

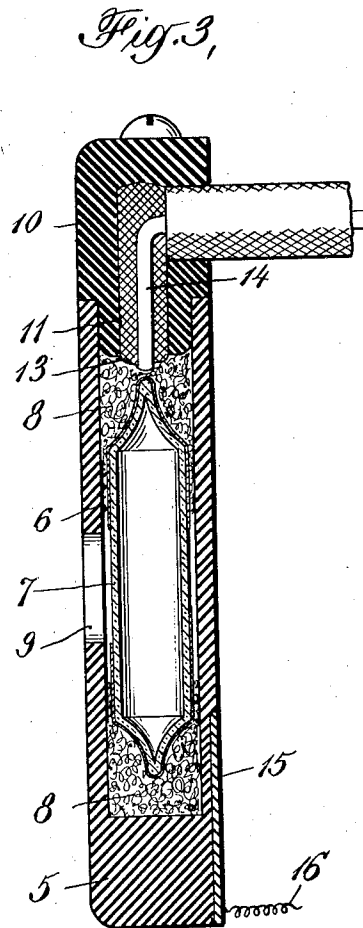
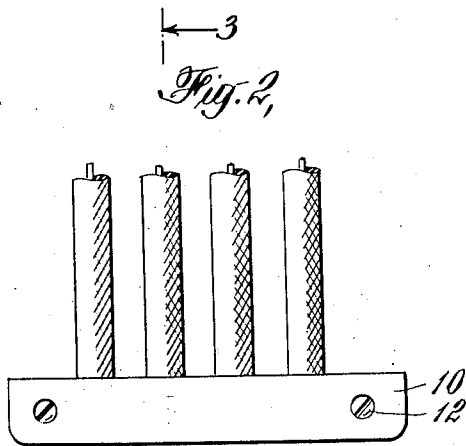
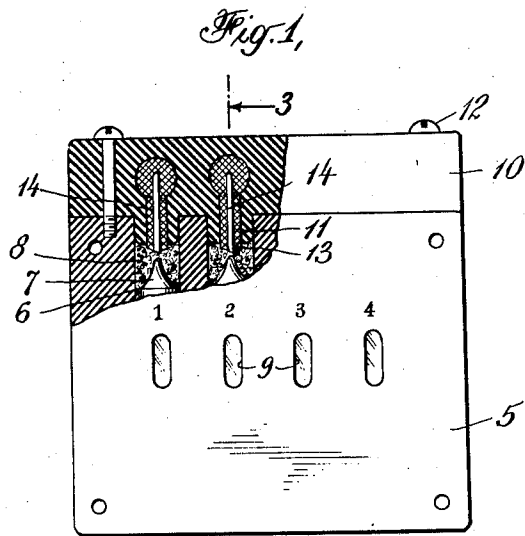
July 13, 1926.

1,592,533

F. J. METZGER

INDICATOR

Filed April 4, 1922



Inventor

F. J. Metzger

By Attorneys

Tennil, Davis, Marvin & Edmonds

Patented July 13, 1926.

1,592,533

UNITED STATES PATENT OFFICE.

FLOYD J. METZGER, OF NEW YORK, N. Y., ASSIGNOR TO AIR REDUCTION COMPANY, INCORPORATED, A CORPORATION OF NEW YORK.

INDICATOR.

Application filed April 4, 1922. Serial No. 549,508.

This invention relates to an indicator for determining the condition of the ignition systems of internal combustion engines, and particularly to a device which may be connected to the ignition system of a multi-cylinder engine to indicate the ignition conditions in the respective cylinders.

The invention depends primarily upon the utilization of a receptacle or tube containing a gas such as neon, helium or the like, which, having a low dielectric coefficient, is readily excited and caused to flash by the discharge of high tension electric currents through the gas. The flash in the case of neon is of a vivid reddish-orange color which readily serves to inform an observer of the passage of current. The gas is sufficiently sensitive so that it is not necessary to provide electrodes extending into the indicator receptacles or tubes, and although electrodes may be used, the ends of the tubes in the preferred embodiment of the invention are provided with externally disposed capacity media which materially increase the brightness of the flash when the discharge takes place.

It has been suggested heretofore to employ tubes containing neon as indicators for the ignition conditions of internal combustion engines, and a device which is adapted to be manually applied to the spark plugs or the conductors leading thereto is described in my copending application Serial No. 475,778. Such a device is useful when the operator can obtain access to the engine, the vehicle being permitted to stand while the engine runs idly. The ignition conditions are different, however, when the engine is loaded and the operator of a motor-driven vehicle frequently desires to determine the condition of the ignition system while he is operating the vehicle and observing some peculiar condition of operation which has come to his attention.

The object of the present invention is the provision of a simple and inexpensive device which may be conveniently arranged and connected to the ignition system to indicate, without the necessity of manipulation, the condition of the respective sparking terminals and generally of the ignition system.

Further objects and advantages of the invention will be apparent as it is better understood by reference to the following spec-

ification and accompanying drawing, in which

Fig. 1 is a front elevation of the device;

Fig. 2 is a plan view of the device illustrating the arrangement of the conductors which convey current to the tubes.

Fig. 3 is a transverse section on the line 3-3 of Fig. 1.

Referring to the drawing, 5 indicates a suitable casing which may be constructed of any desired material, although preferably the material should be of an insulating character such as vulcanite or a hard phenol condensation product. The casing is preferably a solid block of rectangular cross section, although it may, of course, have any desired conformation. It is provided, as indicated, with a plurality of recesses 6 each adapted to receive an indicator tube 7 containing a suitable gas, for example, neon. The neon is preferably under a reduced pressure of approximately 10 mm., though the pressure may vary widely. To insure the production of a brilliant flash, the ends of the tube may be partially surrounded by capacity media which may consist of metal foil or metal wool 8, the latter being preferred because of the ease with which it may be assembled with the tube and casing. When the tubes are thus disposed in the recesses, they may be observed through openings 9 provided in the front of the casing.

A cover 10 is preferably provided with bosses 11 conforming in shape and size to the ends of the recesses 6 and adapted to enter the same for the purpose of sealing the recesses when the cover is secured in place by screws 12. Contacts 13 extend through the bosses into engagement with the capacity media at the adjacent ends of the tubes, and these contacts are connected by conductors 14 to the sparking terminals, i. e., the central electrodes of the spark plugs in the engine (not shown) or to conductors of current leading to the terminals. It is to be understood that an indicator tube is provided in the casing 5 for each cylinder of the engine and that the operation of the sparking system with respect to the individual cylinders may thus be continuously observed. Only one end of each of the tubes need be connected to the ignition circuit. The dispersive effect of the capacity medium at the other end of the tube will permit the desired discharge without the provision of a closed

circuit. Preferably, however, a metallic sheet 15 is secured to the rear face of the casing and is connected by a conductor 16 to the frame of the vehicle. This prevents the accumulation of a charge by the capacity media which would prevent the discharge through the tubes.

From the foregoing it will be observed that when the device herein described is secured, for example, to the instrument board of the vehicle and the several contacts are connected by suitable conductors to the respective sparking terminals, the driver of the vehicle in which the device is installed may determine at any moment the condition of the sparking terminals in any of the several cylinders. In the normal operation of the engine, the several tubes will flash intermittently as each discharge occurs at the corresponding spark gap in the engine. If a bright flash occurs, the plug is in proper condition for continued operation. A very intense flash indicates that the spark gap of the particular plug is too wide. A dim flash indicates that the plug is partially foul or broken, and irregularity of the flash shows that the plug is firing intermittently. If no flash occurs, the plug is foul or there is no current flowing thereto.

30 The installation of the device described

enables the driver of the vehicle to maintain the ignition system in first class operative condition because he may continuously observe the operation of the system and is immediately advised of any deterioration of the spark plugs. If defects appear he may readily overcome them before any injury to the mechanism has occurred.

It is to be understood that the invention may be varied in its details without departing from the essential features thereof as hereinafter claimed.

I claim:

An indicator comprising a casing of insulating material having a plurality of separate compartments therein and openings in its walls opposite each compartment, a cover for the casing having bosses thereon which extend into the compartments, a tube in each compartment which is adapted to become luminous under the influence of a high tension electrical current, capacity media disposed in each compartment at the ends of the tubes and a plurality of conductors extending through the cover of the casing and contacting with the capacity media in each compartment.

In testimony whereof I affix my signature.

FLOYD J. METZGER.