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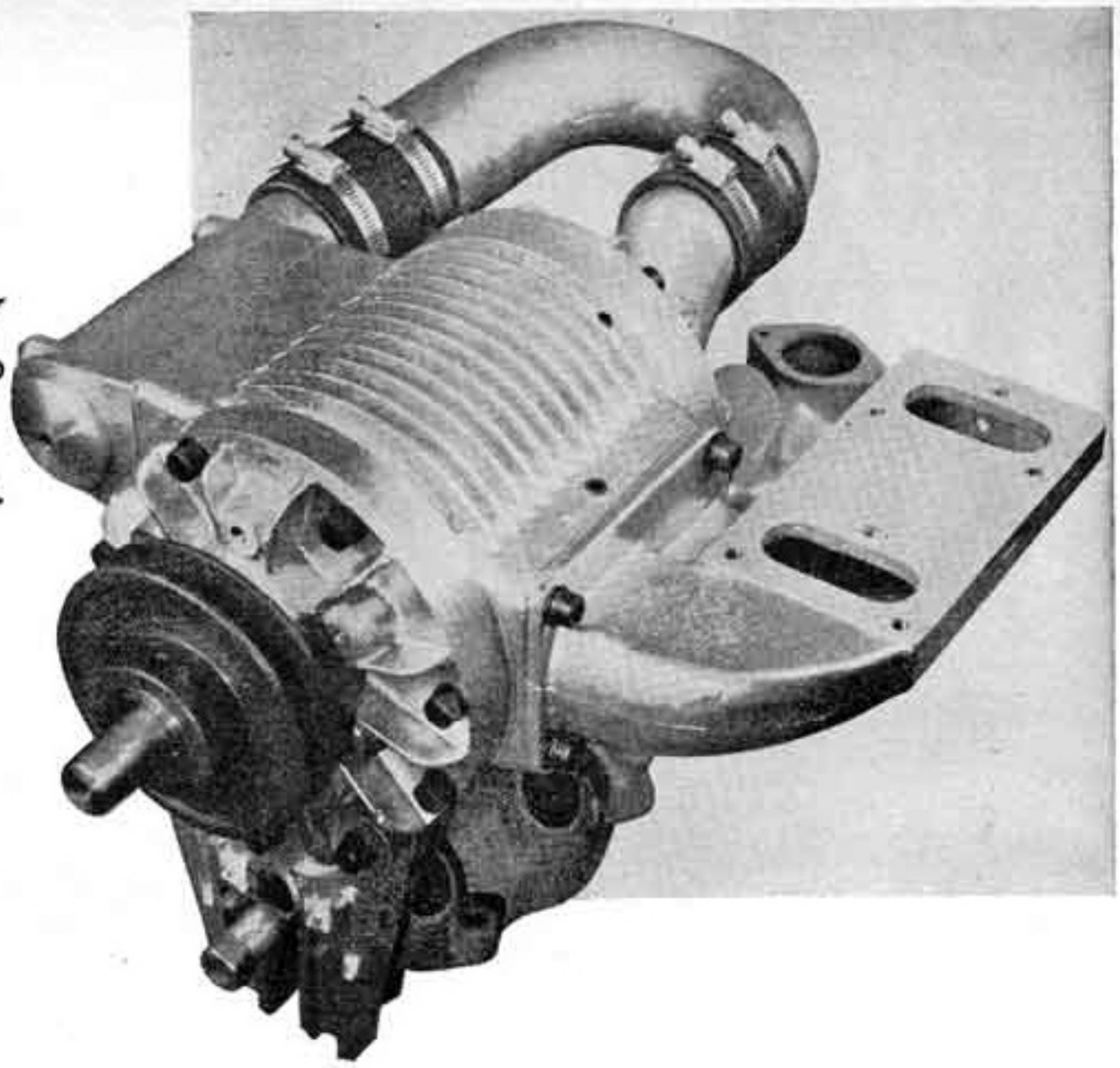
In this article a Judson Supercharger makes its first appearance. This supercharger was designed to fit the Ford/Mercury V8s and pre-dates all other production Judson Superchargers. It was also the first Judson Supercharger to be discontinued

Stock car 'blowers' have come and gone but the Judson may be the answer for the speed merchant who wants a hotter car that retains its low-speed punch.



Something New in SUPERCHARGING

By ROGER HUNTINGTON

S.A.E., TECHNICAL EDITOR, SPEED AGE

WE'VE seen stock car superchargers come and go—and have yet to find the ideal answer to practical low-pressure induction for utility road cars.

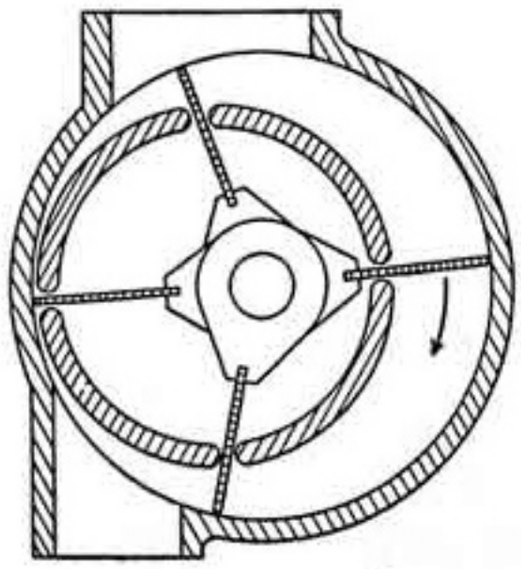
It's a well-known fact that supercharging is probably the toughest nut to crack in the whole bag of souping magic. Trying to rig it for John Q. on his family chariot is real trouble. The centrifugal fan type blower gives good gas mileage, but there's no power boost at low RPM and the things tend to get noisy over a period. The Roots, or 'lobe' type, pumps pressure at all speeds, but requires a lot more driving power, which means less fuel economy—and these, too, are apt to get sick over the long grind.

I want to talk about the rotary vane type. We've seen very little of this deal in America, although it's popular in Britain.

The vane-type supercharger is a positive-displacement pump which uses blades sweeping the inside of a circular drum to move the air. It's similar to the Roots type in principle, except for one very important difference: By using a small inner drum set eccentrically to the outer drum the volume of the air slug between two blades is decreased as it moves around the casing, and results in compression inside the blower.

With the Roots type, the air is moved at constant volume and compression results from merely packing it into the manifold. With the vane type, on the other hand, by arranging the ports and eccentricity a certain way, you get about two thirds of the overall compression inside the blower, and the rest on the Roots principle by packing into the manifold.

What does this feature mean in supercharger performance? Just one thing: When you compress by decreasing volume, you convert the heat of compression into useful pressure energy, so that it requires less power to compress a given amount of air than it would at constant volume as on the Roots. This is known technically as adiabatic compression. It's a vital factor



Layout of vane-type blower

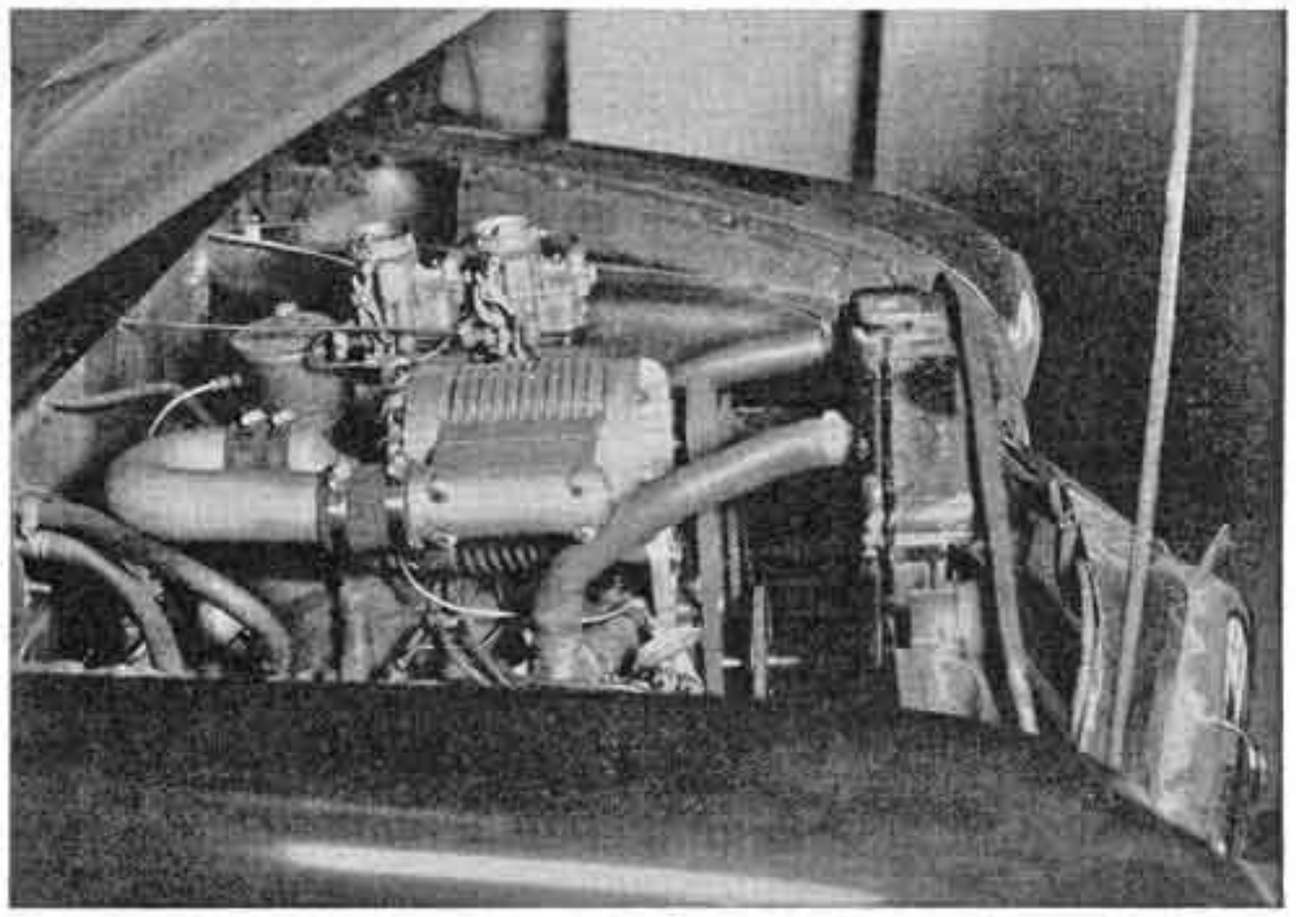
in any supercharging. In the automotive case, not only do you get better gas mileage (because the blower is pulling less power), but the manifold temperature is lower and you're less apt to run into knock on a given fuel octane.

Of course, the rotary vane type blower also has its problems. Since the blades move in and out of the slots in the rotor as they revolve, plus the necessary changes in angularity of the blades relative to the rotor, you'll have the usual problems associated with rubbing contact. (The blades do not touch the outer casing; the rubbing friction comes where they pass through the slots in the rotor.)

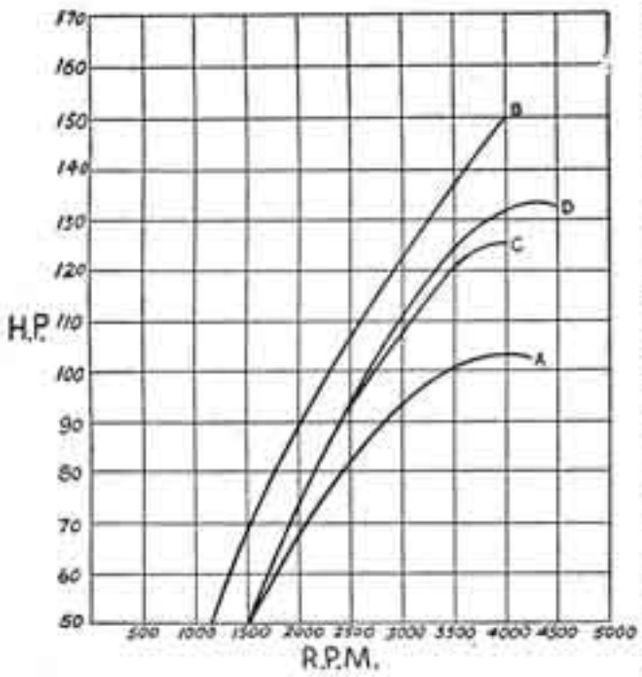
If some guy could dream up a system that would drive both the rotor and blades—as well as vary the angular speed of the different blades to just ride in the center of the slots at all times—you'd get away from this rubbing. But what a complicated and expensive gimmick it would be! As it is now, modern rotary-vane superchargers just drive the rotor, and this pushes the blades around by direct contact; the blades rotate on ball bearings around a central shaft.

Careful design of the slot trunnions is vital to keep wear, noise, and power loss to a minimum. It's a tough problem. If these design precautions are taken, however and if quality machinery methods and materials are used in the construction of the unit, there's no doubt that the rotary-vane supercharger is potentially the most practical of all types for road vehicles.

Well, this is a pretty round-about way to introduce the real subject here—the new line of Judson vane superchargers for stock cars. Charles Judson, proprietor of the Judson Research Manufacturing Company of Conshohocken, Pa., has spent five years developing an efficient model for an American market of large-displacement cars. It's the first attempt to produce a blower of this type for automobile engines in this country. At present there is a special kit in stock for the Ford-Mercury V8 engine, and a universal kit for mounting on any car (with some machining and fitting); a smaller unit for the MG is under development.



The Judson supercharger installed on a Ford V8



Results of dynamometer test of stock Ford V8 engine, equipped with generator, muffler, pumps, etc. but with fan removed. Curve A is stock engine; B, same engine supercharged at 6-8 pounds per square inch; C, stock V8 unsupercharged but with dual manifolds and 8:1 heads; D, same engine as C but with a semi-grind camshaft.

The blower unit is designed to mount on the stock intake manifold of a Ford or Mercury and to be driven by a single V-belt from the crank pulley, with the generator bracketed over one head (as with a dual manifold). Two standard Ford carburetors are used. Installation requires no special tools and takes about four hours.

With the standard pulley drive ratio of 1.2:1, this unit pumps a manifold boost pressure of at least six pounds per square inch above atmospheric. A 1950 Ford engine equipped with the blower showed 136 HP at 3500 RPM on the test stand; the same engine in the car pulled 110 HP at 3000 RPM at the rear wheels on a chassis dyno, compared with 74 HP in stock condition. A 0-60 MPH test on an uncalibrated speedometer gave 8.8 seconds with the blower, 14.5 without. The thing obviously works!

One of the most remarkable features of the new Judson supercharger is its low power consumption; it pulls only 7.5 HP at 4000 RPM when pumping six pounds pressure. This is very little more than a centrifugal blower will pull under similar conditions and much less than a Roots type. As a result, only one belt is needed to drive it, and this saves further power loss, weight, and complication.

In all fairness, it should be mentioned that the rotary-vane type of supercharger suffers one limitation—possibly a serious one where the 'cowboy' is concerned—which the other types aren't much bothered with. That is, you can't wind the engine up tight in the gears. Due to internal stresses peculiar to this type of blower, the practical maximum rotor RPM is limited to about 5000. With a drive ratio of 1.2:1 between crankshaft and blower, this means you shouldn't turn the engine up over 4160 RPM. This is just about the 'peaking' speed of the Ford engine with six pounds boost, and the gross maximum HP available at this speed will be about 150.

Actually, 4160 RPM is plenty for all ordinary conditions and wouldn't be exceeded anyway with an automatic transmission; but when you're dragging through the gears with a manual box, you get your best time when you shift well above the peak—or at least 5000 RPM with the blower.

If you don't mistreat the Judson setup, and check the grease reservoirs regularly every 1,000 miles, it will stand up. A test unit on a Ford showed no appreciable wear or loss of performance after 15,000 miles of operation, and it still pumped six pounds pressure.

The whole deal looks like a very practical new souping weapon. Unlike hot cams and dual carburetion, you get a torque boost at all speeds, and not just in the higher RPM range. You won't need to play a tune on the gearbox to keep moving with the Judson. Furthermore, the setup doesn't appear to be finnicky as to fuel octane, spark advance or idling. And what's probably most important, prices are not rough. The complete Ford-Merc kit lists at $243, and the universal kit for fitting to other cars runs $195. That's no more than a 'three-quarter' job with the usual cams, carbs, and heads—and you do retain that low-speed punch.

Let's hope the new Judson gizmo earns a lasting position in the field. ☆ ☆

AN Australian sheep farmer, having drawn a huge wool check, bought a Rolls-Royce. When he brought it back for servicing, the salesman asked if he was thoroughly satisfied with it.

"Oh, yes," said the farmer. "I especially like that glass partition between the front seat and the back."

"Why?" asked the salesman.

"Well," said the farmer, "it stops the sheep from licking the back of my neck when I'm taking them to market."

—R. BLAGDEN,
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SPEED AGE will pay $2.00 for each acceptable anecdote sent in by readers.