

# POPULAR SCIENCE

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MECHANICS AND HANDICRAFT 



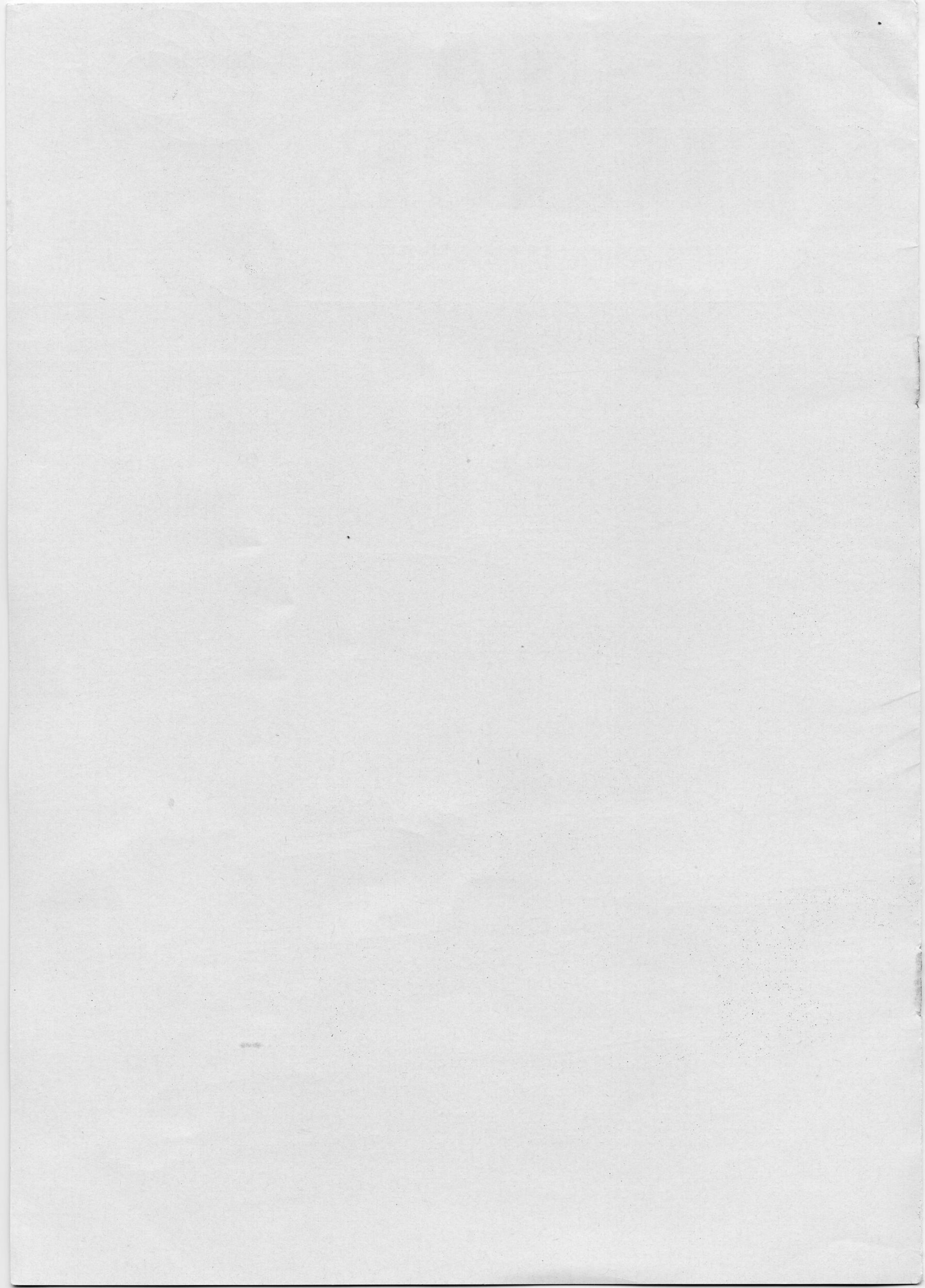
Midget Helicopter

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THE NEW AERO WILLYS



*The story of the New*

*Aero Willys*

*as told by*

**POPULAR SCIENCE MONTHLY**

**JANUARY, 1952 ISSUE**

Your first ride in

# America's New Light Car

Both economical and lush, the Willys can give you 35 miles on a gallon—and give it to you comfortably.

By **Wilbur Shaw**  
and **Devon Francis**

EVER since the war, lean, energetic Ward Canaday, head of Willys-Overland, has dreamed of putting out a light car that would seat six people. Last month he did it. He announced a light automobile that rides like a Cadillac or a Lincoln and gets up to 35 miles on a gallon of gas.

Canaday did even better. He powered his vehicle with a 90-hp. engine having a compression ratio of 7.6:1—second highest in the industry for standard-size cars—and made it run on ordinary, non-premium fuel.

What the design amounts to is a brand-new class of U.S. automobile. Despite a wheelbase of only 108 inches, it does seat six passengers of average displacement comfortably. Front and rear seats are exactly the same width—a roomy 61 inches.

The new Willys has more horsepower per pound of car than anything else in its price class. Its six-cylinder engine develops more horsepower per cubic inch of piston displacement than that of any other U.S. car, regardless of price. At 50 miles an hour in overdrive, it will run for 500 highway miles on one filling of its 18-gallon tank.

It is hundreds of pounds heavier than the other two light American cars, the Nash



...more horsepower  
per pound of car...

From an indicated speed of 60 the  
car came to a full stop in 156 feet

The "Aero" trod washboard as  
though it were glass-smooth

Front and rear seats are exactly the same width-  
61 inches



We accelerated to 60 miles  
an hour in 20½ seconds

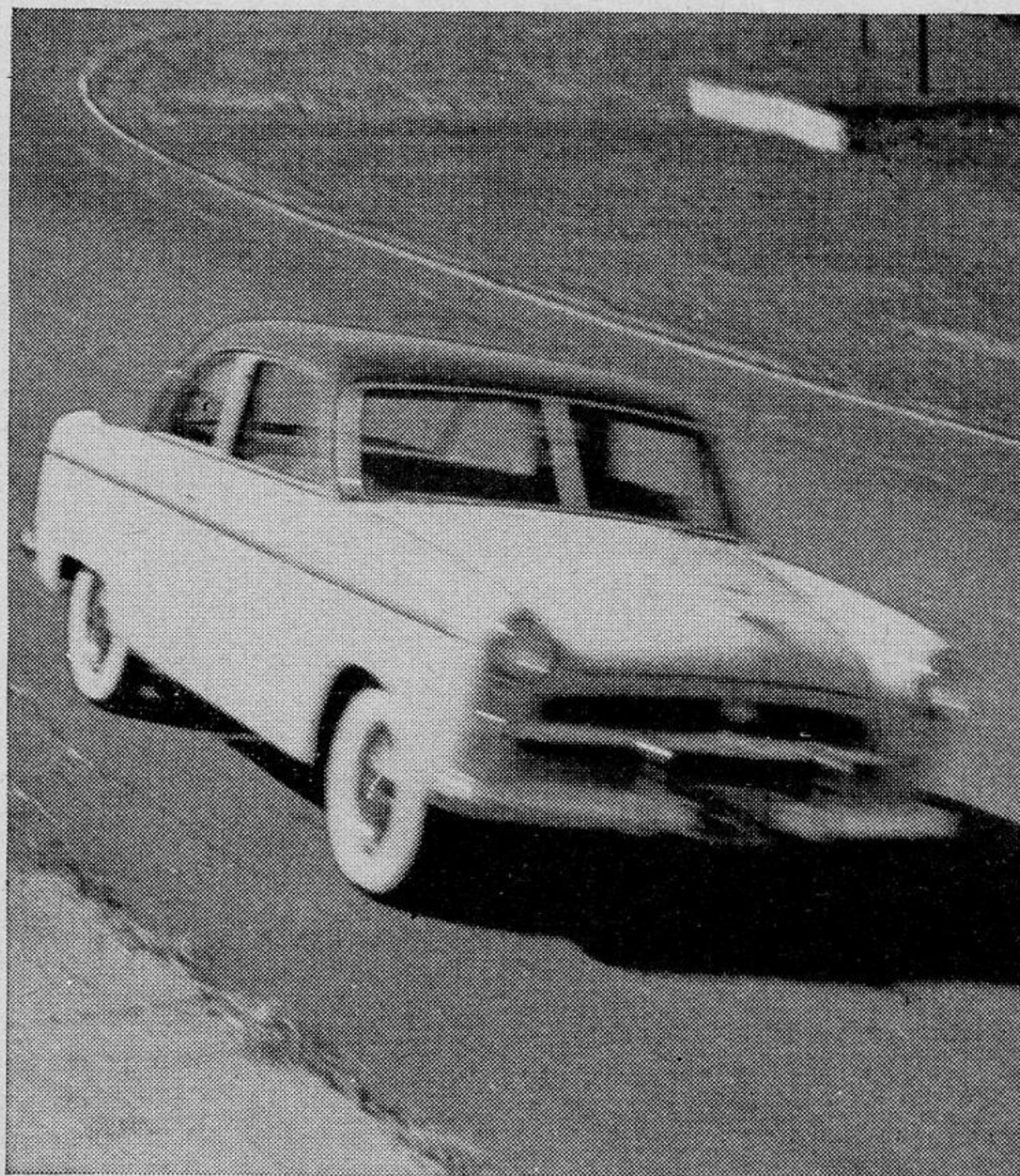


It took right-angle flat turns at 45  
miles an hour without evident sway



CHICAGO  
500 MILES

... 500 highway miles on one  
filling of its 13-gallon tank



**AERO ACE MODEL** took turns on Speedway at full throttle without evidence of sway. Shaw felt that big single-sheet rear fender might prove expensive to repair.



**HERE'S A SURPRISE!** Both rear fenders can be seen from driver's seat. On production models gas cap is next to license plate for easy access from either side.

Rambler convertible and the Kaiser-Frazer Henry J, but it is hundreds of pounds lighter than a Ford, Chevrolet or Plymouth.

It's not cheap. It costs considerably more than a Henry J and a bit more than a Rambler, Ford, Chevrolet or Plymouth. Willys' "Aero" car, as they decided to call it, is in the company's own words, a "light, quality automobile."

It was not until we drove this car on the Indianapolis Motor Speedway that we began to appreciate what the man Canaday,

then board chairman, meant when he laid down the law to the Willys engineering department two years ago:

"I haven't the slightest idea what it's going to look like when you're through," he said, "but here's what it's got to do."

He ticked off on his fingers what he wanted—economy, performance, quietness, an exceptional ride and, finally, ease of handling.

He wasn't disappointed.

The car has scat. Going through all for-

### FACTS ON WILLYS LIGHT CAR

**Make and model:** Willys Aero Ace series 685 two-door sedan.

**Engine:** 6-cyl. F-head; 90 hp. at 4,400 r.p.m., car weight per hp., 28.4 lb. (dry); bore and stroke, 3 $\frac{3}{8}$ " by 3 $\frac{1}{2}$ "; compression ratio, 7.6:1; piston displacement, 161 cu. in.

**Engine piston travel:** (in feet per car mile at 20 m.p.h.) 1,889 standard, 1,471 with overdrive.

**Crankshaft bearing surface:** 34.14 sq. in.

**Torque:** 135 lb.-ft. at 2,000 r.p.m.

**Transmission:** 3-speed sliding gear, synchromesh second and third gears.

**Rear-axle ratio:** 4.1:1 standard, 4.56:1 with overdrive.

**Steering ratio:** 19.7:1.

**Radius of turning circle:** 19'.

**Effective brake-lining area:** 133 sq. in.

**Springs:** front, coil; rear, semi-elliptic.

**Weight and outside dimensions:** 2,562 lb.; height (full load) 60"; over-all length with bumpers and guards, 180 $\frac{7}{8}$ "; width, 72"; wheelbase, 108"; overhang, front 32", rear 40 $\frac{7}{8}$ "; tread, front 58", rear 57".

**Inside dimensions:** seat-cushion width, front 61", rear 61"; leg room, front 42 $\frac{1}{2}$ ", rear 36 $\frac{1}{4}$ "; headroom, front 35 $\frac{1}{2}$ ", rear 34 $\frac{1}{2}$ "; seat height, front 12 $\frac{3}{4}$ ", rear 11 $\frac{1}{4}$ "; vertical distance, steering wheel to seat cushion with seat in mid-position, 5 $\frac{1}{2}$ "; front-seat adjustment, horizontal 4", vertical none.

**Tire size:** 5.90 by 15; optional, 6.40 by 15.



**LOW, DOWN-CURVING HOOD** increases vision, Shaw finds. Both models have two-piece curved windshield. Front seat is split and hinged. Dash lights tell when battery is dis-

charging or oil pressure is low. Turn indicators are standard on custom line, optional on others. All cars come undercoated. Trunk lid is hinged outside to increase space.

ward gears, we accelerated to 60 miles an hour in 20½ seconds. The Willys engineering department had posted a figure of 17½ seconds to 60 and held doggedly to it despite our report from the driver's seat. We're inclined to split the difference with a tuned engine. The car we drove hadn't been touched after a long, hard road test.

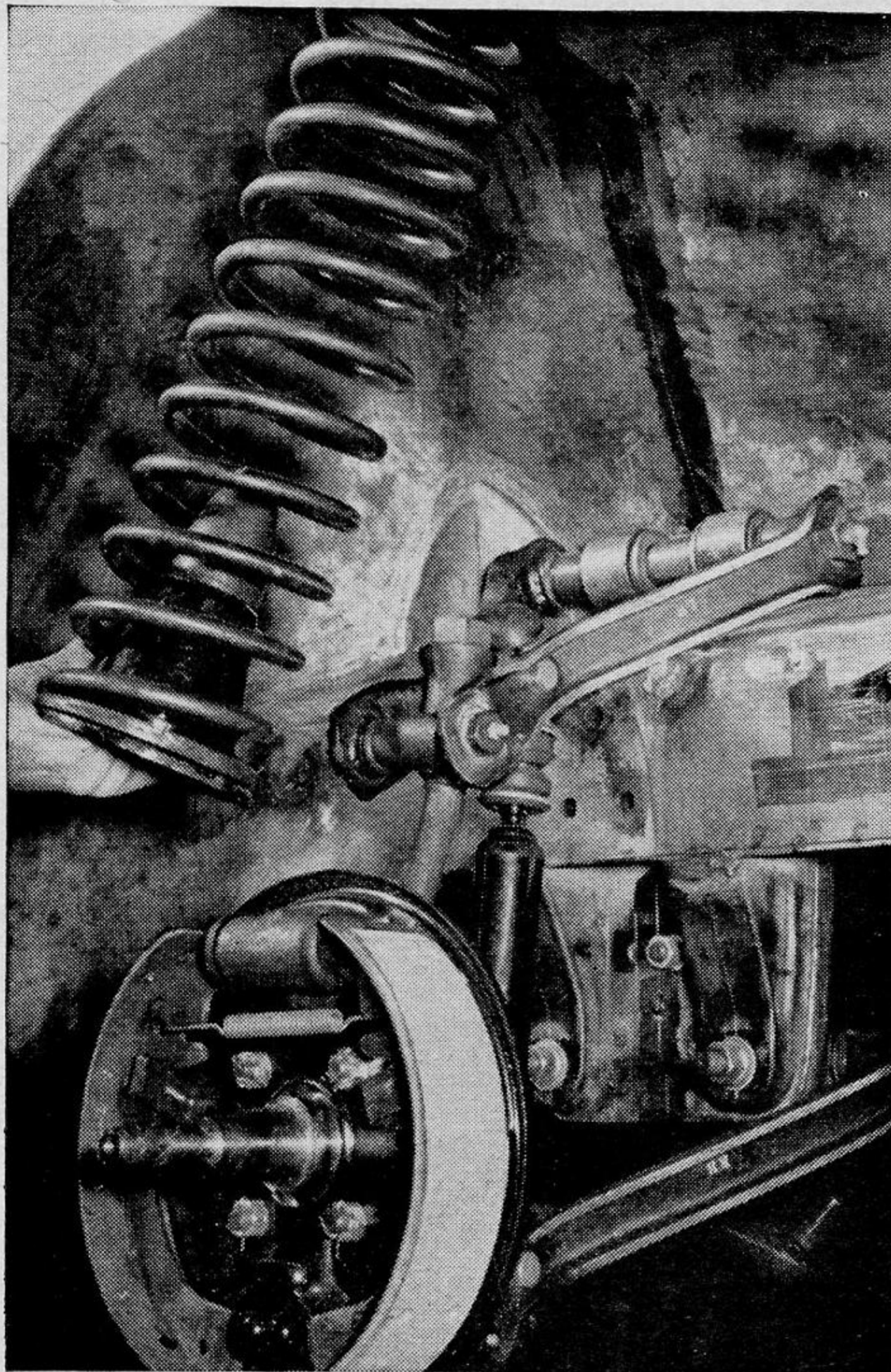
It was the engine that got us. Last year Willys brought out its four-cylinder F-head engine, which has a big overhead intake valve and an exhaust valve in an antechamber like an L-head's (PS, Nov. '50, p. 152). The F-head is now adapted to the new six, and the results are little short of sensational.

#### *Outdoes Even Maker's Claims*

The car walked right on past 60 to 70, then 80 and pegged its speed at 86 in direct drive. The engineering department had stated, with commendable conservatism, that 70 was tops without overdrive. But it wasn't the speed that impressed us most. It was the smoothness of the engine. Whatever vibration it had was effectively insulated from the body.

In overdrive the car did only a little better—89 m.p.h. It cruised beautifully at 75.

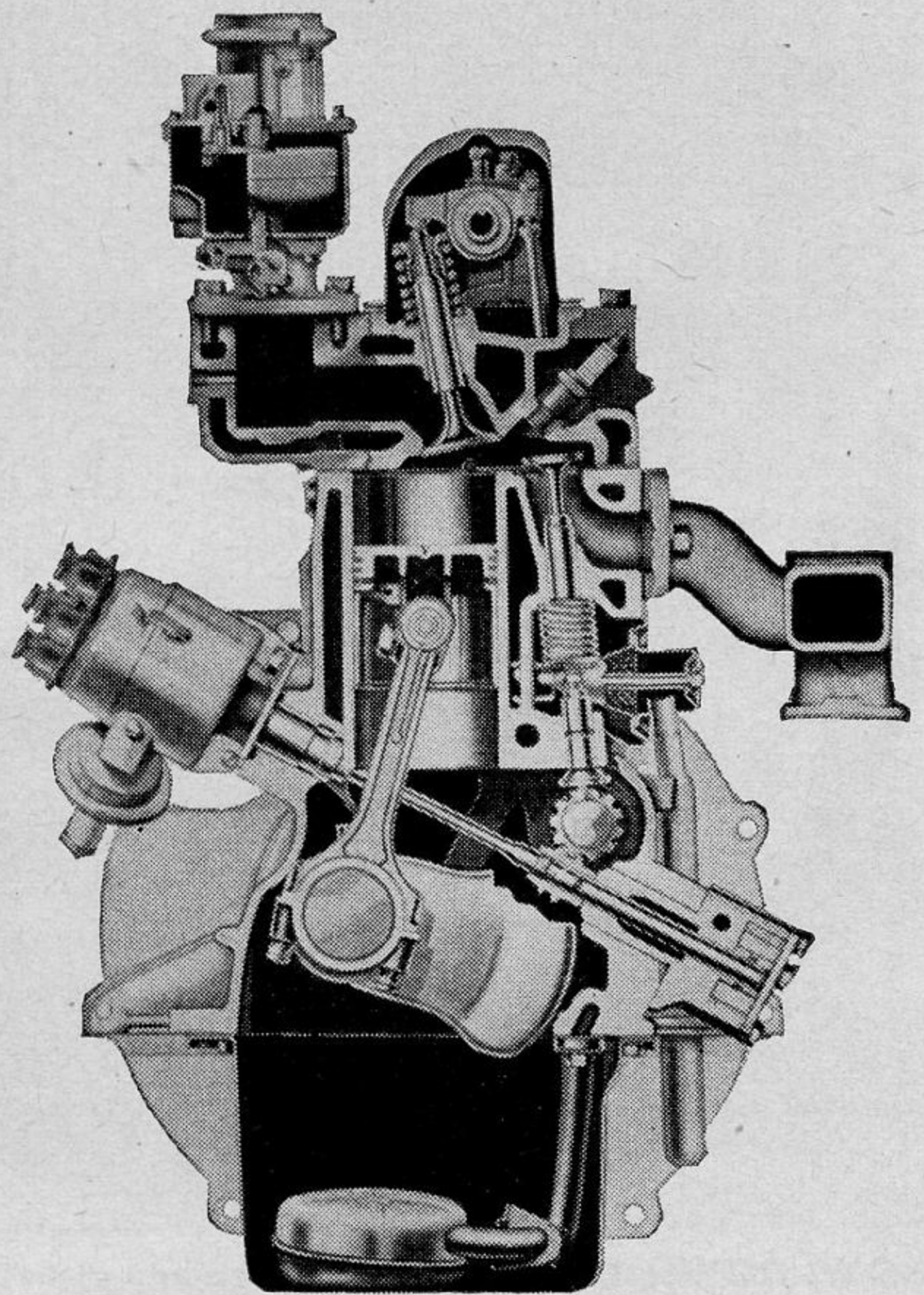
Even with ordinary gas, hard acceleration gave no knock. Coasting down to an in-



**FRONT SUSPENSION** and springing are essentially like Nash Rambler's (PS, May '51, p. 82). Wheel-support members attach directly to the body sheet metal.



**ENGINE** has intake manifold cast integrally with block to eliminate gasket that might cause leakage. Cutaway (right) indicates position of single rocker arm for each cylinder, and extra-big intake valve.



licated 10 miles an hour, we put the accelerator on the floorboard. If a "ping" developed, we would have to hear it—the engine operation was that quiet. Two things promptly didn't happen. No jerk occurred as the engine surged. And there was no ping. Just to be sure, we tried it twice more. Still no ping.

#### *Engine Won't Vibrate*

The absence of jerking under sudden full throttle was something else again. Here was a car with a direct mechanical connection between the engine and the rear wheels. It seemed to us that there was bound to be some lash in the power train.

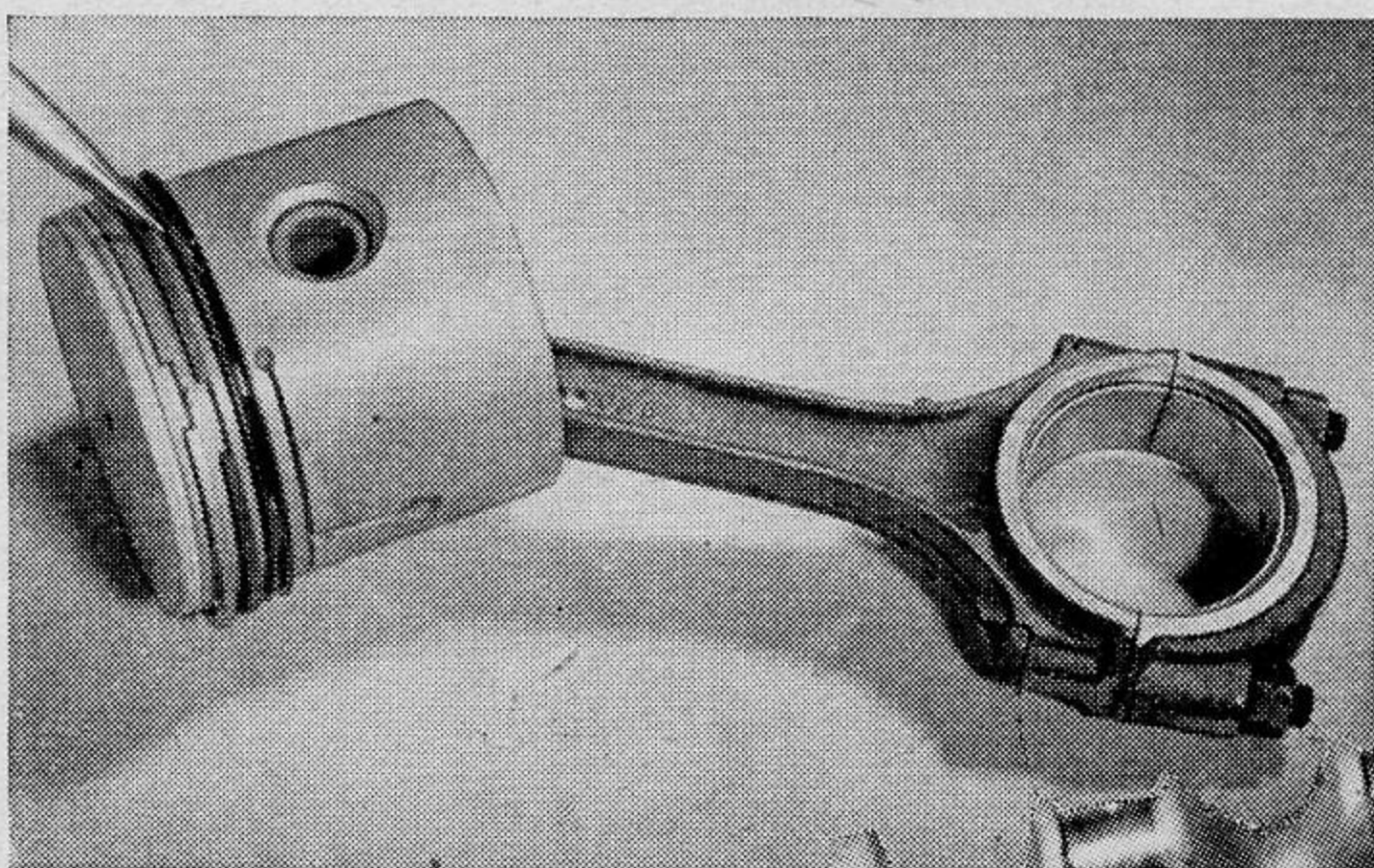
Yet both the engine and the power trans-

mission displayed excellent smoothness. Here is why:

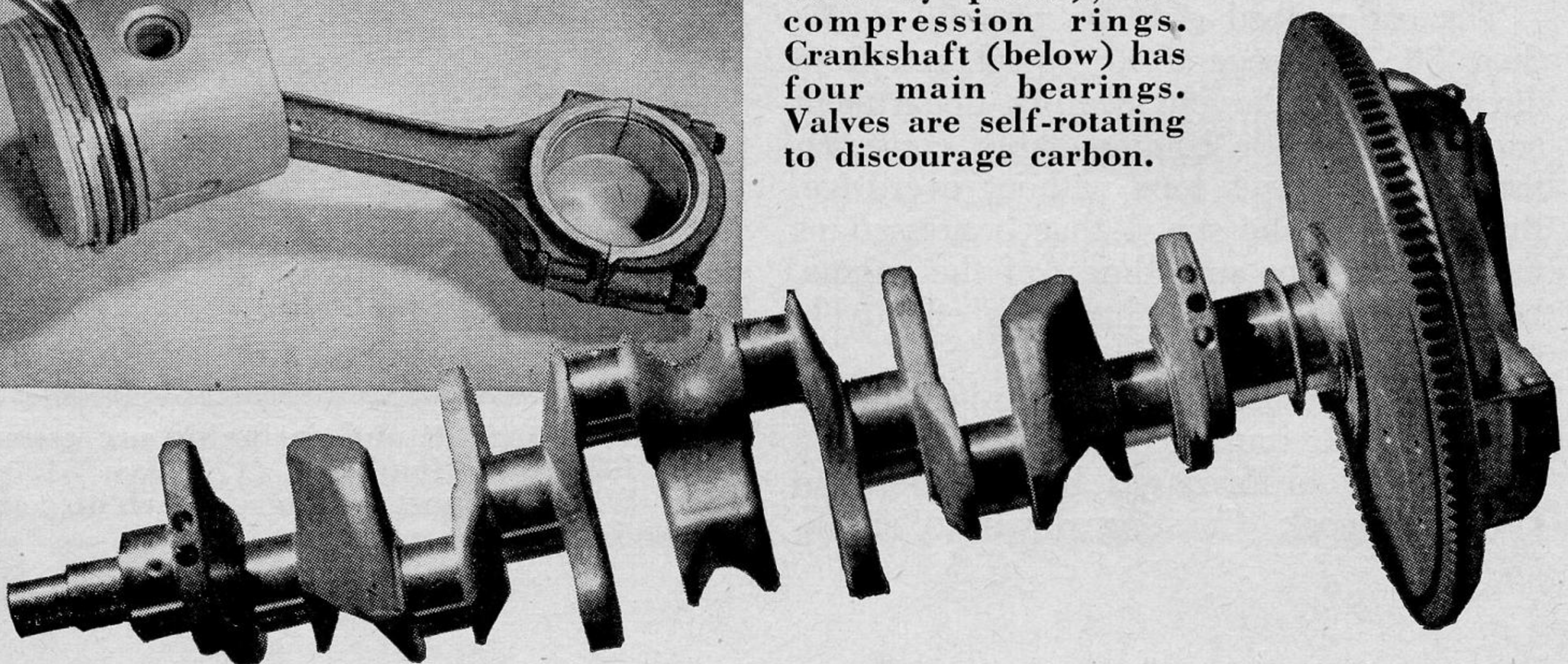
The basic vibration frequency of the entire power plant—the one you would get if you could hit the engine like a tuning fork—is below the vibration frequency generated by crankshaft and piston at idling speed. The engine will stall before it vibrates enough to set up any oscillation in its mounts. As engine speed increases, the disparity between generated vibration frequency and the basic frequency of the engine becomes even greater.

As for cushioning the drive, that would be easy if the car had a fluid coupling—the fluid is the cushion. But the Willys has none.

[Continued on page 240]



**ALUMINUM PISTON** (left) has one oil ring (indicated by pencil), two compression rings. Crankshaft (below) has four main bearings. Valves are self-rotating to discourage carbon.





## **America's New Light Car**

[Continued from page 120]

Moreover, the type of drive used, the Hotchkiss, transmits propulsive power from the rear wheels through the car springs, instead of through the propeller-shaft housing, the way a torque-tube drive does.

Vibration is inevitable in a car's power train. Variations of engine power cause the pinion gear in the differential to try to climb the ring gear. An oscillation develops around the ring gear's center. The principal reaction points with a Hotchkiss drive—insofar as passenger comfort is concerned—are the front eyes of the rear springs.

### ***Rubber Absorbs Shocks***

Willys solved the problem by attaching the spring eyes through live rubber to a "floating" cross member. That, in turn, is mounted in rubber where it attaches to the body. The rubber swallows and digests any shudders before they can reach the seats.

The ride, as the boss man had demanded, was superb. The Aero trod washboard as though it were glass-smooth. The pitch on hard bumps was scarcely noticeable. It took right-angle flat turns at 45 miles an hour without evident sway. That was due to a center of gravity only 23 inches above road level, the lowest of any six-passenger car in its price class.

The braking was exceptional. From an indicated speed of 60, the car came to a full stop in 156 feet. While the brakes were applied hard enough to make the rubber squeal, the shoes did not grab.

The noise level at 75 miles an hour with the vents closed was so low that the driver could hear a passenger in the back seat snapping a cigarette lighter closed. At 10 miles an hour a faint tappet noise did develop. A Willys representative said that was a matter of adjustment.

### ***"Nearest Thing to Flying"***

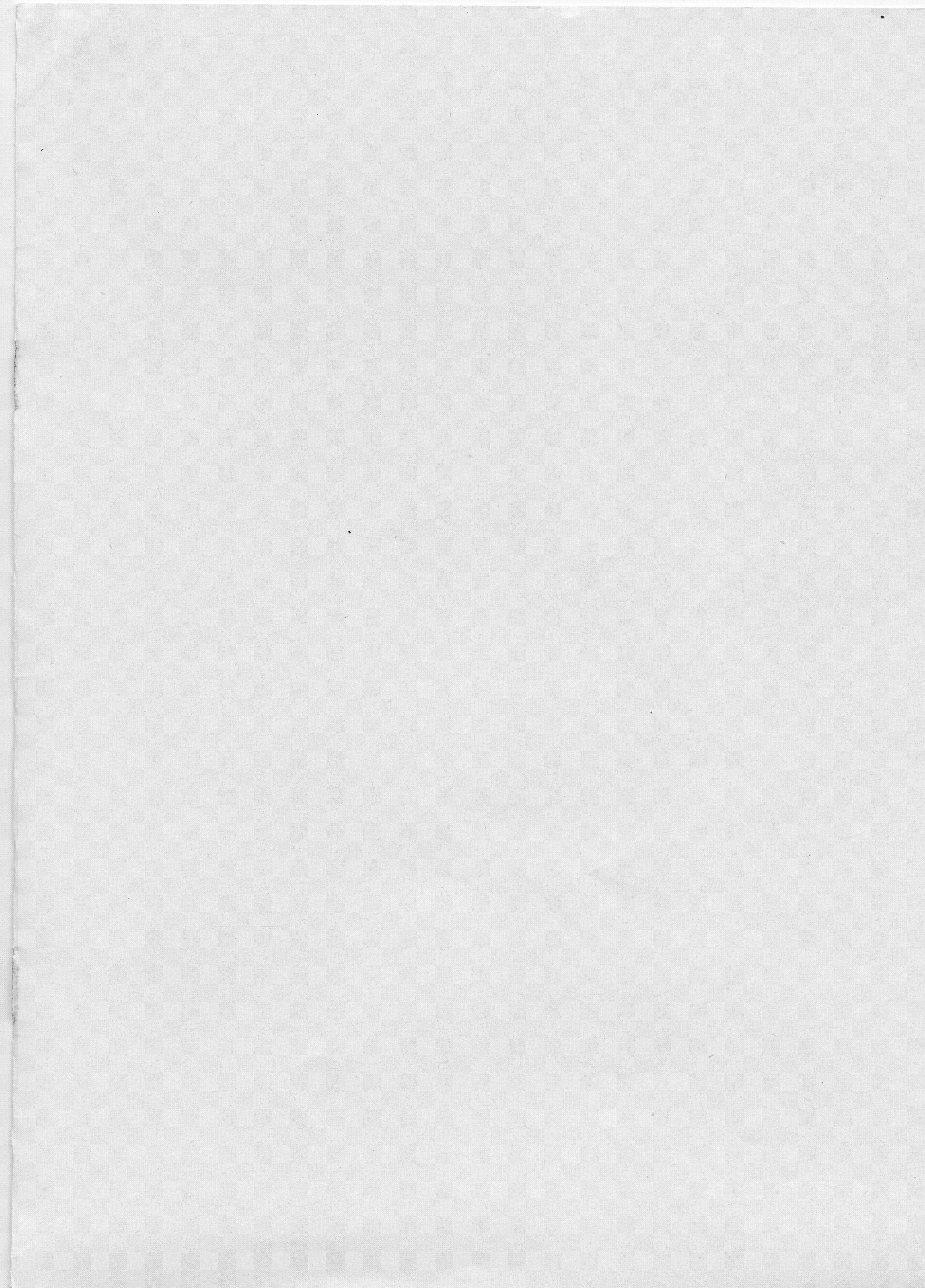
The driver's view of the road was equal to or better than that offered by any other car it has been our pleasure to drive. A low hood helps. Another nice feature is fenders so high that the driver can see all four.

The names that Willys has given two versions of its new car, Aero Ace and Aero Wing, didn't strike us as very imaginative. "Why," we asked Canaday, "the Aero?"

"Because," he countered, "it's the nearest thing to flying you'll find on the highway."

He may have something there!           END





JAN 24 1953