

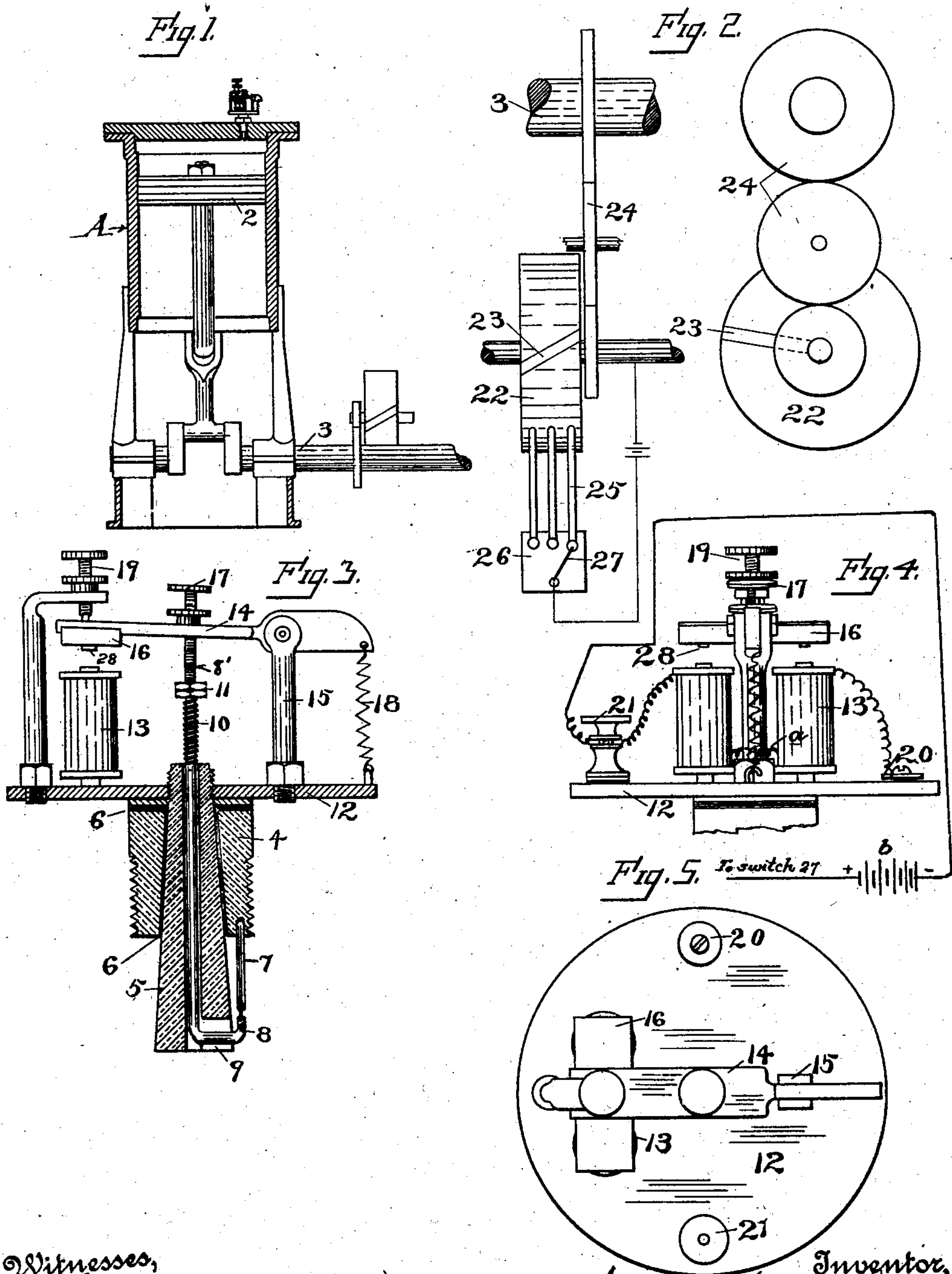
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J. CEREGHINO.
IGNITER FOR GAS ENGINES.

APPLICATION FILED JULY 8, 1902.

NO MODEL.



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UNITED STATES PATENT OFFICE.

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IGNITER FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 721,285, dated February 24, 1903.

Application filed July 8, 1902. Serial No. 114,788. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH CEREGHINO, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Igniters for Gas-Engines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in electric sparking devices for explosive-engines, and particularly in that form of igniter in a which a succession of sparks is produced each time an explosion takes place in the cylinder in contradistinction to the ordinary single "jump-spark" igniters in use, which latter not infrequently fail to explode a charge of gas.

The object of my invention is to provide a device of simple construction and positive action and to provide means by which the timing of the explosion may be regulated according to the speed of the engine, so that ignition may take place more or less before the piston reaches the end of its compression-stroke.

The invention includes a screw-threaded plug fitting the cylinder and having a tapered bore, a fixed electrode in said plug, a longitudinally-perforated conical plug fitting said bore and insulated from the first-named plug, an electrode reciprocable in the conical plug, guides by which the electrode is prevented from turning, a plate into which said conical plug screws, electromagnetic means for opening and closing the circuit between said electrodes, a disk connecting with the engine-shaft, said disk being out of electrical connection with the shaft except for a diagonally-disposed conducting-segment, brushes engaging said disk, and a switch incorporated in the sparking-circuit adapted to engage one or the other of said brushes to operate the sparking mechanism.

It also comprises details which will be more fully set forth hereinafter, having reference to the accompanying drawings, in which—

Figure 1 is a view of a cylinder and shaft with sparking device. Fig. 2 represents two views of electrical controller. Fig. 3 is a section of sparker. Fig. 4 is a rear view of sparker. Fig. 5 is a top view of sparker.

A represents the stationary cylinder of a gas-engine in which the piston 2 is reciprocable.

The piston-rod connects with a crank on the engine-shaft 3.

The igniter comprises a threaded sleeve 4, having a tapered bore contracted at the upper end and is adapted to be secured in the outer end of the cylinder. A conical centrally-perforated plug 5 fits the sleeve and is insulated therefrom, as shown at 6. A fixed electrode 7, having a broad flat point, is secured in the sleeve, and a similarly-pointed electrode 8 is reciprocable in the plug. By means of the guide-slot 9 the movable electrode is prevented from turning, so that the two points are always maintained in proper alinement. A spring 10 tends to keep the electrodes in contact with each other, and the tension of the spring is regulated by the lock-nut device 11. The outer contracted end of the plug is threaded and screws into a steel plate or disk 12, upon which are mounted the electromagnets 13. The plate 12 is insulated, as shown at 6, from the sleeve 4 and the engine-frame. A lever 14, fulcrumed on the standard 15, secured to the plate, carries a cross-head or armature 16, which is adapted to be operated by the magnets when the latter are energized and so cause an adjusting-screw 17 carried by the lever to engage the outer end of the electrode 8, as at 8', to produce a series of rapid reciprocations of the latter. A spring 18, engaging the short arm of the lever, serves to hold the armature normally out of contact with the cores of the magnets, and the rapidity of the vibrations of the armature may be regulated by means of the screw 19. One of the coil-terminals is connected with the plate 12 at 20, and thence through the electrodes with the engine-frame. The other terminal connects with an insulated post 21. The latter is connected with one pole of a battery and the engine-frame with the other pole.

Interposed in the circuit between the battery and the engine is a mechanism adapted to set the armature in motion at the right moment to create the succession of sparks which shall cause the explosion. This consists of a disk 22, of wood or other material not electrically conductive, in which is set a metal segment 23, disposed diagonally to the axis of the disk. This segment is in electrical connection through the gearing 24 with the engine-shaft, as where the engine is of

the four-cycle type. For engines of the two-cycle type the disk may be attached direct to the engine-shaft and turn with it. A series of flexible metal strips or fingers 25, mounted on a switchboard 26 and insulated one from the other, are adapted to bear on the periphery of the disk. A switch 27 serves to connect up the battery with either one or the other of the strips, as desired. The object of this device is to govern the formation of the spark according as the crank is at or more or less removed from center. As the speed of the engine increases it is desirable in order for full effect to be given to the impulse of the expanding gases that explosion should take place at earlier and earlier periods in the revolution of the crank, as otherwise the crank will be carried past the point where the expanding gases should begin to exert their force before the spark occurs. Expansion should begin just as the crank passes center; but if a sparker is set to operate at that point with the engine running at low speed then as the engine attains a higher and higher speed the crank will be carried an appreciable distance beyond that point before the gas begins to act on the piston and a certain amount of power is thereby lost. By reason of the diagonally-disposed segment 23 and the strips 25 contacting with it at different periods, but at every revolution of the disk, it is possible to operate the electrodes at any time desired either before the crank reaches center or at, or immediately after passing center, according as the switch is thrown to connect with one or other of the strips. The contact with the segment of one or the other of the fingers in the circuit causes the electrodes 7 8 to operate to create a succession of sparks and to insure an explosion within the period that the finger is passing over the segment. The length of this period may be varied by varying the width of the segment. As the tendency of the steel armature and iron core of the coils is for them to retain their magnetic quality and to stick together after coming in contact by the energizing of the electromagnets, I have provided buttons 28 of non-magnetic substance, as brass, at each end of the cross-head 16, by which these parts are prevented from ever coming into actual contact with each other. Accordingly a very weak spring 18 is sufficient to separate them as the current is broken and permits the armature and electrode 8 to vibrate rapidly. The two coils are connected, as at *a*. One coil-terminal leads to 20 on plate 12, which is in electrical contact with the engine-frame through plugs 4 5 and electrodes 7 8 when the latter are in contact. The other coil-terminal leads to insulator 21, and thence to one pole of battery *b*. The other pole of the latter leads to switch-point 27. Switch 27 is turned to connect with one or the other of fingers 25. The circuit is completed whenever segment 23 is in contact with the finger 25 engaged by the switch. The

course of the current is then as follows: from the battery through 27, a finger 25, segment 23 to shaft of disk 22, thence through gears 24 on engine-shaft, thence through engine frame and cylinder to plug 4, electrodes 7 8, to plug 5, to plate 12, through the coils to 21, and thence back to the battery. Normally the electrodes 7 8 are in contact; but the moment the circuit is completed, as above described, the coils are energized and their cores pull down arm 14. This immediately breaks the contact of electrodes 7 8, causing a spark and effecting the explosion in the cylinder; but the moment the contact is broken likewise is the circuit. Arm 14 flies upward by reason of spring 18, while spring 10 closes the space between electrodes 7 8. This action takes place repeatedly and with incredible rapidity during such time that the switch-connected finger 25 is in contact with segment 23.

In operation the electrodes make and break circuit after the fashion of an interrupter of an ordinary induction-coil, the principal difference being that the electrodes are disposed in a different position in the circuit in relation to the coils. The reference to the interrupter is by way of illustration and will make clear why a "succession of sparks" is formed. Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination in a gas-engine and with the igniter thereof, of means including a rotatable disk of non-conducting material having a conducting-section fixed therein, a plurality of contacts engaging the disk and an electric switch in the igniter-circuit by which the timing of the explosion may be varied in reference to the position of the piston in its stroke.

2. The combination with the electric igniting apparatus of a gas-engine, of a disk turnable in relation to the engine-shaft, the surface of said disk electrically non-conductive except for a segment in connection with the engine-frame, spring-fingers engaging the periphery of said disk, and switch mechanism in the igniter-circuit by which the current may be made to pass through one or the other of said fingers and segment to create the explosion for the purpose described.

3. The combination with the electric igniting apparatus of a gas-engine, of a disk of non-conducting material, a conducting-segment disposed diagonally to the axis of said disk, said segment having electrical connections with the igniter, spring-fingers engaging the periphery of the disk, a switch in connection with the battery and adapted to complete the circuit through one or the other of the fingers.

4. The combination in an igniter, of a sleeve having a tapered bore, a longitudinally-perforated conical plug fitting said bore and insulated from said sleeve, a fixed electrode on the sleeve and a movable electrode carried by the plug said plug slotted to form a

guide for the movable electrode by which the alinement of said electrodes is maintained, spring-actuated means by which the electrodes are normally held in contact, and
5 electromagnetic means by which said movable electrode is operated to cause a succession of sparks.

5. The combination in an igniter of a sleeve having a tapered bore, a conical plug
10 fitting said sleeve and insulated therefrom, a plate to which said plug is attached and with which it is in electrical connection, fixed and movable electrodes, spring-actuated means
15 by which said electrodes are normally held in contact, electromagnets on said plate and having one terminal connected therewith, a fulcrumed lever, an armature carried thereon,
spring means by which the armature is normally held out of contact with the cores of
20 the coils of the magnets, adjustable connections between the lever and movable electrode, and means by which the vibration of the armature is regulated.

6. The combination in an igniter, of an externally-screw-threaded sleeve, a plug fitting
25 said sleeve and insulated therefrom, a plate to which said plug is attached, a fixed electrode on said sleeve, a second electrode reciprocable through said plug, guides upon the
30 latter whereby the electrodes are maintained in alinement, spring means by which the electrodes are normally held in contact, electromagnets on the plate; a spring-actuated lever
35 having its longer arm provided with an armature, buttons 28 by which the armature and magnet cores are prevented from coming in actual contact, and adjustable connections
40 between the lever and movable electrode by which the electrode-points are separated on the vibration of the armature.

In witness whereof I have hereunto set my hand.

JOSEPH CEREGHINO.

Witnesses:

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