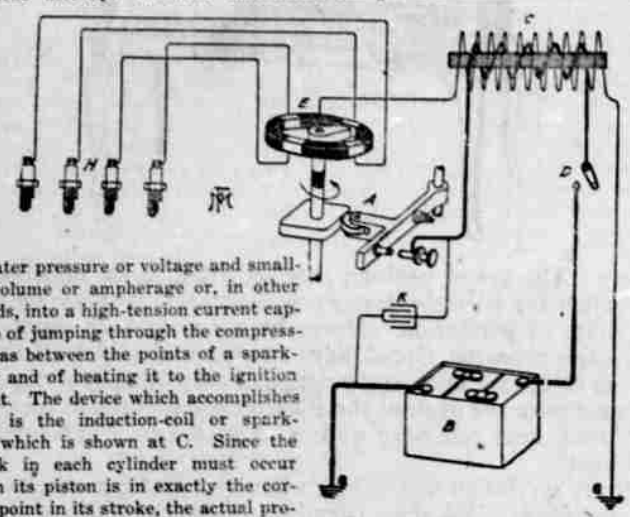
Hints for the Motorist

By Albert Clough

Editor Motor Service Review of Reviews

The Ignition System in General

In order to produce the sparks required by a gasoline engine quite a number of devices are required, which must work together to achieve the desired result and such a grouping of apparatus is known as an ignition system. The accompanying figure represents diagramatically the essentials of a timer-distributor battery system of the most largely used type, as applied to a four cylinder engine. There must be a source of electric-current and this is here represented by the storage battery B, although a set of dry-cells or a direct-current generator or magneto might have been shown. Since the current that the battery can supply, although of considerable volume and heat producing power, is of very low pressure or voltage, it is incapable of jumping between the points of a spark-plug and of producing sparks directly. It must thereforebe changed to a current of immensely



greater pressure or voltage and smaller volume or ampherage or, in other words, into a high-tension current capable of jumping through the compressed gas between the points of a spark-plug and of heating it to the ignition point. The device which accomplishes this is the induction-coil or spark-coil which is shown at C. Since the spark in each cylinder must occur when its piston is in exactly the correct point in its stroke, the actual production of the spark must be effected by some device which is mechanically coupled to the engine and thus follows its movements exactly, namely, the timer, interrupter or make-and-break device A, driven by a vertical shaft geared to the engine, and thus "grounded" or electrically connected to the power-plant. As the engine will continue to run so long as it is sparked and as sparks will continue to be produced so long as current flows through the coil and timer, there must be a means provided for breaking the connection from the battery and the switch D (shown in the "off" position) accomplishes this. The names make-and break and interrupter indicate that the purpose of this device is to break or interrupt the electric current and it is a fact that whenever an electric current is broken, for instance by the separation of two metal points, this curent does not cease quite instantaneously but, on the contrary, still flows for an extremely minute instant, through the air between the opening points in the form of a spark or tiny arc. This arcing at the points not only roughens and wears them away so as finally to cause trouble, but it prevents the coil from giving a powerful spark and the condenser K is therefore included in the system to prevent these evil effects. In such a system as here shown, there is but one coil and timer to produce all the sparks required by the engine and, as the engine has four cylinders which must receive sparks in regular succession, there must be some device to direct the high-tension sparking current to each of the four cylinders in turn. It, as well as the timer, must be so arranged as to follow the movements of the engine and must thus be mechanically connected with it. This device is the distributor E which, for convenience, is usually mounted upon and rotated by the same shaft which carries the timer. It is, however, not grounded through this shaft, but carefully insulated therefrom, as indicated by the black section of the shaft. The change of electrical energy into heat for the actual ignition of the gasoline-air charges in the cylinders takes place at the spark-plugs H, the sparking points of which are within the cylinder walls in the midst of the explosive mixture. Electrical connection among the different devices in an ignition system is effected by two sets of wires, namely, the primary and secondary conductors, but not all of these electrical circuits is through wires, for the metal of the engine (the so-called "ground") is utilized as a conductor. The primary circuit is the one which carries the so-called low-tension current, furnished by the battery and is here represented by the heavy lines. The light lines of connection represent the secondary circuit, which carries the high-tension current into which the low-pressure battery current is transformed by the spark-coil and which is capable of jumping between the points of a spark-plug. Referring to the diagram, the primary circuit (heavy lines) may be traced from the ground G on the engine frame, through the battery B, the switch D, the coil S into the timer A, and thence, when the timer parts are in certain relative positions, through the timer shaft back to the starting point at ground. The secondary circuit may be traced from its ground connection G (in the fine lines), through the coil, to the distributor E and thence by any one of four wires, each leading to one of the spark-plugs H, through any particular plug and to ground in the metal of the engine, into which the plugs are screwed. The component parts of such an ignition system may be thought of in the following terms: The battery furnishes the electric current; the coil transforms the battery current so that it can jump the spark gap at the plug; the timer regulates the instant at which each spark occurs, the switch starts and stops the production of sparks, the condenser protects the timer against the burning effects of the battery current ahd enables the coil to act effectively, the distributor sends the sparking current to the cylinder where a spark is required at any particular instant, the spark-plug changes the high tension current into ignition heat within the gas to be fired, the primary circuit carries the low-tension battery current and the secondary circuit conveys its high-tension sparking current.

Questions of general interest to motorists will be answered in this column, space permitting. If an immediate answer is desired, enclose self-addressed, stamped envelope. Address Albert . Clough, care of our office.

Car Lacks Rapid "Pick Up"

I. R. writes—In overhauling my light six I had new piston rings put in and a new carburetor of the original make installed, but since then it picks up slowly in high-gear and I have to close the choker a few times to make it accelerate. It also burns more gasoline than formerly and the carburetor seems not to give very good results. It has been driven 3,000 miles since overhauling and the valves have recently been ground. Have you any idea where the trouble is?

Answer—This seems to be a case of faulty carburetor adjustment perhaps coupled with faulty vaporization due perhaps to insufficient intake heat. Was the carburetor which you installed identical with the original one and supplied with the same means for heating the mixture? If not, this may be the trouble, apparently you have to supply excess gasoline in order to obtain enough vaporized fuel to accelerate upon. We assume that, in adjusting the carburetor, you have followed closed the directions accompanying it but still it would be well to visit a service station of this make of carburetor and see if they can detect anything wrong.

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Extra Washer Best

Much battery trouble is caused by the terminals not fitting into the battery bus bar snugly. This causes the sulphate deposits to collect in the battery terminal bearing area and make a very poor connection, offering considerable resistance to charging. In fact, a corroded battery terminal will cut down the charging rate about a third.

Usually this trouble is brought about by the terminal lock screw bottoming in its thread socket, making it impossible to pull the terminal up into the bus bar tight. To remedy this some shops merely put an extra washer under the lock screw.

Tube Valve

Frequent removal of the core of an air valve will generally impair the holding ability of the smaller rubber washer. A small screw having a grove lengthwise on one side and threads to fit the inner part of the valve may be run down so as to press on the core and keep the valve open until the air can escape without its being necessary to remove the core.

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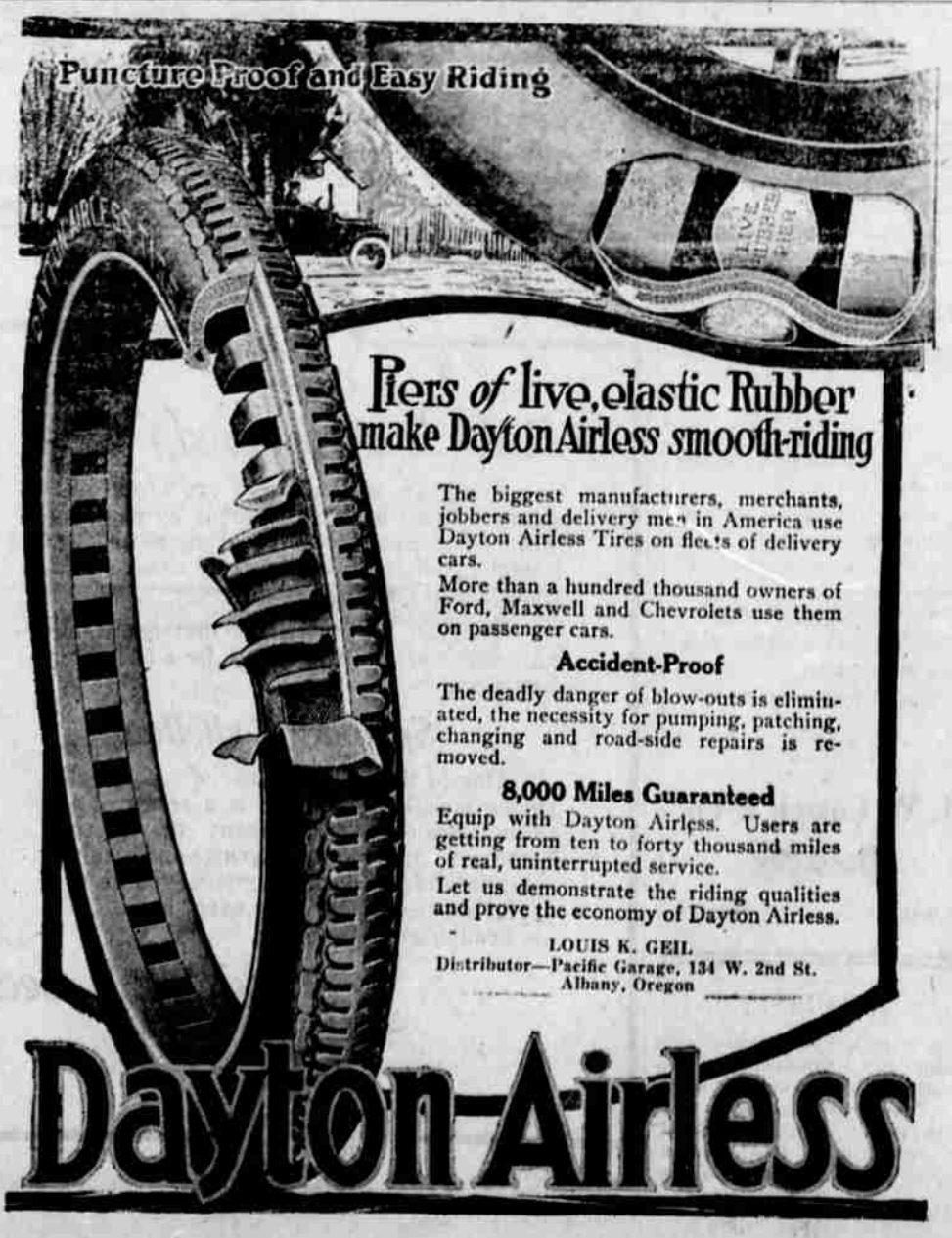
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