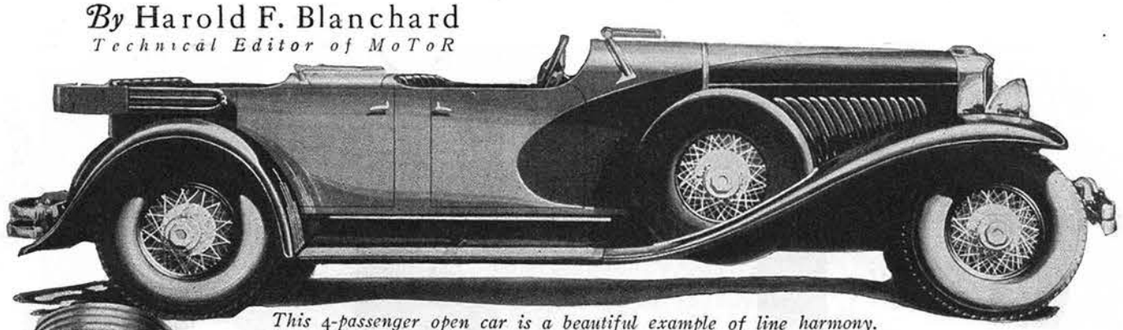
265 Horse Power ....

By Harold F. Blanchard
Technical Editor of MoToR



This 4-passenger open car is a beautiful example of line harmony. Note the blending of curves on hood, fenders, spare wheel and louvres.

WHEN E. L. Cord, president of Auburn, purchased control of Duesenberg, Inc., Indianapolis, in 1926, he said that with the assistance of Fred S. Duesenberg he would build the world's best automobile: A car with superlative acceleration, speed and hill-climbing ability, pleasant to drive and safe, with maximum reliability and exceptionally long life, secured by the finest material and workmanship, in conjunction with Duesenberg's acknowledged genius as a designer of both racing cars and high-grade passenger cars.

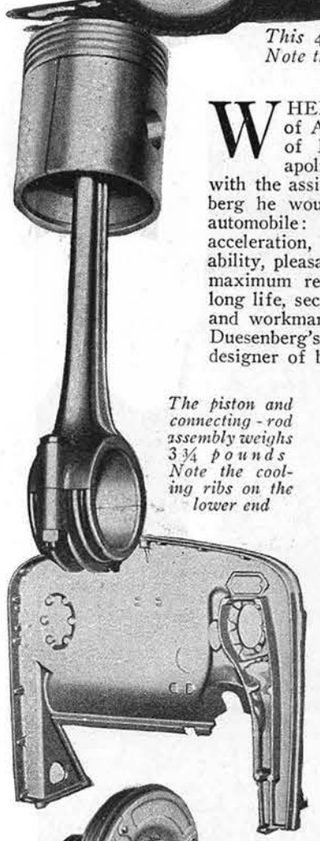
That these ideals have been realized is indicated by stating that it possesses the same fine materials, fine workmanship, strength and precise construction which are commonplace in racing cars. It has the power, acceleration and speed of a racing car together with the size, comfort, flexibility, durability and foolproofness which must be prime features of any outstanding passenger car.

Chief among its numerous features is a straight-eight engine of 265 horsepower set in a chassis cleverly and painstakingly designed to handle this enormous power safely and pleasantly.

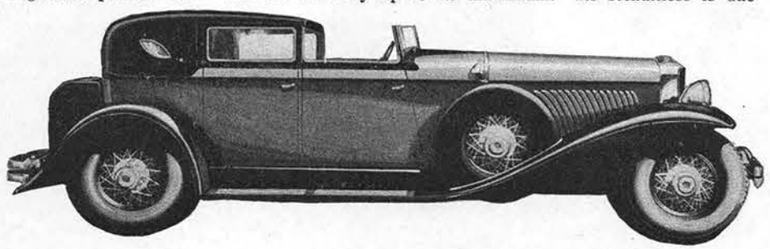
While the maximum speed on the straightaway is still to be determined, the car has done 116 miles per hour on the Indianapolis Speedway, fitted with a four-passenger touring body with windshield, and has run 89 miles per hour in the second gear of its three-speed transmission.

This tremendous speed may not be of direct interest to everybody but it does indicate how effortlessly the car runs at ordinary rates of travel. A mile a minute is a loafing gait, and so is 80 miles per hour for that matter. It is just as steady at this speed as most cars are at 40 miles per hour.

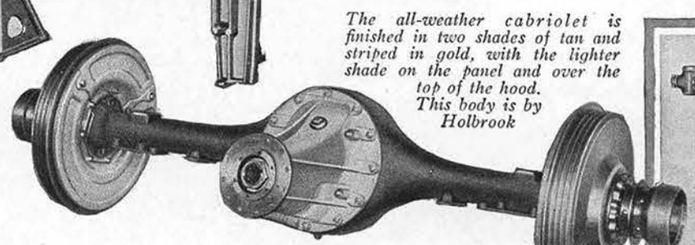
The writer did not have an opportunity to drive it beyond the 80-mile mark but the company states that it handles equally well all the way up to its maximum. Its steadiness is due

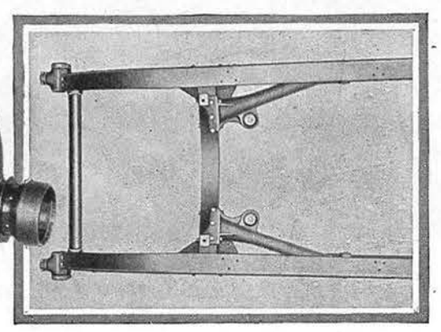


The piston and connecting-rod assembly weighs 3¼ pounds Note the cooling ribs on the lower end



The all-weather cabriolet is finished in two shades of tan and striped in gold, with the lighter shade on the panel and over the top of the hood. This body is by Holbrook

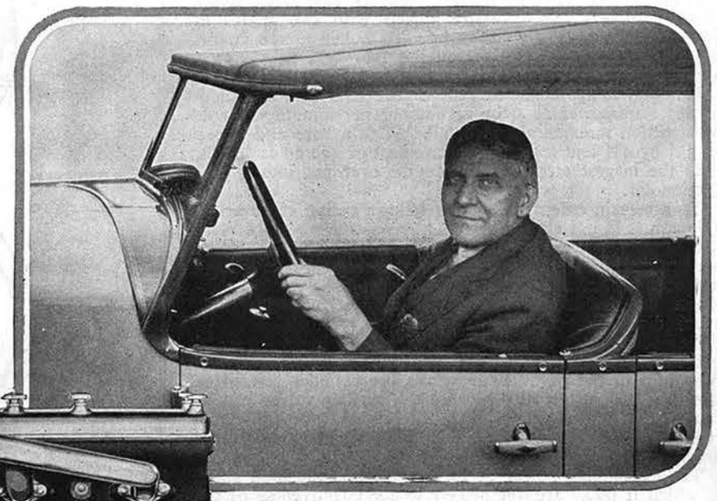




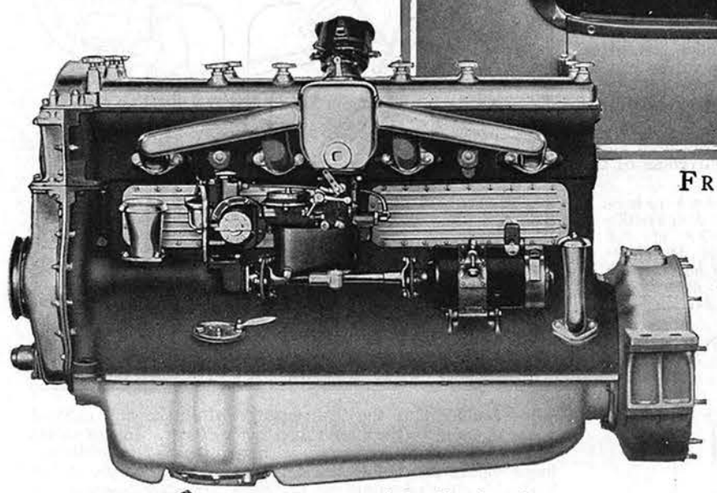
Rear axle showing ribbed brake drums and other features. Above—The cast aluminum heat-treated dash. Right—Front end of frame showing "A" braces which make the front end exceptionally steady

...116 Miles Per Hour

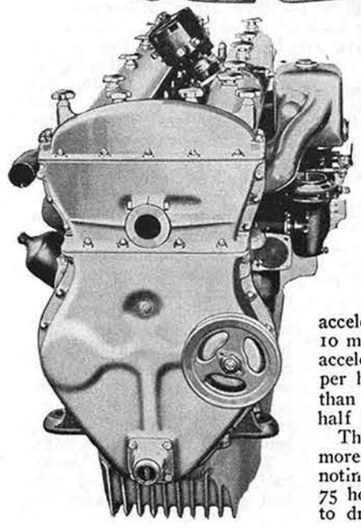
DUESENBERG *Announces an Extraordinary Car with Chassis Priced at* $8,500



FRED S. DUESENBERG
the designer of the car



Left side of engine showing intake manifold and carburetor with fuel pump directly forward of carburetor. Left—Front view of engine



whereas the engine develops 175 horsepower, thus leaving 100 horsepower in reserve for acceleration.

Its low-speed performance is equally impressive. It accelerates from 5 to 25 miles per hour in 5 seconds and by virtue of its enormous reserve power its hill-climbing ability should be as astounding as its acceleration and speed. There are no steep hills within convenient reach of the factory and therefore the writer cannot discuss its upgrade performance in more detail.

Considering its great power and long wheelbase (142½ inches for the five-passenger jobs and 153½ inches for the seven-passenger) its weight of 4,500 pounds when fitted with a four-passenger open body is unusually low, especially considering that parts throughout the car average about 50 per cent stronger than ordinarily considered necessary in high-grade construction.

The relatively low weight is secured by: 1—the extensive use of aluminum, and wherever aluminum is employed it is heat-treated to render it three times as strong as aluminum not heat-treated; 2—the adoption of forgings wherever malleable iron castings are ordinarily employed; 3—the use of highest grade materials throughout; 4—by boring out many of the forgings.

While the new Duesenberg has the speed of a racing car it possesses in more than full measure all those fine features which are expected in a high-grade passenger car.

Steering is easy, clutch and brake pedals have a light action, while the brakes are unusually effective, being internal, two-shoe hydraulics designed by Fred Duesenberg.

The car takes turns beautifully and with a full sense of security, due to many factors, including a well-balanced chassis and a low center of gravity. The top of the frame is 20 inches from the ground although the car looks very much lower than that. The low center of gravity is due principally to hypoid bevel gearing in the rear axle with the pinion 2 inches below the center of the ring gear.

particularly to an unusually stiff frame.

It reaches 80 miles per hour in a surprisingly short time, in 22 seconds to be exact, when accelerating in high from 10 miles per hour, and its acceleration at 75 miles per hour has more punch than most other cars at half this speed.

This statement can be more fully appreciated by noting that approximately 75 horsepower is required to drive it at this speed,

Finally, the car is as beautiful as it is powerful. Its lines express speed and strength gracefully without the slightest suggestion of clumsiness. Radiator and hood lines are different from any heretofore seen, and this, in conjunction with its other features, including sweeping fenders longer than any produced heretofore, gives the ensemble a very rich, distinguished appearance.

All bodies will be custom built and the leading body builders both here and abroad are working on designs. The chassis sells for $8,500, including fenders, bumpers, four Delco-Remy shock absorbers and six wire wheels with two spares in fender wells carried by sturdy brackets bolted to the frame. Several optional gear ratios ranging from 3½ to 4½ to 1 are offered.

It is easy to appreciate that the engine develops a maximum of 265 horsepower at 4,200 revolutions per minute when its construction is examined in detail. With a bore and stroke of 3¾ by 4¾ and a piston displacement of 420 cubic inches, it is the largest straight-eight engine ever put into a production car.

To a certain extent the engine follows racing car practice although it is not equipped with a super-charger since more than ample power is developed without it. The valve mechanism, however, is reminiscent of racing car construction in that the detachable cylinder head carries two overhead camshafts, one for intake and one for exhaust, with the cams acting directly on cups attached to the valve stems.

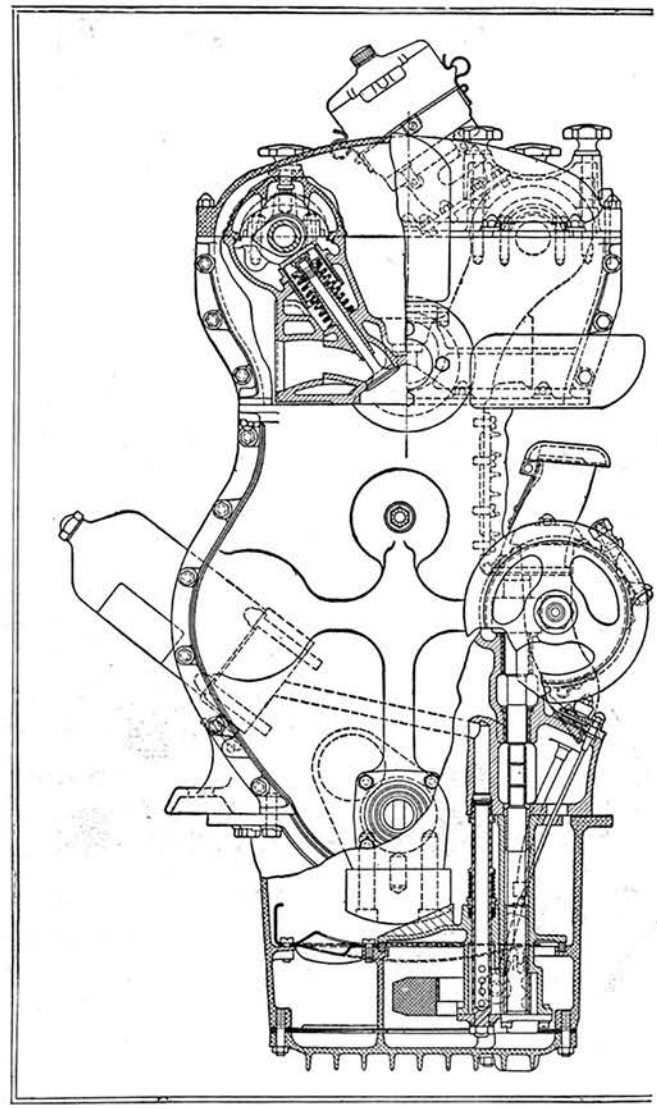
Due to the size of the engine, there are two intake and two exhaust valves per cylinder, the same as on many racing cars built in the past. Four valves per cylinder instead of two are used, principally because the smaller valves can be cooled much more effectively. Their seats are fully surrounded by ample water passages and the valve stem guides are water-cooled for nearly their whole length.

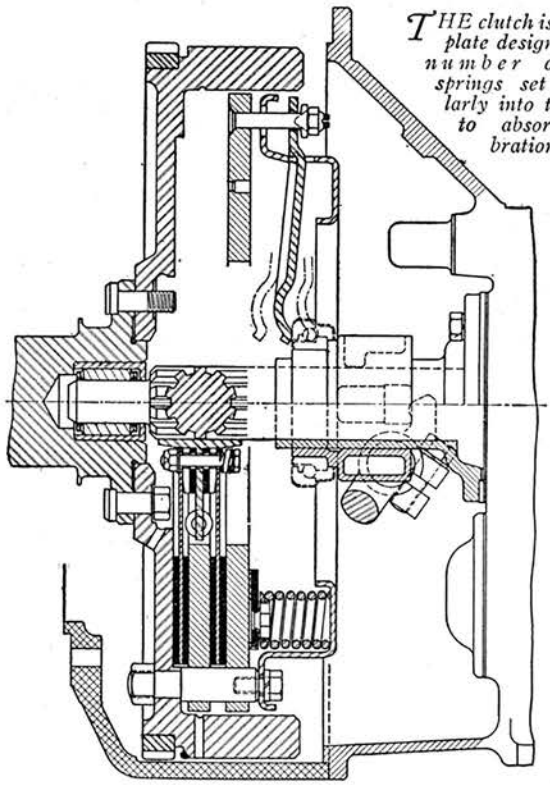
The exceptional power of this engine and the high speed at which it peaks are due largely to the effectiveness of the valve cooling plus the free passage of intake and exhaust gases afforded by the four valves per cylinder. Intake valves are 1½ inches clear diameter with .350 inches lift, while exhaust valves are 1⅞ inches clear diameter with .360 inches lift, with quieting ramps on the cams for silent opening and closing. All valves are made of silchrome steel. Valves are shim adjusted, and have .025-inch clearance. Due to the excellence of the valve layout it is said that in 10,000 miles high-speed running, valve clearance does not change more than .001 or .002 inch.

Front end drive is by a 2-inch silent chain, deriving its power from a transfer gear, which in turn is driven by a second chain from the crankshaft. Both chains run over an automatic take-up to retain permanent tension.

The combustion chamber is fully machined and the spark plug located at the center is completely surrounded by water. The compression ratio is 5.2 to 1 minimum and increases with the engine speed, being 6 to 1 at 60 miles per hour.

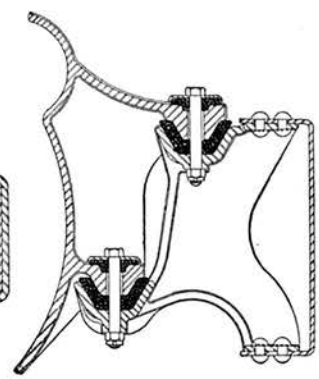
The cylinder block, upper half of crankcase, and rear half of timing chain case are

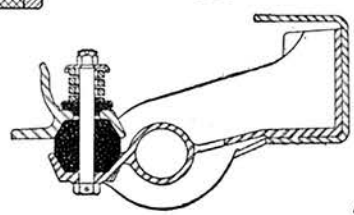




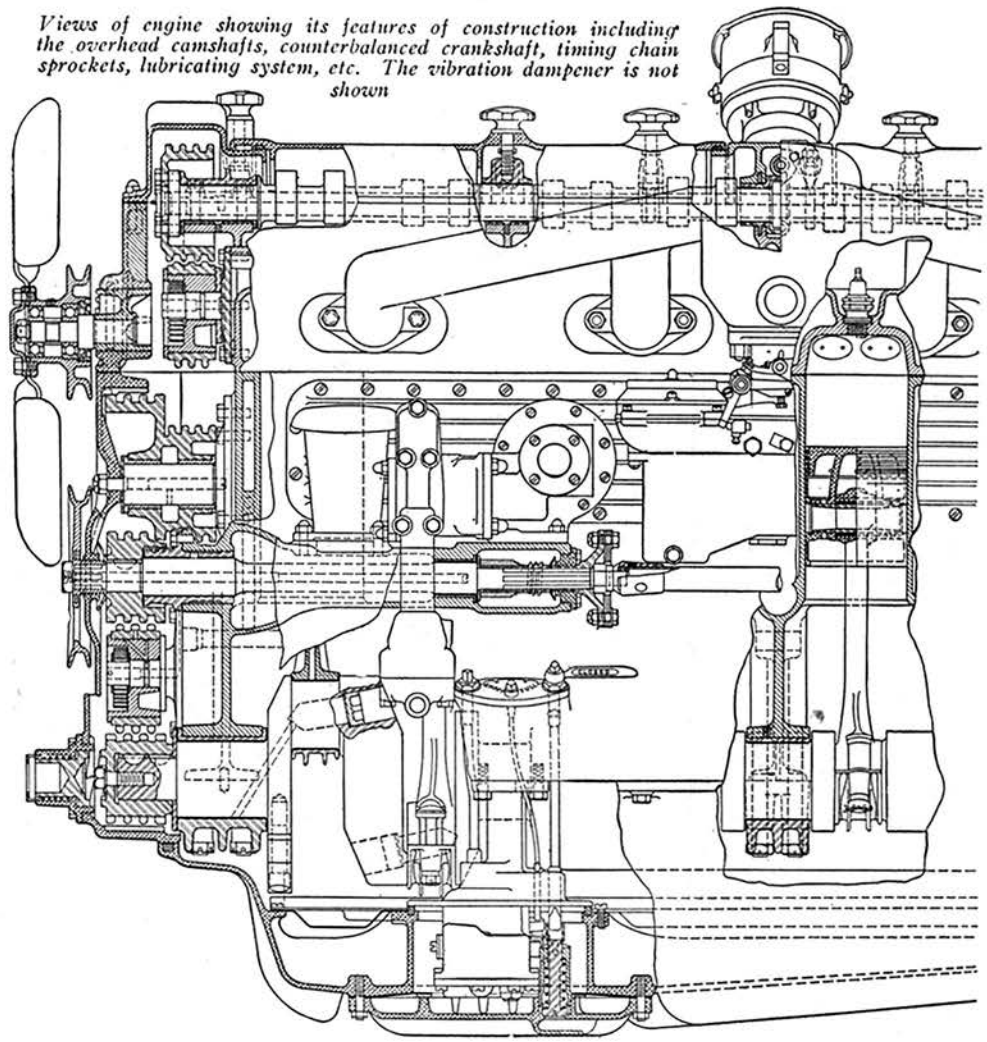
THE clutch is a two-plate design with a number of coil springs set circularly into the hub to absorb vibration

THE dual rubber engine mountings used at the rear are placed at a sufficient distance apart so that they hold the engine very solidly, and yet the complete rubber insulation is capable of absorbing all small vibrations at the front





AT the front, the engine rests on single mountings with the bolts acting through coil springs so that in the rare event of unusual frame distortion these springs will prevent distortion of the crankcase



Views of engine showing its features of construction including the overhead camshafts, counterbalanced crankshaft, timing chain sprockets, lubricating system, etc. The vibration dampener is not shown

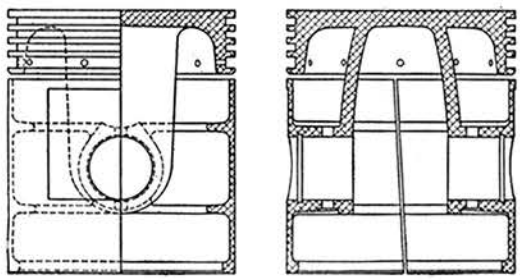
cast integrally of specially selected gray cast iron. Ray-Day aluminum alloy pistons with three compression rings and one oil ring, all above the pin, have been chosen. The wristpin floats. Aluminum alloy connecting-rods of conventional I-section are used but with a number of interesting features. The base of the rod which carries the upper half of the crankpin bearing is stiffer than usual because the notch for the bolt head is not as deep as usual, a feature secured by discarding the common hex-headed bolt for a round headed bolt with one flat side fitting against the vertical wall of the notch. The connecting-rod has been designed to afford a maximum of heat dissipation and the same is true of the steel cap, the exterior of which is ribbed to give full stiffness with maximum heat dissipation. The babbitt is spun into the rod.

The crankshaft is a double-headed chrome-nickel steel forging with five main bearings 2¾ inches in diameter and having the following lengths from front to rear, 3 5/16, 1⅞, 2⅜, 1⅞, 2⅞ inches. It is fully counter-weighted and statically and dynamically balanced.

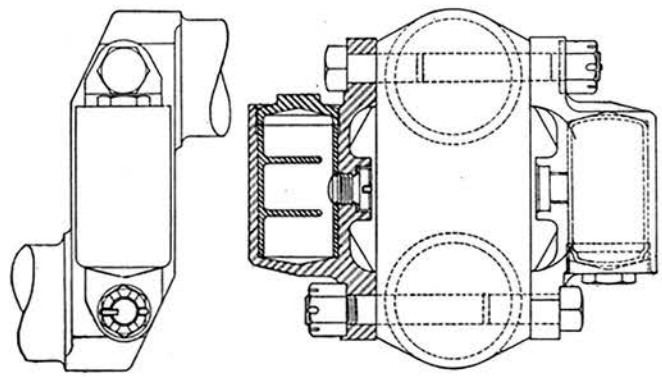
The most interesting feature of the shaft, however, is the unique, simple and effective vibration dampener, consisting of two tightly sealed cartridges bolted to opposite sides of the crank cheek between Nos. 1 and 2 cylinders. Each cartridge is 94 per cent filled with mercury.

When the crankshaft starts to go into a vibration period it twists slightly first in one direction and then in the other, causing the mercury to flow back and forth over the two baffles, and the resulting friction within the mercury and between the mercury and the baffles is sufficient to smother torsional crankshaft vibration before it begins to become noticeable. Nothing could be simpler, and it appears to be fully effective as the writer noticed no periods of vibration while driving the car.

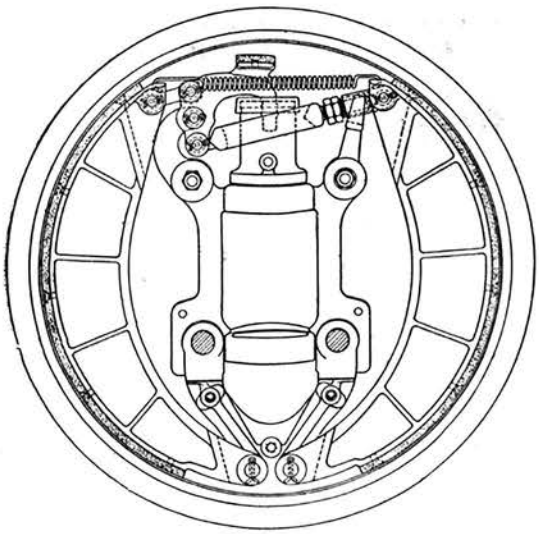
The building of an automobile of such great power, far more than any heretofore built, naturally brought new problems, as in the exhaust and fuel systems for example. There was no muffler available which reduced the back pressure to a satisfactory negligible minimum, and after much study and experiment a muffler design was (*Continued on page* 184)

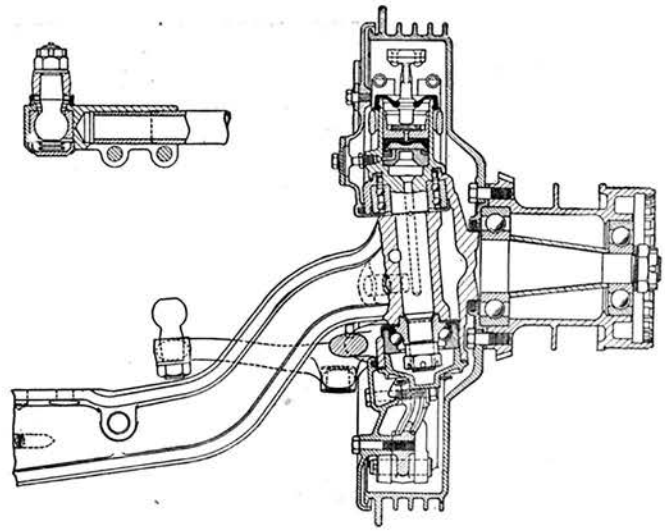


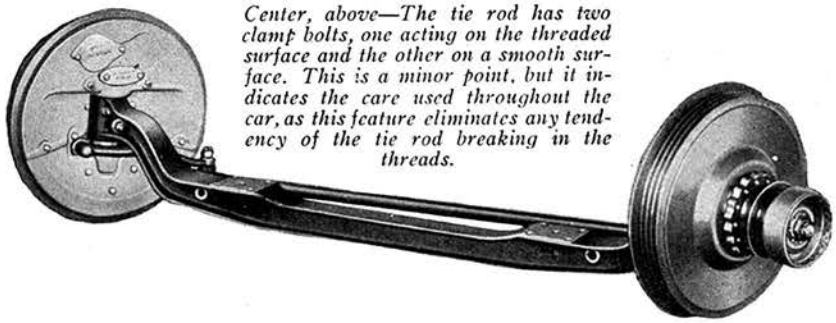
A FEATURE of the Ray-Day aluminum alloy piston is the method of compensating for expansion. The skirt is split at one point as shown and is entirely separate from the head except for two long bosses which attach the skirt to the head. The distance between these bosses is carefully determined so that the expansion of the piston head between the bosses is identical with the expansion of the cast iron cylinder, and thus the piston fits properly both when the engine is cold and warm



THE vibration dampener consists of two cartridges 94 per cent filled with mercury, attached to opposite sides of the crank cheek between cylinders Nos. 1 and 2







Center, above—The tie rod has two clamp bolts, one acting on the threaded surface and the other on a smooth surface. This is a minor point, but it indicates the care used throughout the car, as this feature eliminates any tendency of the tie rod breaking in the threads.

SEVERAL interesting features are noted in the front axle. The Duesenberg hydraulic braking system requires but a single piston and it is placed vertically, thus reducing likelihood of leakage, and preventing dirt from reaching the rubber piston. No adjustment is required on the heel of the brake shoe because this point is so carefully located that an adjustment is superfluous. In consequence, the only adjustment is to take up wear in the lining and only one adjustment is needed for the two shoes as shown. When an adjustment is required the forward shoe is brought into contact with the drum, leaving the rear shoe unaltered for the moment, but the first time the brake pedal is applied the mechanism automatically splits the clearance equally between the two shoes, since the equalizing linkage is mounted on a floating pivot.

Duesenberg 265 Horse Power Car

(*Continued from page* 43)

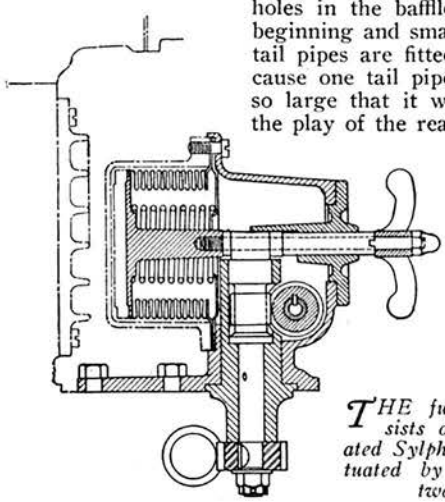
evolved which fully met the requirements. It is of mammoth size, 6½ inches in diameter by 54 inches long.

Muffling effect is secured largely by cooling the exhaust gases by directing them against the outer shell repeatedly, from whence the heat is rapidly transferred to the atmosphere. A by-pass pipe runs through the center of the muffler to give direct discharge of the exhaust gases when desired by the driver. Between the by-pass pipe and the shell are numerous conical baffles, all welded to the outer shell. There is a ring-shaped passage between every other baffle and the by-pass pipe while alternate baffles make close contact with the by-pass pipe but have a series of holes out near the shell. Thus the exhaust passes through the muffler as follows: Through the ring-shaped passage out toward the holes in the next baffle; in toward the next ring-shaped passage and so forth. The holes in the baffles are large at the beginning and small at the end. Two tail pipes are fitted to the muffler because one tail pipe would have to be so large that it would interfere with the play of the rear axle.

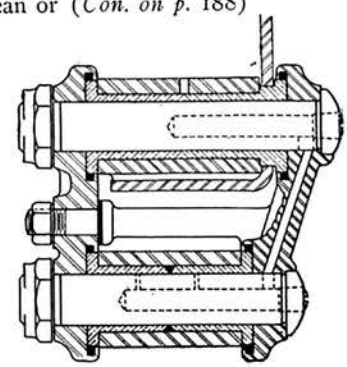
The ample exhaust manifold discharges into an exhaust pipe which is 4¾ inches in diameter, being flanged and bolted to the exhaust manifold by twelve ⅜-inch bolts. Exhaust pipe and exhaust manifold are chromium plated, as are numerous other parts on the car.

A specially designed duplex Schebler carburator is used with 1½-inch openings. The chromium-plated aluminum intake manifold is a double down-flow type with one branch feeding cylinders 1, 2, 7, and 8, and the other branch feeding cylinders 3, 4, 5 and 6. The manifold is exhaust jacketed at the center, and heated by two pipes running through the engine block between cylinders 4 and 5 to the exhaust manifold on the other side of the engine. The flow of hot gas to the inlet manifold and return is controlled by a thermostat located on the right side of the cylinder block.

To feed the unusual amount of fuel required by an engine of this size when running at full speed, a Sylphon bellows operated by a cam with two lobes is used. The fuel pump is driven off of the generator drive shaft, its camshaft running at 1/20 engine speed, but since the cam has two lobes, the pump makes a stroke every ten revolutions of the engine. It feeds in proportion to the speed of the engine. The pump is fitted with a priming handle, which serves the further purpose in service work of indicating to the mechanic whether the mixture is too lean or (*Con. on p.* 188)



THE fuel pump consists of a cam-operated Sylphon bellows actuated by a cam with two lobes



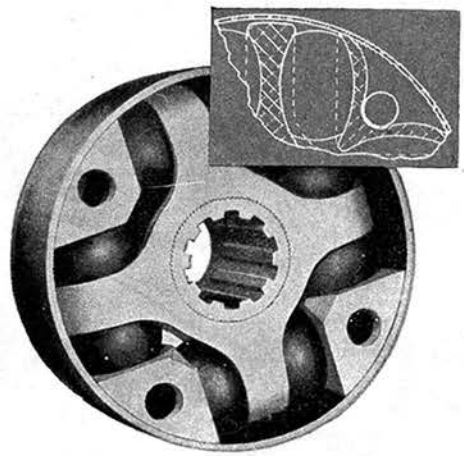
TO exclude dirt the ends of the shackle bushings are supplied with felt washers as shown, while to assure ample wearing surface for side thrust the shackle bushings are provided with large flanges. The V-shaped leather washer shown at the center of the lower bushing prevents oil leakage

Duesenberg 265 Horse Power Car

(*Continued from page* 184)

too rich. Fuel is filtered by a Gascolator on its way to the pump, mounted on the pump housing. The gasoline tank has a capacity of 26 gallons and is filled through a neck at the side of the car placed so that it does not interfere with a trunk.

One of the most novel features on the car is the "timing box," mounted adjacent to the fuel pump and driven from the fuel pump shaft, a device which is all but human in that it greatly assists in relieving the driver of the usual burden of taking care of the car. For example, at 700 miles it turns on a dashlight which tells the driver that it is time for him to change his oil. At 1,400 miles another light goes on indicating that water should be put in the battery, and finally every 75 miles it opens a spring release valve mounted on the fuel pump housing which allows oil to be forced under engine oil pump pressure to all chassis lubricating points, including spring shackles, clutch throwout bearing and shock absorber connections. When the system operates it turns on a red light, while a green light also glows if the Bijur reservoir has oil in it. The foregoing figures apply to a car with a 3½ to 1 gear ratio. The system of course operates a little oftener if the gear ratio is between 3½ and 4½ to 1. The timing box consists of four sets of small planetary gears arranged in series, each with a ratio of 4.8 to 1. The ratio between the box and the fuel pump shaft is 16 to 1, while the ratio between the fuel pump shaft and the crankshaft is 20 to 1, thus the total ratio between the last gear in the timing box and the crankshaft is 20 x 16 x 4.8 x 4.8 x 4.8 x 4.8, and with a 3½ to 1 gear ratio this figures out that the system operates once every 74.5 miles.



A Spicer universal with eight rubber balls is used at the front end of the drive shaft.

The engine lubricating system naturally has been worked out with the greatest care and all important parts are lubricated by pressure, including main bearings, connecting-rod bearings, wristpins, camshafts, timing sprocket bearings, and lay shaft bearings.

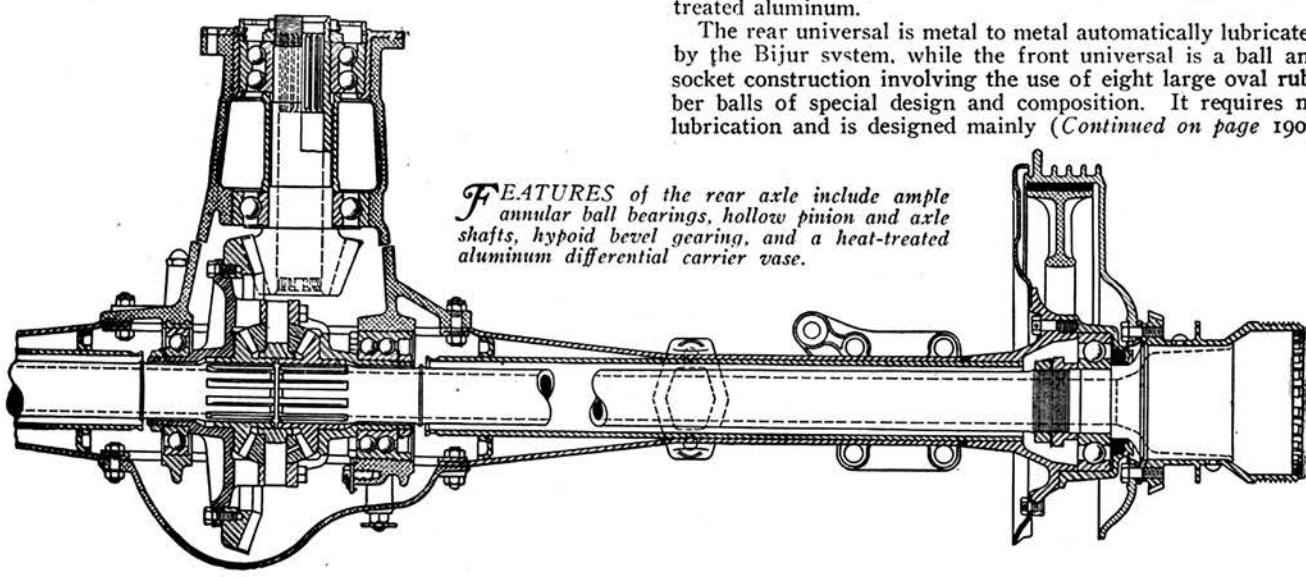
Oil is strained twice, once before entering the gear pump in the base of the crankcase, and again after leaving the pump through a Purolator. In addition to these precautions, the crankpins contain pockets which imprison by centrifugal force any slight amount of dirt which may reach them. The lower half of the crankcase is a heat-treated aluminum casting with deep cooling fins on both the inner and outer surfaces designed to dissipate the heat in the oil with maximum rapidity. The camshafts are hollow to permit the passage of oil to the five bearings from whence the oil passes to a trough running the full length of the camshaft so that the cams and valve cups operate in a bath of oil. The oil pressure adjustment, drain cock lever, and oil supply level indicator are conveniently placed on the right side of the engine. The car is equipped with a crankcase ventilating system, a pipe (not shown) running from a point on the crankcase near the gasoline pump to the carburetor where it enters the crankcase through two breathers.

The cooling system has a capacity of 7 gallons. The radiator is constructed of pure copper cartridge tubes of a honeycomb type and points to a slight angle at the center. The centrifugal pump is driven by the chain accessory drive through a shaft on the left side of the engine, while a thermostatic water control is provided in the casting at the top of the radiator.

A specially designed Delco-Remy starter of extra capacity is operated from a button on the instrument board and engaged by Bendix gear. The Delco-Remy generator of the conventional type also has been specially designed to give a greater output at low speeds. The distributor is of the double cam and breaker type, mounted at an angle on the center top of the engine and driven by bevel gear from the intake camshaft. A 21-plate Exide battery of 160 hour capacity located in a specially designed box under the right splash apron completes the engine electrical equipment. To handle this engine of enormous power a specially designed Long clutch is used of the two-plate type, with a new spring damping feature.

The three-speed transmission is interesting because it is equipped with a silent, internal-geared second. That is, the second gear reduction is secured through two pairs of internal-external gears constantly in mesh. Second gear is engaged simply by moving a relatively light splined shaft, thus making shifting from high to second as well as from second to high exceptionally easy. All transmission gears are heat-treated alloy steel, while the case is made of special heat-treated aluminum.

The rear universal is metal to metal automatically lubricated by the Bijur system, while the front universal is a ball and socket construction involving the use of eight large oval rubber balls of special design and composition. It requires no lubrication and is designed mainly (*Continued on page* 190)



FEATURES of the rear axle include ample annular ball bearings, hollow pinion and axle shafts, hypoid bevel gearing, and a heat-treated aluminum differential carrier vase.

Duesenberg 265 H P Car

(*Continued from page* 188)

to take care of small changes in alignment. The driveshaft is tubular, of large diameter. The torque tube is of special design, incorporating a cast aluminum yoke. It has been made unusually large and is insulated by rubber blocks where it makes contact with the center frame cross member, thus preventing any road noises from being transmitted to the frame. The torque tube carries the drive shaft, and the drive line includes two oversize universal joints.

Hypoid type ring and pinion gears are used in the differential to assure low center of gravity. Oversize annular ball bearings, rigidly mounted, are used throughout the unit. A No. 311 bearing takes the radial pinion load only, while a No. 310 double direction thrust bearing is provided for the front end of the pinion. The pinion shaft is of tubular design, splined on the inside, with a diameter nearly double the usual size. The differential carrier is cast of duraluminum.

The rear axle is semi-floating with 2 3/16-inch tubular shafts, the tubular construction not only cutting down weight but allowing a larger shaft to provide for a greater number of and larger splines. The shafts are made of a special alloy steel, machined inside and out, and are carried in a special pressed steel, banjo-type housing. They are fitted with No. 311 annular bearings on the outer ends and No. 212 single and double on the inner. Wheel hubs are drop forgings, machined for lightness, and are said to weigh about half as much as those used in the ordinary large automobile. An important feature in the construction of the rear axle and wheels is the use of exceptionally large annular ball bearings. The two bearings carrying the pinion shaft are mounted a considerable distance apart so as to give maximum rigidity, and the same statement applies to wheel bearings front and rear. The pinion is shim adjusted, but it is not intended that the adjustment will be altered after the car is manufactured, while the ring gear is adjusted by a screw sleeve on one side, the bearing on the other side floating.

An I-beam drop forging is used for the front axle, with reverse Elliott ends. The king pins are carried almost to the center of the wheel while the spindles are of an unusually large design. A No. 405 annular ball bearing on the outside of the spindle takes the side thrust while a No. 309 inner bearing takes nearly all radial thrust, as its plane lies in the center plane of the wheel. One degree of camber is used in the Duesenberg front axle, while 2½ degrees of caster are provided. The wheels toe in about ⅛-inch on each side.

A special Ross cam and lever steering gear is used in the new car with a ratio of 18 to 1. Every unit of the steering system is constructed oversize to allow a wide margin of safety at high speeds. The wheel is large, of the thin grip type and only three spokes used. The purpose of the fewer spokes is to make easier vision of the instruments mounted on the panel in front of the driver.

Improvements have been effected in the new car's brakes, which are the familiar Duesenberg internal hydraulic type, by increasing the leverage to an appreciable degree and by the use of larger drum cooling fins. The drums are steel forgings, fifteen inches in diameter and three inches wide, entirely surrounded by fins. There are two brake shoes of cast aluminum operating against the drum, so constructed that only one adjustment is necessary to keep both shoes in efficient operation.

The emergency brake drum, 8 inches in diameter and 3 inches wide, is mounted on the propeller shaft, immediately behind the transmission, and operated by a hand lever of unusual massive construction and appearance in the driving compartment.

Springs are wide and long with smooth, polished surfaces. The front springs are 41 inches long by 2½ inches wide, while the rear springs are 62 inches long and 2½ inches wide. Both front and rear springs are shackled in large bronze bushings, protected by special housings that keep out dirt and water and retain the oil supplied by the automatic chassis system. Both springs are enclosed in oil and dirt proof covers. A Lovejoy two-way shock absorber is engineered into the frame at all four spring points.

Six 19-inch wheels with 6-inch (*Continued on page* 192)

Duesenberg 265 H P Car

(*Continued from page* 190)

rims and tires are furnished with each chassis. They are special heavily laced construction to insure tremendous strength. Chromium-plated spokes and rims are standard on all chasses unless otherwise specified.

The frame of the new car probably is one of its most outstanding features. Made up of 7/32-inch stock, the side rails are 8½ inches deep at the center, with 2¾-inch ledges. Six tubular cross members are provided to brace it, the largest of which is 4 inches square and the smallest 2¼ inches in diameter. The 4-inch square member is riveted and welded into the frame with 8½ x 12-inch double gussets.

Second from the front of the frame is a 2¼-inch square member, curving downward, upon which the radiator is mounted. A 2-inch round heat-treated alloy steel casting extends forward from each rear front spring hanger to the second cross member at a point about 6 inches toward the center of the frame. The front of the engine rests on the center of these 24-inch castings.

This "A" type of construction virtually provides a cross member 24 inches wide, the rear end of which theoretically passes through the center of the engine. Two trough-shaped forgings are riveted and welded to the frame on each side behind this member, to accommodate the rear engine supports, which likewise rest on rubber blocks of a wedge shape.

The front construction of the frame was given particular attention as it is Mr. Duesenberg's belief that much shimmy and wheel wobble is due to flexures of the frame. At the rear, a double kickup is provided, allowing the body builder more leniency in the seating arrangement.

One of the beauty spots of the car is the instrument panel. The surface is of brass finished in engine turned oxidized chromium-plated strip. All of the instruments are given black dials with white indicators and numbers, which combination Duesenberg believes easiest to read. Among the instruments on the panel are a 150 m.p.h. speedometer, a 5,000 r.p.m. tachometer, water temperature gauge, brake pressure gauge, ammeter, gasoline gauge, altimeter, starter button, carburetor choke, ignition lock and oil and battery signal lights.

The steering wheel sets at an angle more nearly parallel to the instrument board than is usually the case. It is enameled black with black and silver controls in the center. The controls also represent something of a departure as they take the form of buttons rather than levers. In this group is included the spark and gas manuals and the lighting switches.

The dash is another of the unusual features of the car. It is made of heat-treated aluminum and the toe board mountings are cast integral with it. Two oval-shaped, hollow aluminum castings extend from the rear of the dash to support the instrument panel. The castings are about 15 inches long and in addition to their function as an instrument board support, they contain all the wires and cables for the instruments, thus insuring a rigid instrument panel mounting to the chassis independent of the body and making all electrical connections accessible and sightly.

Head lamps and parking lamps are of special design to harmonize with the motif of the car. A combination tail, stop and backing light is fitted. Running boards of the car are short and of walnut. Chromium ribs run longitudinally on them and extend up the rear fender almost to the crest.

As previously stated, an unusual number of heat-treated aluminum parts are used in the car and also an unusual number of chromium-plated parts. The following items are made of heat-treated aluminum: Dash, instrument board, instrument board supports, steering column brackets, tail lamp bracket, differential housing, torque tube yoke and cap, torque tube yoke brackets, flywheel housing, engine oil pan, engine chain covers, camshaft covers, engine water jacket covers, water pump, intake manifold, front and rear axle brake drum covers, hydraulic and emergency brake shoes, spare wheel support, gas tank filler body and fuel pump housing.

The following parts are chromium-plated: Radiator, wheels and hub caps, head lamps, brackets, and tie rod tube, cowl lamps, tail lamps, dash moulding, bumpers, hood brackets, oil filter, generator drive shaft, generator strap, all exposed bolts and nuts on engine, gas tank filler cap, running and instrument board moulding and bezels and radiator tie rod.