No. 633,275. Patented Sept. 19, 1899.

C. C. RIOTTE.

MEANS FOR ELECTRIC IGNITION FOR VAPOR ENGINES.

(Application filed Jan. 6, 1899.)

(No Model.)

Fig. 1.

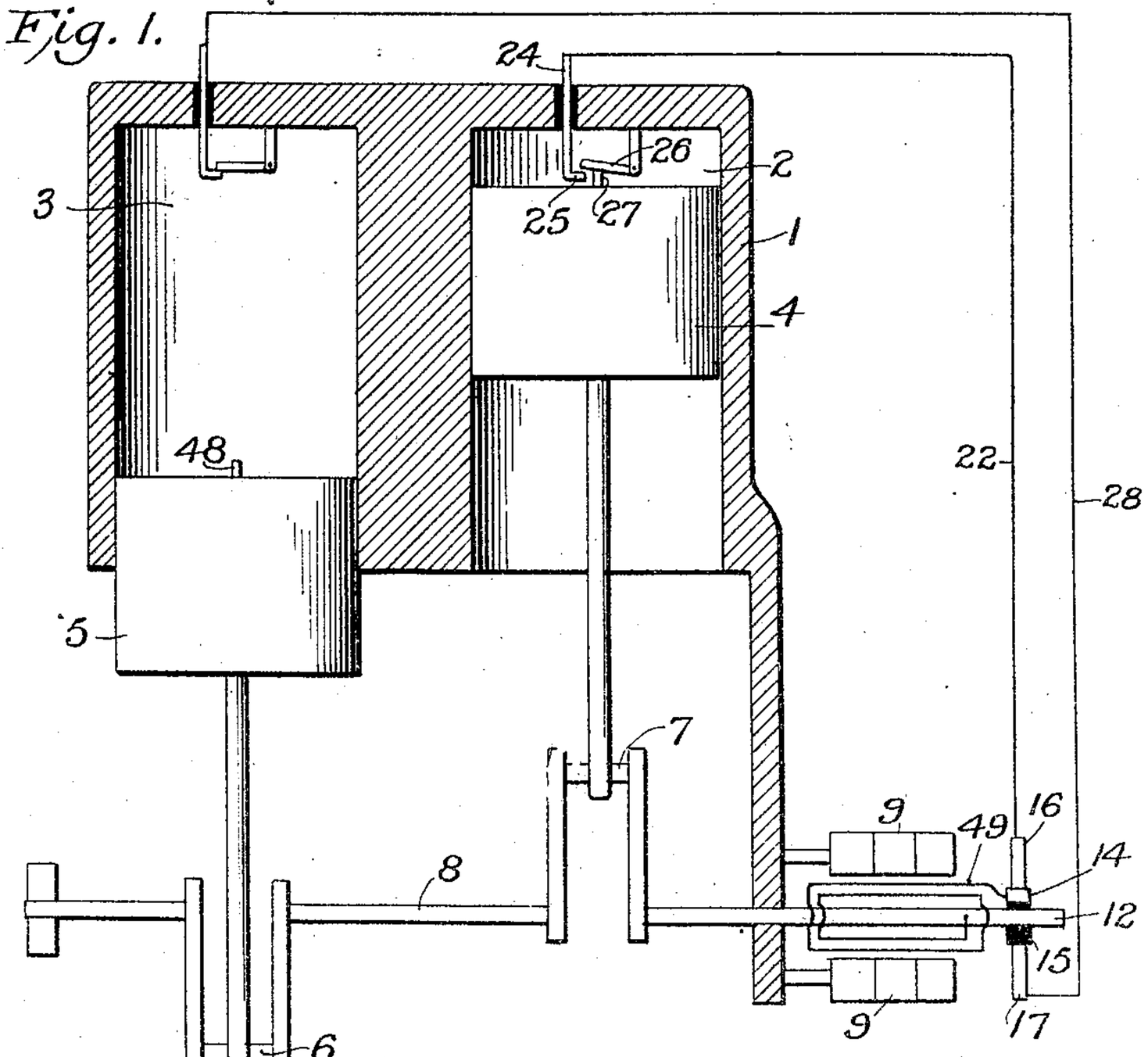


Fig. 2.

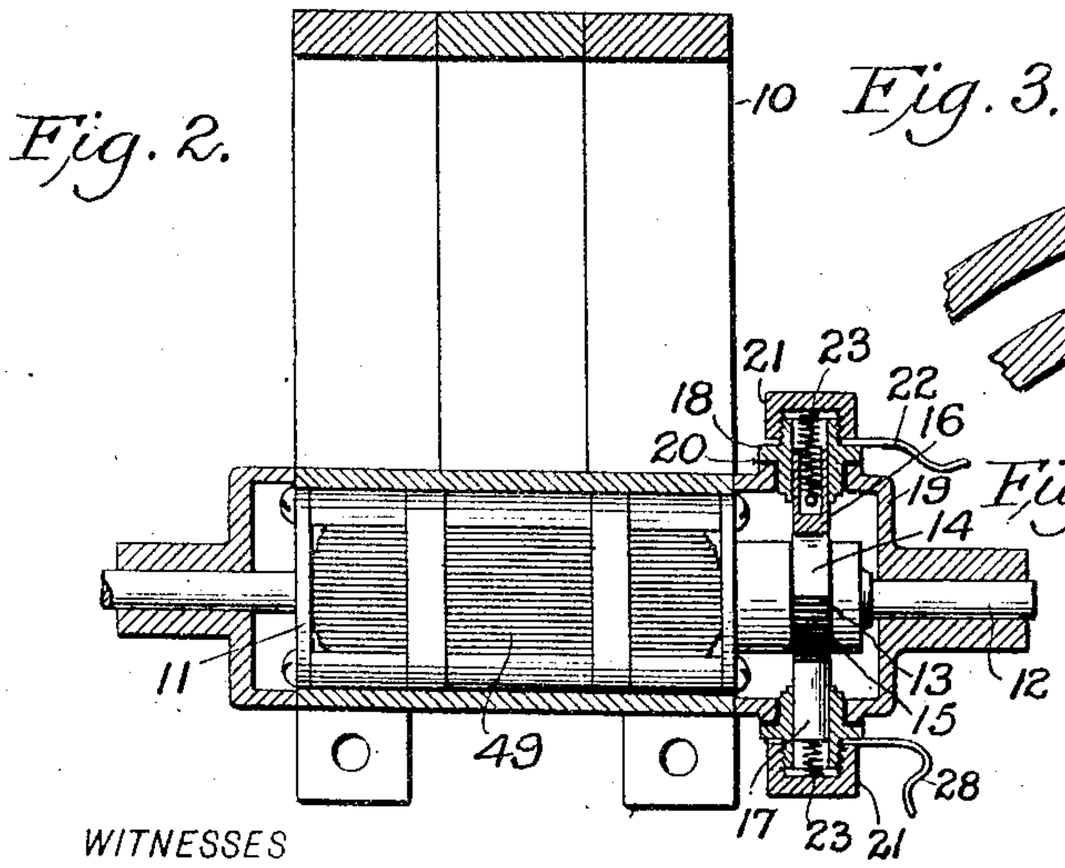


Fig. 3.

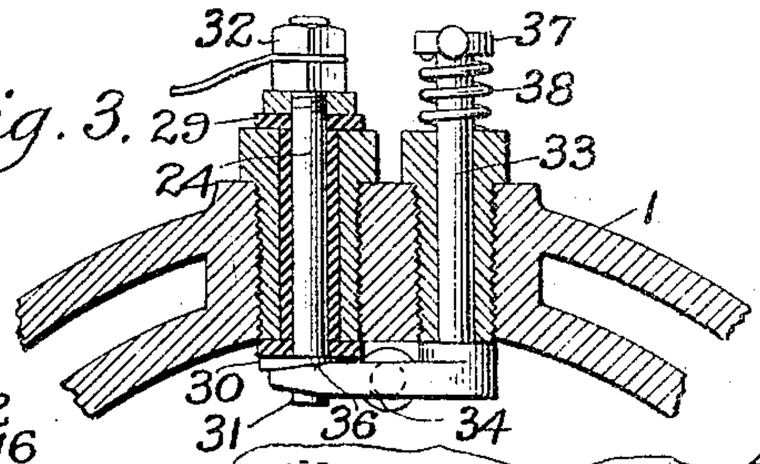
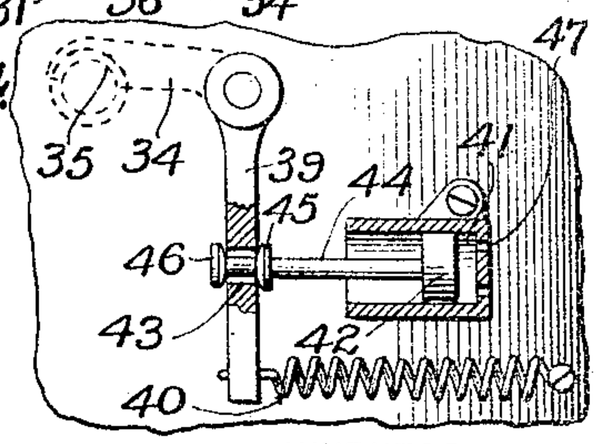


Fig. 4.



WITNESSES

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MEANS FOR ELECTRIC IGNITION FOR VAPOR-ENGINES.

SPECIFICATION forming part of Letters Patent No. 633,275, dated September 19, 1899.

Application filed January 6, 1899. Serial No. 701,326. (No model.)

To all whom it may concern:

Be it known that I, CARL C. RIOTTE, a citizen of the United States, residing at New York, county of New York, State of New York, have invented certain new and useful Improvements in Means for Electric Ignition for Vapor-Engines, of which the following is a full, clear, and exact description.

My invention relates to an improvement in means for electrical ignition for vapor-engines; and my object is to provide a construction which will be simple, inexpensive, automatic, and positive in its action.

Many other advantages of my invention will appear on inspection of the following drawings, in which—

Figure 1 represents in diagram a two-cylinder vapor-engine with the preferred form of my dynamo connected therewith. Fig. 2 is a sectional view of my dynamo. Fig. 3 is a detail of the sparking device, and Fig. 4 is a further detail of the cushioning device for one member of the same.

In the accompanying drawings, showing the preferred form of my invention, 1 is a casing for a vapor-engine, having cylinders 2 and 3. Within these cylinders move, preferably alternately, reciprocating pistons 4 and 5, connected to cranks 6 and 7 of the driving-shaft 8. This casing 1 is in the preferred embodiment made of some electrically-conducting material, such as iron or steel, as may be also the driving-shaft 8.

The preferred form of my dynamo to generate electricity for the sparking device is shown in detail in Fig. 2 and in diagram in Fig. 1.

9 9 are the pole-pieces of the field-magnet 10. Between the pole-pieces rotates an armature 11, in this embodiment a shuttle-wound armature carried on armature-snaft 12, which may be a continuation of driving-shaft 8, as shown, so that said armature will rotate synchronously with said driving-shaft. One end of the armature-coil 9 is electrically connected to the armature-shaft 12, as shown in Fig. 1, and the other end of the coil, as shown in diagram in Fig. 1, is electrically connected to a division or segment 14 of an automatic switch, in this embodiment a divided commutator 13. This segment 14 is otherwise insulated from said armature-winding, except through the line-circuit embracing in this embodiment wire 22, the electrodes 25 26, and the casing of the engine, hereinafter described. Another segment 15 of the commutator is insulated from the other parts or may be formed of some insulating material, as shown.

16 and 17 are brushes resting against the commutator and preferably touching the same at opposite points and located so that one of them will be in contact with the segment 14 at each of the points of greatest electromotive force in the rotation of the armature—for instance, as shown in Fig. 1. These brushes and their brush-holders are shown in detail in Fig. 2. In the preferred embodiment of these brush-holders 18 is a hollow plug fastened in a hole in the commutator-casing 19. 20 is an insulating material between this plug and the casing. This plug has a threaded reduced projection at the upper end, on which screws an internally-threaded cap 21, which may coöperate with a shoulder on the plug to form a binding-post for a wire 22. The brush itself in this embodiment is of a cup shape and is held within the hole in the plug so as to be free to slide and be guided therein. 23 is a coiled spring attached at one end to the inside of the brush and at the other end to the cap 21, if desired, which constitutes a retaining means for said brush, so that when the cap is removed from the plug the brush may be drawn out with it. The other brush-holder and brush may be a counterpart of the one just described.

25 and 26 are two electrodes of a sparking device for and preferably in said cylinder 2 and located near the limit of movement of piston 4. Electrode 25 is in this embodiment fixed and carried on a shaft 24, insulated from the casing; but electrode 26 is movable and may be normally in contact with the other. These electrodes are connected by a circuit embracing in this embodiment the casing of the engine, the shaft and winding of the armature, and the line-wire 22, as shown in Fig. 1. The piston 4 carries a projection 27, which when the piston reaches, preferably, the limit of its stroke strikes against one member of the sparking device and automatically operates the sparking device in this embodiment

by moving one electrode away from contact with the other electrode. The parts at this moment are preferably in the position shown in Fig. 1, the armature generating its greatest electromotive force and the brush 16 touching the commutator-segment 14. An electric current will thus be driven around the circuit formed in this embodiment by wire 22, the sparking device, the casing of the engine, the shaft of the armature, and the armature-winding. When the projection 27 separates the electrodes, a spark will thus be produced which will ignite the vapor in the casing 2 and drive forward the piston 4. As the dynamo is at this moment impressing on said circuit its greatest electromotive force, a strong spark will be produced.

Referring now to Fig. 3, 24 is a shaft passing through the casing 1 and insulated therefrom by some insulating material 29. This shaft carries on its end, preferably within the casing, an electrode consisting in this embodiment of a head 30 and a reduced projection 31 therefrom. The outer end of the rod may be screw-threaded and carry a nut 32 to form a binding-post, if desired. 33 is a second shaft fastened in a bearing in the casing 1 so as to be rotatable therein, and said shaft is electrically connected with the casing. This shaft carries within the cylinder a second electrode 34, in this embodiment in the form of an arm, having a curved contact-face 35 to fit the contour of the projection 31 and also having a beveled side 36, which side when said electrode 34 is turned into contact with the other electrode will have a frictional contact with the head 30, which will serve to keep the contact parts bright and form a good electrical connection. 37 is a head on the shaft 33 without the casing, and between this head and the casing is a spring 38, pressing outward the shaft 33, which is movable longitudinally, as well as rotatable in its bearing. From the shaft 33, also outside of the casing, projects an arm 39, to which is attached a spring 40, tending to press said electrode 34 into contact with the other electrode.

When the projection 27 moves away from the movable electrode, said electrode would be brought against the opposite one suddenly and with a shock, depending upon the speed of the piston and the strength of the spring 40. To reduce this shock and allow the electrodes to come in contact gently, I have provided a cushioning device consisting in this embodiment of an air-chamber or dash-pot 41 and a piston 42, moving therein, connected with the arm 39. This arm has a hole therein through which passes the piston-rod 44. 45 and 46 are heads preferably rounded on their opposing surfaces, as shown, so as to allow of a universal movement of said shaft 44 in said hole. The air-chamber 41 may also be pivoted to the casing, if desired. 47 are holes in the bottom of the air-chamber for the entrance and exit of air. When the projection 27 leaves the movable electrode, the spring 40 will tend to draw it quickly back into contact with the other electrode; but the piston 42 will enter the air-chamber 41 and will tend to compress the air therein. The air will escape slowly through the holes 47 and allow the electrode 34 to come gently into contact with the other electrode and will thus prevent any shock.

28 is a wire connecting the brush 17 with a sparking device in the cylinder 3, which may be similar to that just described. The pistons are preferably connected to oppositely-disposed bell-cranks on the shaft 8. Before the parts reach the position shown in Fig. 1 segment 14 will come into contact with brush 16, closing the circuit through the electrodes as the sparking device is about to be operated. After the piston has operated the sparking device and the spark has passed, segment 14 will break contact with brush 16, opening the circuit, and by a further revolution of driving-shaft 8 the armature will be given part of a turn, bringing the segment 14 of the commutator into contact with the brush 17 and the brush 16 into contact with the insulated segment 15 of the commutator. When a half-revolution from the position shown in Fig. 1 is given, the dynamo will be again generating its greatest electromotive force and a current will be passing from the brush 17 through the wire 28 and sparking device in the cylinder 3 back through the casing of the engine and the shaft of the armature to and through the armature-coil in substantially the same manner as before. A projection 48 on piston 5 will then strike the movable electrode of the sparking device in cylinder 3 and produce a spark. This action will then go on automatically, a spark being produced at the proper moment in one cylinder, and yet no current will be passing to the sparking device in the other cylinder at that time. There is, further, no necessity of making but one wire connection to each sparking device or of having more than one brush for each sparking device, as a common return is provided through the cylinder-casing. The side rubbing contact of the beveled edge 36 of the electrode 34 against the electrode 30 will insure a good electrical contact between them; but if there is no frictional contact between the curved face 35 of electrode 34 and the reduced projection 31 those surfaces are liable to become coated with the products of the burned vapor. The spring 40, however, presses the face 35 into contact with the projection 31, and if it is desired to clean these contact parts of the electrodes a reciprocating motion may be given to the electrode 34 by pressing against head 37 on shaft 33 outside of the casing. This will scrape the face 35 of electrode 34 over the projection 31 of the other electrode and effectually clean the contact parts. Piston-rod 44 may have sufficient lateral motion in the mouth of the dash-pot 41 to allow of this longitudinal reciprocating of shaft 33.

In the above embodiment of my invention when the piston recedes from the sparking device after the burned gas has been expelled a sudden and partial vacuum is produced in the cylinder. This will lower the atmospheric pressure upon the end of the rod 33 which is inside of the cylinder, and if the spring 38 is not too strong the pressure of the outside atmosphere on the head 37 will press in the rod 33, giving a slight reciprocating movement to electrode 34. The rod will then be automatically moved longitudinally in its bearing and the electrodes will be rubbed together. This will tend to keep the contact parts bright.

Other advantages will appear from the disclosure herein made; but I do not desire to limit myself to this embodiment of my invention, as many changes may be made therein without departing from the spirit thereof.

What I claim is—

1. In a vapor-engine, in combination, a plurality of cylinders, a piston moving in each cylinder, a sparking device for each cylinder embracing a pair of electrodes, an independent circuit for each pair of electrodes, a dynamo having a rotating shaft and means to drive the same, an armature-coil carried thereby and forming a part of each circuit, a commutator having a segment electrically connected to said coil and carried by the said shaft, a brush for each circuit for each set of electrodes and in contact with said armature, said segment being adapted to make and break an electric circuit with the proper set of electrodes at the proper time.

2. In a vapor-engine, in combination, a cylinder-casing inclosing a plurality of cylinders, a piston moving in each cylinder, a sparking device for each cylinder embracing a pair of electrodes, one of which is movable, an electric circuit connecting each pair of electrodes, a dynamo having a rotating shaft driven by said engine, an armature having a segment electrically connected to said coil and also carried by said shaft, a brush for each circuit for each set of electrodes and in contact with said armature, said segment being adapted to complete an electric circuit through each set of electrodes successively and independently, and means to disengage the movable electrode from the other electrode to produce a spark at the proper time.

Signed at New York, N. Y., this 21st day of December, 1898.

CARL C. RIOTTE.

Witnesses:
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