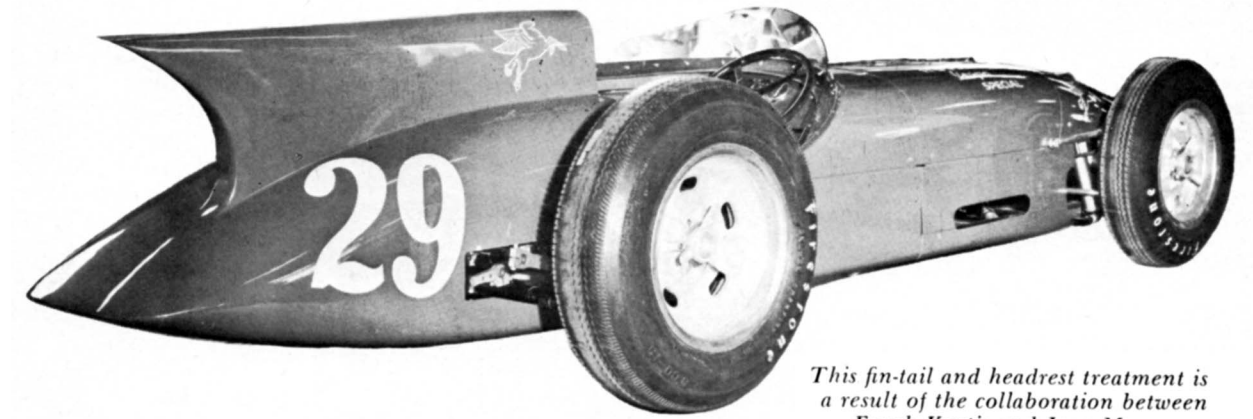
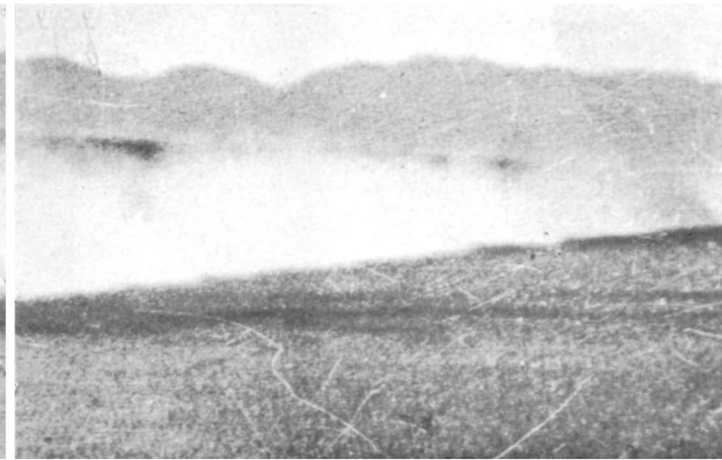
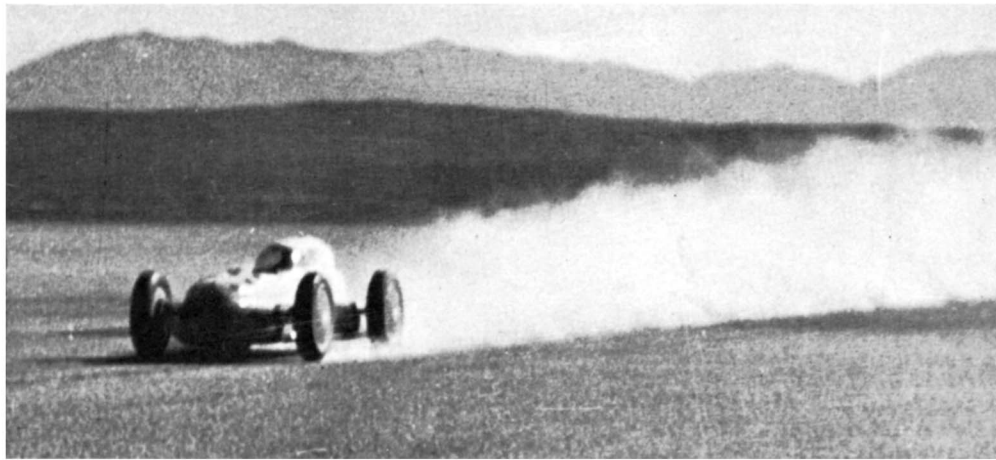
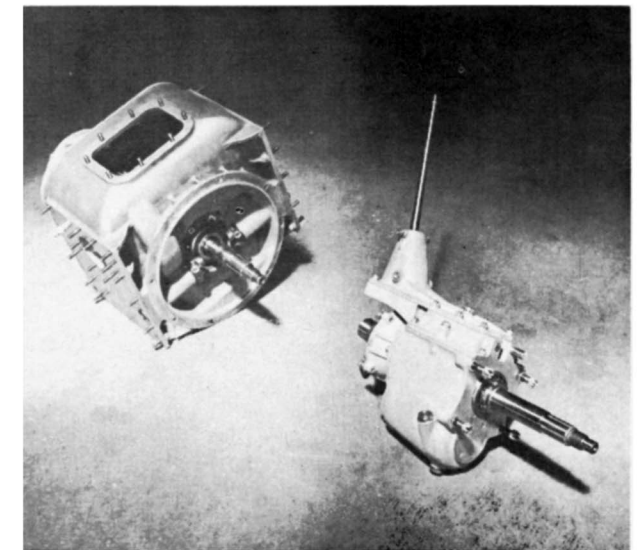


*The Novi has long been America's most powerful racing engine...and its most unlucky one. The new rear drive car was the final effort to beat the 10-year jinx.*

*Instrument panel, and engine mounted on dynamometer in the Novi shop. Performance characteristics were determined in this way before America's most potent engine was installed in car.*



*This fin-tail and headrest treatment is a result of the collaboration between Frank Kurtis and Jean Marcenac.*



*Comparative sizes of old and new gearboxes. New box, of course, is at right. Both weight and space were saved with the new installation.*

*Trial run of first Novi at El Mirage dry lake. Slide rule calculations by Bud Winfield indicated approximate speed of 225 mph at 7500 rpm. Different gears would have allowed 75 mph more.*

# The New Novi

By LYSLE E. EVANS

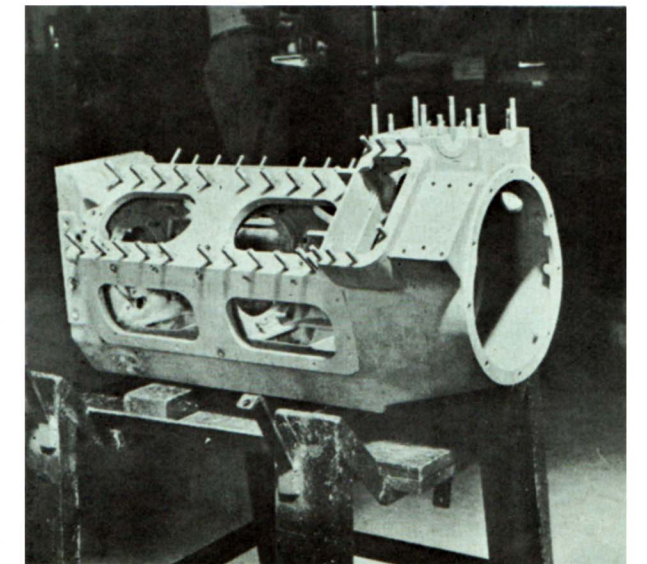
THOSE who have followed the Indianapolis 500 miler, and are acquainted with the racing equipment which competes there, may well have wondered just what could have prevented the Novi race cars from sweeping the field, year after year. In the Novi racing camp, this problem has not been an enigma. Weight distribution, particularly that of a better re-distribution of weight to all four wheels, was the first and major problem. Through patient effort and persistent trying, they had exhausted, without success, all the known methods of overcoming this problem on their front drive Miller-designed cars. The answer was found in the complete abandonment, with the exception of the engines, of the front drive equipment, and their replacement with two new cars of rear drive design.

When this decision was reached, Lou Welch, owner, and Jean Marcenac, his chief mechanic, immediately commissioned Frank Kurtis, of Glendale, California, to build two new race car chassis and bodies. Kurtis and Marcenac have collaborated in designing two new Novi racing cars with a body design that is surely a beautiful thing to look upon. They have incorporated in this new body design a head-rest fin-tail that takes on the lines of a space ship.

In order to transfer weight through torsion bar tensioning from one wheel to another, as is fundamentally necessary in the modern race car, it was imperative that the channel type frame, used on the old front-drive cars be abandoned, and that a much more rigid, tubular, space-type frame be built. This frame gave them the needed rigidity

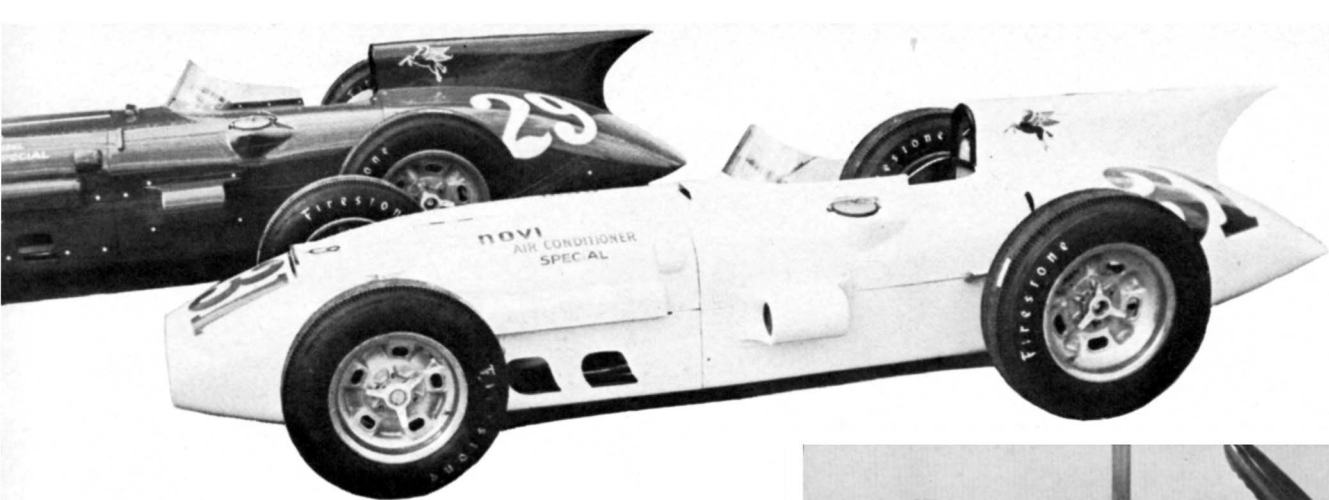
to make needed weight transfer possible through adjustment of the torsion bars. The tendency of the channel type frame is to allow the left front wheel to rise from the track when going through the turns at high speeds, thus losing traction. On the new cars this is overcome by increasing the tension of the right rear torsion bar; thus more weight can be forced on to the left front wheel, stopping it from rising up off the track, and as a result better traction, better weight distribution and less break-loose are attained.

The new chassis is 16 percent lower, 8 percent shorter, and has up to 12½ percent greater road clearance than the old front-drive cars. This in itself presented another problem, for everything that had been in the larger cars had to be incorporated in the newer and smaller ones. Compact-

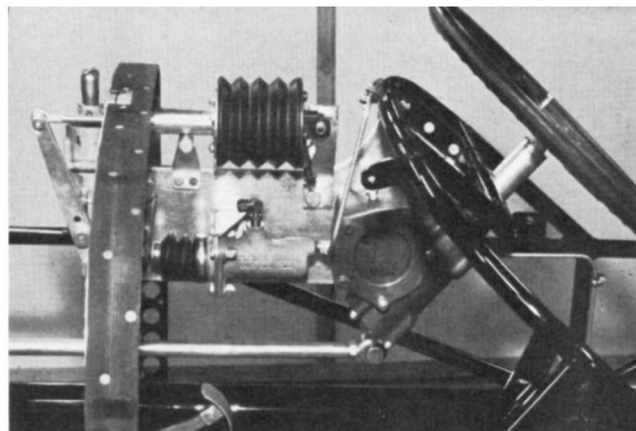


*Heavily constructed, all aluminum crankcase, partially studded, awaits assembly. Crankshaft bearings will next be fitted, and then the crankshaft itself.*





*The newly completed Novi twins in Glendale, Cal. Engine, exhaust header, manifold, exhaust pipes and upholstery have not yet been added.*

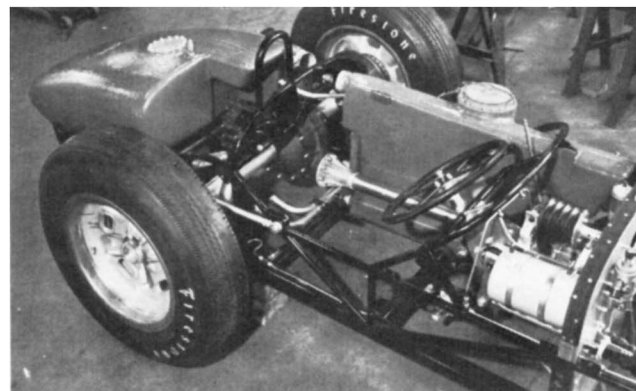


*Booster brake installation, showing master cylinder, booster and its compact location under cowling on the driver's side of the car.*

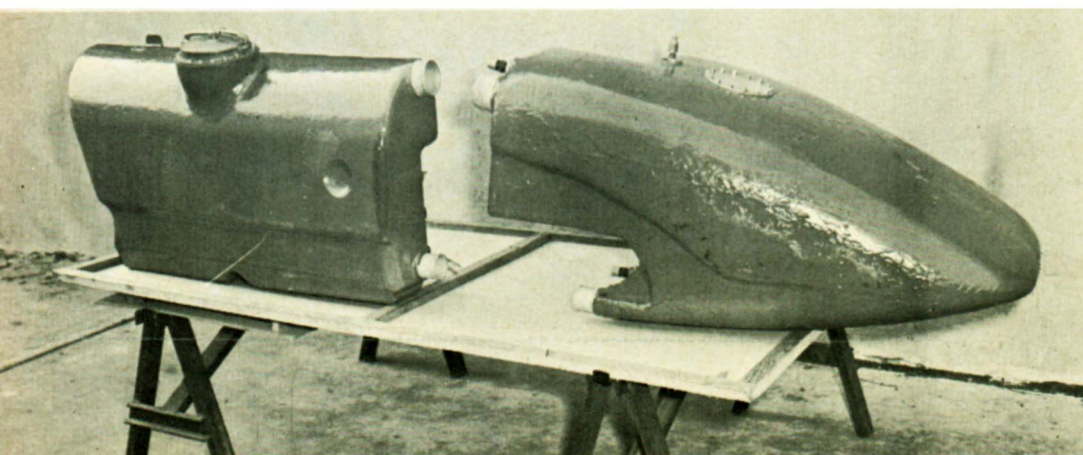
ness had to be achieved, and the accompanying photograph of the new Novi without the skin and wheels shows that no space was wasted in bringing this about.

In the old front-drive cars, it just wasn't good mechanical design to set the engine off center and to the left, as is done in the new Novis. This engineering difficulty was a part of the problem of weight distribution in the old Novis. In the new cars, the engines are placed as far to the left of center as is practical, and at a point two inches lower than before. This also allows the driver to sit at a lower point. At the same time, two separate gas tanks were made which are self-equalizing. These tanks are constructed of anodized aluminum, covered on the outside with thiokol—a synthetic liquid rubber coating—and are located inboard, one to the left of the driver, and the other to his rear in the tail. Prior to this change, the entire gasoline load was carried by the rear wheels, not allowing the front wheels to carry their share of the weight. This is another point in the more advantageous distribution of weight in the new cars.

The 12 gallon oil tank is also in under the fin-tail cover. Its construction is of anodized aluminum, but this tank is

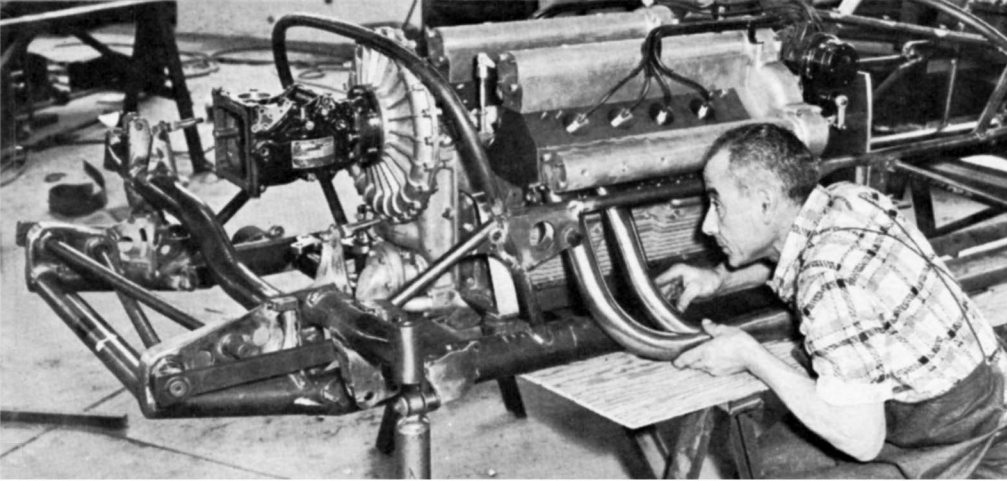


*Rear half of the space-type frame of the new Novi shows rigid construction, booster brake assembly, gas tank position and quick change gear differential.*

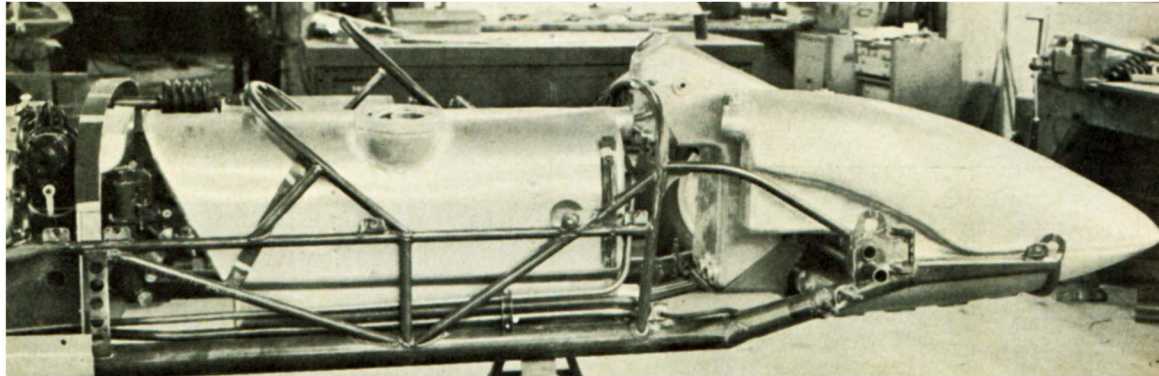


*Two self-equalizing tanks are sprayed with synthetic rubber known as thiokol, beside driver, and the one at right is the fin-tail reservoir. Left tank is inboard*





*Hand made headers are fitted to the left bank of cylinders. Note torsion bars (crossed at front) fixed to the front axle, and supercharger position.*



*Close-up of fuel tanks installed, and 12 gallon oil tank behind back of driver's headrest.*

covered with laminated Fiberglas. It is believed that these coverings for the gas and oil tanks are an innovation.

Mr. Welch's absolute faith in the ability of the Novi engines, and his desire to prove their worth, has led him to build these two new cars, although they may well be obsolete after this year's race because of the contemplated change in the formula for the race at Indianapolis for 1957. This means that this year's 500 mile race will be the last opportunity to prove the mettle of the Novi racing engine.

In installing these engines in their new chassis, alterations in the design of the crankcase had to be made so that

the new transmission and clutch housing could be adapted to the rear of the block. The accompanying photo shows the relative sizes of the new and old transmission cases and clutch housings, and it can easily be seen where more weight and space were saved by using the smaller gear boxes in the new cars.

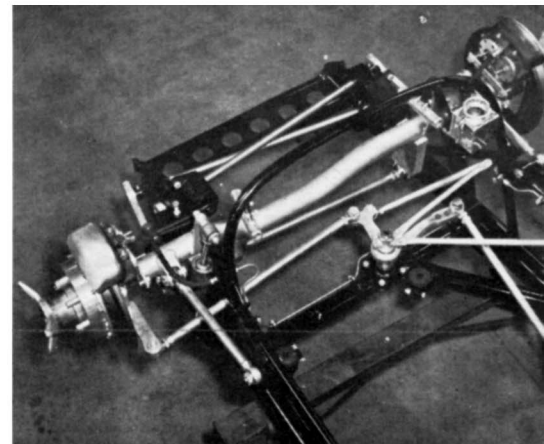
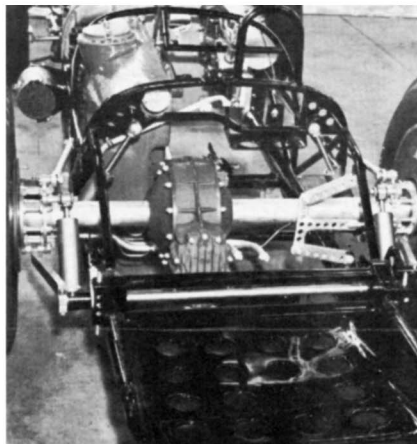
These Novi engines are 8 cylinder V-type with a total cylinder displacement of 180 cubic inches. For comparison with one of our present day passenger cars, they are approximately equal to that of the small Studebaker Champion, which has a displacement of 170 cubic inches.

*(Continued on page 62)*

*Twin Novi chassis in the final stages of completion. Engines are last to be installed. Note long, heavy tubular drag link to steering idler arm.*

*Anti-sway unit (at right just before shock absorber) is highly important. A Kurtis design, it also acts as a lateral locator unit.*

*Leverage on the torsion bars is regulated by adjustment points on the frame. Rubber engine mounts can be seen on the cross member of frame.*





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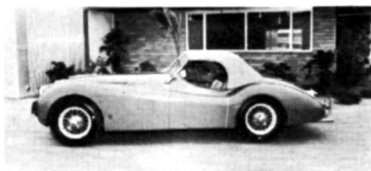
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## Novi

(Continued from page 47)

However, with their high compression ratio, dual overhead cams, and supercharger, together with their modern design, these Novi plants are able to turn out more than 650 bhp. The basic design of a square engine, i.e., where the bore and stroke are approximately the same, was first introduced by the Novi engine in 1940, and in the last few years has become standard design in our present day passenger cars and trucks.

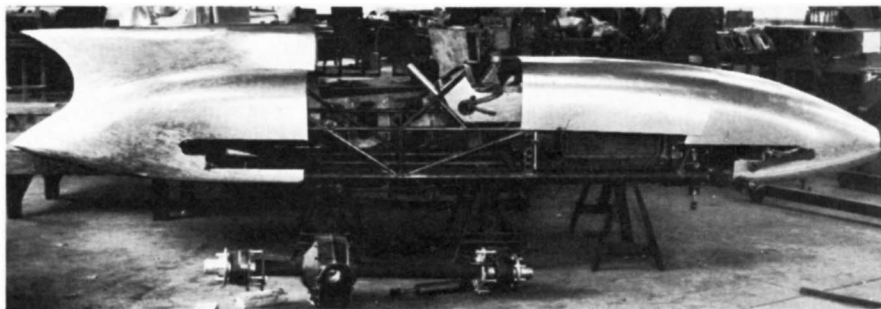
The centrifugally supercharged Novis have been the only racing cars at Indianapolis that have consistently used this type of induction to supply the cylinders with fuel. The Novi blower is geared  $5\frac{1}{4}$  turns to one turn of the crank, and at peak engine speed — in coming "through the chutes" at Indianapolis, for instance—the impeller is turning approximately 40,000 revolutions per minute. The power to drive this impeller is taken from the gears of the cam towers.

The auxiliary equipment to the en-

temperature of the bearings, water and oil, peak horsepower, vacuum pull, etc., can be obtained simply by opening a valve or throwing a switch. This takes all the guess work out of the expected performance.

With the independently sprung front wheels of the old front-drive Novis, it was necessary to have independent steering linkage to each front wheel. This meant two long links must come from the steering quadrant, located directly back of the engine, forward to each front wheel, together with their adjustable Pitman arms. In the new Novis, this has been changed. Instead, they now have solid front axles with transverse torsion bar suspension which can be serviced by conventional steering linkage. In effect the layout is very similar to that of the more usual Meyer-Drake powered Kurtis roadster.

The adoption of vacuum booster brakes added another facet to the already complex problem of a limited working area. This was accomplished, however, by installing the vacuum tank directly behind the firewall and in the cockpit underneath the cowl on the driver's side; the supply tank and master cylinder were mounted on the steering post foundation. With these booster brakes it is hoped to re-



New Novi in early stages of construction shows space frame and clean shell lines.

gine consists of a continuous turning oil filter, and heat exchanger to reduce the oil temperature during the 500 mile grind. These both can prove very beneficial to the performance of these supercharged beauties, as the temperatures mount during the race. The oil cooling system is mounted externally on the left side of the car, and is the only break in its beautiful low slung lines.

A dynamometer laboratory was set up at the rear of Marcenac's machine shop and garage where these engines can be put through their paces and checked. In this way, Marcenac can determine just what kind of performance can be expected, and at the same time, if any flaws develop during these test runs they can be corrected before the engine is placed in the chassis. Other vital information on the condition of the engine, such as oil pressure,

lieve much driver fatigue caused by the more than 800 times it is necessary to check the car speed in making the 500 mile trip. These brakes can exert approximately 125 pounds of pedal pressure with very little effort on the part of the driver, and should relieve much of the braking hazard. They are operated hydraulically, and compress with a vise-like grip two fibre discs on a circular steel disc on each of the four wheels, and have proved to be far superior to the old drum type system of brakes used on passenger cars and trucks.

Another advantageous point in favor of better weight distribution is that the wheels can be reversed in such a manner (by turning the inside to the outside) that the tread can be increased or decreased on either side of the car by two inches, or an over-all total of four inches. #