

POPULAR SCIENCE

FEBRUARY 5M ★

15 CENTS

20 CENTS IN CANADA

MONTHLY

NOW
15¢



SEE PAGE 47

GEORGE
FRANKLIN
WITTEBACK
III

**NEW INVENTIONS • MECHANICS • MONEY MAKING IDEAS
HOME WORKSHOP PLANS AND HINTS • 350 PICTURES**

How Modern Gas

ADDS POWER TO YOUR MOTOR

CLIFF MACDONALD had dropped in at the Model Garage for a noon-hour chat with his old friend Gus Wilson.

"By the way, Gus," he said jerking a thumb toward the gasoline pumps that stood in a line outside the garage office window, "what's your idea of the perfect gasoline?"

Gus Wilson had just finished his lunch and was poking tufts of black tobacco into the charred bowl of his favorite pipe.

"Your guess is about as good as mine," he replied as he struck a match. "Why do you ask?"

"Well, years ago, gasoline was just gasoline," said MacDonald. "But now every brand advertises some new feature that's supposed to make it better than all the rest. Why, they've even gone so far as to put the stuff out in different colors."

Gus chuckled as he found himself a seat on a corner of the office desk.

"You're getting more for your gasoline dollar today than you ever got before," he pointed out. "Gasoline had to change to keep up with the times. You know, automobiles aren't as simple as they used to be either."

"Well, the bodies may have changed but I don't see where the motors are much different," MacDonald maintained. "They may be a trifle faster and more powerful but—"

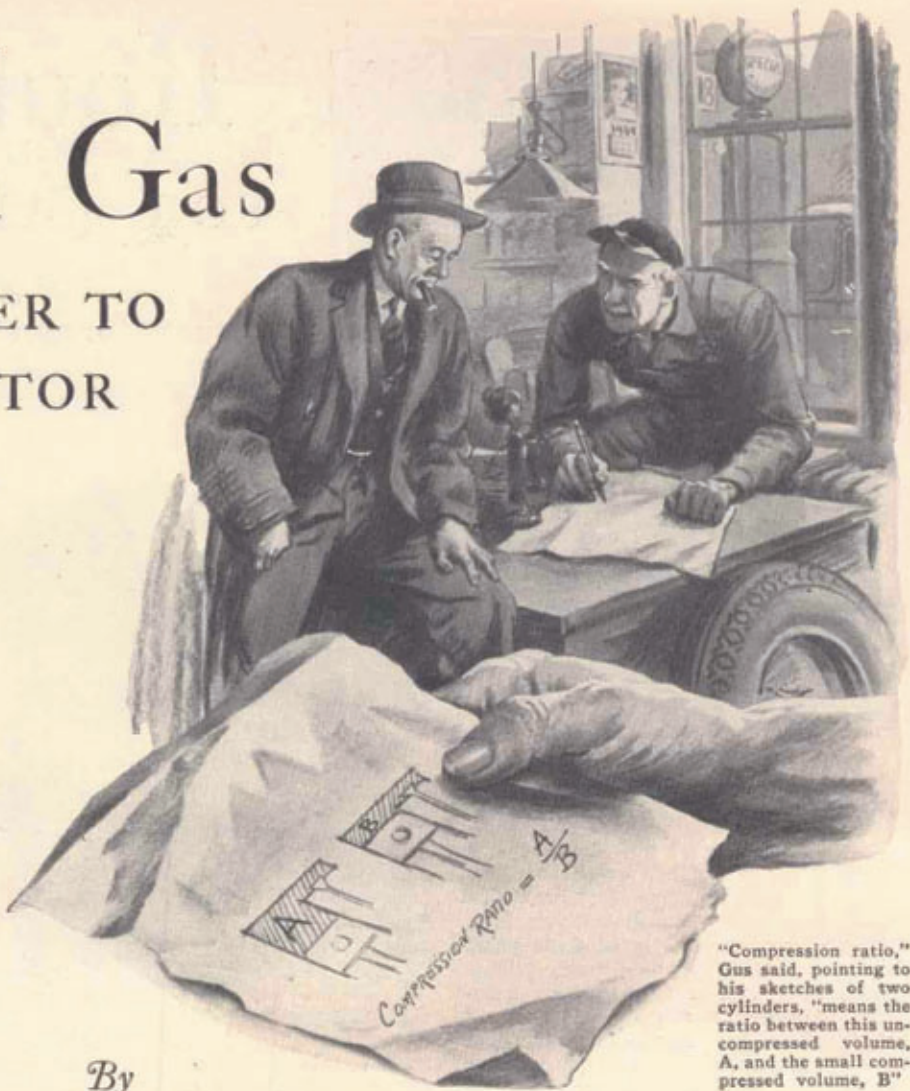
"And that's the answer," interrupted Gus. "It's that extra power and added speed that's back of the whole business. Car horsepowers have increased over seventy-five per cent in the last eight years."

"Sure, but that's a question of motor design and not gasoline," MacDonald argued.

"Not entirely," Gus corrected. "It's true that one way to get more power is to build a larger engine and feed it more gasoline. But when the public started its howl for more power and speed, it didn't want a heavier engine. In fact, they wanted a smaller one that would use less gasoline. So automobile engineers had to compromise."

"First of all, they knew that by putting the air and gas mixture in the cylinders under more pressure they could get more power with the same amount of gas so they worked along those lines and developed the high-compression motor. By making the space in the cylinder head smaller, they increased the compression."

"So that's what they mean when they say that the modern motor has a higher compression ratio than the older ones?"



By
MARTIN BUNN

"Exactly," agreed Gus as he picked up a scrap of wrapping paper and proceeded to make rough sketches of two cylinders; one with the piston at the top of its stroke and the other with the piston at the bottom.

"Compression ratio," he explained pointing to his sketches, "simply means the ratio between this large uncompressed volume (A) and this small compressed volume (B). In other words, it tells the number of times that the mixture of air and gas is compressed by the up stroke of the piston. Ten years ago plenty of cars had compression ratios as low as three to one. Today, some go higher than six to one. In 1923, only about four per cent of cars had a cylinder pressure over one hundred pounds. Now, ninety-three per cent of the cars operate at that pressure."

"How about gas mileage?" put in MacDonald. "I should think a high-compression motor would use more fuel."

Gus shook his head. "As a matter of fact," he pointed out, "a good high-compression engine will deliver more power for less gas. But the engineers ran into a snag with their high-compression motors and that's where the new gasolines come in."

"Years ago, gasoline used to be obtained from the crude oil by a simple method of distillation. You know, like moonshine

whiskey; simply boiled and then condensed. That kind of gasoline worked fine in the older motors but when they put it in a high-compression motor, it made all kinds of noises and wouldn't give any power."

"What caused that?" MacDonald asked.

"The increased pressure in the cylinders. Instead of burning slowly and pushing the piston steadily, it exploded. That gave the piston a sudden punch that lacked power and caused a 'pinging' knock."

"Naturally, if high-compression motors were to be a success, something had to be done about it, so the gasoline chemists tinkered around until they made a discovery. They found that if instead of distilling the crude oil they placed it in a closed container under pressure and heated it, like the vegetables in a pressure cooker, they obtained an entirely different gasoline. They called this process 'cracking' and its product was found to burn quietly in a high-compression motor. After a little more fussing around, they finally brought out the modern anti-knock gasoline. Some chemists even added a chemical, tetra-ethyl lead, to make it burn still more evenly."

"But what's this octane rating you see and hear so much about these days?" MacDonald asked. "Sounds like the name of a gas or something."

Gus smiled. "It's not, though. It's simply a number, like degrees of temperature that des- (Continued on page 99)

"Compression ratio," Gus said, pointing to his sketches of two cylinders, "means the ratio between this uncompressed volume, A, and the small compressed volume, B"

CRACKED GAS FOR THE MODERN MOTORS

(Continued from page 56)

ignates anti-knocking qualities. They get it by comparing the running qualities of the gasoline with some known gasoline. A gasoline with a high octane rating will run under high pressure without knocking."

AS GUS talked, he ambled toward the repair shop door and beckoned to MacDonald to follow him. "I've got something in here along this same line," he said as he led the way to one corner of the shop.

"You know Dave Clemons? Well, this is his car. Brought it in here the other day to let me give the radiator the once over. During the conversation he happened to mention that his favorite brand of gas wasn't giving him the service it used to. Claimed it knocked.

"I suggested carbon. But he told me that he'd just had it cleaned. That gave me a hunch and I examined the gasket between the cylinder head and the block.

"My guess was right. The serviceman who did the job had substituted a gasket that was thinner than the one that was originally in the car. Naturally that reduced the cylinder head volume slightly. But even that small difference—and it wasn't over a tenth of an inch at the most—increased the compression enough to make 'regular' gas knock. With the 'premium' stuff, it works fine."

"Something like the mistake I made a couple of years ago," commented MacDonald as the two men strolled back to the garage office. "In putting in a new gas line, I got it too close to the exhaust and every hot day the motor would die. Had me puzzled until some one told me about vapor lock and I realized that when the motor reached a certain temperature, the gas boiled and the bubbles choked off the supply."

"Gasoline companies have licked that problem and they've licked winter starting, too," explained Gus. "Now they regulate their gasolines so they perform well under almost any natural temperatures. Sometimes they speak of this feature as 'climatic control.' Of course, the automobile companies have done their share, too, by designing the fuel supply more carefully."

"Well, the thing that gets me," confessed MacDonald, "is how the average car owner is supposed to know just what brand of gasoline is best for his car?"

"He doesn't have to know," concluded Gus. "Knock and gas mileage will soon tell him which is the best. Obviously, no one gasoline will meet the needs of all cars under all conditions. Be your own experimenter. Try several tanks of each of the good grade gasolines, both the regular and the premium. If you'll continue to use the one that gives you the smoothest, quietest, and peppiest performance, you can forget about octane ratings and compression ratios."

INCREASE IN SUNSPOTS WOULD KILL WORLD

If a super-criminal wished to wipe out the earth, all he would have to do, according to Dr. R. M. Langer, of the California Institute of Technology, would be to cover the face of the sun with sunspots. The resulting increase in activity on our solar furnace would raise the temperature on the earth until life would be impossible and our planet would become as dead as the moon. If thermometers throughout the world, over a period of a year, indicated an average increase of only ten degrees, Dr. Langer points out, the rarefaction of the air around the earth would reduce the oxygen content below the point at which life is possible. The chance of this ever occurring is remote.

PATENTS and TRADEMARKS

INVENTORS
Get this
FREE Book

Patent Your Ideas This Free Book Shows How

YOUR idea for a practical article or an improvement upon an old one should be patented NOW. Frequently many of the thousands of applications filed in the U. S. Patent Office each year are for the same or almost the same idea. In such a case, the burden of proof rests with the last application filed. Sometimes a delay of even a few days in filing the application means the total loss of the patent. Lose NO TIME.

The entire time of my large and experienced organization is devoted exclusively to patent and trade-mark cases. We know the rules and requirements of the Patent Office. We understand the technicalities of Patent Law. We can proceed in the quickest and safest ways in preparing an application for a patent covering your idea.

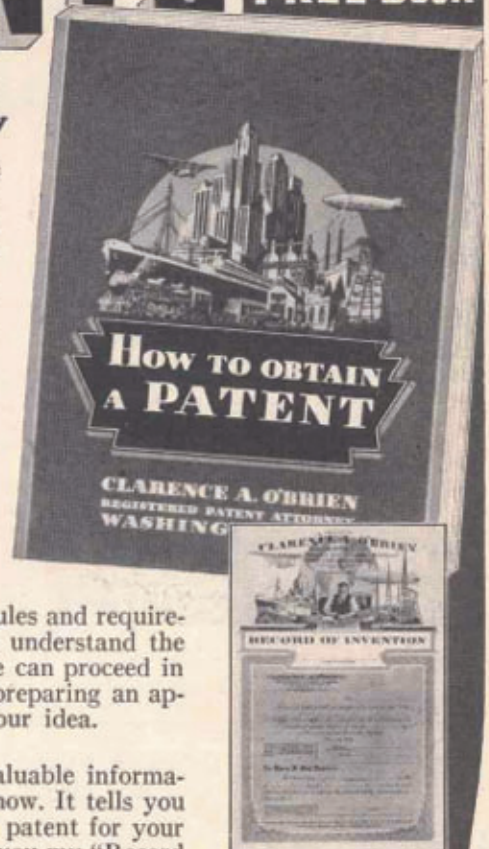
The book shown here contains valuable information that every inventor should know. It tells you just how to go about obtaining a patent for your idea. With the booklet I will send you my "Record of Invention" form on which you may sketch your idea and establish its date before a witness. If a dispute arises this will be valuable to you. Send the coupon TODAY! You will receive the FREE book, the "Record of Invention" Form, and full information regarding costs.

Strict Secrecy Preserved

All communications, sketches, etc., are held in strictest confidence and protected by steel files. Your idea will be in trustworthy hands. I have the highest references. It is probable that I can help you. Send the Coupon AT ONCE.

Personal Service

Your case will be handled by a specialist selected for knowledge and experience in certain lines of inventions. His personal attention will be given to your idea.



ALSO FREE

"Record of Invention" Blank: On request I will send you FREE a copy of my "Record of Invention" blank. On this blank you can sketch and describe your invention and have it witnessed in such manner that it may be of value to you as evidence. Send coupon now and receive this form together with my free book.

CLARENCE A. O'BRIEN
REGISTERED PATENT ATTORNEY
887 Adams Building
WASHINGTON, D. C.

Please send at once your FREE book, "How to Obtain a Patent" and your "Record of Invention" form, without any cost or obligation on my part.

NAME

ADDRESS

(Be sure to write or print name clearly)