SPORTS CARS ILLUSTRATED

SEPTEMBER 1957 35¢

WILL ROAD RACING GO PROFESSIONAL?

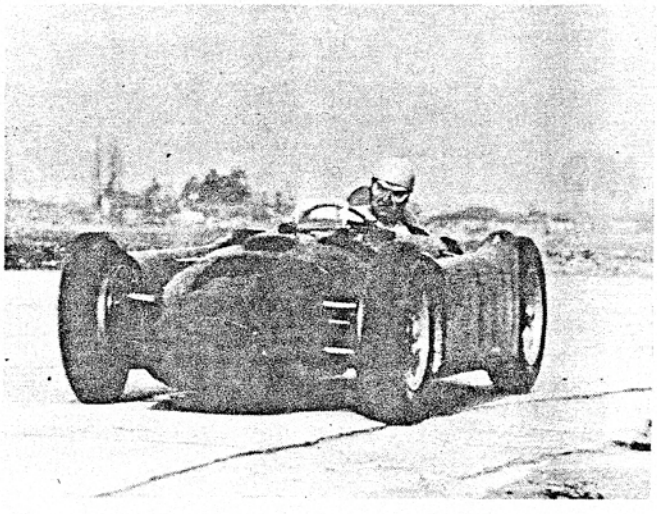
Eight U.S. Experts Discuss Racing's Hottest Question

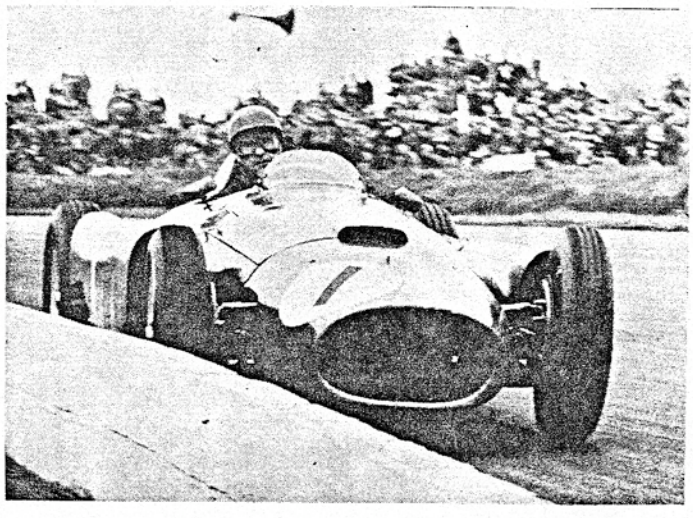
Cutaway:
CONSISTENT CHAMPION-
LANCIA-FERRARI D50

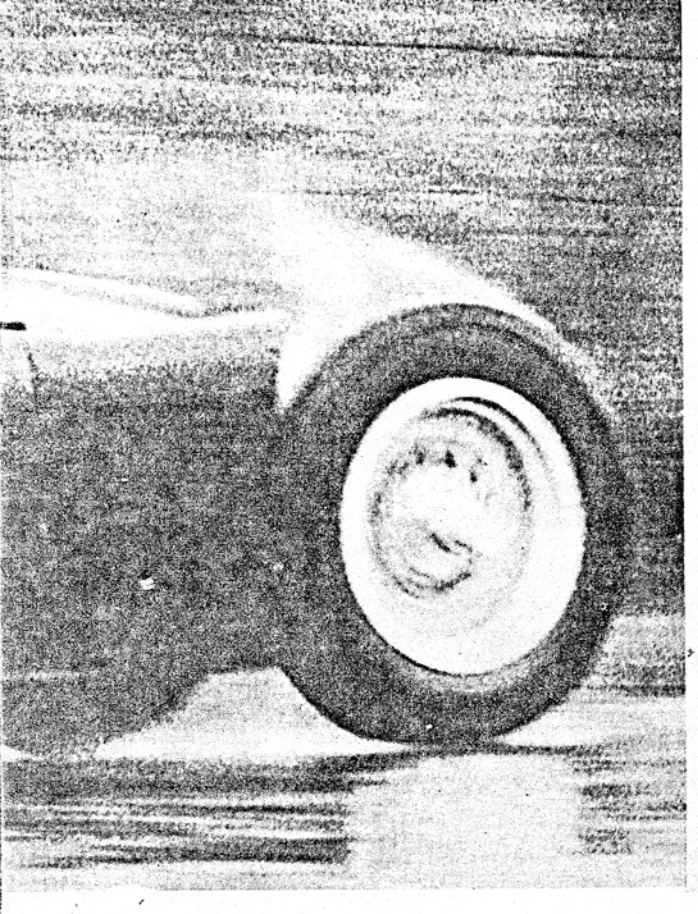
The late Eugenio Castellotti, Belgian Grand Prix, 1955

SCI Technical Report:

CONSISTENT CHAMPION







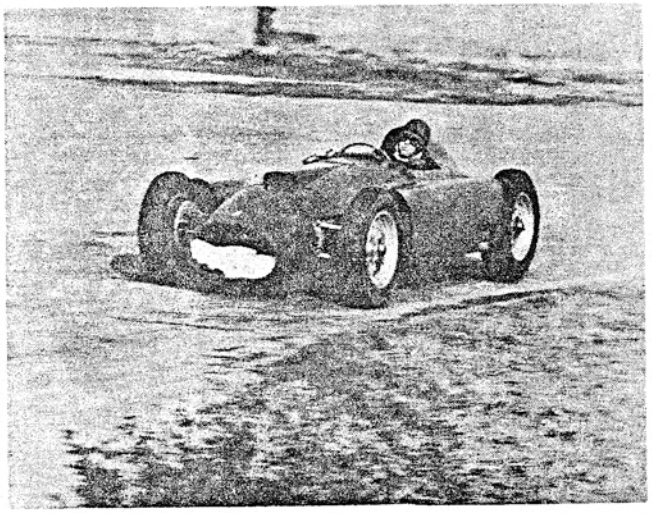
IT WAS Vincenzo Lancia, a glowing, hulking mountain of a man who once roared, between sea-draining swigs of champagne, "To WIN a race you must FIRST stay on the ROAD!" Never daunted and full of cheer, he tested all inferences of this remark, wreaking his ebullient spirit on the then-new F.I.A.T. racing cars — awful monsters of machines to ordinary men but pitiful toys in the vast palms of Vincenzo. To vent his horizonless energy, Lancia turned to the building of cars that could take it, cars that leaped to being under the spurs of his imagination. They climbed fast and hard to the ever-rising plateaus of automotive design and beat many new paths of their own, but never did the firm at 27 via Vincenzo Lancia, Torino, release its creations for racing.

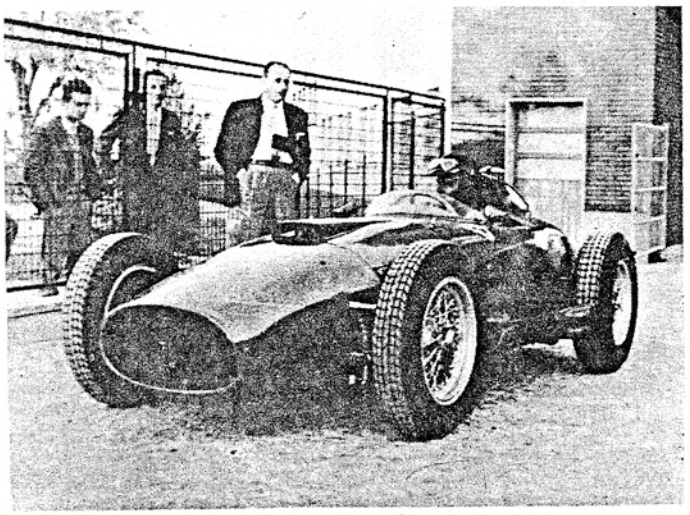
Never, that is, until heir Giovanni, like his father in bulk alone, emerged from engineering school and found Lancia & C. and its tradition in his hands. There was another asset: Vittorio Jano. This facile mind had been at work for Fiat during the decade before 1921 and developed the P2 machine with which Alfa won the '24 French Grand Prix. It streaked on to design the classic yet radical Type B "P3" Alfa Romeo of 1932 and the other Alfas of that time on which Nuvolari worked some of his greatest wonders. In 1938 Jano joined Lancia, and after the war he presented the company with the imperturbable Aurelia model.

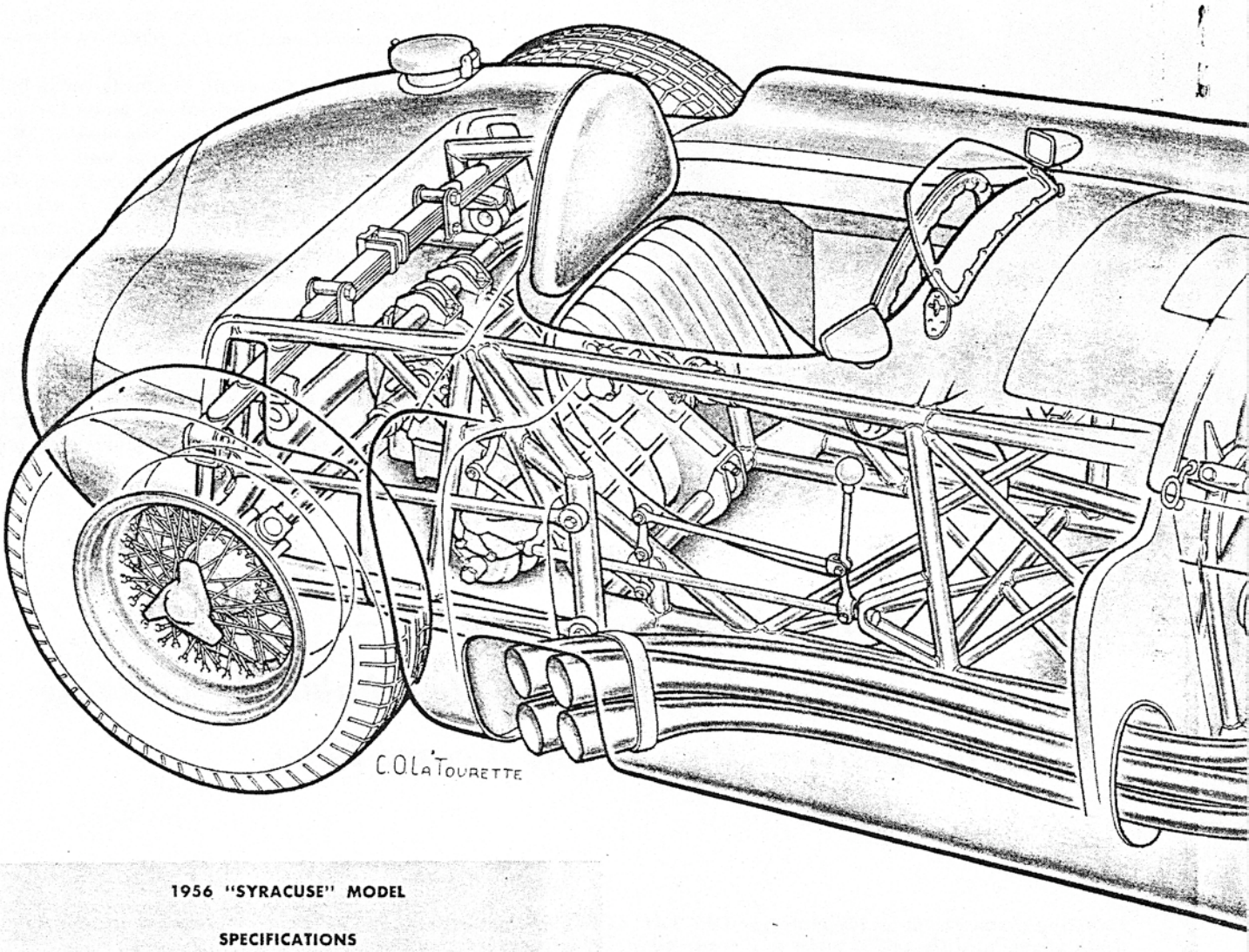
Hiding below broad brims and dark glasses, the near-sixty Vittorio was thin to the point of gauntness and fairly vanished next to "Gianni" Lancia, with whom he worked to design the Jewel-like Appia of 1953. These two conspirators, betrayed by their past, had more on their minds than pro-

From the time of its inception the Ferrari— nee-Lancia D50 has made a habit of clobbering all competition. Here is how it came to be.

Handling characteristics of the prototype D50, FAR LEFT, were designed for skill and ability of Ascari, whose untimely death precipitated the cars' transfer to Ferrari and their subsequent chassis-detuning. Fangio, LEFT, proves that GP cars DO roll at Silverstone in 1956. At Monza, BELOW, Collins tests the early 1957 model which has already been superseded by latest car, RIGHT, which uses coils in front and has abandoned the famous, but now empty pontoons.







1956 "SYRACUSE" MODEL

SPECIFICATIONS

POWER UNIT:

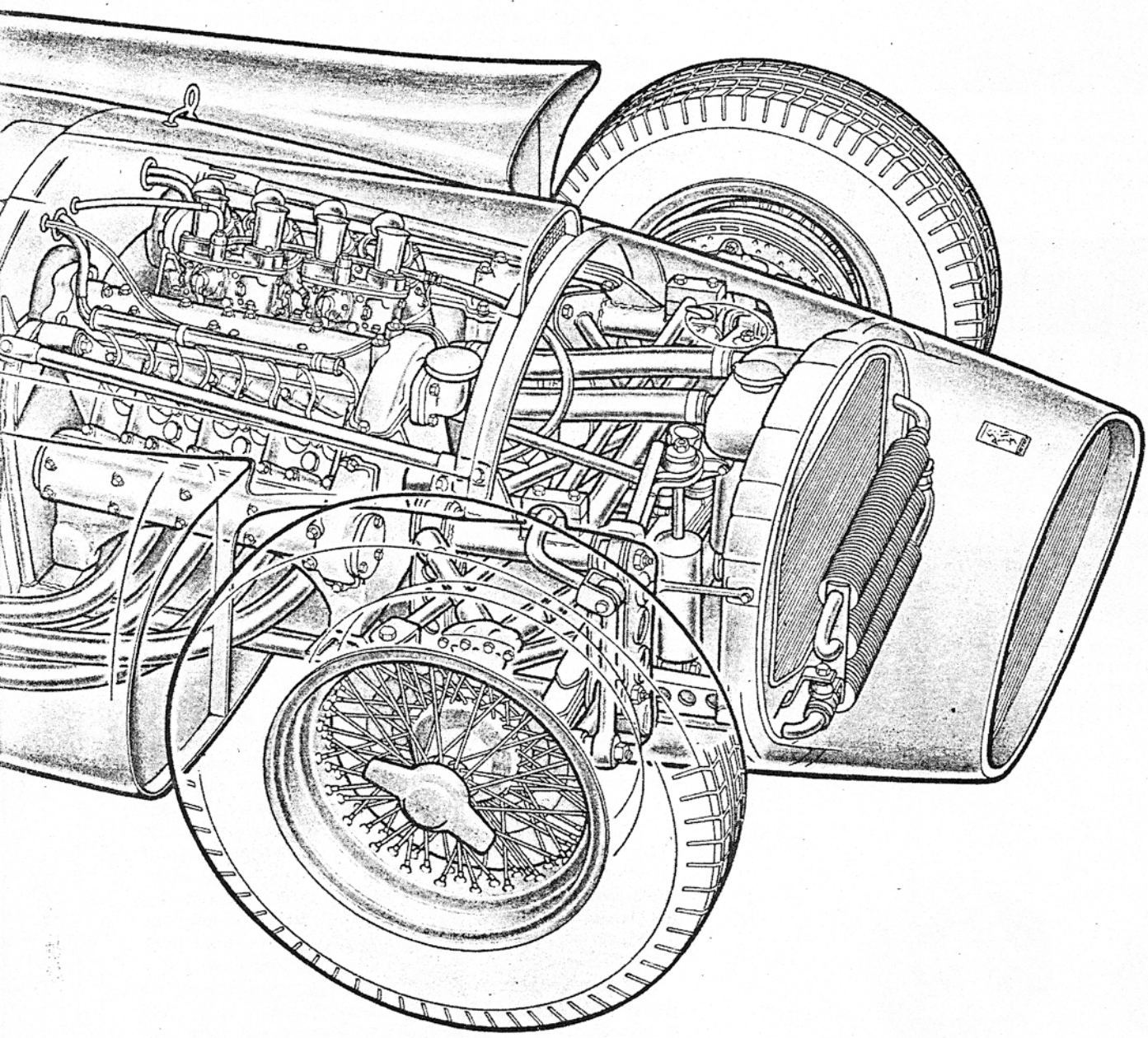
Type	V-8, 90°
Valve Arrangement	Inclined 40°
Valve drive	Four chain-driven camshafts
Bore & Stroke	2.99 x 2.70 in. (76 x 68.5 mm)
Stroke/Bore Ratio	0.90/1
Displacement	151 cu. in. (2490 cc.)
Compression Ratio	12/1
Ignition by	Two Marelli magnetos, two plugs per cylinder
Carburetion by	Four Solex 40 PII
Max. bhp @ rpm	275 @ 8000
Bhp per cu. in.	1.82
Bhp per sq. in. piston area	4.92
Piston speed @ max bhp	3600 fpm

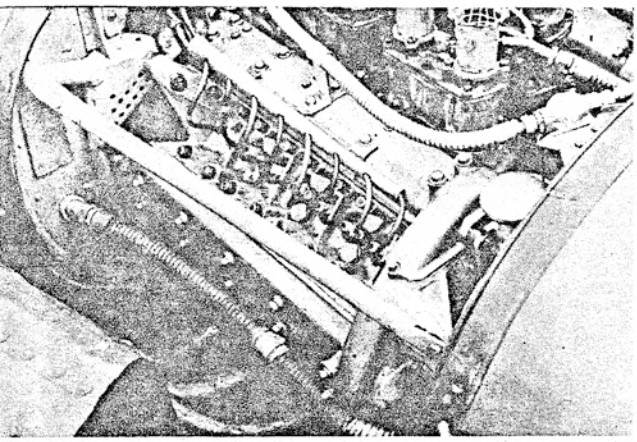
CHASSIS:

Wheelbase	90 in.
Front Tread	50 in.
Rear Tread	50 in.
Suspension, front	Equal length wishbones with ball-joints, tranverse leaf spring, anti-roll bar
Suspension, rear	de Dion axle, parallel radius rods, sliding guide, tranverse leaf spring
Shock absorbers	Front: telescopic, rear: Houdaille rotary
Frame construction	Space frame of small diameter tubes
Drive train	Clutch and differential in unit with 5 speed and reverse transmission
Brake type	Drum type, two leading shoe
Tire size	front: 5.50 x 16, rear: 7.00 x 16
Fuel capacity	61 U. S. gallons

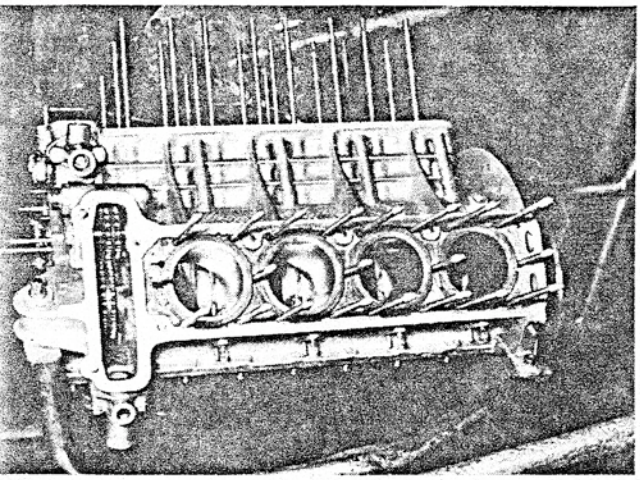
FERRARI LANCIA D-50

Starting Point for Championship

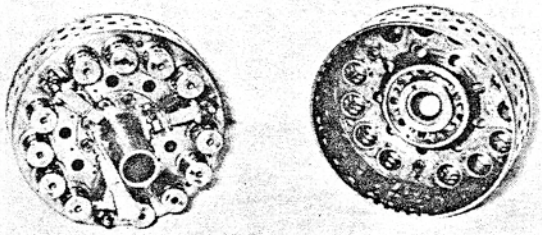




The sturdy, well-ribbed cylinder heads, with built-in lugs, served as frame members in the original Lancia concept. Ferrari's first step was to relieve them of chassis loads by adding struts.



Bristling with studs, and with crankshaft and cylinder liners already installed, this crankcase is now ready to receive the diagonally split con-rods and the five-ring pistons.



Not bank vault doors, but two views of part of the multi-plate clutch, with the task of containing torque and plenty of it.

duction profits, to the glory of racing car design and the grief of the stockholders (among whom the Lancia family were most numerous). In 1952 it was generally surmised that the Lancia factory would be in racing with both feet soon, after the Gran Turismo Aurelia had done some astonishing things at Le Mans and Mexico.

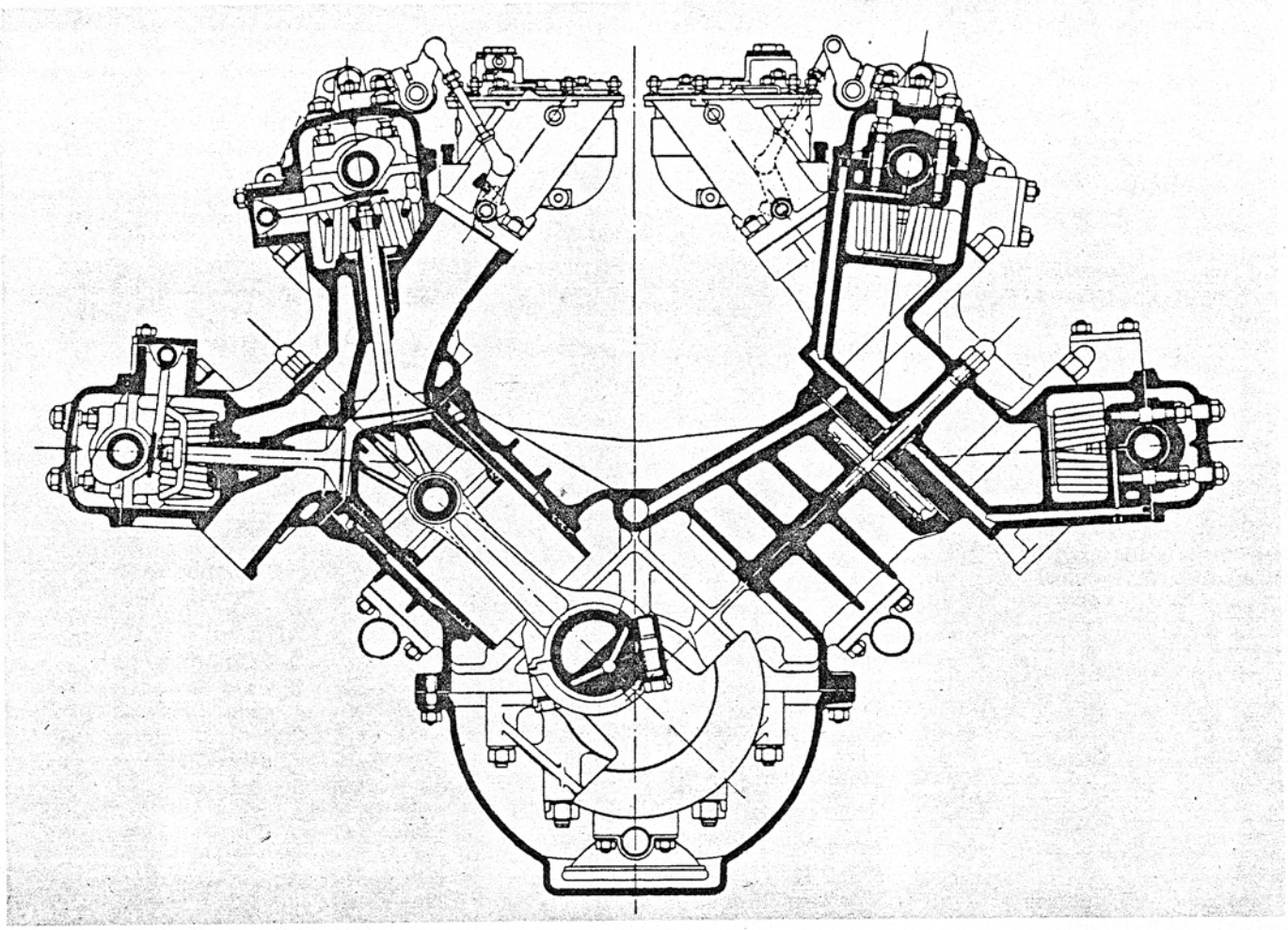
As finally settled, the Jano-Lancia Postwar Plan was very similar to that adopted by Mercedes. A year or two of sports car racing just to get the feel of things and build up a cohesive *scuderia*, and then the Grand Prix effort, but only when really ready. First manifestation of this came on March 15, 1953 when the Le Mans entry list was seen to include three 2.9 liter Lancias. Just like the 300SL the year before and the SLR two years later, the new machines were first revealed for the Mille Miglia. They resembled the Aurelias in that they were coupes (fashionable at the time) with vee-six engines in front and a combined clutch-gearbox-differential in the rear, but that's about as far as it went. The V6 had two plugs per cylinder and inclined valves with twin overhead cams. Jano shook the sports car world in 1935 when he designed a twin-cam 2.3 liter Alfa with chain drive to the cams, and the new Lancias had the same logical, cheap feature.

Displacement was 2,962 cc (86 x 85mm) and was fed by three twin-throat Webers ducted to ports on the inside of the 60 degree vee. A reasonable estimate of power at this time might be 210 bhp at 6700 rpm, though reports then ranged from 120 to 240 horses for this mystical machine. The Lancia crew weren't loose-lipped about it either. Final drive was as mentioned, with the three units right in line. Rear suspension was similar to that of the then-current Aurelia, with angled trailing arms, but had a transverse leaf instead of coils. The greatest standing Lancia tradition — sliding pillar and coil spring front suspension — was set down by a system of parallel trailing arms like that on the Aston DB3, mounted on a big tube crossmember and shackled to another transverse leaf. Telescopic shocks were used all around, and the whole works was united by a triangulated frame of small tubes.

Most radical were the brakes, which were all about half a foot wide and all bolted firmly to the chassis, as sprung weight. This was then common at the rear but unheard of at the front, where the drums were placed either side of the radiator and connected to the wheels by U-jointed shafts. To gain "leverage" and improve cooling and control each drum was fitted with a small planetary gear to whirl the drum faster than the wheel. The coupes were stubby, rugged-looking weapons in their scooped and vented blue-and-white Farina bodywork. They went, too, taking third in their maiden race and winning the Targa Florio three weeks later.

For Le Mans they clamped on a moderate-boost Roots blower which nestled in the crotch of the vee. It was fed by two horizontal Webers and driven by a three-inch-wide flat belt at the rear. Engine size was cut to 2.6 liters to help out on handicap, and the resulting assembly just couldn't push the 1870 pound coupe very fast. They all broke down.

Lancia now had an impressive racing organization that was rolling fast and didn't make the same mistake twice. Just a fortnight after Le Mans they had a bright red open two-seater version running at Monza, where the late Felice Bonetto used it to snag second place. This was a lighter short-chassis rig with the 2.9 engine but with revised rear suspension. The cross spring was still there but now hooked to a de Dion tube curving behind the differential. Location was by a central sliding guide and parallel radius rods at each hub. Bonetto went on to win the Portuguese G.P. with this car, then joined the rest of the team at the Nürburgring for a big test session, in the course of which a few unofficial distance records were wiped out.



An extremely handsome layout, the four-cam 90° V-8 has shown impressive improvement in Ferrari's hands. While the special Weber carbs and even the bore and stroke have been changed again and again, basic features, such as the rigid crankcase structure and the drilled oilways, have proved their value throughout the long period of development.

For the 1000 kilometer race at the 'Ring at the end of August, Lancia turned out yet another version, named the Type B24. This was the basis for all their sports car work from then on, having a 3.3 liter engine and a new gearbox in which the four speeds were slung below the differential instead of in line with it. The de Dion tube now bent around in front of the final drive and was located by a trailing quarter-elliptic spring and radius rod at each side — lighter and more compact than the previous version.

This at last was the race car Gianni and Jano were after. With Fangio on the team the two new cars had no trouble leading a 4.5 Ferrari until they were both disqualified by battery failure. They were fast enough to give confidence, though, and to be on the safe side for the Carrera Mexico engine size was cut to 3.1 liters with one even three liter car for Castellotti. These swept Lancia to its first big-time win, running easily to the first three places. Engineer Piero Taruffi (second place) had high praise for the cars: "They needed little overnight servicing and had the same compression and valve clearance as when we started!"

Once the sports car was set, in September of 1953, construction of a Grand Prix car prototype moved into top cog. Vittorio Jano was no longer young, and realized that this was in all likelihood his last great project. He had always known that high power was no substitute for light weight and good handling — proven in the Alfa days — and had learned a lot from the Lancia sports machines about highly developed modern suspension techniques. Over his head was the threat of Mercedes, too, for Jano knew that Uhlenhaut held a strong lead in facilities and that most valuable commodity, time. The new Lancia would have to be light, simple and compact to a degree never approached before. They would have to build close to a dozen of them. And they would have to be handled by the best racing drivers in Italy.

There was cloudless sun but it was sweater-cool over the concrete of a private circuit near Turin. It was early January, and mechanics who had not been told that it was now 1954 stood with weary, flickering smiles as Alberto Ascari approached, loosely swinging his eggshell blue crash hat. Looking on, young Lancia knew he had his team. Soon — they didn't know when — he and Jano would know if they had a race car in the squat, dark machine that waited muttering on the concrete.

(Continued on page 54)

Ferrari D50

(Continued from page 37)

The portable gas-operated hot air blower was switched off and wheeled away from the tail, where it had been warming the rear-mounted oil tank with the engine whirring at a steady 2000 rpm. Then a brief shutoff while sixteen cold plugs were twisted into the V-8, followed by a restart with the portable motor and shaft which plugs into the left *rear* and mates with a driveshaft extension. Now aboard, with only head and collar showing in the compact cockpit, Ascari booted the D50 Lancia down the access road, its deep exhaust note coughing and sputtering in the low starting gear. Clicking in the synchronized second Alberto laid on it hard and all eight came in with a racketing blare that was to become very familiar in the next four years. With the blue hat and red car dwindling down the runway, work had just begun.

Jano had outdone himself with the D50, which was a fine-strung violin of a car and as such needed lots of tuning. Its literal heart was and still is a 90 degree V8 of 2½ liters capacity to suit the current Formula I. The derivation from the sports-racing Lancia is very clear in such matters as the chain drive to the cams — unique among Grand Prix cars — in which the double-roller chain for each head runs straight across between the two cam sprockets, and then over an adjustable idler placed just below the left-hand cam sprocket of each bank. This is similar to the layout used in current Alfas and in the new touring 3.5 liter Maserati engine, but differs from the 3.8 Ferrari twelve and the Beavis Offy, which bend the chain around an idler just between and below the cam sprockets.

Another link to the B24 Lancia is the cylinder head structure. There's a deep external web crossing between the cam boxes just above the center of each combustion chamber, in both cases. Right between each cylinder there's a stud going down into the block, and there are eight more studs along each side of the detachable head which effectively give six studs surrounding each cylinder. In common with several other current engines the Lancia has wet liners inserted in a one-piece block and crankcase, but the detail design is brilliant. In the first place, the water jackets of adjacent cylinders are completely separate except for a cross passage at the top just below the head face. The jackets are structurally joined by two planes of fore-and-aft webs, and are tied to the crankcase by lateral webbing.

Secondly, a wet liner must be sealed at both top and bottom of the water jacket, which most such engines accomplish by fitting gaskets to flanges at top and bottom and compressing the whole liner with cylinder head pressure. Not so Jano, who wanted to avoid any chance of liner distortion. The top of his liner has a flange which meets the cylinder head (then through a gasket) like most others, but just ¾ of an inch below the top is a shaped and notched flange which butts up against a counterbore in the cylinder casting. Between these two flanges, right at the top of the liner, all the stress of the cylinder head seal is absorbed. From this point down the liner only has to guide the piston, takes no compression stresses. Seal at the bottom of the Cylinder is assured by a close fit plus two synthetic rings grooved into the liner.

The above meant that the liner walls could be thin, for light weight and high heat transference. Water speeds and jacket capacity are low to keep temperatures up and wall friction down, the coolant coming in through manifolds low at each side and exiting through ducts alongside the intake valve seats. Distribution of water in the heads is very good, with flow all around all the valve seats and a wet, finned section of the exhaust valve guide. The water pump itself is driven from a small gear train at the nose of the crank, and has an integrally-cast duct to the cylinder manifolds. Mounted vertically just ahead of the front suspension assemblies, the radiator is thick-cored and has integral top and bottom tanks. Its outside shape conforms very closely to the cross-section of the body at that point, which gives it considerable area — perhaps more than other comparable GP cars. The same criticism was made of the first sports-racing Lancias. Space is so scarce up front that there's no room for air ducting away from the core.

Each cylinder head and its joint seal is treated as a unit in itself, the water jackets acting only as structural supports. The crankcase is a third design unit. The bottom of the block is machined off on the centerline of the crank, like a Jag, and the five mains are backed up by deep, thick webs. Block and heads, by the way, are cast in an aluminum alloy with a high silicon content, which improves castability in small, thin sections and increases durability under vibration.

Main bearing caps are about the heaviest yet thought up. Each one has two big studs close in and two smaller ones farther out which anchor the webbed cap firmly to the block. All the strength of this bottom end is in the block and main caps, plus the often underestimated contribution of the machined crankshaft. The low rotational moment of a V8 crankshaft is already a boon to responsiveness and acceleration, but Jano's version, with metal dispersed only where absolutely essential, set a new standard for the type.

With all this stiffness the Lancia D50 engine's sump could be just that — a collector for oil to feed the dry sump system. The big scavenge pump is mounted low down at the front, sucking oil through a series of collectors hung from the main caps. An oil reservoir is in the tail end of the car, as mentioned, and a core-type oil cooler was mounted in the front of the left-hand pontoon with a scoop on the outboard side. The pressure oil pump body is offset to the right of the crank nose and is integral with the top of an oil filter housing.

In contrast to some of the other Italian machinery that we've looked at lately, this Lancia engine has practically no external pressure oil feeds. Main artery of the lubrication network is a gallery the size of your thumb which runs from front to back of the block right in the center of the vee. Each main is fed by a short duct down through the web. Passages up through the water jackets and head joints feed ducts drilled across the heads, which in turn deliver pressure oil to the camshaft bearings and valve mechanism.

There are a lot of practical features in this engine to make week-to-week teardowns easier. The detachable head is handy, for example, and to take full advantage of this two-bolt rod big ends are split diagonally so they can be pulled up through the cylinders.

The original pistons were high-domed with full skirts which carried five rings each — one below the big wrist pin. Heavy ribs under the crown curved down to carry loads to the wrist pin bosses. Very shallow cutaways for valve head clearance show unusual confidence in the valve gear! And with good reason, right up to the designed limits of the engine.

Early prototype editions of the D50 had long slim fingers separating the cam and valve stem end. Hairpin springs were fitted to keep the stems short and valve weight down, but this arrangment, while good of its type, was still too heavy for the exacting Jano. During development in 1954 the fingers were dispensed with once the rest of the engine was proven, and Vittorio inserted the compact type of tappet that he first developed for Alfa Romeo. With this the simple mushroom-type tappet is screwed directly to the valve stem, in some versions with a surrounding collar for extra security. Valve clearance is easily set by rotating the tappet in relation to the valve, and locked by a series of notches under the pressure of the coil valve springs. Adaptations of this system are now appearing on the Ferrari Formula II V6 and 3.8 liter sports V12, to no one's surprise.

Only after the later valve gear was adopted did the cars show enough speed to be competitive, and in their first few races there was a spate of bearing trouble. Nothing is more precarious than the balance between power and durability in a racing engine.

Thanks to the detachable head, there are no mechanical restrictions on the valve dimensions, which are big by any standards. Stems are hefty and the heads are deeply tuliped, diameters being 1.81 inches for the intake and 1.75 for the exhaust. Both have seat inserts. Both are also angled at 40 degrees to the cylinder center line, the intake valve stem being nearly an inch longer to allow plenty of room for a big smoothly-curving port from the carbs.

Early drawings show very special Weber carburetors with throttle bodies angled just right to mate with the Lancia intake ports. These carbs were actually built but didn't deliver the goods so an ace Solex salesman came to the rescue. The D50's made their debut with four twin-throat Type 40 PII Solexes fed by a seemingly small fuel line network down the center of the group. Among other little touches, carburetion development made use of a finned, temperature-pickup bulb placed high between the two rear carb intakes, where underhood air would be at its hottest. Air came in through a duct recessed

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Ferrari D50

continued from preceding page

in the top of the snout, instead of a conventional scoop.

Twin Marelli magnetos are driven off the back ends of the intake cams and protrude through the firewall into the cockpit. The first prototype car had two little cowl air scoops — one to cool each mag — but anticipating rain the later cars had a shuttable square scoop in the center.

At the back of the V8 is nothing but a small cover for oil sealing and a direct connection to the driveshaft which, like the engine, is angled from right front to left rear of the chassis to allow a low profile. The transmission is right behind the driver and all its shafts plus the integral differential are aligned *across* the car. As viewed from the side the case leans back at a 45 degree angle. The input or countershaft is at the bottom, the mainshaft at the center, and the spur-driven differential is at the top and farthest to the rear. At the left of the beautifully-ribbed case is an integral housing for the dry, multi-plate clutch which drives the countershaft. The clutch cover plate houses a pair of bevels which take engine rpm from the drive shaft, and which have an extension for the starter that we mentioned.

The box has five forward speeds with first mainly for starting. Porsche synchro is used on the top four gears, and it's likely, as in the case of the Bugatti GP car, that this included the valuable help of the Porsche design staff in laying out the bearings and shafting. Gears are selected with a gateless lever on the right hand side which first did its job through one rod, but later had a second one added. There's a hydraulic cylinder for the driver's left foot, just like the one on the right for the binders. It kicks open the clutch via a small slave cylinder at the rear which tugs the withdrawal lever against a coil spring in tension.

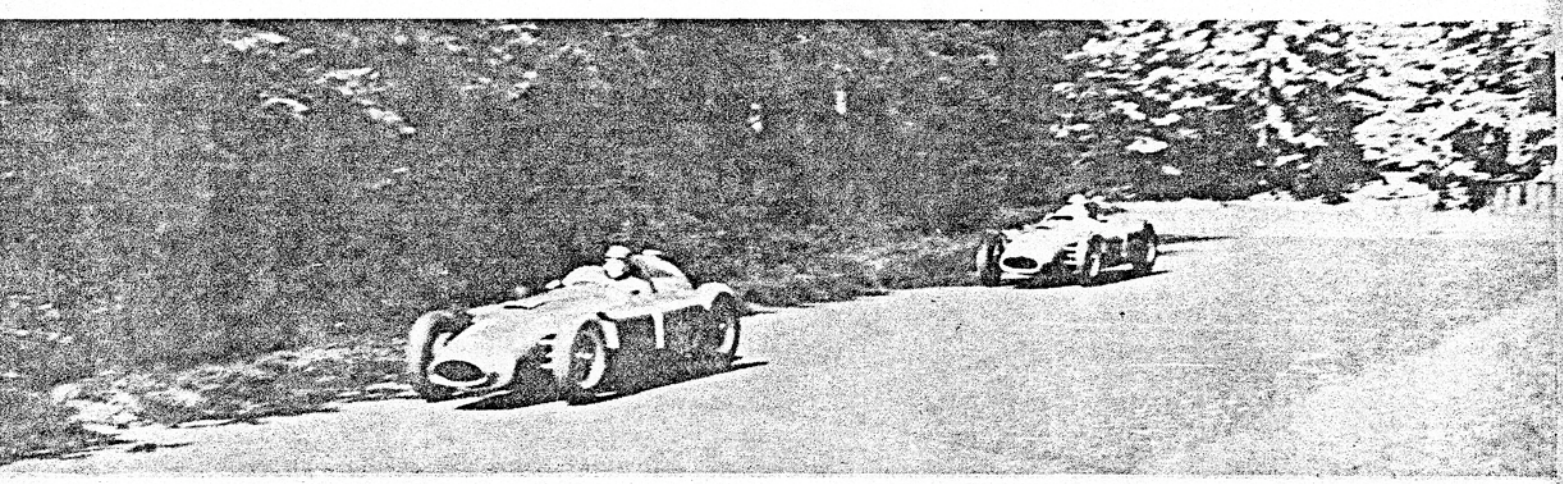
The section of the casing for the differential is exceptionally large, to prevent pressure buildup and allow a wide range of ratios. A ZF-type differential is used. To answer a few questions, this is a device which uses sliding cams instead of pinions to balance forces between cammed surfaces instead of axle bevels. The eventual effect is the same with the exception that the cams slide with such friction that some torque is always transmitted to both wheels.

In this case the torque goes to the wheels through U-jointed half-shafts which, like the drive shaft, are remarkably small in diameter. Both universals are simple Hooke-type and length changes are catered for by sliding splines which ride on ball bearings to reduce friction. Otherwise you get an uncontrollable amount of suspension damping.

TO BE CONCLUDED
NEXT MONTH:
FULL CONSTRUCTION DETAILS

CONSISTENT CHAMPION

Continuing the story of the fabulous Lancia-Ferrari D-50



Fangio leads Collins during the 1956 German G.P.

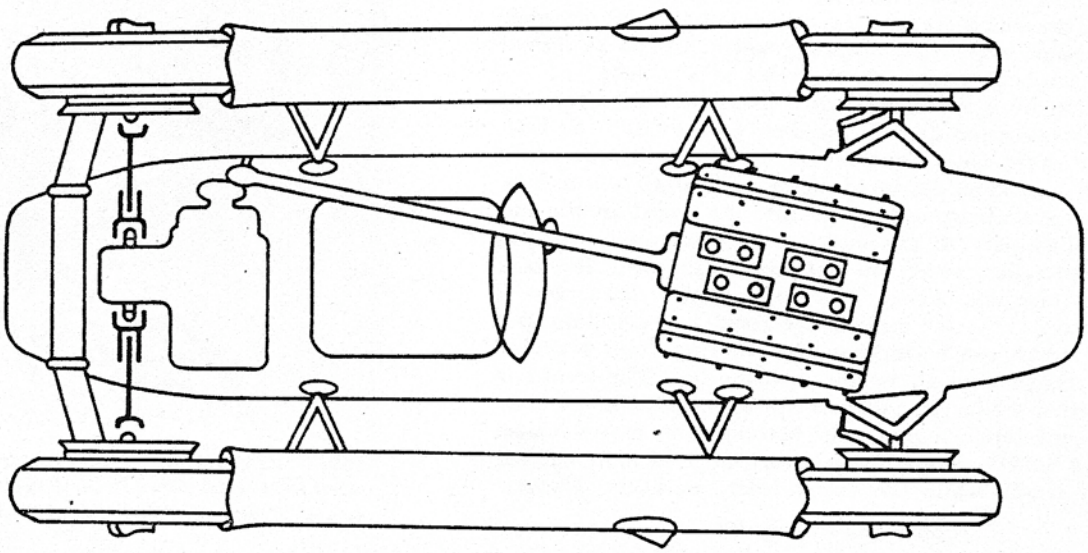
By KARL LUDVIGSEN

BEFORE the D50 Lancia made its debut, the few who had managed to get a glimpse of it were deeply impressed by the tightness of its design. Nothing was either wasted or superfluous. It looked as though the suspension was simply hung from the engine and gearbox. Actually, however, the engine and gearbox, both extremely lightweight, were used to back up the frame and suspension.

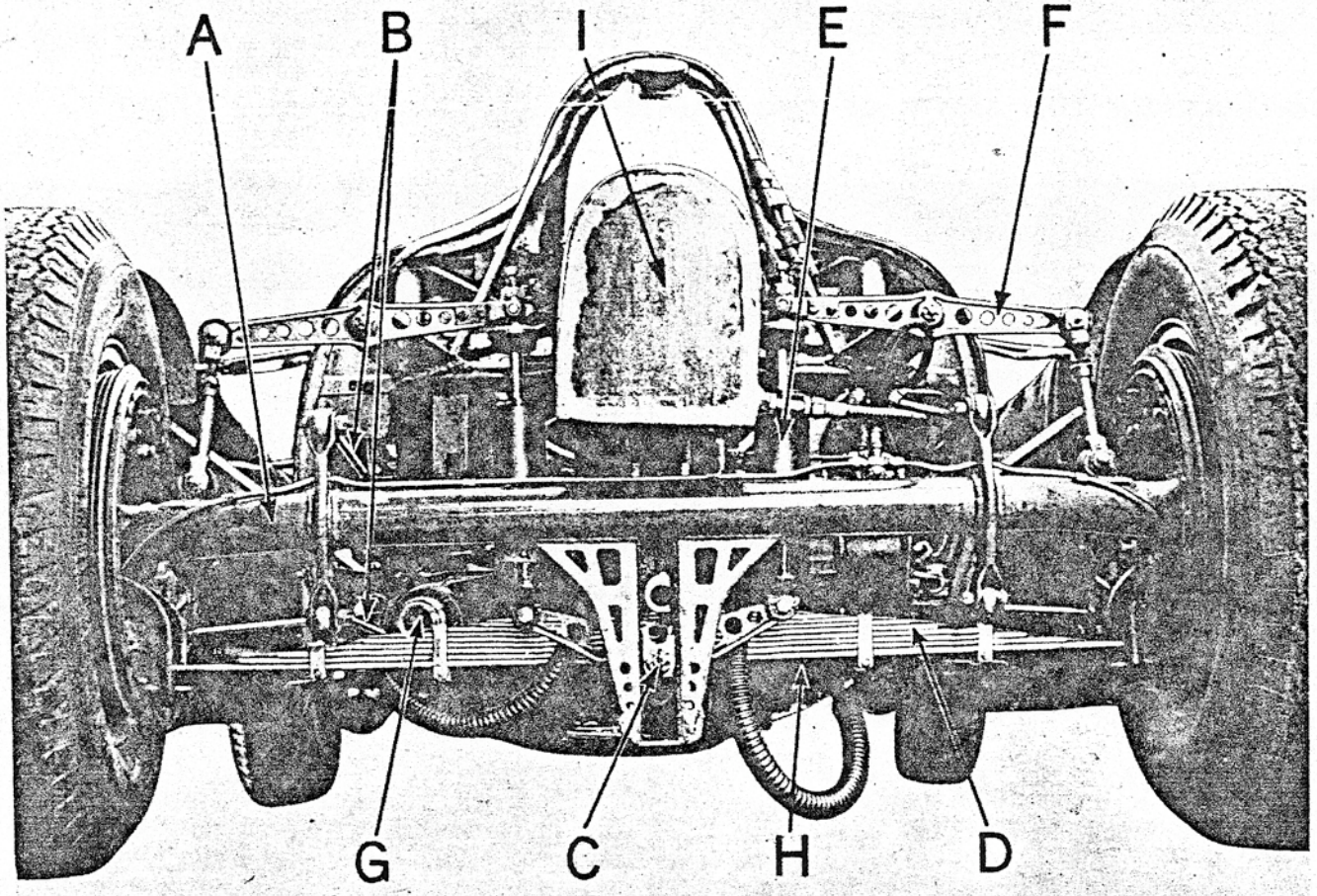
With major members of tubing about an inch and a half in diameter, the chassis frame is a simple truss-type rig with extremely high — about shoulder height — upper tubes. This is highly reminiscent of a frame that Nardi built a few years back, using Lancia Aurelia parts. To tie the cowl and firewall up to the front suspension crossmember, though, Jano didn't add tubes and weight. He just cast special lugs into the front and back of each cylinder head and bolted them right into the structure. In addition, two lugs at the "bottom" of each head mated with mounts welded to the bottom frame members, adding immeasurably to frame and beam stiffness. The cylinders and crankcase hang suspended between the cylinder heads, in this unique installation.

Two boxed towers are erected at each side just ahead of the engine, to serve as mounts for the parallel wishbone suspension. The two front towers are connected across the car by big upper and lower tubes and the back towers are braced in by smaller diagonal tubes. Behind the cockpit, the frame only went far enough to get a good hold on the massive transmission casting, which in turn supported such items as the transverse leaf spring and the locating block for the de Dion tube. Through the cockpit, stiffness is aided by smaller tubes and by perforated sheet metal webs, the firewall already being an integral part of the chassis. The stark simplicity of the original Lancia shows well the advantages of starting with a virgin sheet of paper in the design room.

When he started to make marks on this paper, Jano wanted lightness, yet he wanted roadholding of an entirely new order. Each tire was to do as much work as possible — requiring careful studies of cornering and acceleration conditions which affect selection of roll centers, weight transfer and distribution, etc. To make a tough job just a little easier the bulk of the fuel was stored in the famous pontoons slung between the wheels, with strut supports and with a third header tank behind the driver's skull. This of course kept front/rear weight distribution roughly the same



The engine is at such an angle that drive-shaft engages side-mounted clutch shaft through bevel gears, enabling both a low seating position and fairly simple, transverse gearbox ahead of the differential.



On the original Lancia D-50, the deDion tube (A) is located by two radius rods (B) on each side and a low-mounted sliding block (C). Equally low, the leaf spring (D) rides on rollers hung below the wheel hubs. Tubular dampers (E) are connected to each other and to the deDion tube through three rockers (F) to avoid roll-damping. The engine is started through an extension (G) to driveshaft at the left rear of the gearbox-differential unit (H). Inside the headrest fairing is a header tank (I) for fuel. Both Lancia and Ferrari have made extensive changes and current cars, while similar in layout, are vastly different in detail.

whether the tanks were full or empty.

The point at which a set of wheels will bust loose and head for the bean fields depends mainly on the loads on the *outside* tire in a given corner. This in turn depends on the amount of car weight that shifts over to the outside in a turn, which finally follows from such technicalities as roll center and spring stiffness, as allied to the center of gravity. In general, the more roll stiffness there is, the lower the overall weight transfer will be, and the better the car's sheer traction will be. In other words, it'll stick to the road after a car with more lateral transfer at one end or the other has broken away. Also, unsprung weight had to be shoved down since the entire car was exceptionally light.

At the front this wasn't hard, since the front tires only have to brake and steer, and seldom (or shouldn't) do both at the same time. Equal-length parallel wishbones were settled on, and welded up of tubing with forged connections. The outer ends are ball-jointed into the forged spindle and vertical support. At the outer tips of the bottom arms are enclosed rollers which are massaged by the main leaf of a single transverse spring. This has five hefty leaves but is clamped only at the center. The result is low stiffness per wheel which can be increased by screwing down a couple of outrigged stops above the small top leaf. The front bar of each wishbone extends inboard of its pivot as a drilled I-section lever. Flanges on the bottom levers rotate against rubber buffers on the lower crossmember to limit upward wheel travel, while the upper levers work the plungers

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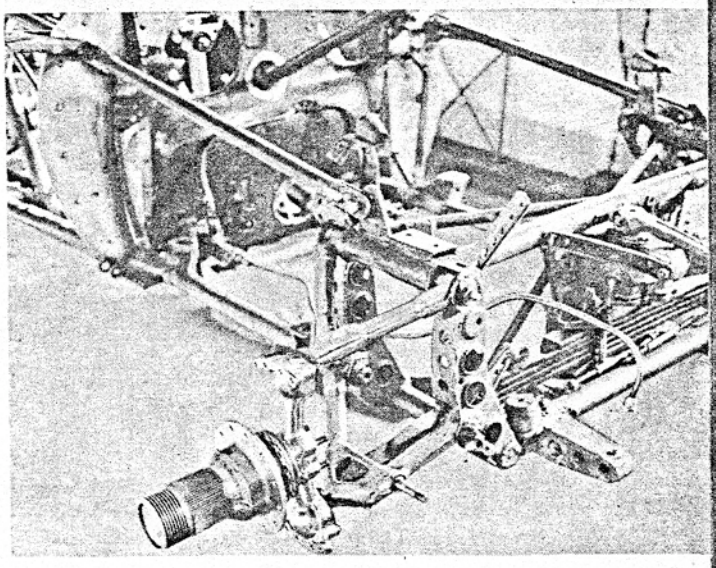

Front transverse spring rides on roller in outer end of lower wishbone. Drilled extension to upper one compresses an inboard-mounted shock absorber.

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on vertically placed tubular shocks. These units are here — instead of outboard — only because this is the best place to feed stress into the chassis without adding more weighty bracing.

The back wheels are overworked to begin with, so needed special attention from Jano. A de Dion tube, small and light, of course, curves behind the differential and is located in one plane by parallel trailing arms mounted well inboard on each side. We've seen sliding blocks for lateral guiding before, but seldom with the block bolted to the frame and the guide hung below the de Dion tube as is done here. This was done to get a low roll center without excess downward curvature of the axle tube. Springing is again by transverse leaf, clamped in the center and working on rollers below the hubs, with nine thin leaves this time. Though it looks stiff, this is more flexible in operation than the roller-mounted leaves used in the rear by Ferrari and Maserati.

To make sure the tubular shocks had no effect on roll stiffness at all, Jano mounted them vertically about a foot apart in the center of the car. Links and rocker arms actuated them from the top and a third rocker joined them at the bottom so that when the car rolled the whole shock absorber assembly rolled with it. The shocks only worked when both wheels jolted up and down in unison.

When all this was worked out, there just wasn't any room left in the chassis for inboard brakes, as had been used in the sports cars. Outboard brakes, conventional except for the use of four shoes per wheel, filled the insides of the 16-inch wire wheels. Drums were exceptionally wide, with several types of finning, and the backing plates had no scoops and were only moderately drilled.

The cockpit was stark, even for a race car, with a big 10,000 rpm tach hung from the cowl and a small cover over the even-smaller two-piece prop shaft. A handsome drilled-spoke wheel had a short shaft to a steering box just behind the dash. The pitman arm pushed a long drag link down the center of the engine vee which rotated a bell crank vertically pivoted to the upper front crossmember. Bottom arm of the bell crank turns the wheels through a split track rod and drilled I-section steering arms. The rear brakes could be hand-applied through cables and a small lever at the left of the seat.

You can see that the general layout of Jano's brainchild was conventional, in terms of modern racing design, but the details were extremely imaginative. With a prototype constructed in early '54 Gianni Lancia and his team had a lot of gremlins to evict from the premises. In the meantime they went on with sports car racing to keep up with the times and try out equipment for the GP car — not to mention keeping their star-driver team in shape. After a poor weekend in Florida they snapped back to win the Tour of Sicily, the Mille Miglia, the Portugese GP and the Targa Florio. Nothing but 4.9 Ferraris could get even close to the 3.3 liter B24 Lancias.

The high point of the sports car's career was Ascari's single-handed Mille Miglia victory, for in September the Grand Prix preparations were soaking up most of the team energy. Only highlights of their four-car Tourist Trophy entry were two new 3750 cc engined cars with outboard front brakes — undoubtedly the same units as were about to appear on the GP car.

In the meantime Ascari and Villoresi spent their work week flogging the D50 prototypes around Monza and San Remo, as well as the private Turin course. They bent up at least one car apiece while trying to get below the Mercedes time of 1:59 at Monza, but even in early October they could only touch 2:04. Most of the work so far had been on chassis, though, and when the latest items were transferred from the engine dynos to the cars it was announced that Ascari was down to 1:56, which was really fast. Then followed a solid entry for the Barcelona Grand Prix.

Dramatically late three cherry-red cars appeared: two for go and one for practice. The two went in a big way, setting fastest laps before and during the race and pulling out before ten laps were run. Villoresi had brake and bearing trouble while a defect in the gearbox casting had doused Ascari's clutch with oil, but when they were in they outcornered and outaccelerated Ferrari, Maserati and Mercedes. There was a twitch to the handling and they were hard to hold out of corners, but the prospects looked good.

A KLM plane flew the cars, in practically identical trim, down to Buenos Aires in January. On this twisty course Castellotti was nowhere in his first GP start, but the two aces travelled very fast. While watching them the public realized what the drivers had known for some time: that Jano's concept had given the cars better sheer road adhesion than any competing machine, but when the limit was passed there was no turning back. Front and rear cornering powers were so well matched that they couldn't predict which end would break away first — sometimes both at once — and when they broke it was like lightning.

The theory employed was excellent, and is still being recommended today by many blue-sky designers. Trouble was that the cars couldn't be tossed around with a little margin to play with at the breakaway verge; Italy's best drivers weren't equal to it. This layout could still be good for courses with tight corners and long straights, like Barcelona and Sebring or the second Watkins Glen course, or even for straight drag racing where the excellent rear wheel bite would pay off in lowered elapsed times. Keep this in mind!

Jano and staff worked hard on these matters in early '55, altering many details. Removal of the oil cooler from the left hand pontoon allowed an increase of nine gallons in fuel capacity, and the new tanks were riveted instead of welded. Both single and multiple oil cooling pipes were tried, running between the right hand tank and the body. A more conventional two-shoe brake was developed, as was a drum with a finned aluminum face riveted to a cast iron braking surface with deep, delicate finning. There was a rounder nose shape, and two instead of one gearbox control rods. To improve rear wheel behavior, the de Dion tube mounts for the trailing arms were moved out toward the hubs on some cars.

These things done, Ascari carried the team to wins at Turin and Naples and led most of the way at Pau. At Monaco, though, he couldn't catch Fangio and Moss in the short-chassis Mercedes and went flying off course into the bay in the attempt! On the following Wednesday Ascari was up and practicing for the Monza 1000 kilometer race. As he hurtled over a back straight in a Monza Ferrari borrowed from his friend Castellotti, a workman ambled out into the road. In trying to avoid him Ascari overturned the car and was killed.

This was what Gianni Lancia's opponents needed. The Lancia family had 49 percent of the company stock, and Gianni only a part of that. Lancia was not prospering so the racing activities were ruled out by a majority of the directors. While feelers were extended to seek out possible purchasers for the equipment, Castellotti took one car to Belgium as a private entry; he also took Vittorio Jano, a squad of mechanics and a spare car. After setting fastest lap in practice the D50 ran a controlled third spot until it spun and stalled on a patch of oil.

About a month later, after checking with British and American firms, Lancia turned every shred of the racing department (except the sports cars) over to Enzo Ferrari. Jano went along with the deal, so development of the snarling V8's could continue as planned. The cars turned up at Monza in September, but had to be scratched. Tire temperatures were running half again as high as on the Super Squalo Ferraris, which was too much for the Englebert casings to which Ferrari was bound by contract. They later tried Dunlops in practice at Oulton Park in England, returning to Monza for winter testing.

The 1956 season and Fangio's World Championship are recent history, telling of the success of the Lancia D50 as modified by Ferrari's crew. The refurbishments advanced in two stages: for Argentina and for Syracuse, and similar stages apply for 1957 too. Let's look at the refinement of that furry V8 first, and then see how the cars were made driveable by ordinary mortals.

Early power figures quoted for the V8 ranged between 230 and 260 bhp, a reasonable figure being 250 horses. Lancia had experimented a lot with direct fuel injection but were discouraged by a tendency for fuel droplets to find their way down the walls into the oil supply. Solexes were the answer. They also tried two bore/stroke combinations: 76 by 68.5 mm and 73.6 by 73.1 mm, finally settling on the latter. First set at 8100, the rev limit crept up to 8400 and Hawthorn took it to 8900 at the end of '55.

Prior to 1956 the original Weber carbs were given another try. They produced ten

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more horsepower at the top than the Solexes could, but were weak in the middle ranges. Reinstatement of the Solexes allied with the use of a separate tuned pipe for each exhaust port brought the power in at 5000 rpm instead of 6500 and raised peak power from the 1955 level. The cars were geared for 82-8600 on the fastest straight of a given course, and drivers were still asked to stay under 8100 in the gears.

Before the middle of 1956 the structure of the engine had been heavily reworked. Ferrari elected to use the oversquare dimensions previously rejected, now that induction and exhaust were taking care of low-end power. To raise compression new pistons were made and gaskets between heads and cylinders were eliminated. A heavier oil pan was also cast to contribute more stiffness to the bottom end. These touches resulted in an engine that was reliable but just a hair rough at 9000 revs, but would blow sky-high at 9100! Fangio proved the point in Belgium, where he left a broken car with 9200 showing on the tell-tale. There were also some clutch troubles, probably aggravated by the hot, unventilated working conditions back there by the gearbox, but a switch to metal-to-metal discs cured them.

For this year new Solexes have been bolted on and reangled to give a straighter air path to the valves. This, with more detail attention, smoothed out the torque curve and tacked on 18 bhp from 4500 to 7000 rpm. Before going to Buenos Aires they tried out some new fuel brews at Modena, and did put six percent nitro to it in Aregntina, but the cool race day threw off their still-experimental carburetion. Clutch faults cropped up again but were blamed on faulty materials. To upset the situation further, the latest open-wheeled Ferrari-Lancia has the 1956 vertical Solex layout, though it appears that this was a trial engine for the revised chassis.

Speaking of chassis, Ferrari worked fast and hard to endow the Lancia with normal handling. He made two changes right away in 1955: added an upper frame tube at each side to take loads off the cylinder heads, and fitted an anti-roll bar above the front suspension with links connecting the bar ends to the bottom wishbones. The objective was to make the machine understeer mildly up to breakaway and then gradually slide away at the rear. Adding the anti-roll bar increased lateral weight transfer at the front end, which promotes understeer.

Then, to give more control and "feel" at the back end, a new rear-mounted fuel tank was riveted up and only the very front portions of the pontoons used for fuel. Several like this were built for Argentina, but for Syracuse, 1956 another version was prepared with small saddle tanks next to the cockpit, the pontoons being faired into the body for aerodynamics only. The Syracuse cars also had the revised rear suspension that was tried on Fangio's Buenos Aires car, using the Lancia de Dion tube with new springing. A Ferrari transverse leaf was roller-mounted on new frame members above the axle tube and connected to it by links as were the original shock absorber rockers. Those rockers were tossd out and good old Houdailles attached just behind each hub. In the course of this work the wheelbase was also lengthened about four inches.

Result of all this was that the breakaway line was reached a lot sooner than before, and almost always at the rear, but the Lancia could now be driven on either side of that line consistently by most of the Ferrari team handlers: As a double-check one car was tried at Rheims with the front anti-roll bar (now attached *between* the wishbones) removed. This improved tight-corner handling, which was always good with the D50, but the car was a brute on swerves of the 100 mph and up variety. With the bar replaced the characteristics were exactly the reverse — still not right, but better.

Also at Rheims Ferrari produced one machine with a brand-new Modena-built frame, like Jano's but with a stiffer front section and other refinements. For the bumpy Nürburgring the shock mounts and the fuel tank were given added bracing. They didn't anticipate the structural failures that turned up at Monza, though, where the bumpy banked track surface broke nearly all the nice drilled steering arms. This led to some hairy moments for the drivers: sliding off the course, into pit counters, and so forth.

Now for 1957 the wheelbase was shortened four inches again, to bring it back to D50 size. This was in search of neutral steer on slow corners, as was a longer rear wheel travel and slightly larger saddle fuel tanks with smaller rear oil and fuel tanks. All these indicate a return to the compactness and low polar moment of the original D50. Several cars of this type were erected with 1956-type bodies and altered front suspension geometry, but the big change came at this year's Syracuse event. Fuel tankage had again been reworked and the hollow pontoons sheared off entirely, revealing the bunched megaphone exhausts. Also an adaptor was clamped to the reshaped bottom wishbones to allow the use of coil springs instead of the transverse leaf, which can still be replaced if necessary. The torsion anti-roll bar took up a third position below the suspension entirely. If the '56 pattern is followed, this edition will have been seen most often this year.

For Jano, the Lancia sports-racing cars were only a guide, not a foundation for the Grand Prix machines, which took shape without restriction of any kind in the mind of a great designer. As a result the D50 ranks as one of the best integrated and most consistent race car designs ever. Had there been enough drivers with the patience to feel out its unusual handling it might still exist in original form, but racing drivers are not patient men by nature. Knowing this Ferrari's staff made drastic changes, but now they're edging stealthily back to Jano's concept.

At today's pace, it's indeed commendable that a racing car conceived in 1953 is still THE car to beat.

Karl Ludvigsen