

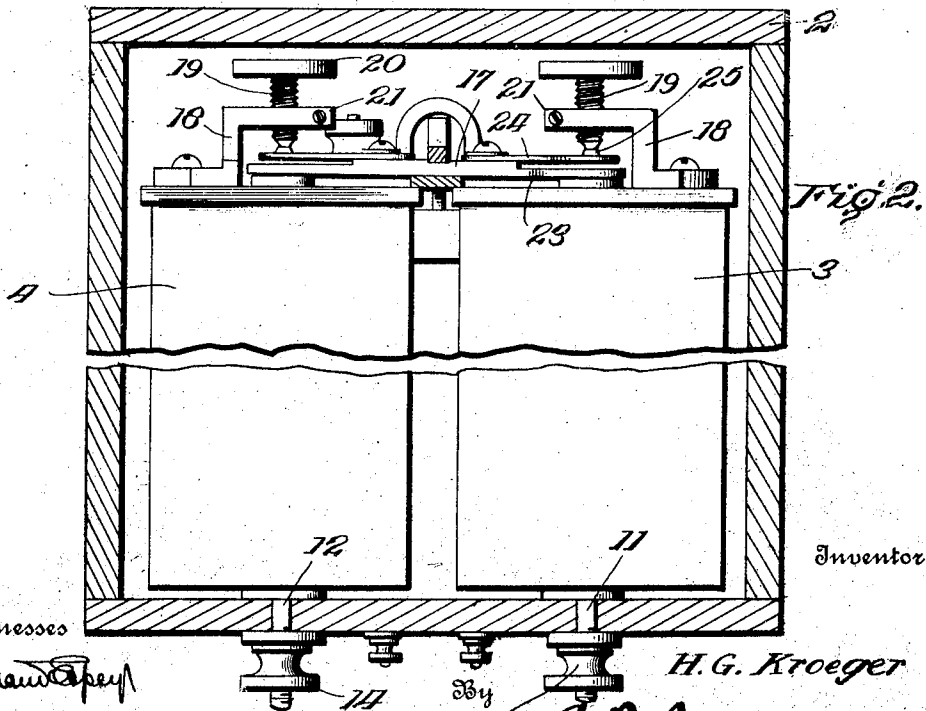
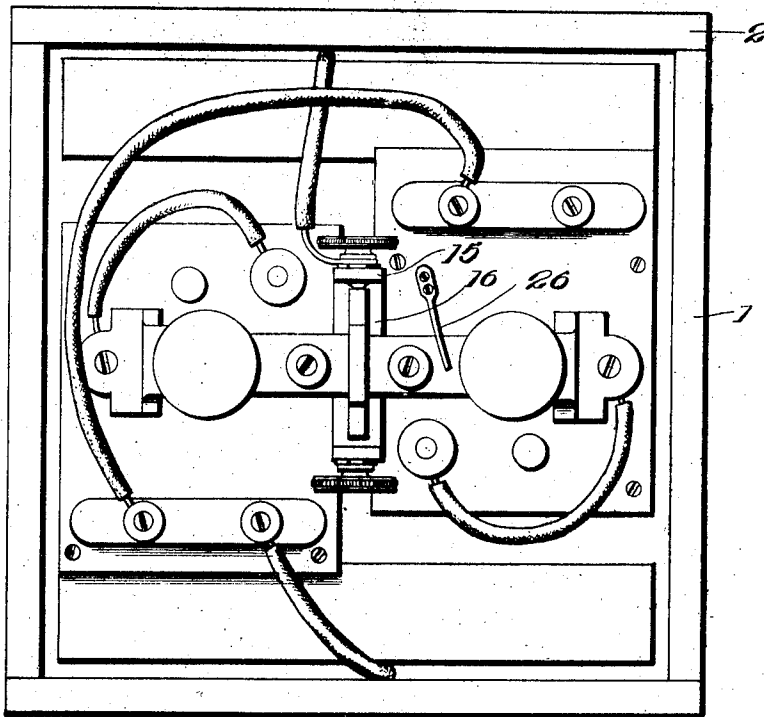
H. G. KROEGER.
IGNITER FOR EXPLOSIVE ENGINES.
APPLICATION FILED DEC. 14, 1911.

1,058,371.

Patented Apr. 8, 1913.

2 SHEETS—SHEET 1.

Fig. 1.



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13

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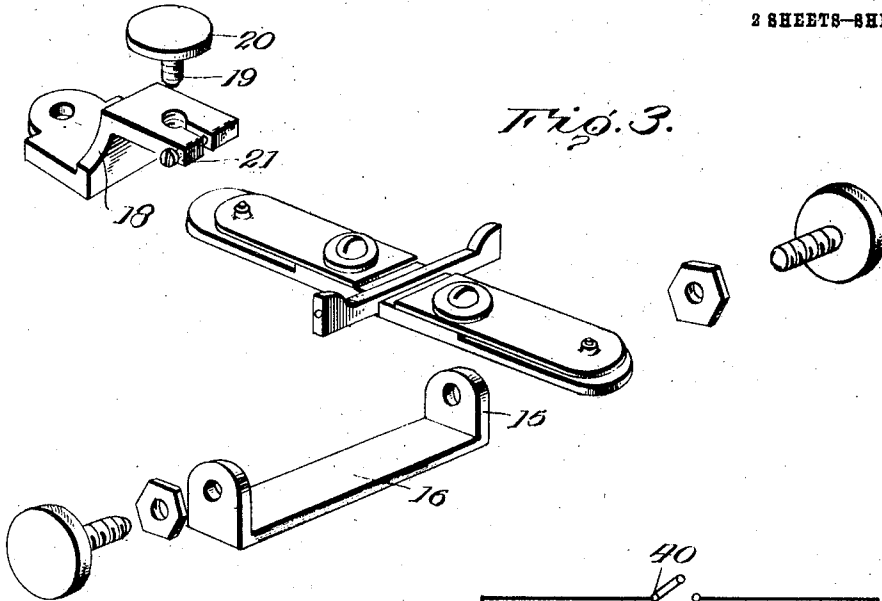
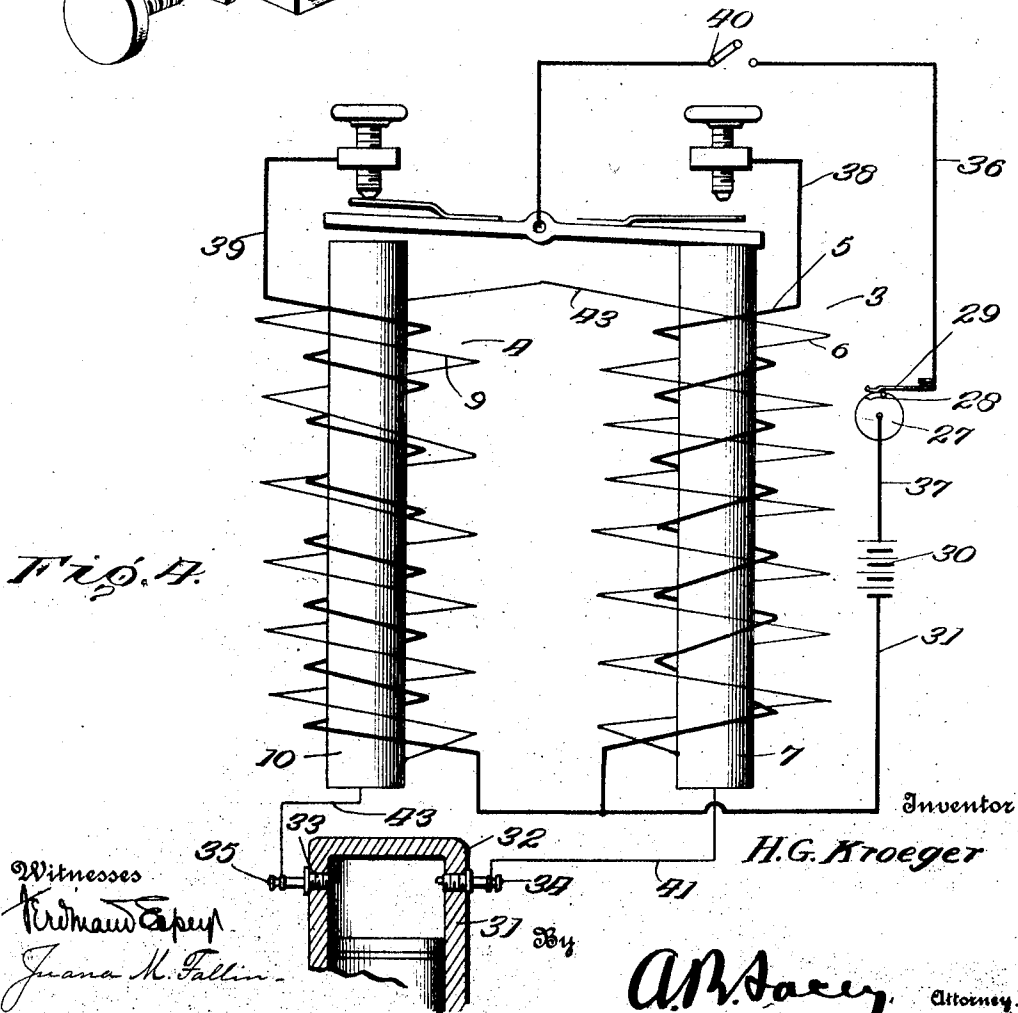


Fig. 3.



UNITED STATES PATENT OFFICE.

HERRMANN G. KROEGER, OF LOUISVILLE, KENTUCKY.

IGNITER FOR EXPLOSIVE-ENGINES.

1,058,371.

Specification of Letters Patent.

Patented Apr. 8, 1913.

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To all whom it may concern:

Be it known that I, HERRMANN G. KROEGER, citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Igniters for Explosive-Engines, of which the following is a specification.

This invention relates to electric igniters for explosive engines.

It is one aim of the invention to provide an igniter constructed and arranged to simultaneously produce two sparks in the engine cylinder or in each engine cylinder, at each contact of the timer, so that more rapid combustion of the explosive mixture will take place, with the result that the engine will be rendered more efficient in its action and less fuel will be consumed.

The igniter embodying the present invention is of that type in which a vibrator is employed for closing a secondary or high tension circuit, and the invention aims to so construct this vibrator as to produce two sparks, in synchronism, as above mentioned, and to obviate sparking at the contact points of the vibrator. In this connection, the invention further aims to obviate the use of springs to return the armature after contact with the cores of the coils of the vibrator.

With these and other objects in view as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of the parts that I shall hereinafter fully describe and claim.

For a full understanding of the invention reference is to be had to the following description and accompanying drawing, in which:

Figure 1 is a plan view of the igniter embodying the present invention; Fig. 2 is a view in side elevation thereof; Fig. 3 is a group view illustrating the armature of the vibrator; and Fig. 4 is a diagrammatic view illustrating the circuits through the igniter.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawing by the same reference characters.

It will be readily understood that the igniter embodying the invention may be mounted in any desired manner, depending upon whether it is used in connection with a marine motor, an automobile motor, or a stationary motor, but as a matter of con-

venience, it is here shown as arranged within a casing which is indicated in general by the reference numeral 1, and includes a hinged cover 2 which may be opened to permit of access to the vibrator for the purpose of adjusting the same.

Mounted within the casing are two coils, one indicated by the numeral 3 and the other by the numeral 4, and the coil 3 includes a primary winding 5 and a secondary winding 6. The core of this coil is indicated by the numeral 7. The coil 4 includes a primary winding 8, a secondary winding 9, and a core 10. While the coils may be mounted in any desired manner within the casing, it is preferable that threaded binding posts 11 and 12 be fixed at corresponding ends of the cores 7 and 10, respectively, and these binding posts are inserted through openings in one wall of the casing and have arranged thereon binding nuts 13 and 14, respectively. To these binding posts are connected the conductor wires which lead to the spark plugs, as will be presently explained.

Mounted as at 15 in a bracket 16 arranged between the coils 3 and 4 at their ends opposite their ends at which the binding posts 11 and 12 are located, is an armature 17 having arms extending in opposite directions from its axis and arranged to vibrate between the adjacent ends of the cores 7 and 10, and contact screws which are positioned opposite the said ends of the cores, as will now be explained. Brackets 18 are mounted upon the said ends of the coils and have portions extending in spaced relation to said ends of the cores 7 and 10, and through that bracket 18 which is mounted upon the coil 3 there is adjustably threaded a contact screw 19 having its contact point opposing the adjacent end of the core 7. A similar screw 20 is adjustably threaded through the other bracket 15, and has its contact point opposing the adjacent end of the core 10. The brackets 18 are split as at 21, and screens 22 are threaded through the split portions and may be tightened to hold the contact screws at adjustment. The upper face of each arm of the armature 17 is recessed as at 23, and secured to each arm near its inner end is a leaf spring 24 having a contact point 25 upon its upper face near its free end these leaf springs projecting over the recesses in the respective arms of the armature to allow for their vi-

bration. At this point, it will be readily understood that the arms of the armature are designed to contact with the upper ends of the cores 7 and 10, and that the contact screws 19 and 20 are designed to contact with the points 25 of the respective leaf springs 24, during the vibration of the armature, and it will be further understood that the amplitude of vibration of the armature may be adjusted by means of the contact screws 19 and 20. As a means for insuring the contact of one arm of the armature 17 with its respective core and to prevent the armature assuming a position with both arms out of contact with the cores of the coils, a leaf spring 26 is secured to one of the coils, for example, the coil 3, and bears lightly against the spring 24 upon the adjacent arm of the armature.

Referring to Fig. 4 of the drawings, the numeral 27 indicates a timer of ordinary type and 28 indicates the contact block of the timer. The contact member with which the timer coöperates is indicated by the numeral 29. The battery for the primary circuit is indicated by the numeral 30, and at 31 there is shown diagrammatically the cylinder of the engine in connection with which the igniter is used. Into this cylinder at diametrically opposite points are threaded the bases of two spark plugs, one of which is indicated by the numeral 32 and the other by the numeral 33, the binding posts of the plugs being indicated, respectively, by the numerals 34 and 35. A conductor wire 36 leads from the contact member 29 to the pivot of the armature 17, and from the timer 27 leads a wire 37 which is connected to one terminal of the battery 30. A wire 31 leads from the other terminal of the battery, and is connected to the primary windings 5 and 8 of the coils 3 and 4, respectively. The other terminal of the primary winding 5 is connected by a wire 38 with contact screw 19, and a wire 39 connects the other terminal of the primary winding 8 with the contact screw 20. This completes the primary circuit, and there is preferably interposed in this circuit, for example, in the wire 36, a switch 40, by means of which the circuit may be opened and closed. A wire 41 is connected to binding post 11 and to the binding post 34 of the spark plug 37, and a wire 42 connects the binding post 12 of the coil 4 with the binding post 35 of the spark plug 33. The other terminals of the secondary windings of the two coils are connected by a wire 43.

When the switch 40 is closed and the timer 27 is rotating, the primary circuit is intermittently closed, and when closed will be from the battery 30, through the timer 27, the wire 36, and to the armature 17. Assuming that the armature is normally held by the spring 26 in contact with the contact

screw 20, the primary circuit will then extend through the said armature and screw, through the primary winding of the coil 4 and back through the wire 31 to battery 30. This results in an energization of the coil 4 and the armature is then attracted to the core of this coil, bringing the spring at the other end of the armature into contact with the screw 19. The primary circuit is then from battery 30, through timer 27, wire 36, the armature 17, screw 19, primary winding of coil 3, and back to battery through wire 31. Coil 3 is in this manner energized, attracting the armature to its core. This operation is rapidly repeated, and the armature 17 is rapidly vibrated. As a result of the successive energization of the primary windings of the coils 3 and 4, the current is induced in the secondary windings of these coils and passes through the wires 41 and 42 to the binding posts of the spark plugs 32 and 33, respectively, and leaping across the spark gaps of the plugs, passes to ground through the engine cylinder and bed. As before stated, the spark plugs are located at diametrically opposite points upon the engine cylinder, and as a consequence there is a more rapid combustion of the explosive mixture than would take place if but one spark plug was used. Also, as before stated, the peculiar arrangement of the armature and the fact that the contact screws 19 and 20 are adjustable to adjust the amplitude of vibration of the said armature, the current induced in the secondary windings of the coils is of high frequency, and better results are secured than by the use of a single coil.

Having thus described my invention, what I claim is:

1. In an ignition system for explosive engines, spark plugs located in spaced relation upon the engine cylinder and in circuit therewith to ground, a primary and a secondary circuit, coils having each a primary and a secondary winding respectively in said circuits, each of the said spark plugs being in circuit with the secondary winding of one of the coils, the secondary windings of the two coils being electrically connected, and vibratory circuit closing means for the primary circuit.

2. In an ignition system for explosive engines, spark plugs located at spaced points upon the engine cylinder and having their bases bridged by the said cylinder, a primary and a secondary circuit, coils having each a primary and a secondary winding respectively in said circuits, the binding post of each spark plug being in circuit with the secondary winding of one coil, the secondary windings of the two coils being electrically connected, and vibratory circuit closing means in the primary circuit.

3. In an electric igniting device, a pri-

mary and a secondary circuit, coils having
each a primary and a secondary winding re-
spectively in said circuits, a source of elec-
tric supply for the primary circuit, a vi-
bratory armature common to both coils and
located in the primary circuit, two of the
terminals of the secondary windings being
electrically connected, and independent
spark plugs each having a ground terminal,
the other terminals of the secondary wind-
ings being connected one to each of the other

terminals of the spark plugs whereby a cur-
rent induced in the secondary windings will
be grounded across the spark gaps of the
spark plugs.

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

HERRMANN G. KROEGER. [L. S.]

Witnesses:

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