Oct. 7, 1941. C. F. HOLCOMBE 2,257,958

SPARK PLUG TESTER

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Fig. 1.

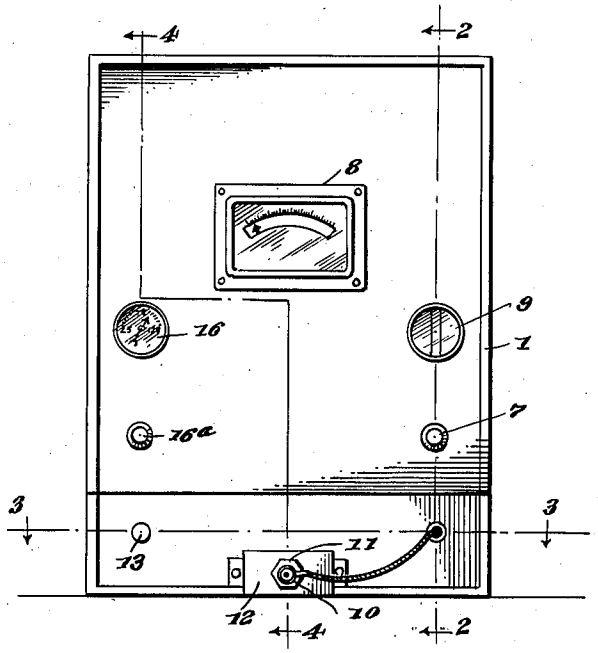


Fig. 2.

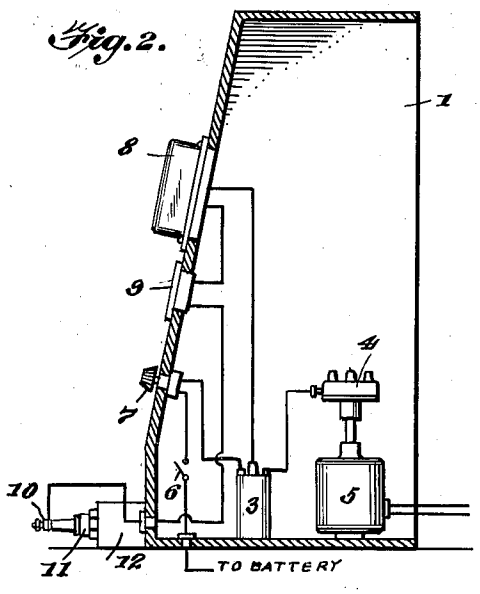
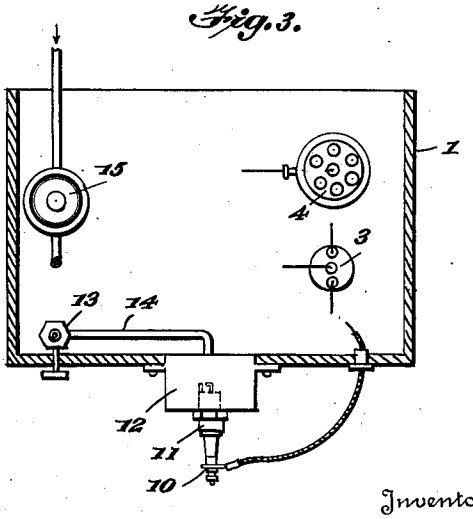


Fig. 3.



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Fig. 4.

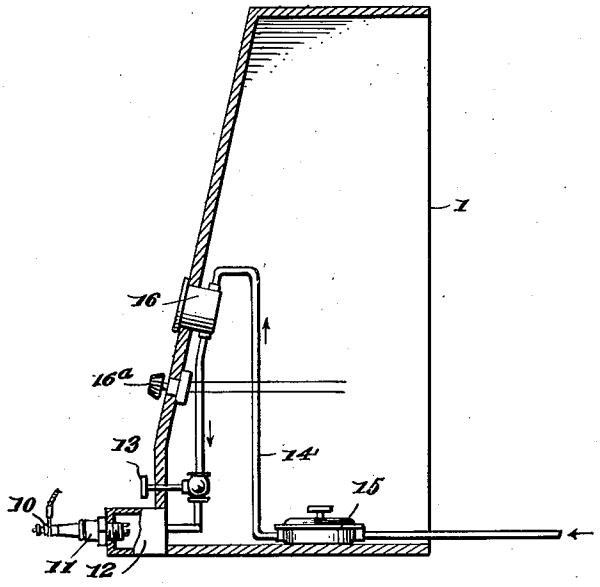
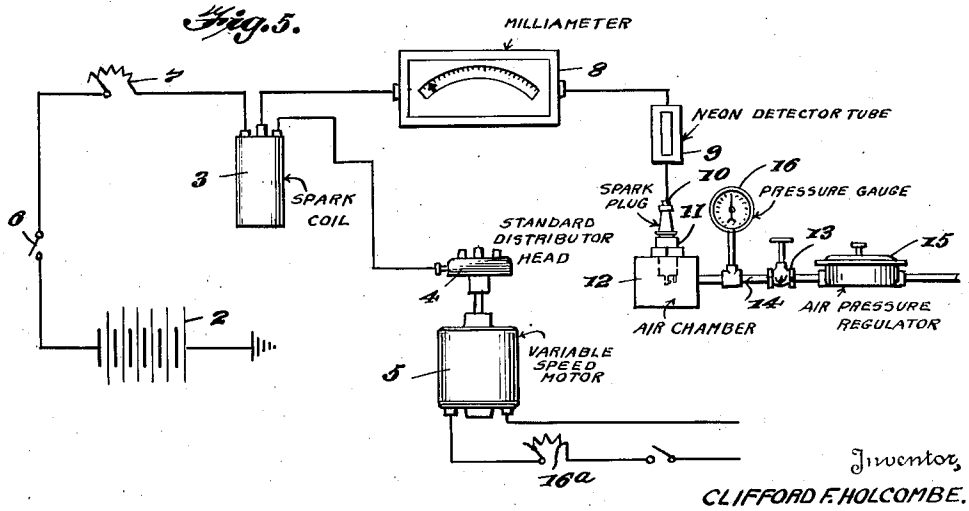


Fig. 5.



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UNITED STATES PATENT OFFICE

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SPARK PLUG TESTER

Clifford F. Holcombe, San Antonio, Tex.

Application April 29, 1940, Serial No. 332,381

1 Claim. (Cl. 175—183)

This invention relates to a spark plug tester.

An object of this invention is to provide novel and efficient means for testing spark plugs, in which the three factors governing spark plug performance can be duplicated, i. e., compression pressure, motor speed, and the volume of current that the coil can deliver to the plug.

In all plug testers in use today, the only means of judging the effective discharge across the points is by visual judgment of the brilliancy of the spark, and no means is provided to determine the amount of current flowing across the points, nor the output of the coil being used for test purposes.

Therefore, another object of this invention is the provision of novel and efficient means for testing a plug under every condition that will effect its performance in an engine, just the same as when the plug is being used on an engine or motor.

A still further object is the construction of an apparatus that furnishes means of duplicating all of the factors of an engine operation which affects spark plug performance, and measures the actual discharge of current across the points of the plug; no part of the test is left to the frailty of human judgment; but is measured and shown on the meter and gauges.

With the foregoing and other objects in view, the invention comprises certain novel constructions, combinations, and arrangements of parts as will be hereinafter fully described, illustrated in the accompanying drawings, and more particularly pointed out in the appended claim.

In the drawings:

Figure 1 is a view in elevation of an apparatus constructed in accordance with the present invention.

Figure 2 is a vertical sectional view, taken on line 2—2, Fig. 1, and looking in the direction of the arrows.

Figure 3 is a horizontal sectional view, taken on line 3—3, Fig. 1 and looking in the direction of the arrows.

Figure 4 is a sectional view, taken on line 4—4, Fig. 1 and looking in the direction of the arrows.

Figure 5 is a diagrammatic view of the apparatus.

Referring to the drawings, in which I have shown the preferred embodiment of my apparatus, 1 designates a casing or cabinet in which the apparatus is mounted. The apparatus comprises a conventional ignition system, in which 2 is a standard type storage battery which supplies current for the primary circuit of the spark coil 3, which spark coil 3 is connected to a standard distributor 4, which distributor 4 is driven by a variable speed motor 5. A switch 6 is incorporated in the primary circuit as well as a rheostat 7, the function of which will be explained in the operation of the apparatus. This circuit, with the exception of the rheostat 7, is the conventional ignition system of the present day gasoline engine.

In the secondary circuit, a milliammeter 8 is connected in series with the spark coil 3, and a neon detector tube 9, which is in turn connected to the spark plug terminal 10 (Fig. 5). The spark plug 11 is screwed into the air chamber 12 into which air pressure may be admitted by means of a valve 13; the valve 13 being on the pipe line 14. The air pressure regulator 15 is in communication with the valve 13, as clearly shown in Figure 5. The air chamber 12 is also in communication, through pipe line 14, with the air gauge 16.

The operation of the apparatus is as follows: First, the compression pressure and coil output of the particular engine, in which the plug to be tested has been used, is determined. For example, the compression pressure was found to be 100 pounds, and the normal coil discharge .5 of a milliampere. First the valve 13 is opened to allow air to flow into the air chamber 12, into which the plug 11 has been screwed. The air pressure is then regulated to 100 pounds by means of the pressure regulator 15. The ignition coil being used in this circuit is of the high output type, which delivers a far greater volume of current than the standard ignition coil. By decreasing the amount of current flowing through the primary circuit of the coil 3, the output of a secondary circuit is also reduced which means less volume of current delivered to the spark plug 11. This is accomplished by regulating the rheostat 7 so as to diminish the flow of current through the primary circuit of the coil 3 and reduce the output of the coil to the equivalent of the coil on the vehicle in which the plug is to be used. The point of setting the rheostat 7 must be determined by calibrating the rheostat so that the value of any standard coil may readily be duplicated. The operator now has the same compression pressure as the motor uses and has adjusted the flow of current in the primary circuit of the coils so as to reduce the value of current delivered in the secondary circuit of the coil to the same amount as the coil on the car will deliver.

As the modern motor operates at speeds varying from approximately 350 to 3500 revolutions

per minute, the spark plug 11 should be tested at various speeds through this range in order to determine its true condition. This is accomplished by varying the speed of the motor 5 by means of the rheostat 16a (Fig. 5). This varies the speed of the cam, which cam is a duplicate of the distributor cam on the car and so causes more or less spark to be delivered to the plug 11, just as is the case on engine when it is accelerated or decelerated.

While operating this plug under these conditions of speed and compression, the amount of current being delivered across the points of the spark plug can be readily determined by observing the reading of the millammeter 8 and the steadiness of flow of current as shown by the detector tube 9. By comparing the performance of a new plug and a used plug under these identical operating conditions, the efficiency of the used plug can be determined. The efficiency of various types or makes of plugs can readily be compared, and the point of service (mileage operated) at which plugs should be serviced can be quickly determined.

The detector tube 9 is used to detect any tendency to "cutting out" or erratic firing. The detector tube 9 will show up this condition much easier than trying to observe any flicker in the milliammeter 8.

Therefore, it will be seen that this testing apparatus provides means of duplicating all of the factors of engine operation which effects spark plug performance, and measures the actual discharge of current across the points of the plug. No part of the test is left to the frailty of human judgment, but is measured and shown on the meter and gauges.

The advantages of this novel apparatus over the prior art are as follows: Positive control over volume over coil discharge, which means exact duplication of car speed and coil strength, and the positive measurement of the current flowing across the plug points.

I may call this plug-tester a "spark plug dynamo-meter," because, as the name implies, it is an apparatus for measuring the force or power of the spark plugs.

While I have described the preferred embodiment of my invention and illustrated the same in the accompanying drawings, certain changes or alterations may appear to one skilled in the art to which this invention relates during the extensive manufacture of the same and I, therefore, reserve the right to make such changes or alterations as shall fairly fall within the scope of the appended claim.

What I claim is:

In an apparatus for testing spark plugs, a spark-plug receiving air chamber, a pipe line for delivering air under pressure to said air chamber having a pressure regulator therein and a pressure gauge and a valve in the pipe line between the pressure regulator and the air chamber, and electrical indicating means including a spark coil, a distributor head in circuit with the primary winding of the spark coil and driven by a variable speed motor, a milliammeter and a neon detector tube in series with the secondary winding of the spark coil and adapted to be connected in series with a spark plug on the air chamber whereby the spark plug may be tested, and a rheostat for controlling flow of current from a source through the spark coil.

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