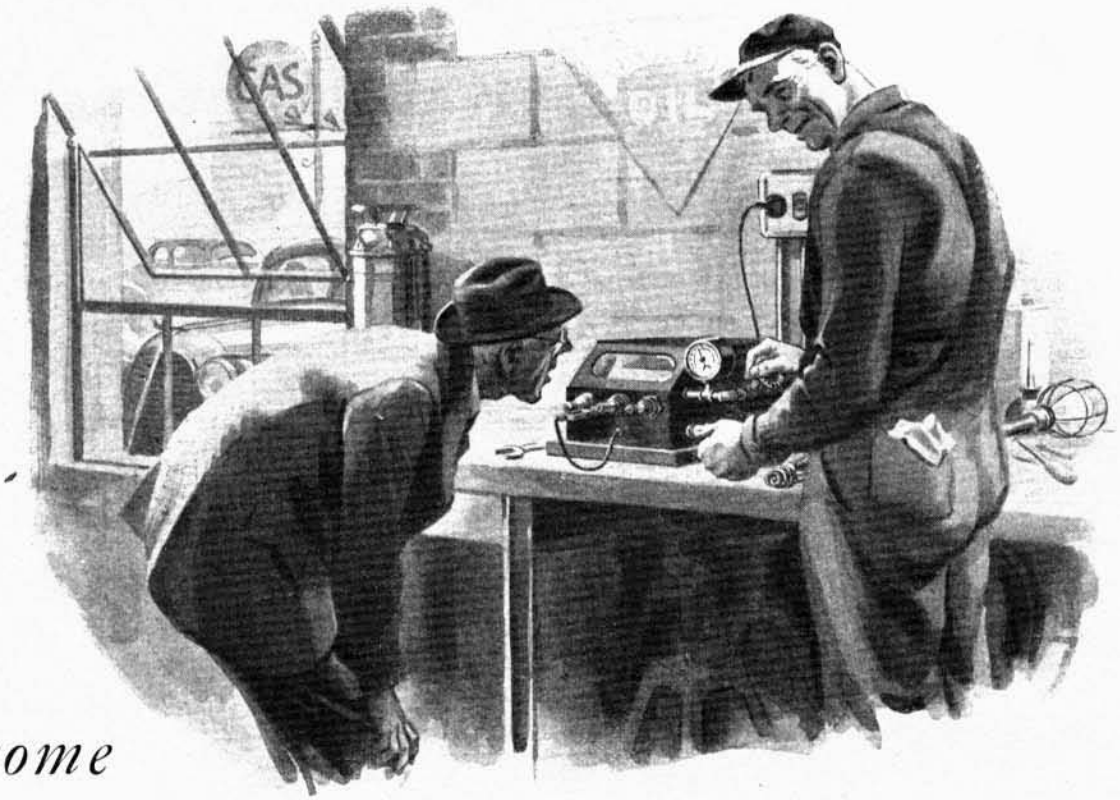

Gus turned a valve on the tester and, as the pressure inside the case went up, Nolan saw the heavy, red spark on the points of the spark plug fade to a thin, bluish line

Gus gives some

Up-to-Date Ignition Tests

TOM NOLAN scratched the end of his long, thin nose with a grimy finger as he glared witheringly at the motor of his new sedan.

"You're a fine-looking job, old girl," he grumbled disgustedly, "but when it comes to running, you're almost as rotten as that crate I got stuck with back in 1924. Every time I get you on a stiff hill, you go temperamental on me and stutter and skip like nobody's business! I wish I could find out what is the matter with your innards."

The elderly motorist walked around to the other side of the car and eyed each part of the motor that was visible from that point.

"The trouble can't be in your fuel system," he reasoned. "There's not a speck of dirt or water in that carburetor. And your ignition system seems perfect—I've tested the spark plugs, there's an almighty juicy spark, and your contact points are only a little burned.

"Guess I'd better test those plugs again," he muttered. "Maybe I missed one the last time."

After starting the motor and letting it idle a moment or two until it settled down to steady running, he fished a wooden-handled screw driver out of his tool kit and pressed the blade against each cylinder in turn, in such a position that the shaft of the screw-driver blade was a little less than a quarter of an inch from the plug connection. From each plug a snappy blue spark flecked with red crackled regularly to the steel shaft. Each time this happened, the smooth running of the motor was broken by a slight jerk. As near as Nolan could judge, the effect was the same for each cylinder.

"Every one as right as rain," he grumbled, as he tossed the screw driver back into the tool kit. "Guess I'll take you down to Gus. Maybe you've got some queer disease that'll stump him, too."

Nolan backed the sedan out into the street and, a few minutes later, pulled up in front of the Model Garage. Gus Wilson, half owner and the mechanic of the establishment, put down the padded hammer he was using to repair a fender.

"Howdy, Tom," he greeted the newcomer. "Trouble with the new bus?"

"She's got something mighty mysterious the matter with her," Nolan replied, detailing the symptoms and the tests he had made. "And I'll bet it's something that'll fool you, too."

"That wouldn't be any wonder," laughed Gus. "The man isn't born yet who can't be fooled about car troubles. Motor misses under load, does it? Most likely the trouble's in the spark plugs, so we'll start there."

"But didn't you hear me say I'd just tested them?" Nolan protested indignantly. "Don't you think I know how to test spark plugs?"

"You did, back in the dark ages of automobiles, Tom," Gus grinned, as he removed the spark-plug wires and fished out the proper socket wrench. "But that old screw-driver test only tells you whether the plugs are badly fouled or not, and cars nowadays don't foul plugs much until they get old and start to pump oil.

"The only test that shows anything about spark plugs now," Gus continued, as he removed the last plug and started into the garage with Nolan following him, "is to see how they spark under compression. All the modern cars have such high compression, compared to the old-timers, that the plugs are up against a tougher job than they used to have."

Gus cleaned all traces of carbon from each of the plugs and then screwed three of them into sockets in the front of a heavy iron case on the work bench.

"Now look through that little glass window and you can see the spark reflected in the mirror at the back of the case," he directed.

Leading into the metal case was a copper pipe on which was mounted a valve and a pressure gauge. Gus attached a wire to one of the plugs, and pressed a button. A steady spark appeared between the points as seen through the window. It was heavy, and quite red in color. Then he turned the valve slightly. As the pressure inside the case went up, the spark faded to a thin, blue-white line, although it held steady without a miss all the way up to a 100-pound pressure.

"That's the way they should act," Gus commented, as he switched the wire to another plug. This, too, passed the test, but the third missed badly at 100 pounds.

"There's a bad one, sure enough," exclaimed Gus. "Did you notice how the spark started to miss as the pressure went up? It's hardly sparking at all at 100 pounds; *(Continued on page 121)*

By MARTIN BUNN

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evidently the insulator has a tiny crack in it, so that the spark jumps away up inside the plug instead of at the points—compressed air being a tougher proposition for the spark to break through than ordinary air.

"That's what happens in your cylinder," Gus went on, as he chucked the bad plug into the scrap box and screwed the three remaining plugs into the tester. "When you open the throttle on a hill, the compression goes up and the missing starts."

"Cigars are on me, Gus," Nolan smiled, pulling a couple out of his pocket. "By jimminy, you have to keep right on your toes to follow all the changes in this automobile game, don't you? And some of the changes don't make sense to me. What's the use of running up the compression, if it's hard on the spark plugs and makes them break down?"

"THERE *wouldn't* be any use, if that was the only feature of high compression," laughed Gus. "It's just a case of sacrificing one advantage to gain more important ones. The public keeps demanding more and more speed and power, and gasoline economy at the same time. The only way you can get all three is to use a high-compression motor.

"As a matter of fact, there really isn't as much spark-plug trouble now as there used to be, because the quality of the insulation in spark plugs has been improved a lot. Did you check up on the breaker contact points?"

"Sure, I did," Nolan replied. "They're not burned so much, but more than on my old car at the same milcage."

"That's another place where the car makers have had to sacrifice one advantage to get others more important," said Gus, as he finished testing the last plug. "When you run up the compression, it takes more voltage at the spark plugs to jump the gap. On top of that, if you expect the spark to jump steadily at the very much higher speeds of today's cars, you've got to use a peppier coil that draws more current. But nobody has been able to find any better material for contact points than the tungsten that's been used for years, so the timer contact points in the modern car have to stand the gaff of a heavier current flow and the current kick-back from a more powerful coil. Naturally, the points won't last as long as they used to in the old days."

"And, I suppose, the faster you travel, the more wear there is on them," Nolan interrupted.

"The funny part of it is that it doesn't work that way," Gus corrected him. "The more often you start the motor, the more you let it idle, and the slower you go, the more wear there will be."

"That doesn't make sense, either," said the car owner. "What makes it work that way?"

It's easy to see why if you stop to figure a bit," Gus replied. "If the ignition system is designed so that it will make sparks steadily at high speed, it means that only a very short contact between the timer points is needed to get results. When you go slowly, the points contact longer than necessary, so that more than enough current flows, and that means more burning away of the tungsten."

"THAT'S clear enough," Nolan agreed. "But what about fellows like me, who aren't interested in all that speed and power? Couldn't we have new coils fitted that wouldn't be so peppy and take so much juice?"

"Sure, you could," Gus answered, as he put the wrench on the last plug and screwed it down tight. "But a better stunt than that, if you're having trouble with the breaker contacts giving out too quick, is to fit a rheostat in the primary circuit of the coil, with a short-circuiting switch *(Continued on page 122)*

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(Continued from page 121)

connected across it, so you can cut the current flow down to the minimum needed for your usual kind of driving. Then, if you do want full-power ignition for a quick start in cold weather, or for a bit of speed, all you have to do is flip the switch and you've got it without disturbing the rheostat setting.

"Incidentally," Gus added, "having the rheostat in the circuit brings other advantages. For one thing, it is a fine indicator of the condition of the timer contact points. When they begin to get worn and pitted, you'll find that you can't have nearly so much resistance and still get good ignition. And if you hide the rheostat up under the dash where it doesn't show, you can use it as a thief-stopper. Before you leave the car, you can turn the rheostat too far to give a good spark, and even if a thief has a key that will unlock your ignition, he isn't likely to figure out in a hurry why the motor won't start."

"SOUNDS interesting. Where can I get the right kind of a rheostat and switch?" Nolan asked.

"The rheostat ought to have a total resistance of about two ohms and be able to carry about five amperes continuously," Gus specified, "and any reliable toggle switch that will fit where you want it to go will do fine. You can get them both from a radio-parts supply house—ordinarily, there's no call for rheostats like that in the automobile business."

"How do I connect them?" Nolan asked, pulling out his notebook and pencil.

"Connect the terminals of the rheostat into the ignition primary circuit anywhere that it is convenient, like this," Gus directed, as he took the pencil and drew a diagram in the notebook. "Then you simply connect the terminals of the rheostat also to the terminals of the switch, so that when you throw the switch to the closed position, the rheostat will be short-circuited and the circuit will be the same as it was without the extra gadgets. Be careful, when you mount them, that neither the switch nor the rheostat is grounded on the metal dash, or you'll put the ignition out of commission entirely."

"Thanks, Gus, I'm going to try that," Nolan said, as he pocketed the notebook and pencil.

"Here's another worth-while tip on contact points," Gus volunteered. "It isn't a bad plan to inspect a new set of contacts after you've gone, say, a couple of hundred miles. If you see a tiny point building up on one of them, stone it off, without touching the rest of the contact surface if you can help it. Lots of times that'll save them from wearing out too fast."

"That's something else I'll keep my eye on," Nolan decided.

"And, speaking of dirty points," Gus grinned, "there's plenty of soot on the point of that long beak of yours, Tom!"

"Gosh!" gasped Nolan, as he glanced in the mirror over the washstand and immediately reached for his handkerchief. "So that's where the carbon collects nowadays!"

NEW LAMP SHADE HAS FOCUSING CONTROL

FOCUSED by turning a screw, a recently invented lamp shade is said to be capable of controlling in a simple manner the intensity and spread of light from a lamp. The height to which a wall can be illuminated is also variable at will. Made from parchment, thin sheet metal, or plastic in the shape of a split ring, the shade is arranged so that one edge of the split portion can ride over the other, causing it to take on a conical shape of any desired focus. The adjustment is controlled by means of a thumb screw.