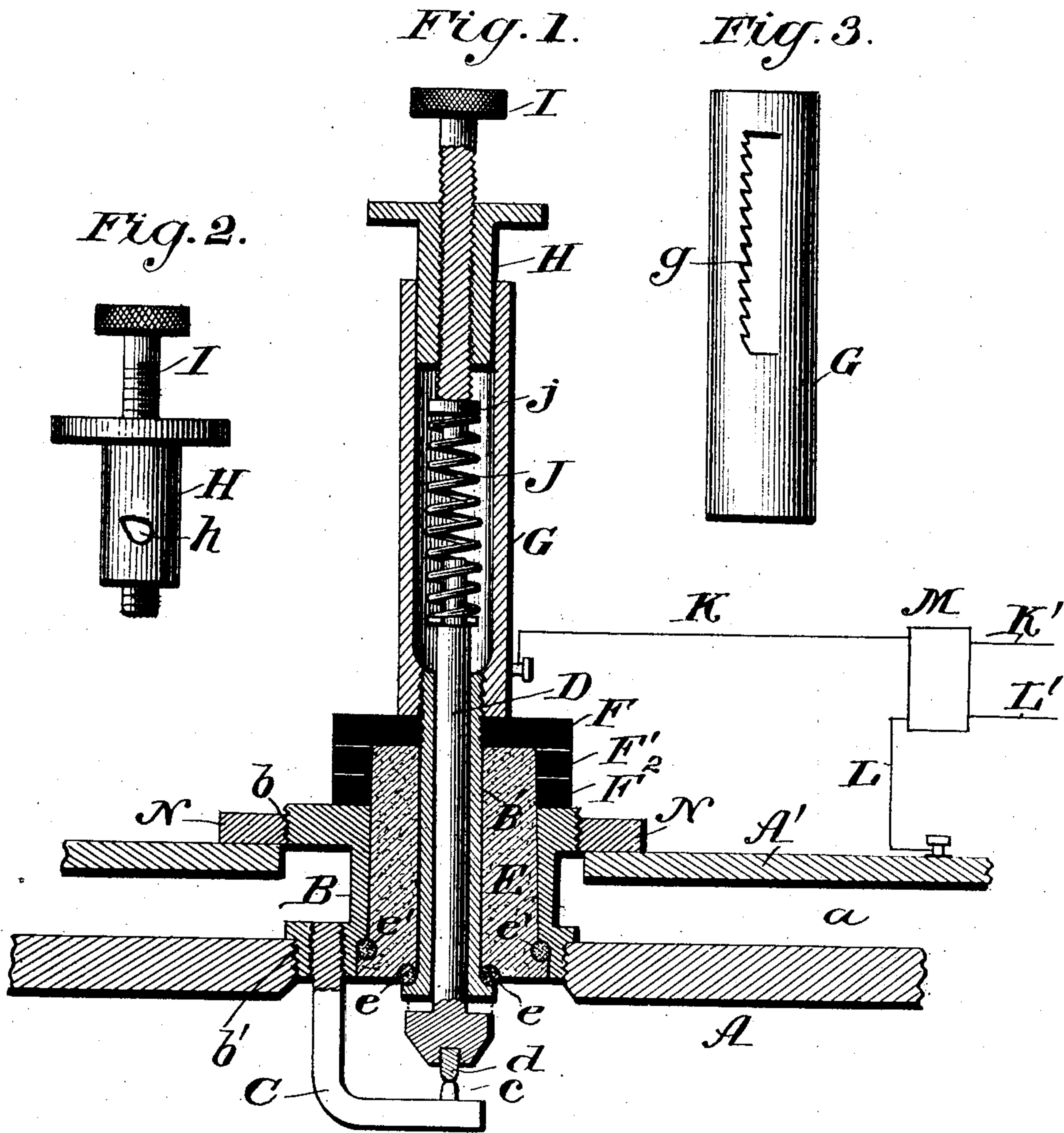
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E. FORD.
ELECTRIC IGNITER FOR GAS ENGINES.

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NO MODEL.



WITNESSES:
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ELECTRIC IGNITER FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 764,998, dated July 12, 1904.

Application filed October 15, 1903. Serial No. 177,146. (No model.)

To all whom it may concern:

Be it known that I, EDGAR FORD, a citizen of the United States, residing at Wilmington, in the county of Newcastle and State of Delaware, have made certain new and useful Improvements in Electric Igniters for Gas-Engines, of which the following is a specification.

My invention is in the nature of an electric igniter for gas and gasoline engines. It belongs to the class known as the "jump-spark" igniter and is automatic in its action.

It consists in means whereby the electrodes are held in contact by a spring and are separated by the direct pneumatic pressure of the gases when they reach a certain degree of compression preparatory to explosion, as will be hereinafter fully described with reference to the drawings, in which—

Figure 1 is a sectional elevation through the igniter as applied to the cylinder-head. Fig. 2 is a detail side view of the adjusting-screw and its carrying-sleeve, and Fig. 3 is a detail view of the barrel which receives the adjusting-screw and its carrying-sleeve.

In the drawings, A represents the cylinder-head, and A' the outer casing, between which and the cylinder is formed the usual water-jacket space *a*.

B is a hollow hub having exteriorly-screwed flanges *b* and *b'*. Of these flange *b'* screws into an opening in the cylinder-head and *b* receives a jam-nut N to bear on the casing A' and make a tight joint for the water-jacket.

Within the hub B is a non-conducting porcelain plug E, arranged eccentrically in the hub and having a fixed metal sleeve B' in its center. This sleeve has a flange at its lower end outside the porcelain plug and within the explosion-chamber, and between this flange and the porcelain plug is a tight packing *e*, of asbestos. A similar packing *e'* is arranged between the porcelain plug and the flange *b'* of the hub. These packing-rings make tight joints for the explosion-chamber.

Within the sleeve B' there slides a closely-fitting steel rod D, arranged to move freely up and down in the sleeve B' and having at its lower end within the explosion-chamber an enlarged head bearing a platinum pin *d*, forming

the movable electrode. Immediately below this platinum pin is another one, *c*, carried on the upper surface of a bent steel arm C, secured to the flange *b'* on the thicker side of the hub B and projecting within the explosion-chamber. This bent arm, with its platinum pin, forms the stationary electrode, between which and the movable electrode above the jump-spark is formed whenever the upper electrode is separated from the lower one.

The upper end of the sleeve B' is secured by an external screw-thread to a non-conducting and insulating plate F, and between which and the flange *b* of the hub is other insulation in the form of washers F' F², of hard rubber or vulcanized fiber.

Upon the non-conducting plate F and screwed upon the upper end of the sleeve B' is a vertical barrel G, containing a helical spring J, which at its lower end embraces and bears upon the upper end of the sliding electrode D and at its upper end carries a screw-seat *j*, upon which bears an adjusting-screw I, tapped in a movable flanged sleeve H. This sleeve is removably located in the upper end of the barrel G and is quickly locked therein at any suitable height by a chisel-edged detent *h* on the exterior of sleeve H (see Fig. 2) and a slot in the side of barrel G, having on its side downwardly-pointing ratchet-teeth *g*, (see Fig. 3,) any one of which teeth is adapted to be caught by the detent to hold the sleeve down to the position to which it may be set. This means of adjustment permits the sleeve H and adjusting-screw I to be quickly fixed in or removed from the upper end of the barrel, the detent *h* being thrown into or out of engagement with the ratchet-teeth *g* of the slot by a slight rotary movement of the sleeve H about its vertical longitudinal axis. When the screw I is thus held above the spring J, the tension of the latter and its pressure on the movable electrode may be nicely adjusted by turning the screw I up or down within its carrying-sleeve H.

K is one of the secondary wires from the spark-coil M. This wire connects with the insulated barrel G and is therefore in exclu-

sive electrical connection with the movable electrode D. L is the other secondary wire from the spark-coil M, and this is connected to the metal casing A', and consequently to the hub B and arm C, carrying the lower stationary electrode.

The operation of my igniter is as follows: The hub and plug, as shown, are seated in the cylinder-head; but they may be located anywhere so long as the electrodes are in the explosion-chamber. Normally the electrodes are held closed by the tension of the spring J, and the secondary circuit is completed from the spark-coil. When, however, the piston of the engine compresses the charge of gas and air and the pressure is reached at which the electrodes open, the pneumatic pressure of the compressed gases acts on the movable electrode D as a piston and raising it against the spring separates its point *d* from *c* and gives the spark just at the moment of complete compression, the degree of compression at which the electrode moves being regulated by the adjusting-screw I, which is made to increase or diminish the tension of the spring J at the pleasure of the operator.

In defining my invention with greater clearness I would state that I am aware that the movable electrode of a gas-engine igniter has been operated in one direction by a spring and in the other direction by the pneumatic pressure of the compressed gases; but in such case the electrodes were normally out of contact and were brought into contact by the compression of the gases and were opened by the spring only when the piston moved back after maximum compression. In such case the spark is not given at the time of maximum compression.

I am also aware that the movable electrode of a gas-engine igniter has been worked in both directions by the pneumatic pressure of the compressed gases—*i. e.*, the direct pressure closed the electrodes and when the piston arrived at a certain point in compressing the gases a passage-way was opened through an extraneous pipe to the opposite side of the electrode to cause it to move away from the stationary electrode. The skin friction and choked passage-way of this extraneous tube cannot allow a sensitive transfer of the pressure of the gases to the opposite side of the electrode. I therefore make no claim, broadly, to operating the movable electrode pneumatically nor to either of the constructions described. In my invention the movable electrode is separated from the stationary one by the direct pressure of the gases in the explosion-chamber itself, and consequently the spark occurs at the moment of maximum compression in a very certain, positive, and sensitive way.

It will be seen that by locating the porcelain plug E eccentrically within the metal hub B one side of the hub is left thicker than the

other, so as to give room for the attachment of the arm carrying the stationary electrode. This allows a minimum size of hub B to be used, and yet permits the hub, with its plug and both electrodes, to come within the limits of the screw-threaded hole in the cylinder-head and be together applied and removed as a unit.

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

1. An electric igniter for explosive-engines, comprising two electrodes insulated from each other except at the point of contact, a spring for normally holding them together at this point of contact, one of said electrodes being constructed and arranged to be exposed to the direct pneumatic pressure of the compressed gases, so as to be actuated thereby to break contact and give the jump-spark at the moment of greatest compression, substantially as described.

2. An electric igniter for explosive-engines, comprising two electrodes insulated from each other except at the point of contact, a spring for holding them together at this point of contact, one of said electrodes being constructed and arranged to be exposed to the direct pneumatic pressure of the compressed gases, so as to be actuated thereby to break contact at the moment of greatest compression, and means for adjusting the tension of the spring to regulate the pressure at which the electrodes separate, substantially as described.

3. An electric igniter for explosive-engines, comprising two electrodes insulated from each other, except at the point of contact, a spring for holding them together at this point of contact, one of said electrodes being constructed and arranged to be exposed to the direct pneumatic pressure of the compressed gases so as to be actuated thereby to break contact, a set-screw for regulating the tension of the spring, a sleeve for the set-screw, and a barrel inclosing the spring and screw-sleeve and having an interlocking connection with said sleeve.

4. An igniter for explosive-engines, comprising an externally-screw-threaded hub having a non-conducting plug located eccentrically therein, a metal sleeve arranged in said plug, a sliding electrode arranged within the sleeve, and an arm fixed to the thicker side of the inner end of the hub and carrying a fixed electrode in range of contact with the sliding electrode substantially as shown and described.

5. In an igniter for explosive-engines, the combination with the movable electrode and the spring bearing against the same; of an inclosing barrel having a slot in its side with locking-teeth along its edge, a removable sleeve fitting in the barrel and having a locking-detent and a set-screw tapped in the sleeve to adjust the tension of the spring, substantially as shown and described.

6. In an igniter for explosive-engines, the
combination with the movable electrode, its
spring and containing barrel; of an adjusting-
screw and a carrier-sleeve for the screw hav-
5 ing a quick-locking connection with the bar-
rel, whereby the screw is at once adjusted to
bear on its spring and the tension of the lat-

ter is subsequently regulated, substantially as
described.

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