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R. VARLEY.

IGNITION SYSTEM FOR EXPLOSION ENGINES.

APPLICATION FILED NOV. 3, 1906.

Fig. 1.

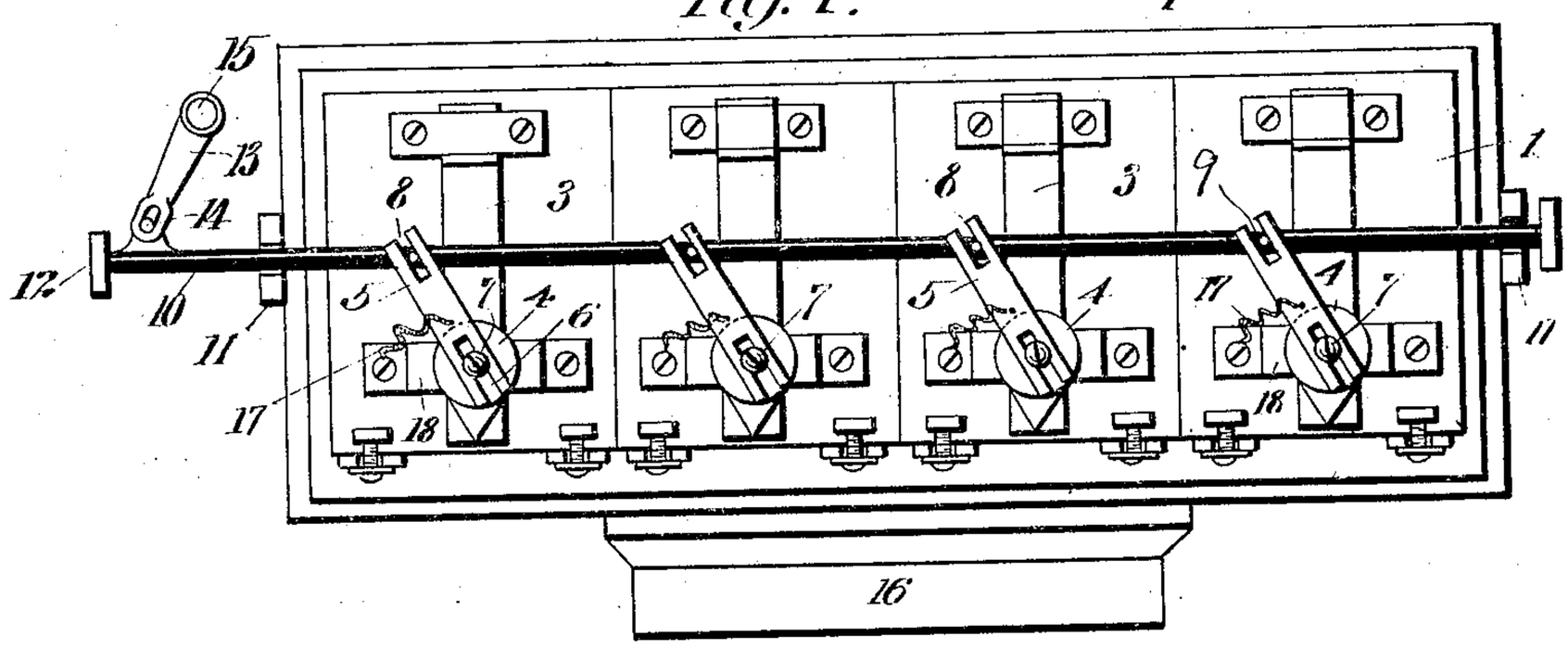


Fig. 2.

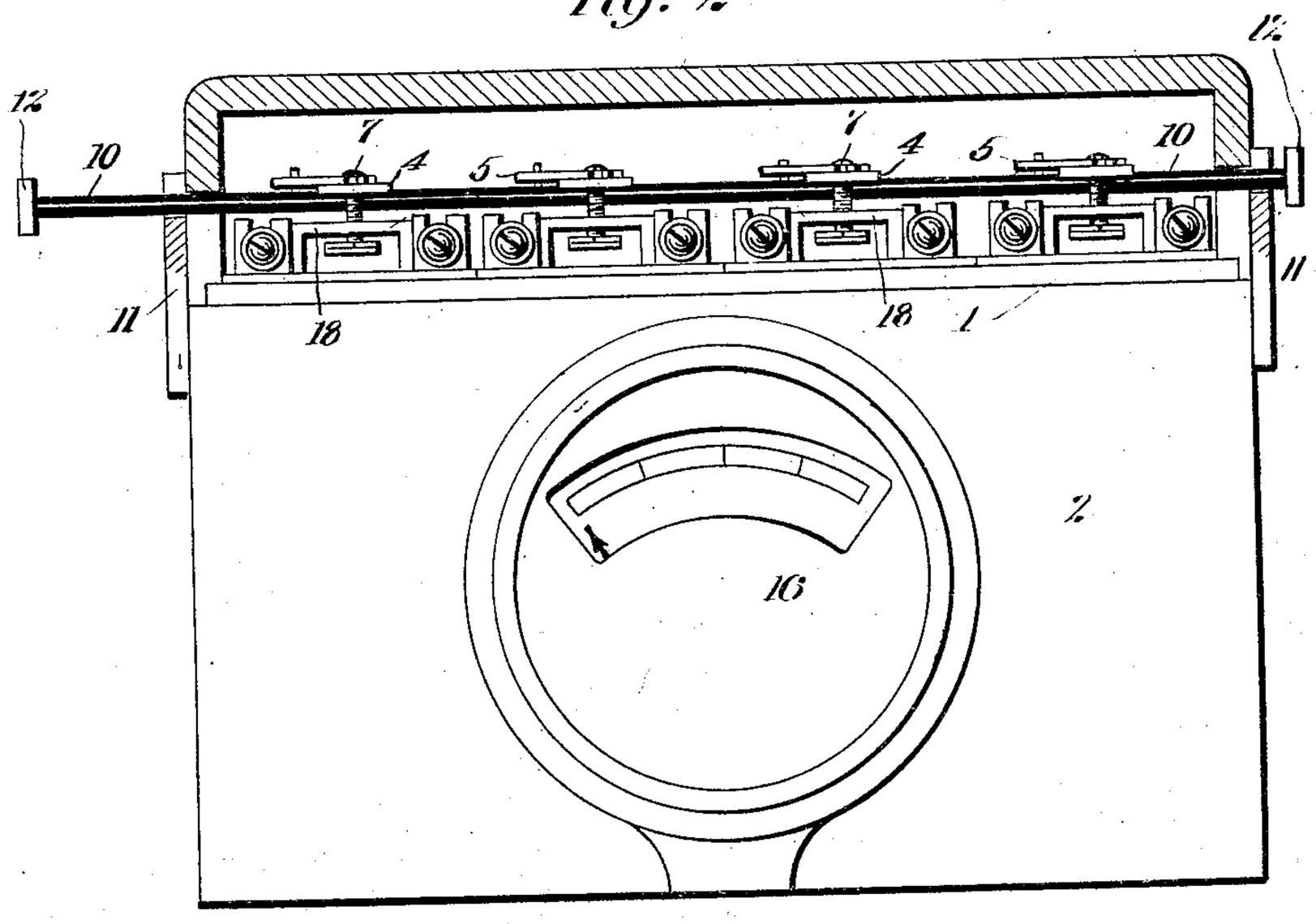
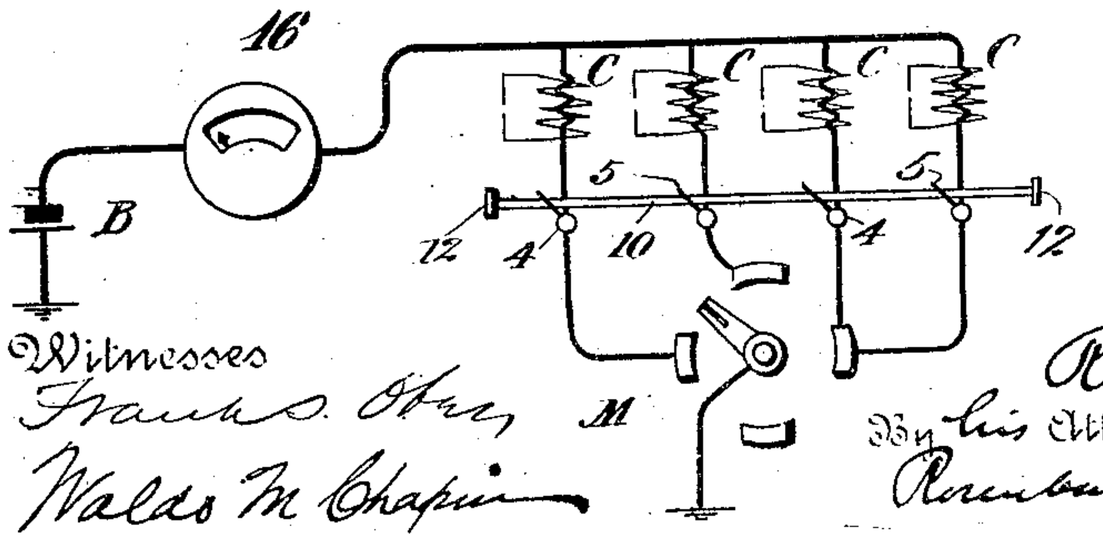


Fig. 3.



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UNITED STATES PATENT OFFICE.

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IGNITION SYSTEM FOR EXPLOSION-ENGINES.

No. 846,811. Specification of Letters Patent. Patented March 12, 1907.

Application filed November 3, 1906. Serial No. 341,925.

To all whom it may concern:

Be it known that I, RICHARD VARLEY, a citizen of the United States, residing at Englewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Ignition Systems for Explosion-Engines, of which the following is a full, clear, and exact description.

My invention relates to ignition systems for explosion-engines, and pertains specially to a means for economizing battery-current, while at the same time enabling the best results to be secured.

It is a fact that the quantity of current taken by vibrator or trembler coils varies greatly according to the adjustment of the vibrator. If the vibrator-contact is screwed down fairly hard, the coil takes from 0.3 to 1.5 amperes; but if the contact is only screwed down slightly only 0.1 or 0.2 will be used. Of course a hotter ignition-spark is obtained with the large current consumption; but in ordinary running the low current gives sufficiently perfect results and at the same time saves the battery and minimizes wear of the vibrators and the commutator. In carrying out my invention I provide means by which the adjustment of all the vibrators can be simultaneously made and the resultant current indicated. This arrangement is found to satisfy a serious need when used with a motor-vehicle. For example, in starting a motor-vehicle the mixture is poor and cold and is not ignited easily. At this time the ignition system should therefore be adjusted for the strongest spark obtainable. This should also be done in hill-climbing, because the compression is higher and more energy is required to fire a highly-compressed charge than one only moderately compressed. Moreover, the power is largely dependent on exact firing, and this can only be had by perfect ignition. On the other hand, it is often desirable to weaken the spark. For example, if one cylinder misses occasionally it becomes necessary to locate which cylinder is missing, and it generally happens that when the clutch is slipped and the engine running idly for the purpose of testing out the cylinders the fault temporarily disappears, due to the light compression under these circumstances. The vibrators would therefore be simultaneously adjusted to give a feeble ignition-spark, so that the weak cylinder will miss and be located. In running along a level road the requirements for power are not large, and the light compression renders a feeble ignition perfectly effective. Moreover, there is a greater dwell or duration of the spark cascade at moderate speeds. Therefore at this time the adjustment would be made to economize the battery. It is also important to determine at times whether an imperfectly-working engine is losing power by reason of the valves or the ignition. By manipulating the devices of my invention hereinafter described it is possible to vary the intensity of the ignition-sparks at will, so as to note the effect on the engine, and thereby ascertain whether it is the ignition or the valves or mixture which is at fault.

Referring to the drawings, Figure 1 is a plan view of a coil-box embodying the principles of my invention. Fig. 2 is a front view of the same. Fig. 3 is a digram of the electrical circuits.

The induction-coils 1 are contained in a box or casing 2 of the ordinary form. Each induction-coil has an ordinary vibrator or trembler 3, the contacts of which are adjustable by thumb-screws 4. These features are the ordinary construction of coil-box and form no part of my present invention. The top surface of each of the thumb-screws 4 receives an arm 5, angularly adjustable thereon in any suitable way. A convenient arrangement is the one shown, where the arms 5 are slotted at 6 and received under a small machine-screw 7, axially threaded into the top of the thumb-screw 4. In this way the arms 5 may be tightly held upon the upper surface of the thumb-screw in any desired angular relation. The outer ends of the arms 5 are also provided with slots 8, and these slots coöperate with pins 9 on a longitudinally-sliding bar 10, of insulating material. This bar 10 extends entirely across the top of the coil-box, being mounted in the guides 11, so as to be capable of a to-and-fro sliding movement. The arrangement is such that when the bar 10 is slid to and fro the arms 5 are all swung angularly in one direction or the other and in corresponding amounts, according to the motion of the bar 10. The angular motion of these arms is directly transmitted to the vibrator-screws

4, which are thereby all adjusted to substantially the same amount and in the same direction. I provide means by which the bar 10 may be slid to and fro either by hand or automatically, as desired. For this purpose I have shown handles 12 at both ends of the bar and a lever-arm 13, having a pin-and-slot connection 14 with the bar and fixed to a shaft 15, which projects upward on the dashboard from the floor of the car. This shaft has any suitable link connection (not shown) with the muffler cut-out or any other controlling parts, whereby the bar 13 may be thrown to increase the current of the various coils whenever the muffler cut-out is opened, as is ordinarily done in hill-climbing. In combination with the above I employ an ammeter 16, which may be conveniently attached to the front of the coil-box. This ammeter operates in connection with the vibrator adjustment, by means of which the results mentioned at the beginning of this specification are attained.

The operation is as follows: The battery B is connected with the primaries of the various coils C through the ammeter 16, the coils being also connected to the usual commutator M, by which they are successively grounded, so as to complete the circuit and induce a secondary discharge through the spark-plugs of the engine. The vibrators 3 of the various induction-coils are initially adjusted by setting the engine at a sparking position and adjusting the vibrator of the operating-coil so as to produce any predetermined reading—say 0.3 ampere. This being done for all the coils, it is merely necessary to tighten the various screws 7, whereupon the apparatus is ready for use. When the engine starts running, the reading will be about 0.2 ampere, depending on the length of dwell of the timer-segments, so that all the coils together draw only two-thirds the current any one of them uses when working continuously. The ammeter would therefore indicate 0.2 ampere. This is sufficient for ignition on level roads. When a hill is encountered, the sliding bar 10 is moved over so as to give a hotter ignition, and this can always be done at any moment when power is needed or when it is found the engine is not working perfectly satisfactorily. Thus not only is the battery-current greatly economized and the burning of the commutator-segments prevented and fusing of the platinum vibrator-contacts minimized, but a means is provided for readily indicating engine and ignition troubles, for making all necessary adjustments of the vibrators, and for continuously showing the condition of the batteries.

An important feature of the invention relates to the way in which a perfect circuit is insured between the vibrator-screws and their connected parts or terminals. Since the vibrator-screws work in an oily guide or bearing, it is desirable to have means independent of such bearing for establishing the electrical circuit therewith. For this purpose I employ flexible leads 17, which are soldered to the arms 5 and to the bearing or guide 18, in which the vibrator-screws move. Since the arms 5 never have more than a certain limited angular movement, these flexible leads answer perfectly for all requirements.

What I claim is—

1. In an ignition system for explosion-engines, a plurality of vibrator induction-coils having their primaries connected to a common circuit, and means for simultaneously increasing the current received by said coils.

2. In an ignition system for explosion-engines, a plurality of vibrator induction-coils having their primaries connected to a common circuit, means for separately adjusting the coils to take a predetermined current, and means for simultaneously adjusting the coils whereby such current is varied in corresponding amounts in all the coils.

3. In an ignition system for explosion-engines, a plurality of vibrator induction-coils having their primaries connected to a common circuit, and means for separately adjusting the vibrators of the coils, and means for simultaneously adjusting the vibrators of all the coils in corresponding amounts and directions.

4. In an ignition system for explosion-engines, a plurality of coils having vibrator-screws, an arm adjustably attached to said vibrator-screws, and a sliding rod connected to said arms and adapted to swing all of them through a corresponding angle when it is shifted.

5. In an ignition system for explosion-engines, a plurality of vibrator induction-coils having their primaries connected to a common circuit, an ammeter in such circuit, and means for simultaneously adjusting the vibrators of all the coils.

6. In an ignition system for explosion engines, a plurality of vibrator induction-coils having their primaries connected to a common circuit, an ammeter in such circuit, and means for simultaneously adjusting the vibrators of all the coils in corresponding amounts and directions.

7. In an ignition system for explosion-engines, a plurality of induction-coils having their primaries connected to a common source of battery-current, an ammeter in circuit therewith, and means for automatically adjusting the vibrators of all the coils to take more current when the engine is manipulated to obtain more power.

8. In an ignition system for explosion-engines, a plurality of vibrator induction-coils having their primaries connected to a com-

mon circuit, and means connected with the muffler cut-out of the engine for simultaneously adjusting the vibrators of all the coils.

9. In an ignition system for explosion-engines, a plurality of coils having vibrator-screws, an arm adjustably attached to said vibrator-screws, a sliding rod connected to said arms and adapted to swing all of them through a corresponding angle when it is shifted, and an ammeter in circuit with all of the coils to indicate the condition of the adjustment.

10. In an ignition system for explosion-engines, a plurality of coils each having a vibrator-screw, an arm adjustable on said vibrator-screws, and flexible primary-circuit leads attached to said arms.

In witness whereof I subscribe my signature in the presence of two witnesses.

RICHARD VARLEY.

Witnesses:
FRANK S. OBER,
WALDO M. CHAPIN.