June 24, 1930. A. H. BENSON 1,765,479

ELECTRICAL TESTING INSTRUMENT

Filed April 7, 1927 2 Sheets-Sheet 1

Fig. 1.

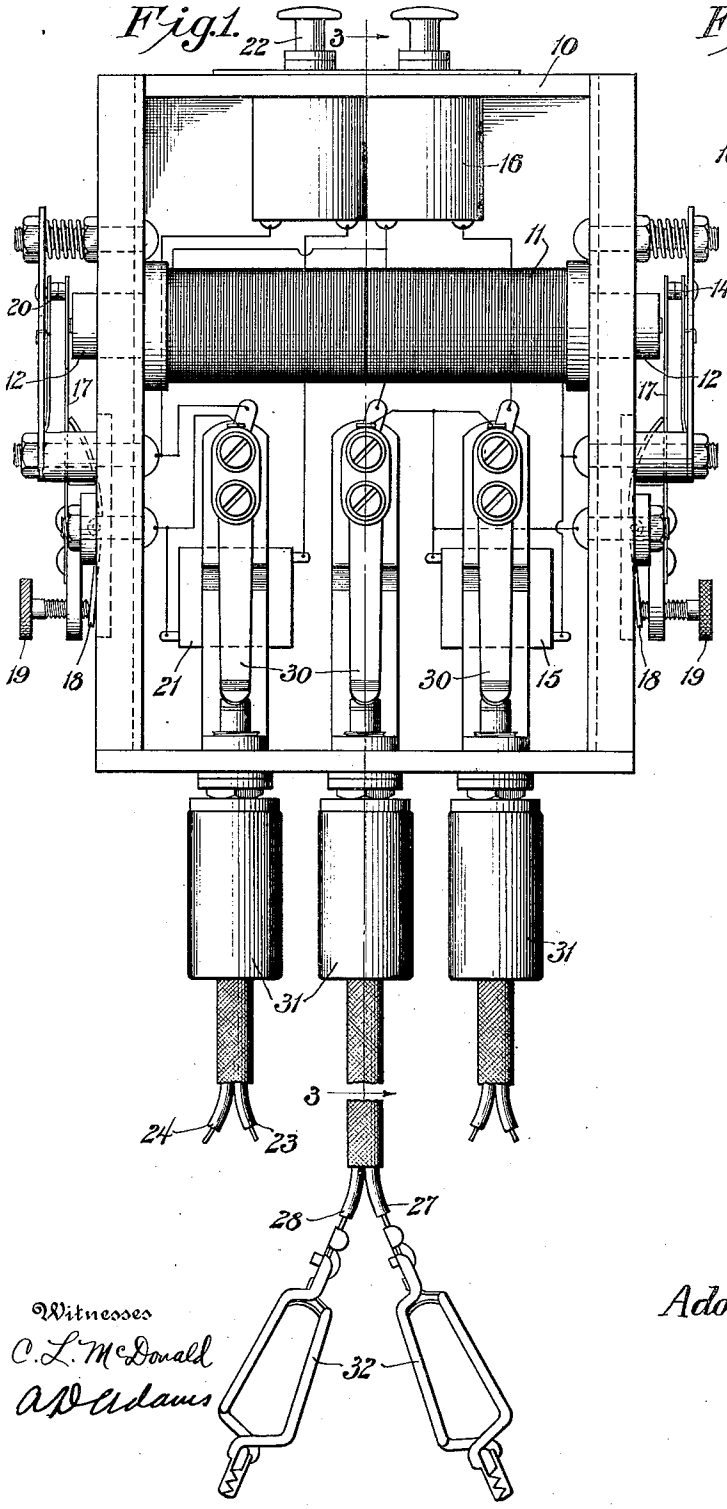
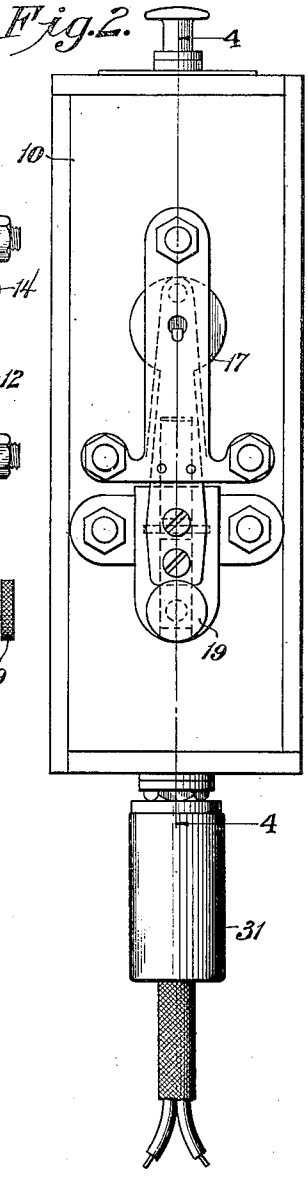


Fig. 2.



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Fig. 3.

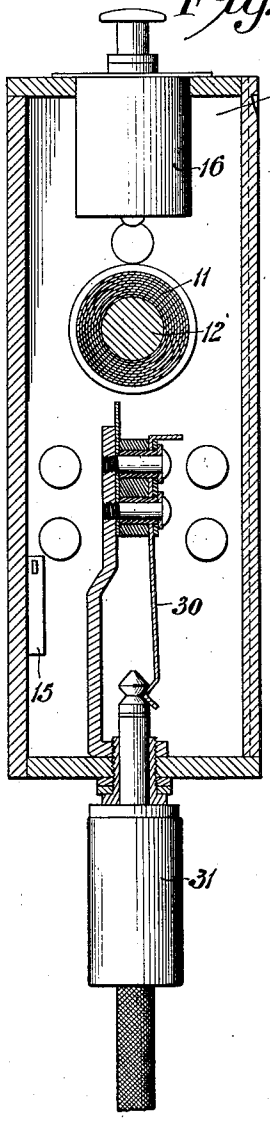


Fig. 4.

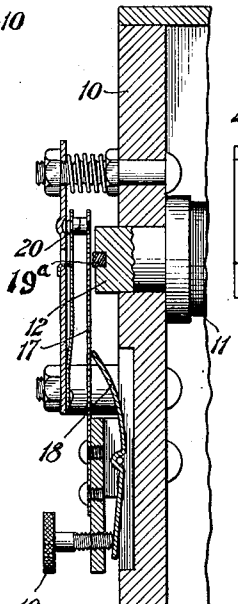
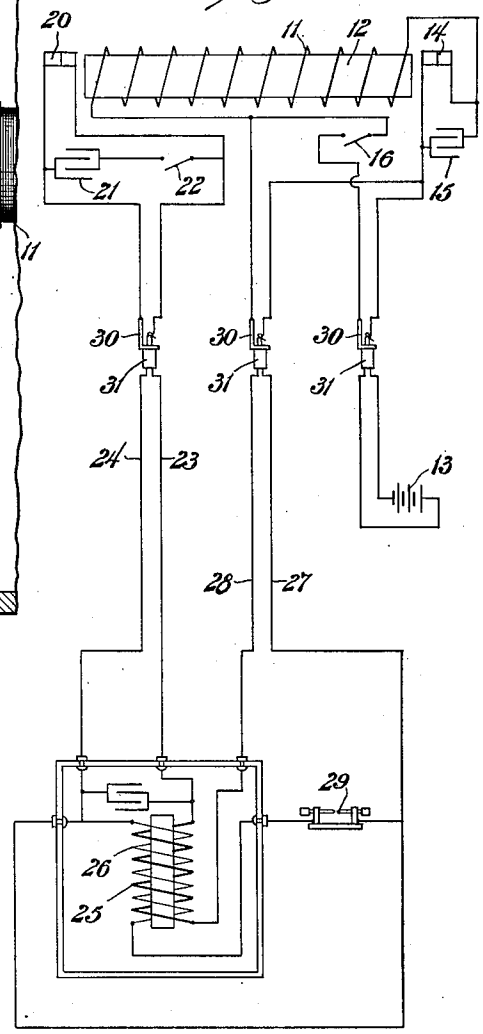


Fig. 5.



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UNITED STATES PATENT OFFICE

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ELECTRICAL TESTING INSTRUMENT

Application filed April 7, 1927. Serial No. 181,769.

My invention aims to provide an improved testing instrument for electrical apparatus such as ignition coils, magneto armature windings and the like.

One of the objects is to provide a simple and compact tester that may be made and sold very cheaply and that may be used to determine faults or defective wiring in the ignition systems of automobile engines, magneto windings, spark plugs and the like.

Other objects and advantages of my invention will appear in the specification, when considered in connection with the accompanying drawings wherein I have shown a preferred embodiment thereof and, in which,

Fig. 1 is a top plan view of a tester embodying my invention;

Fig. 2 is a view taken from one side of Fig. 1;

Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary cross sectional view taken on the line 4—4 of Fig. 2; and

Fig. 5 is a wiring diagram of the tester shown in Fig. 1, showing it applied to a high tension induction coil.

Referring specifically to the drawings and to the embodiment of the invention which I have selected for illustrative purposes, my improved tester, there shown, is carried in a suitable casing 10 such as a wooden box to protect the delicate parts.

Between the side walls of the casing, I have shown an electro-magnet 11 having a core 12 projecting through the walls. The coil of the electro-magnet is adapted to be connected in circuit with a source of E. M. F. 13. shown as a battery (Fig. 5). This circuit preferably includes an interrupter 14 secured to the casing adjacent to one end of the core 12 and a condenser 15 both in the line from one terminal of the battery 13 and a switch 16 of the push button type is arranged in the line from the other terminal of the battery. This arrangement is somewhat similar to an ordinary electric buzzer except that I employ means to vary the spring tension of the armature spring 17 of the interrupter which, in the present example, includes a pivotally mounted leaf spring 18 (Fig. 4) having one end pressing against the under side of the armature spring and the other end, beyond the pivot bearing, arranged to be adjusted by a thumb screw 19 whereby to regulate the speed of the vibrator and thus the induced voltage passing through the various circuits of the apparatus to be tested. Moreover, in a recess in the end of the core I provide a piece of fibre or other non-magnetic material 19a to prevent the armature from sticking due to residual magnetism in the core after the current is cut off.

At the opposite end of the core 12 of the electro-magnet, is another interrupter 20 which is identical with the interrupter 14, likewise including a shunting condenser 21 which can be cut out by a switch 22, in its circuit but this circuit is adapted to be connected to the apparatus to be tested provided it does not include a condenser. In this instance lead wires 23 and 24 are connected to one terminal of the primary winding 25 and to one terminal of the secondary winding 26, respectively, of a high tension induction or ignition coil.

The lead wire 24 as shown in the wiring diagram, is connected by a lead wire 27 in circuit with the positive terminal of the battery, while the opposite terminal of the primary coil 25 is connected by a lead wire 28 in circuit with the negative terminal of the battery. Across the lower terminal of the secondary winding 26 and the lead wire 27, I interpose an adjustable spark gap 29.

The circuits just described are complete for conducting a test of an ordinary high tension, ignition coil which is not provided with an interrupter. For convenience from the standpoint of packing as well as practical application, I have shown jacks 30 in the casing 10 for standard jack plugs 31 on the various pairs of lead wires and I provide suitably colored or numbered spring clips 32 (Fig. 1) on the ends of the wires to enable an operator quickly to apply them in accordance with simple instructions.

When the coil is connected as shown in Fig. 5 and the switch 16 is closed, current from the battery passes through the interrupter 14 and the winding of the magnet 11.

The interrupter functions in the manner of the well known buzzer and periodically opens and closes the battery circuit through the magnet winding, thus magnetizing and demagnetizing the core 12 rapidly. When the core is magnetized, the contacts of the vibrator 20 are opened and closed. The connections are such that the battery is connected in series with the primary of the induction coil through the interrupter 20 and the operation of this interrupter causes pulsating currents to flow in the primary and induce high frequency currents in the secondary in the well known manner, if the induction coil is in good order. Such current will be manifest by sparking at the gap 29, and if such spark is fat and of the proper color, will indicate that the coil being tested is good. A weak spark or the absence of any spark will indicate a bad or defective coil.

By using two interrupters on the one coil, two advantages are obtained, viz: no mechanical interrupter will be employed to cause the coil to operate, and the coil used to drive the interrupter does not have to be placed in series with the primary of the coil being tested to thus change the resistance of the primary circuit.

The condenser 21 is used only when the coil being tested is not provided with one and may be used to ascertain a failure of the coil.

From the foregoing description, it will be observed, among other things, that my improved tester eliminates the necessity to employ complicated and expensive mechanical interrupters; that the simple electro-magnetically operated circuit makers and breakers are very compact; that the instrument is relatively inexpensive and easy to apply to ignition coils in situ; and, that the operator needs only to give his attention to the character of the spark across the spark gap after he completes the circuits.

Obviously the present invention is not restricted to the particular embodiment thereof herein shown and described. Moreover, it is not indispensable that all the features of the invention be used conjointly since they may be employed advantageously in various combinations and sub-combinations.

What I claim is:

1. In an interrupter for electromagnets of the class described, a spring armature; a pivoted leaf spring having one end engaging the underside of the armature; and an adjustable abutment for the other end.

2. In an interrupter of the class described, a spring armature; means for varying the tension of the armature; said means comprising a leaf spring pivoted intermediate its ends; one end of the spring engaging the underside of the armature intermediate of its ends; and a thumb screw mounted in a fixed support and engageable with the outer side of the other end of the spring.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature.

ADOLPH H. BENSON.