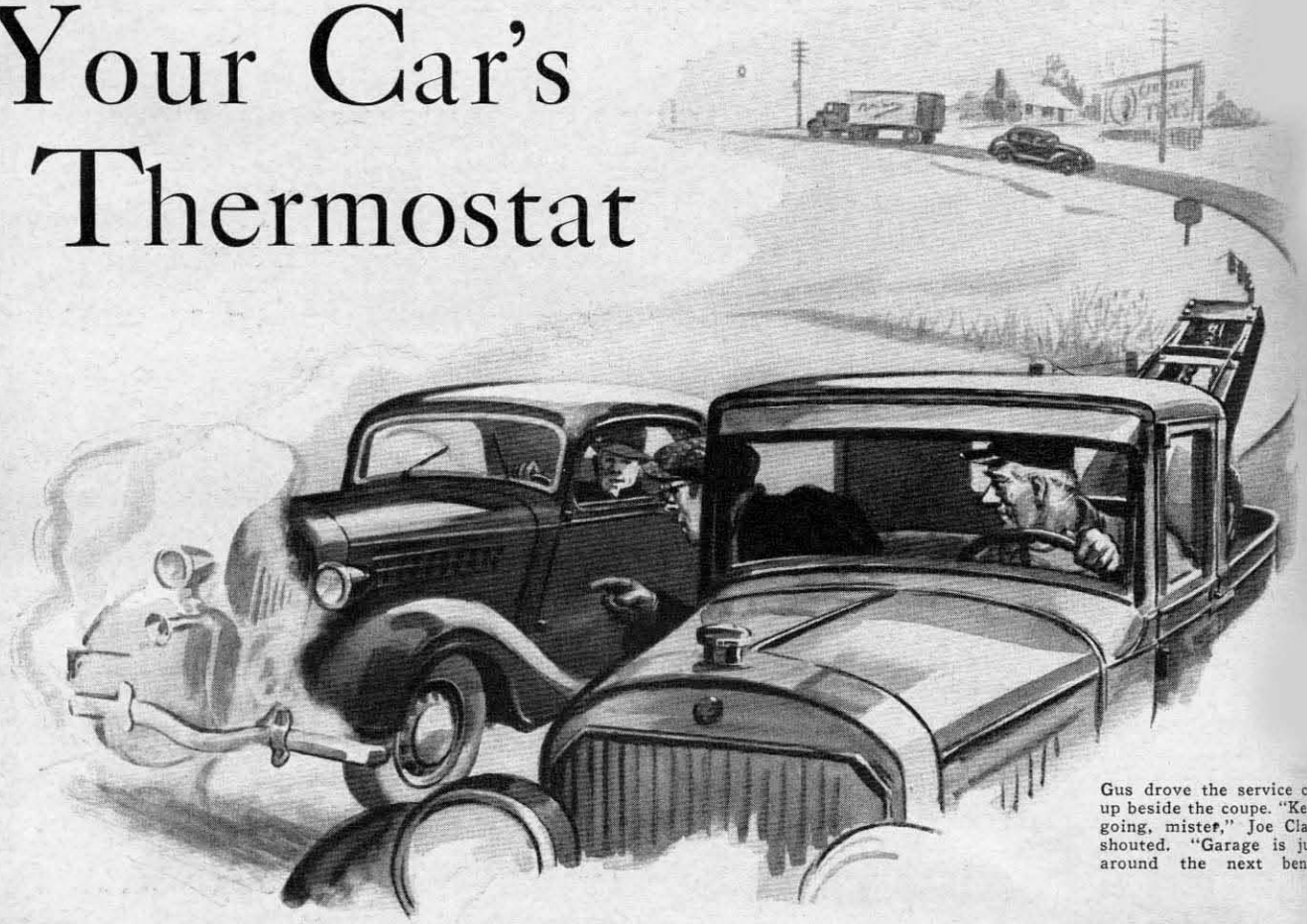
THINGS YOU SHOULD KNOW ABOUT . .

Your Car's Thermostat



Gus drove the service car up beside the coupe. "Keep going, mister," Joe Clark shouted. "Garage is just around the next bend"

By
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GUS WILSON halted the Model Garage service car at the intersection of the state road, and then turned onto the concrete stretch behind a fast-traveling coupe.

Joe Clark, Gus's partner in the operation of the garage, who occupied the other seat in the service car, briskly rubbed his ears and pulled his coat more tightly around his throat.

"Dang it, Gus!" he muttered. "I'm just about frozen solid. Hope we don't have any more stalled trucks today. A big cup of hot coffee would hit the spot with me right—er—look at the steam, Gus! Another frozen radiator!"

A heavy cloud of white mist trailed in the frosty air behind the coupe ahead. Evidently the driver had spotted the trouble, for he slowed down and Gus pulled up along side.

"Keep going, mister!" Joe shouted. "Garage is just around the next bend."

The driver nodded his head and dropped back to follow Gus.

"Frozen solid!" the car owner grumbled as he stumbled out of his car in the Model Garage and gazed wrathfully at the hissing column of steam that was rising from under the radiator. "That confounded swindler pinched my antifreeze solution and put in plain water. I've a good notion to go back and knock his block off!"

"How'd he get a chance to do that?" Gus asked, leaning against the car and waiting for the radiator to stop steaming.

"Garage down the road a piece," the car owner sputtered. "I noticed that the dash thermometer was much too high. Knew it couldn't be freezing, because I'd just had permanent antifreeze put in the day before. Stopped at that swindler's joint and he said the radiator was clogged. He flushed it out this way and that, and hooked me for new hose connections, too. Then he rubbed it in by swiping my antifreeze!"

As soon as the steaming stopped, Gus removed the radiator cap and looked in the opening with the aid of a flashlight. Then he felt the radiator core at various points.

"Humph!" he grunted. "It's a good thing you didn't go back to knock his block off. You'd have busted your fist on a solid-ivory dome. He didn't swipe your antifreeze, and there wasn't anything the matter with the radiator in the first place. The thermostat is busted, that's all."

"Thermostat busted!" echoed the car owner. "How could that happen?"

"Just a minute and I'll show you," said Gus, as he shoved a pan under the radiator and started it draining. When the level of solution in the radiator had dropped far enough, he removed the upper hose connection and took out the thermostat.

"Here you are," he said, pointing to a spot on the copper bellows of the thermostat with a huge, work-stained finger. "See where the copper has corroded right through?"

"I see it," the car owner admitted, "but what's a little hole like that got to do with it? The rest of the copper is all right, isn't it? You don't mean to say that a little hole weakens the copper so much that it can't expand like it should?"

"You've got the cart before the horse, mister," Gus laughed. "All that this copper is supposed to do is to resist expansion. The expansion is produced by what is supposed to be inside—only it isn't, because it leaked away through the hole."

"What is supposed to be inside?" asked the car owner. "Is it a liquid, or a gas, or what?"

"Each maker has his own ideas on that," Gus replied, "and of course it depends on the temperature at which the bellows is supposed to expand. For instance, if you wanted a thermostat that would open at, say, around 180 degrees, you could put a little ordinary alcohol inside before you sealed up the bellows. Then, when the bellows reached the boiling point of alcohol, the pressure would go right up and the bellows would expand. Or, if you put in a little water, the bellows would expand as soon as the temperature reached 212 degrees."

Joe Clark came out of the stock room with a new thermostat in his hand. "This is the same size and temperature rating," he said, as he *(Continued on page 130)*

YOUR CAR'S THERMOSTAT

(Continued from page 76)

handed it to Gus, who held it up to the light.

"How does this one work?" the car owner asked, as he squinted into first one end and then the other. "It hasn't any bellows at all."

"That works on a different principle," Gus explained. "See that coiled strip of metal? It's made by taking two pieces of different kinds of metal and sweating them together so they form a single strip with one metal on one side and the other metal on the other side. All metals, you know, expand more or less when they're heated, but they don't all expand at the same rate. Brass expands much more than steel does, for the same degree of heating. So, if you had brass and steel soldered together, and you heated the strip, it would bend more and more as it got hotter and hotter. In that thermostat, as the water heats up the strip, at a certain temperature it starts to bend and open the valve."

"HOW am I to know that it will open at the right temperature for this car?"

"I'll prove it to you," said Gus, walking over to a bench where some coffee had just come to a boil in a fat pot on an electric heating plate.

"Coffee's ready, Joe!" he called out to his partner, who had stepped into his tiny office. "Will you join us in a cup, mister?"

"Thanks, I will," smiled the car owner. "Garron's the name. Just moved into this town, so you wouldn't know me."

"Here you are, Mr. Garron," said Gus, as he handed him a cup of coffee. Gus put a small skillet of cold water on the hot plate in place of the pot. "Now, as I was saying," the veteran auto mechanic went on, "testing an auto cooling-system thermostat is a cinch. Just drop it into some cold water on the stove and stick a thermometer in beside it—where'd you put the thermometer, Joe? Ah, here it is! Then all you've got to do is to watch the thermostat. When it starts to open, you read the temperature."

Garron kept his eyes on the thermostat as he sipped the steaming hot coffee. In a few minutes he called out, "There it goes!"

Gus quickly read the thermometer. "One hundred and fifty-two degrees. That's almost right on the nose. The specified figure is 150."

"That double metal strip is something new, isn't it?" Garron asked.

"New!" exclaimed Gus. "You carry a good watch, don't you? Look at the balance wheel, and you'll see its rim is made the same way, so it'll automatically adjust itself to keep good time in both cold weather and warm. Fine watches have been made that way for years. Even the bellows idea of making a thermostat is old, too."

"YOU win," laughed Garron, as he put his empty cup on the bench. "Thanks for the coffee. Stick that thermostat in the car, and I'll get going. I suppose some day they'll make cars that don't need such delicate mechanisms."

"Maybe so," Gus grunted, "but I wouldn't call a thermostat a delicate mechanism. Besides, that isn't the only thermostat in your car. There's another one, working on exactly the same principle, that acts to cut the charging rate of your generator when it gets warm, and still another that works the automatic choke."

"That's right, now I come to think of it," Garron admitted. "One thing I never could get through my head, though, is how a thermostat can keep your motor really warm in cold weather. Of course, I can see how it would stop the circulation until the water around the cylinders got warm, but when the thermostat opens, why doesn't the icy-cold water rush in and make the motor stone cold again? Then, of *(Continued on page 131)*

YOUR CAR'S THERMOSTAT

(Continued from page 130)

course, the thermostat would close and the water would start to warm up; one minute the motor would be hot, and the next minute cold, and so on."

"That's almost what does happen on a very cold day when you first start out," Gus explained. "If you'll watch the dash thermometer real close after the motor is started, you'll notice it creeps up to the warm point and then, as the thermostat opens up, it drops back quite a bit; then it creeps up again slowly to a position where it will stay as long as you keep the motor running.

"The reason the motor settles down to a steady temperature so quickly is because the thermostat doesn't snap open and snap shut. After the first swing up and down, it settles to a point where the opening is big enough so that the water flow will be just right to keep the motor at the correct temperature.

"AND that," Gus went on, as he tightened the hose connection, "is just another reason why you should let your motor warm up slowly and carefully when you start out in real cold weather. If you hop into a car where everything is chilled down to zero, and the minute she starts you shove her into gear and tear off down the road, the cylinder head and the upper part of the cylinder block get hot while the lower part of the cylinder casting and the rest of the motor are still below freezing. Lots of cylinder-head cracks show up right then, and if you're going fast when the thermostat opens for the first time, and the pump is working like mad, there's a rush of icy water that's likely to cause cracks, too.

"So, if you want your motor to last," Gus continued, "let it warm up slowly for a couple of minutes before you start from stone cold. That will give the heat a chance to work down the cylinder walls, and when the thermostat opens the pump will be working so slow that it won't shoot a couple of gallons of ice water into a hot cylinder and head jacket."

"How about putting one of these adjustable covers over the radiator? Would that help?" Garron asked.

"It will help to keep the motor warm longer when you stop, but it won't save the motor on a quick cold start," Gus maintained, "and if the thermostat is working the way it should, it won't help much, anyhow, at any temperature down to freezing. Of course, when the temperature is down to zero and below, then the flow of water through the thermostat is slow and the water is very cold where it flows in even after the motor has been running some time, so there is more difference in temperature than there should be between the cylinder walls at the lower end and at the cylinder head. The best cure for that is to cover up the lower third of the radiator with a regular adjustable cover or a piece of cardboard fastened to the core under the grill that you find in the new types of cars."

"THAT sounds reasonable," Garron agreed. "I'll let my engine warm slowly after this. But what are you going to do if you are in a big hurry to get started?"

"Hurry right off, if you want," growled Gus. "But remember that it may turn out to be a mighty expensive hurry!"

BEARING ALLOY FOR CARS

LONGER life for automobile bearings is promised by using a new alloy of silver, cadmium, and copper, instead of babbitt. Driving tests, it is said, indicate that use of the new material triples bearing life. Corrosion caused by organic acids in lubricants has delayed commercial adoption of the alloy, but automobile and oil industries are reported to be working to remove this objection.