HINTS FOR The Motorist

BY ALBERT L. CLOUGH

SEPARABLE OR INSEPARABLE SPARK-PLUGS

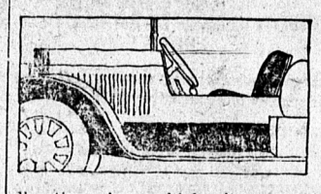
G. W. asks: Which are preferable, spark-plugs that can be taken apart or those that are made inseparable? The latter kind came with the car that I recently bought, but previous to that I used the other kind.

Answer: We cannot say. One of the worst spark-plug evils is leakage between the core and the shell and there is little doubt that the inseparable plug is the best safeguard against this. The inseparable plug is not very convenient to clean thoroughly and a defect in its insulation may readily escape notice. If its porcelain breaks down, the whole plug must be discarded. On the other hand, a separate plug that is taken apart for cleaning, may be put together so that it leaks compression so badly as to affect engine performance or it may be assembled so carelessly that the porcelain is cracked in the process. Skilfully handled, separable plugs give good results and a little may be saved by replacing the cores instead of the whole plug, but under rough usuage the inseparable plug is perhaps perferable.

EARLY VALVE TIMING TO SECURE SPEED

L.E.T. writes: I am building over an old car into a speedster and have been told that I may be able to get the engine to run faster, if I change the way the valves are set. If this is true, how should the change be made?

Answer: .. Setting the exhaust valves to open earlier in the power stroke, that is, when the piston is further from lower dead center, tends to get rid of the burned gases more promptly and thus to insure a more complete filling of the cylinders with fresh charge. It therefore permits an engine to run faster, if the valve sizes and lifts and the carburator are such as to provide gas to meet the demands of higher speed operation. In case this engine has a single cam-shaft, the change of setting will make all valve operations take place earlier, giving an earlier intake opening and closing as well. A very early exhaust opening tends toward low gasoline economy, a loud exhaust and less well sustained torque at low speeds. If you remove the cam-shaft gear, turn the cam-shaft in the



direction in which it runs the amount of one tooth or so and remesh the gears in this position, you will secure an earlier setting.

FIGURING ENGINE SPEED

I.E.B. asks: How can I figure how fast my engine is turning over when my car is running at any certain speed, on high gear?

Answer: The number of turns per mile of the wheels, divided by 60 and the result multiplied by the gear reduction, gives the engine speed in revolutions per minute, when a car is running at one mile per hour. Multiplying this figure by the actual speed in miles per hour gives the coresponding engine speed. A 36 inch wheel turns 672 times to the mile a 32-inch 631 times, a 34-inch 593 and a 36-inch 560. Suppose your car has 30-inch wheels and a gear reduction of 4 (gear ratio 4:1) and you wish to know the engine speed at 25 miles per hour. It will be (672—60) x 4 x 25 — 1120 r. p. m. If you compute the engine speed at one mile per hour for your car and keep it in mind, you can almost instantly figure the engine speed under any particular conditions.

Questions of general interest to motorists will be answered in this column, space permitting. Address Albert L. Clough, care of this office.

IS CARBONIZATION DUE TO OIL OR "GAS"?

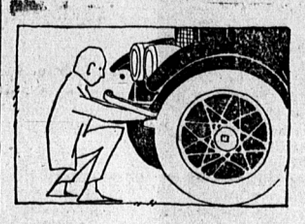
The Principal Plague Of The Motorists

In the early days of American motoring carbonization was never mentioned and seems not to have been recognized, but sometimes in the rather early nineteen hundreds, it and its effects were noticed in technical circles although it was hardly considered by motorists in general. Since that time its malign importance has steadily increased, until now it is one of the principal plagues of motoring. For a long time, carbon deposits were attributed almost entirely to the destructive distillation of lubricating oil, which entered the motor's combustion spaces, under the intense heat of the burning gases and this view is still very widely held. After a while, however, it was hinted that the residue of imperfectly consumed fuel was also an important factor in building up these troublsome deposits and analyses showed them to contain much mineral matter, derived from road dust, as well as carbon and partly carbonized materials. Rather recently, there has appeared a tendency to relieve lubricating oil of much of the blame for these accumulations and to attribute them more and more to the dense and heterogeneous fuel now in universal use. Seemingly there is good ground for this changing view, based upon evidence such as this: Early gas engine cylinder oil was a development from steam-cylinder oil and was less adapted to withstand excessively high temperatures than that now in use. The art of boring cylinders and fitting pistons and rings was at first decidedly crude as compared with what it is at present and lubricating systems were but imperfectly developed, so that it would seem that if carbonization were an oil evil it should have gradually diminished up to the present time instead of increasing by leaps and bounds as it actually has. Furthermore, the "real gasoline," as first used in motoring, was practically homogeneous fuel that would evaporate completely at ordinary air temperatures and could not readily be "cracked" or decomposed by heat, to form solid residue, but since that time the fuel known as gasoline has gradually become a mixture of hydrocarbons of the widest range of volatility only a small fraction of which will evaporate at ordinary temperatures, of which crtain components cannot be lighted with a match, in bulk and certain fractions of which are readily decomposed so as to yield solid products. If carbonization were a fuel evil, it would have increased up to the present time just as, in fact, it has. The case is something like this, with steadily bettering lubrication conditions and rapidly "worsening" fuel coditions, carbonization has rapidly increased. Which should the result be laid to —— oil or fuel?

CONTROLLING CARBONIZATION DUE TO THE FUEL

The Exhaust Heated Intake Is Now A Necessity

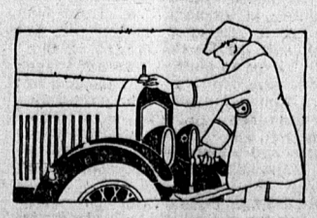
Assuming that the carbonization of engines is very largely due to the fuel rather than to the lubricant and that fuel conditions are likely to become worse rather than better, what is to be done to mitigate the evil? Too little is known concerning the processes by which carbon accumulations are found to warrant a very decided answer, but the theory is that the heavier elements in the fuel enter the cylinders in the liquid state and the less volatile of them resists full vaporization and combustion to a considerable degree, under some conditions of engine operations. Some of the most refractory constituents leak, as liquids past the pistons into the oil, some partially expelled as products of incomplete combustion or as altered hydrocarbon vapors, with the exhaust and some settle as drops or as a liquid film upon th piston-heads exhaust-valves and other hot parts, where they are subject to destructive distillation, that is they are cracked or altered chemically by heat, into substances which are in part solids. It is this solid residue, adhering to the internal parts of the engine's combustion-space, that are what are called carbon deposits. As stated above, this is a large theory, but it is safe to say that if all fuel could be introduced into the cylinders in the condition of vapors, mixed in a thorough maner with the correct amount of air for its perfect combustion, and could be maintained in that condition, there would be no distillation of fuel to form carbon deposits. But unfortunately, this ideal condition can by no means be realized. Its attainment implies that all fuel be in a perfect vaporous state at the end of the compression stroke and this means temperatures, during this stroke, which would probably cause detonations and knocking However, the better vaporized the fuel is, when introduced, the greater the tendency will be for it to continue in that state, and the only way available to increase vaporization is to apply exhaust heat to the mixture. Jacket water temperature, even when at its maximum—and this as high as practicable, is utterly insufficient to evaporate the heavier fuel constituents, some of which vaporize only at points away above 212 Fahrenheit. The only remedy in slight is to jacket the intake passages with exhaust gas and every engine now requires this, despite its inescapable attendant disadvantages.



TURNING RADIUS TOO GREAT

V. H. M. writes: The new car which I have, will not turn in as short a space as my old one, although it is no longer between the axles. Is there anything that can be done to overcome this defect?

Answer: You better inspect the steering gear and see what it is that limits the extent to which the front



wheels can be turned from the straight ahead position, in both directions. If the front wheels now turn until one of them almost strikes the steering connection rod, its mud guard shield or some other part, you will have to put up with existing conditions. However, on very many cars there is a steering -stop on each side, which limits the road wheel angle. These stops are usually carried by the axle ends and the knuckle arms strike them, and thus restrict the wheel movement. Generally the stops are adjustable and, if you find that it is the stops that now define the steering angle and that some more movement is allowable, you can "let up" on the stops and obtain it.

SPARK INQUIRY

P. H. McC. asks: What becomes of the spark which would otherwise pass from the end of a spark-plug cabe, that is separated, by too great a distance, from any metal part of the car?

Answer: The spark jumps at the safety spark-gap, provided as part of the coil or magneto furnishing the current, instead of at the cable end. The safety spark-gap consists of a pair of points, one of which is connected to each side of the high tension winding of the battery coil or magneto, the two points being permanently set at 5/8 inch or so apart. If the plug cable terminal is removed more than this distance from a grounded part of the car when a spark is to occur, the discharge will naturally take place at the shorter gap—that at the safety spark points. If there were no such safety gap provided, the spark would be likely to jump through the insulating material of the coil winding, thus running the coil by forming a short-circuit. The safety gap is usually inside the coil, where it can not be seen.

Questions of general interest to motorists will be answered in this column, space permitting. Address Albert L. Clough, care of this office.