

June 27, 1933.

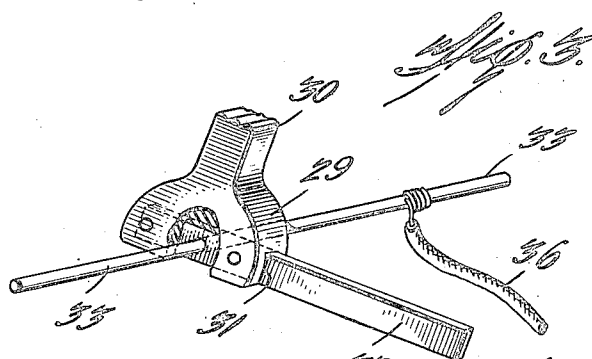
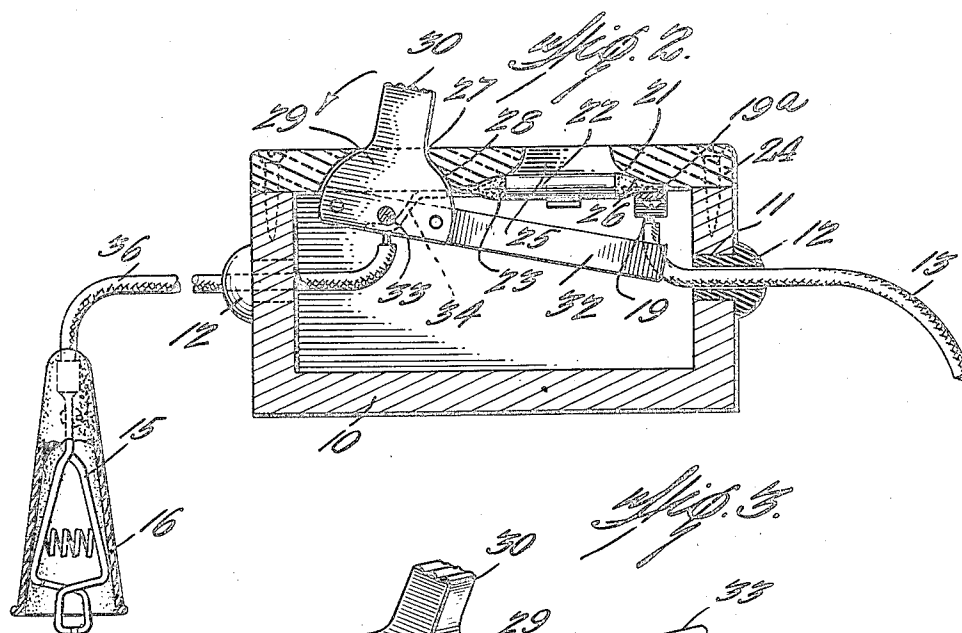
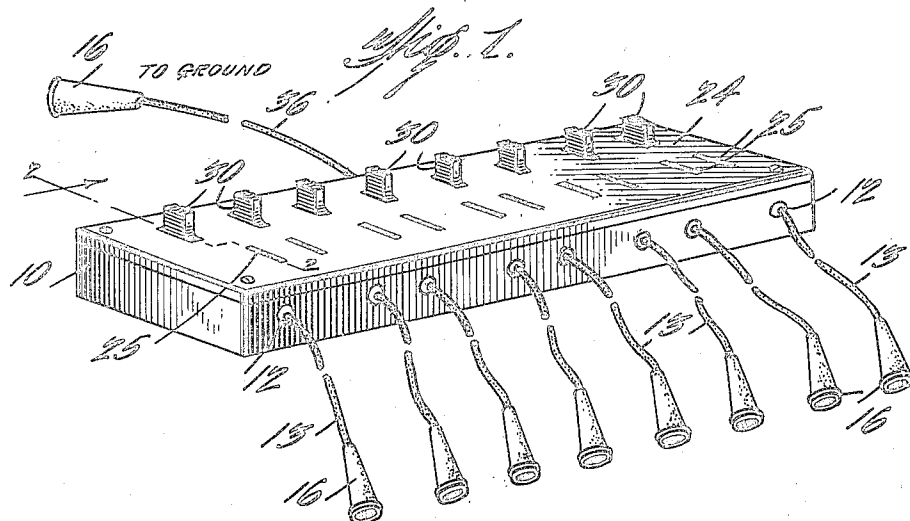
T. J. WISEMAN

1,915,709

TESTER FOR INTERNAL COMBUSTION ENGINES

Filed Feb. 8, 1932

2 Sheets-Sheet 1



Inventor

Thomas J. Wiseman
By *Mark A. Adelman*
Attorney

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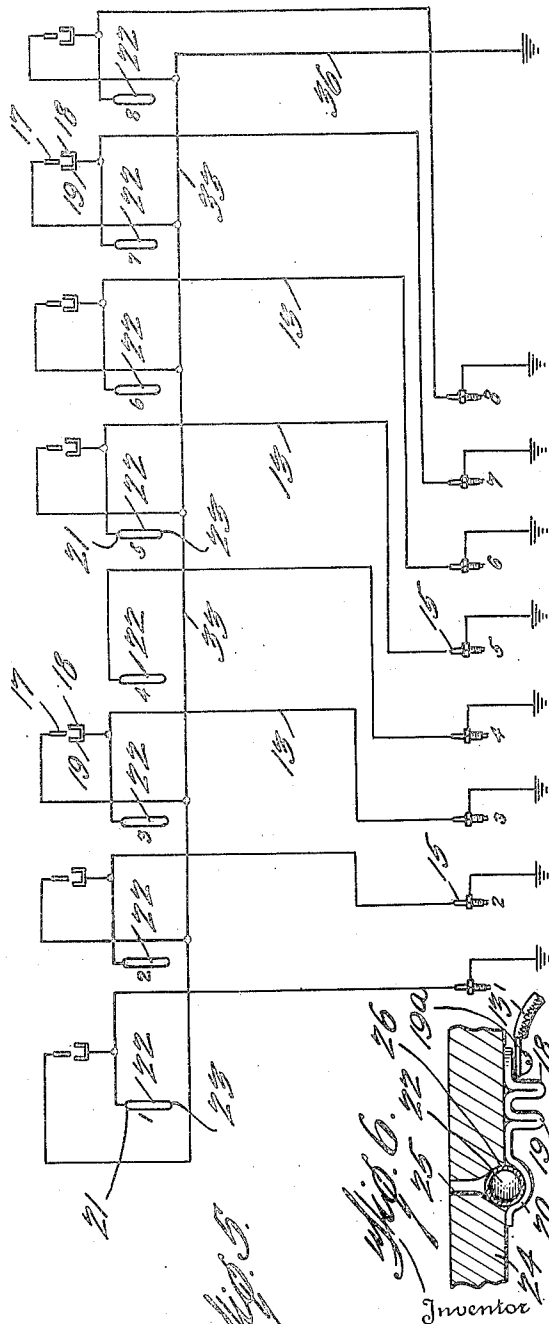
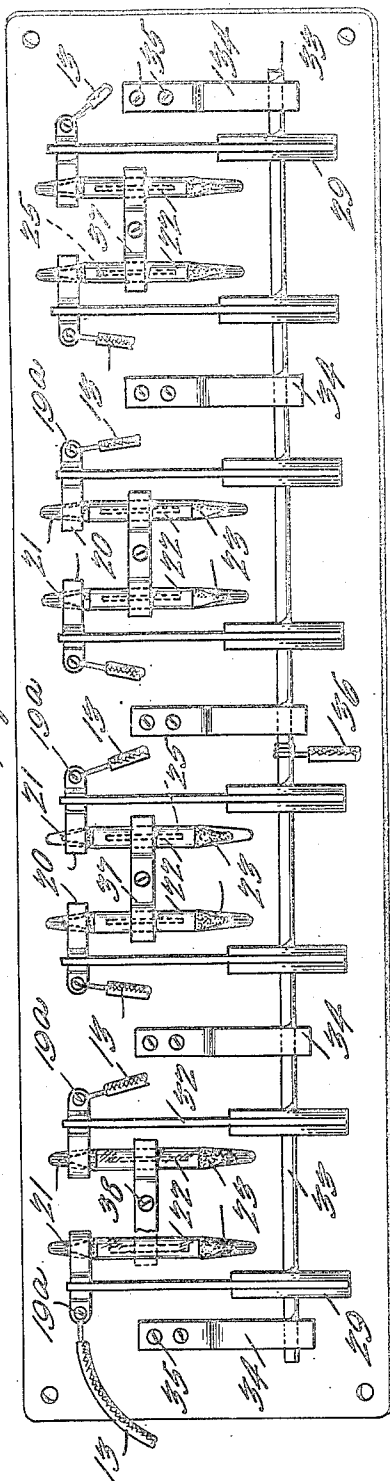
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TESTER FOR INTERNAL COMBUSTION ENGINES

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2 Sheets-Sheet 2



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W.P.S.
W.P.S.
Inventor
Thomas J. Freeman
By Messrs. Chandler.
Attorney

By

Miss. Adamsman.

Attorney,

UNITED STATES PATENT OFFICE

THOMAS J. WISEMAN, OF NITRO, WEST VIRGINIA

TESTER FOR INTERNAL COMBUSTION ENGINES

Application filed February 8, 1932. Serial No. 591,715.

This invention relates to testers for internal combustion engines, and has for an object the provision of novel means for determining whether there is a circuit through the spark plugs from the conductors to ground and, if there is a circuit, whether it is producing a normally operative spark or an impaired ignition. The difficulties of locating trouble in one or more of a multi-cylinder internal combustion engine are, of course, known to those who have tested for impairment of function, and it is an object of this invention to provide a compact testing device which will indicate the distribution of current or the lack of distribution, the said device being capable of detecting defects through the use of visual signals which may be inspected as the mechanisms are actuated to make and break a circuit from the spark plug to a ground connection of the high tension electric circuit.

It is a further object of this invention to provide a casing in which the operating parts of the switches are enclosed, the top of the casing being provided with slots or openings, through which the visual signal is exposed.

It is a further object of this invention to provide switch operating instrumentalities having manually operable parts extending through the casing where they are readily accessible, such parts being the only operative parts of the mechanism which are exposed and which could likely be damaged in handling or manipulating the tester.

It is a still further object of this invention to produce a tester which requires comparatively small storage space and that can be expeditiously manipulated both in the application to the parts of the engine being tested and its removal therefrom, as well as in the operation of the parts for making and breaking the circuit.

With the foregoing and other objects in view, the invention consists in the details of construction, and in the arrangement and combination of parts to be hereinafter more fully set forth and claimed.

In describing the invention in detail, reference will be had to the accompanying drawings forming part of this application, where-

in like characters denote corresponding parts in the several views, and in which—

Figure 1 illustrates a view in perspective of a tester embodying the invention;

Figure 2 illustrates an enlarged transverse sectional view on the line 2—2 of Fig. 1;

Figure 3 illustrates a perspective view of fragments of the circuit controlling means;

Figure 4 illustrates an underneath plan view of a cover or lid for the casing;

Figure 5 illustrates a diagrammatic view of the circuits; and

Figure 6 illustrates an enlarged sectional view through a fragment of the cover and parts associated with it.

It is the purpose of this inventor to provide a tester which will be effective for testing an engine having any number of cylinders and the present embodiment of the invention illustrates a tester for an engine having eight cylinders.

In these drawings, 10 denotes a rectangular housing or casing having a plurality of openings such as 11 on one side, and each of said openings is provided preferably with an insulator 12 through which a conductor 13 extends. Each conductor 13 has its inner end attached to a binding post or terminal 14 and its outer end is connected to a clip 15 of appropriate type which, in the present embodiment of the invention, is of conventional type, capable of being clamped to an electrode of a spark plug. The inventor does not wish to be limited with respect to the type of clip employed and therefore a description of the details of construction of the clip is omitted. It has been found desirable to provide insulating nipples 16 for the clips, the said nipples, in the present embodiment of the invention, being flexible in order that when they are pressed they will operate the clip for opening its jaws to embrace an electrode.

Each binding post or terminal, in the present embodiment of the invention, is formed by employing a strip of conductive metal, such as copper, and shaping it between its ends to form a seat for a knife switch 17. In forming the said seat, the strip is doubled on itself at locations 18 and 19, the doubled

portions being in spaced relation to each other and the space therebetween forming the seat for the said switch blade, it being understood that the doubled portions are in such spaced relation to each other that the blade will wipe the sides thereof in entering the seat so that there will be electrical contact between the blade and the parts forming the seat. Each strip may be secured to the under side of the cover by a screw 19^a to which an end of a conductor 13 is attached. The end 20 of the strip remote from the binding post is shaped to partially embrace the cap or terminal 21 of a vacuum lamp 22, the said lamp being supplied with a cap or terminal 23 at its opposite end located in certain relation to a ground connection, as will presently appear.

The cover 24 of the casing has a plurality of windows therein, formed in the present instance, by providing slots 25 which are elongated transversely of the cover and each slot merges with a transversely disposed recess 26 in the inner surface of the cover, each recess constituting a seat for a lamp.

The cover 24 is also provided with a plurality of apertures 27 which merge with transversely disposed recesses 28 in the inner surface of the cover, one such aperture and recess being formed for each window in the cover. Each aperture and recess last mentioned contains a switch operating member which, in the present embodiment of the invention, comprises an insulating body 29 with a finger piece extension 30. The contour of the body 29 is such that it fits in the recess 28 and the extension 30 projects through the aperture of the top where it is accessible for manipulation. The body 29 has a slot 31 in which a blade 32 is seated, the said blade extending practically through the body and with the body, has an aperture to receive a rod 33 that extends longitudinally of the housing. The body 29 and blade 32 are oscillatable on the rod 33 and the blade is arranged to be in electrical contact with the said rod. When the parts are assembled, the rod is engaged by resilient clips 34, the free ends of which extend across and in engagement with the said rod, whereas the opposite end of each clip is secured to the under surface of the cover by fastenings 35 such as screws or the like. The rod 33 constitutes a connection for a ground conductor 36, which conductor is supplied with a clip and insulator, as disclosed in Figure 2 and described in connection therewith.

In the diagrammatic view, Figure 5, the lamps 22 are numbered from 1 to 8 to indicate the cylinders, and the spark plugs included in the high tension circuit are likewise numbered from 1 to 8. The other connections of the diagram are numbered in accordance with the mechanical parts of the

tester, to which reference has been made in the specification.

From an inspection of the drawings and from the foregoing description, it is apparent that when the tester has its clips connected to the electrodes of the spark plugs of an engine and the ground connection clip fastened to some metallic part of the engine casing or other element which will form a ground, the manipulation of the device which will move the switch member into and out of engagement with the terminals will result in intermittently short circuiting a normal circuit of the high tension system. When the circuit is changed the lamps will exhibit visual signals proportional to the intensity of the current passing through them, it being understood that the terminals 23 of the several lamps are in such proximity to the rod 33 as to permit a circuit which will illuminate the lamps.

The tubes are held in place in the casing by strips 37 and the said strips are secured by fastenings 38 such as screws or the like.

I claim:

1. In a tester for internal combustion engines, a housing having windows, a lamp disposed in the housing for each window, contact strips disposed in the housing, each of which engages a lamp and conducts current thereto, a rod extending longitudinally of the housing in position to receive current from the lamps, a switch blade for each contact strip electrically connected to the rod, means oscillatable on the rod and extending externally of the housing for operating each switch blade, a grounding conductor connected to the rod, and conductors connected to the contact strips and adapted to be anchored to spark plugs of internal combustion engines.

2. In a tester for internal combustion engines, a housing, a cover therefor having windows, lamps disposed in the housing under each window, a contact strip secured to the under side of the cover for each lamp and operative to conduct current thereto, a rod extending longitudinally of the cover, a switch blade for each contact strip oscillatably mounted on the rod and electrically connected thereto, means oscillatable on the rod and extending through the cover for operating each switch blade, a grounding conductor connected to the rod and adapted to be anchored to a grounding part of the engine, and conductors connected to the contact strips and adapted to be anchored to spark plugs of the engine.

3. In a tester for internal combustion engines, a housing, a cover therefor having windows, lamps attached to the cover under each window, a contact strip secured to the under side of the cover for each lamp and operative to conduct current thereto, a rod extending longitudinally of the cover, a switch

blade for each contact strip oscillatably mounted on the rod and electrically connected thereto, members oscillatable on the rod to which the switch blades are connected, parts
5 of the said members extending through the cover for manipulation in rocking the members on the rod, a grounding conductor connected to the rod, and conductors connected to the contact strips and adapted to be connected to spark plugs of the engine.

4. In a tester for internal combustion engines, a housing, a cover therefor having windows, the said cover having recesses on its inner surface in line with the windows,
15 lamps located in said recesses, means for holding the lamps in place, the said cover having transversely disposed recesses merging with an aperture, a rod in the housing extending transversely of the said recesses, ele-

ments in the last mentioned recesses oscillatably mounted on the rod and having portions projecting through the apertures with which the recesses merge, the said projections constituting means for manipulating the members, switch blades electrically connected to the rod and carried by the said members, contact strips with relation to which the blades are operable, means for securing the contact strips in place with portions thereof in contact with the aforesaid lamps, conductors connected to the contact strips and adapted to be connected to spark plugs of internal combustion engines, and a grounding conductor connected to the rod and having means
80 for attaching it to a metal part of the said engine.

THOMAS J. WISEMAN.

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