No. 648,122. Patented Apr. 24, 1900.

W. F. DAVIS.

ELECTRIC IGNITER FOR EXPLOSIVE ENGINES.

(Application filed May 22, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

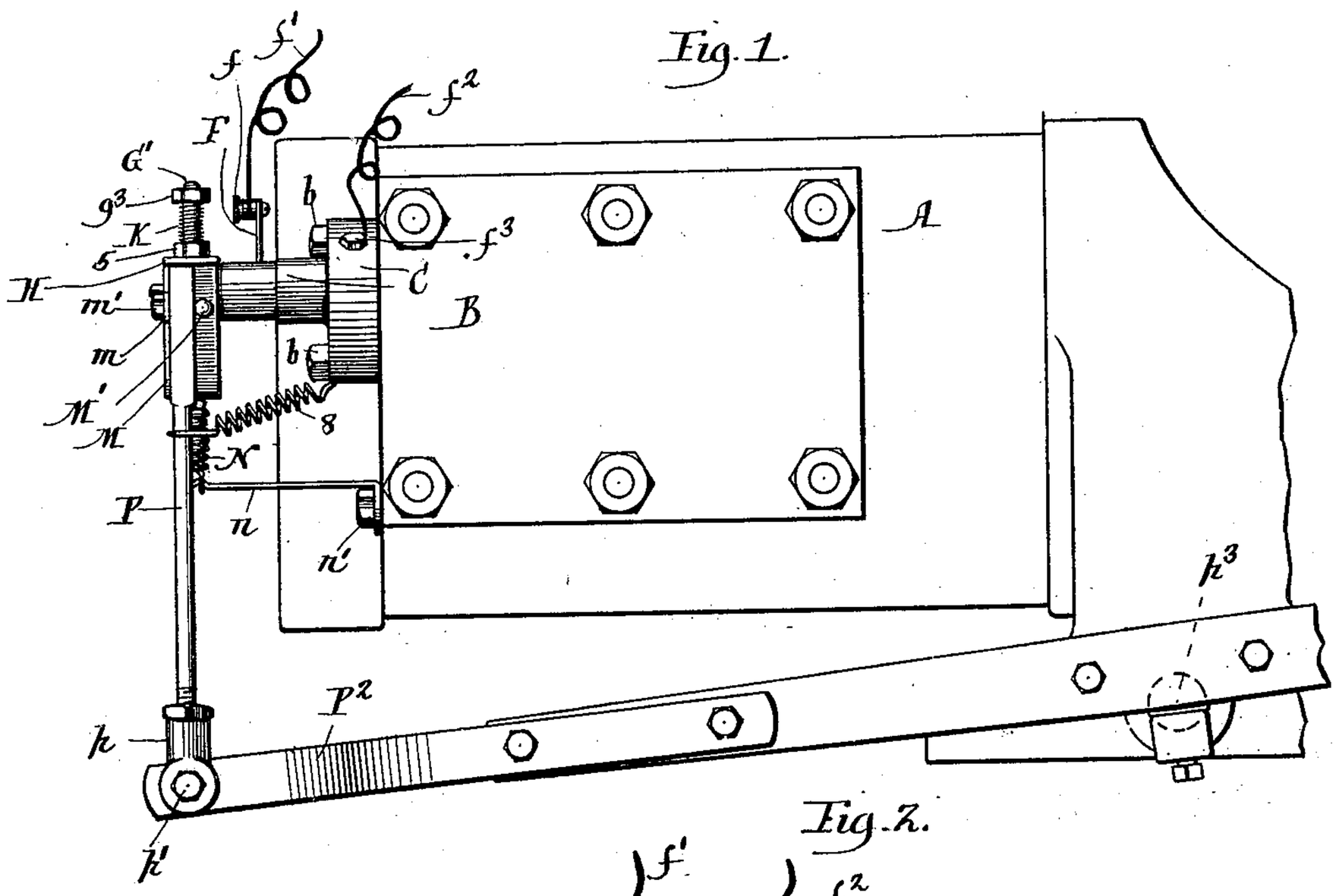

Fig. 2.

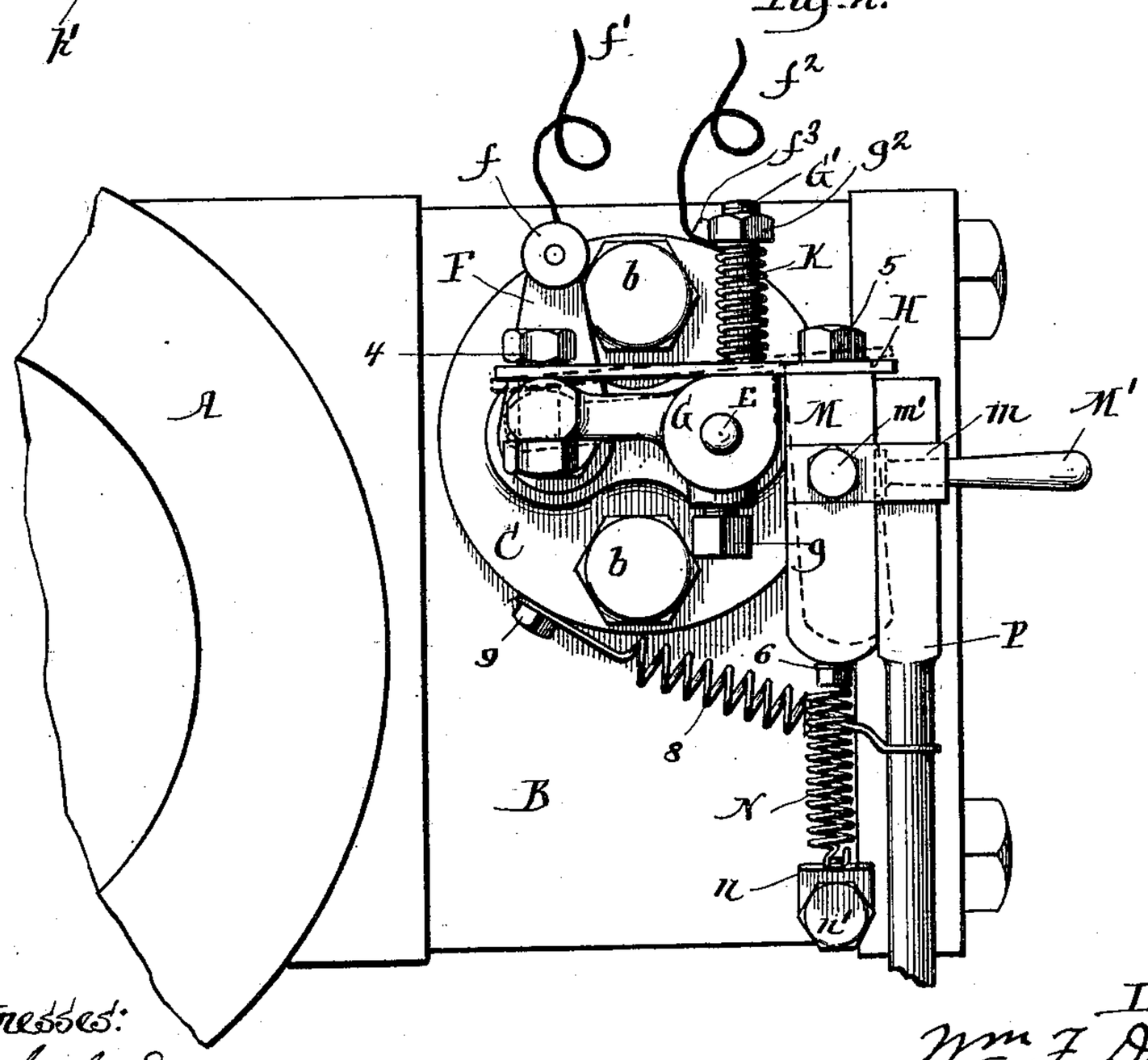

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Fig. 3.

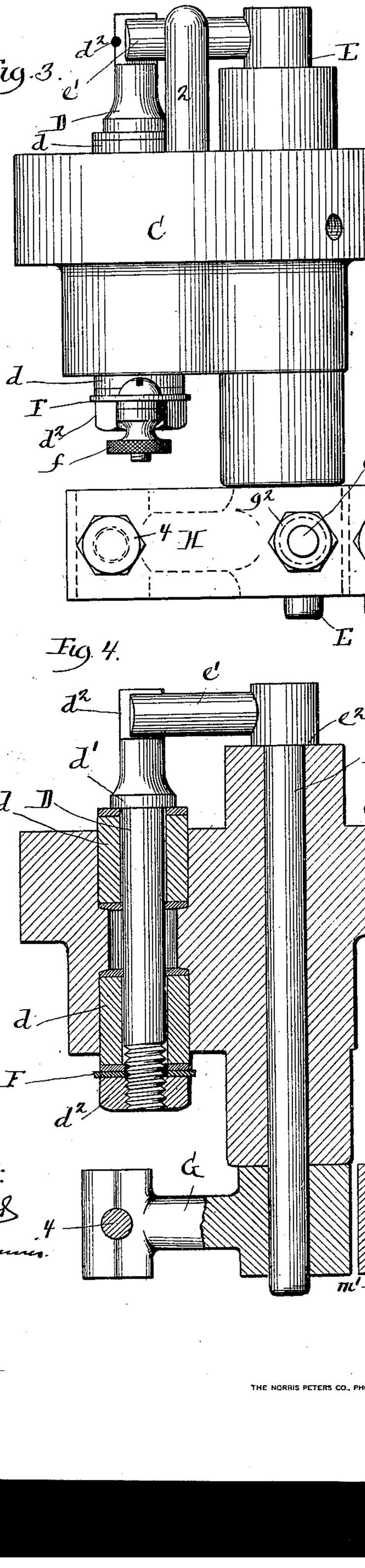
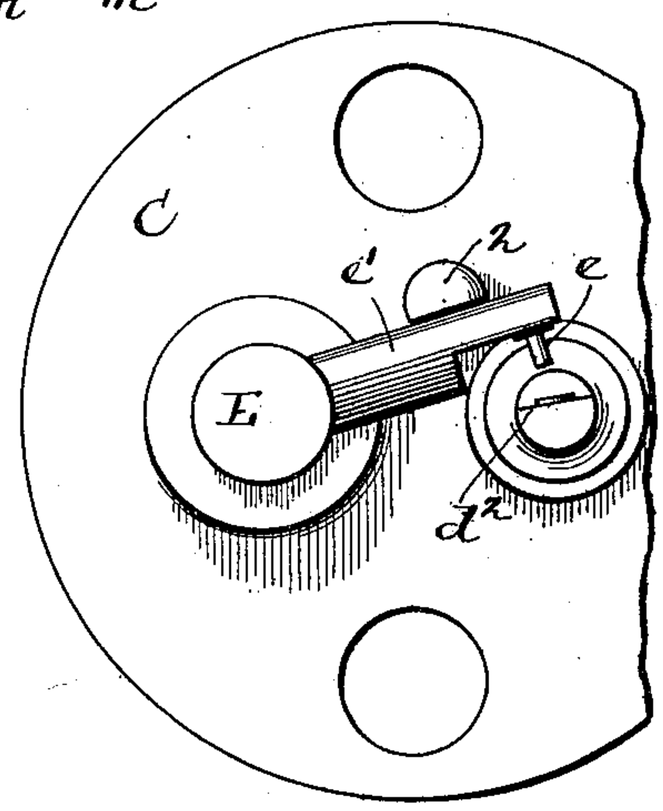


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM F. DAVIS, OF WATERLOO, IOWA, ASSIGNOR TO THE DAVIS GASOLINE ENGINE WORKS COMPANY, OF SAME PLACE.

ELECTRIC IGNITER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 648,122, dated April 24, 1900.

Application filed May 22, 1899. Serial No. 717,688. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. DAVIS, a resident of Waterloo, in the county of Black Hawk, State of Iowa, have invented certain new and useful Improvements in Electric Igniters for Explosive-Engines, of which the following is a full, clear, and exact description.

The invention has for its object to provide a simple and effective construction of igniter, the novel features of which are hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the claims at the end of this specification.

Figure 1 is a view in side elevation of a portion of a gas-engine having my invention applied thereto. Fig. 2 is a view in front elevation. Fig. 3 is an enlarged plan view of the igniter detached. Fig. 4 is a view in horizontal section through the electrodes of the igniter and adjacent parts. Fig. 5 is an elevation of the inner side of the igniter-body and electrodes.

The invention is shown in the accompanying drawings as applied to an engine commonly known to the trade as the "Davis horizontal engine;" but it will be readily understood that the invention is applicable also to other types of gas-engines, either vertical or horizontal.

A designates the cylinder of the engine, and B denotes the valve-casing at one side thereof. To the end of the valve-casing B is attached by suitable through-bolts *b* the body C of the igniter, this body C being formed with perforations through which pass the electrodes D and E. The electrode D is insulated from the body A by suitable insulating material *d*, and at its inner end is preferably formed with a shoulder *d'* and at its outer end with a threaded portion to receive a nut d^2, the shoulder and nut serving by means of suitable washers to securely retain the insulating material in place. The outer end of the fixed electrode D passes through a copper pole-plate F, that is furnished with a binding-screw *f*, having connected thereto one of the electric wires *f'* of the circuit. The opposite wire f^2 of this circuit is shown as connected at f^3 to the body of the igniter. The inner end of the electrode D is shown as cut away, as at d^2, and with this cut-away part (which may be furnished with a contact-piece of suitable material) will contact the corresponding contact-point *e* of the movable electrode E.

As shown, the inner end of the movable electrode E has an angular arm *e'* attached thereto, so that as the electrode E is oscillated its contact-point *e* can be brought to bear against the contact-point of the fixed electrode D. The inner end of the electrode E is furnished with a shoulder e^2, that bears against the body C, so as to securely retain the electrode in place and guard against danger of leakage. An arm or stud 2 is shown as projecting inwardly from the body C and above the arm *e'* of the movable electrode, this arm or stud 2 serving to limit the oscillation of the movable electrode-arm *e'*.

To the outer end of the movable electrode E a shifting arm G is connected by means of a set-screw *g*, the arm G extending at an angle to the electrode E and having hinged thereto a trip-plate H. Preferably the hinge connection between the trip-plate H and the arm G is effected by a through-bolt 4, that passes through a hole in the outer end of the arm G and through a hole in the trip-plate of somewhat-larger diameter than the body of the bolt 4, so as to permit the bolt to turn with respect to the plate H. By reference to Fig. 2 it will be seen that the space between the head of the bolt 4 and the arm G is sufficient to allow the turning of the trip-plate, as indicated by dotted lines in Fig. 2.

From the arm G rises a stud G', the upper threaded end of which is provided with an adjusting-nut g^2, and between this nut g^2 and the trip-plate H is placed the coil-spring K, that serves to normally hold the trip-plate against the arm G. To the outer end of the trip-plate H is connected, as by a screw 5, a depending block M, that is provided at one side with a guide-plate *m*, preferably connected to the block by a screw *m'*, and the block M is furnished with a handle M', whereby the igniter may be operated by hand, as will presently more fully appear. To the block M is attached, by means of a screw 6,

one end of a coil-spring N, the opposite end of this spring being connected to a bracket-arm n, that is fastened, as at n', to the casing B. The coil-spring N serves to draw downward on the block M and to normally hold the movable electrode so that its contact-point shall be separate from the contact-point of the fixed electrode.

By reference more particularly to Figs. 1 and 2 it will be seen that one end of the trip-plate H projects beyond the block M, and with this projecting end will engage the upper end of a trip-rod P, that is held in bearing with the block M by means of a coil-spring 8, one end of which is shown as connected to the rod P, while its opposite end is shown as attached, as at 9, to the body C of the igniter. The lower end of the rod P is threaded and is adjustably connected to a threaded sleeve p, that is pivotally joined, as at p', to the outer end of a rocking lever P^2. The rocking lever P^2 is pivotally mounted, as at p^3, and at its inner end may carry a roller adapted to be driven by a cam or other movable part of the engine. Any convenient means, however, can be employed for imparting a vertical movement to the trip-rod P.

From the foregoing description it will be seen that when the parts are in normal position the contact-points of the electrodes will be separated, the coil-spring N and the weight of the block M serving to hold the parts in such position. As soon, however, as the lever P^2 is oscillated the trip-rod P will be raised, and inasmuch as the upper end of this rod engages the end of the trip-plate H the trip-plate will be lifted against the force of the coil-spring K. As the trip-plate is thus lifted it will cause the arm G to rock the movable electrode E until the contact-point e of this electrode is brought to bear against the contact-surface d^2 of the fixed electrode D; but during the continued upward movement of the trip-rod P, which is permitted by the compression of the coil-spring K, the lower end of the block M will force outward the upper end of the trip-rod P, as indicated by dotted lines in Fig. 2, until the end of the trip-rod passes from engagement with the end of the trip-plate H. The coil-springs K and N and the weight of the block M will then instantly restore the parts to the normal position, (seen by full lines in the drawings,) thereby breaking the contact between the electrodes. When in the movement of the engine the trip-rod P is brought to its lowest position, its upper end will again engage the outer end of the trip-plate H in readiness to effect a further shift or the movement of the electrode.

By lengthening and shortening the trip-rod P the time of the ignition may be exactly adjusted, it being understood, however, that the rocking lever P^2 will be first properly timed with respect to the movement of the engine parts. By shifting the position of the arm G upon the movable electrode E (which can be readily accomplished by the set-screw g) the time during which the contact-points of the igniter are held together may be varied as desired. By this means the time of holding the contact-points of the electrodes may be made so short that the use of a switch outside of the igniter is not required. The handle M' serves as a means whereby the igniter may be tripped by hand to get the first explosion when starting the engine, it being understood that the subsequent tripping or actuations of the movable electrode will be automatic. The contact-points of the electrodes will be held apart until immediately before the trip takes place.

I believe that my present invention possesses various advantages over prior igniters. The adjustment of the trip-rod P may be readily effected even during the running of the engine, and the entire igniter mechanism may be quickly and readily removed for inspection, repairs, or cleaning without disturbing the relations of other parts of the engine.

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 suitable electrodes, one of which is movable and is provided at its inner end with an arm carrying a contact-point, an arm connected to the outer end of said movable electrode, a trip-plate connected to said outer arm, a block connected to said trip-plate adjacent its outer end and a trip-rod arranged to engage the outer end of the trip-plate and to be released therefrom by said block.

2. An electric igniter for explosive-engines, comprising suitable electrodes, one of which is movable and is provided at its inner end with an arm carrying a contact-point, an arm connected to the outer end of said movable electrode, a trip-plate hinged to said outer arm, a spring for forcing said trip-plate normally toward said outer arm, a block attached to said trip-plate adjacent its outer end, a spring connected with said block to aid in restoring the movable electrode to normal position and a trip-rod arranged to engage the outer end of the trip-plate and to be disengaged therefrom by said block.

3. An electric igniter for explosive-engines comprising suitable electrodes, one of which is movable and is provided at its inner end with an arm carrying a contact-point, an arm connected to the outer end of said movable electrode, a trip-plate extending from said outer arm and having a block attached to one side thereof, a trip-rod arranged adjacent said block and in position to engage the end of the trip-plate, said block serving to release the trip-rod from the trip-plate.

4. An electric igniter for explosive-engines

comprising suitable electrodes, one of which is movable and is provided at its inner end with an arm carrying a contact-point, an arm connected to the outer end of said movable electrode, a trip-plate extending from said outer arm, a block fixed to said trip-plate adjacent its end, a trip-rod engaging said block and arranged in position to engage the outer end of the trip-plate and a spring for drawing said trip-rod normally toward said block.

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