DUESENBERG

THE ORIGINAL STRAIGHT EIGHT - PIONEERS OF FOUR WHEEL BRAKES

LUBRICATION INSTRUCTIONS

DUESENBERG
STRAIGHT
8

DUESENBERG MOTORS COMPANY
INDIANAPOLIS, IND.,
U.S.A.

Lubrication Instructions

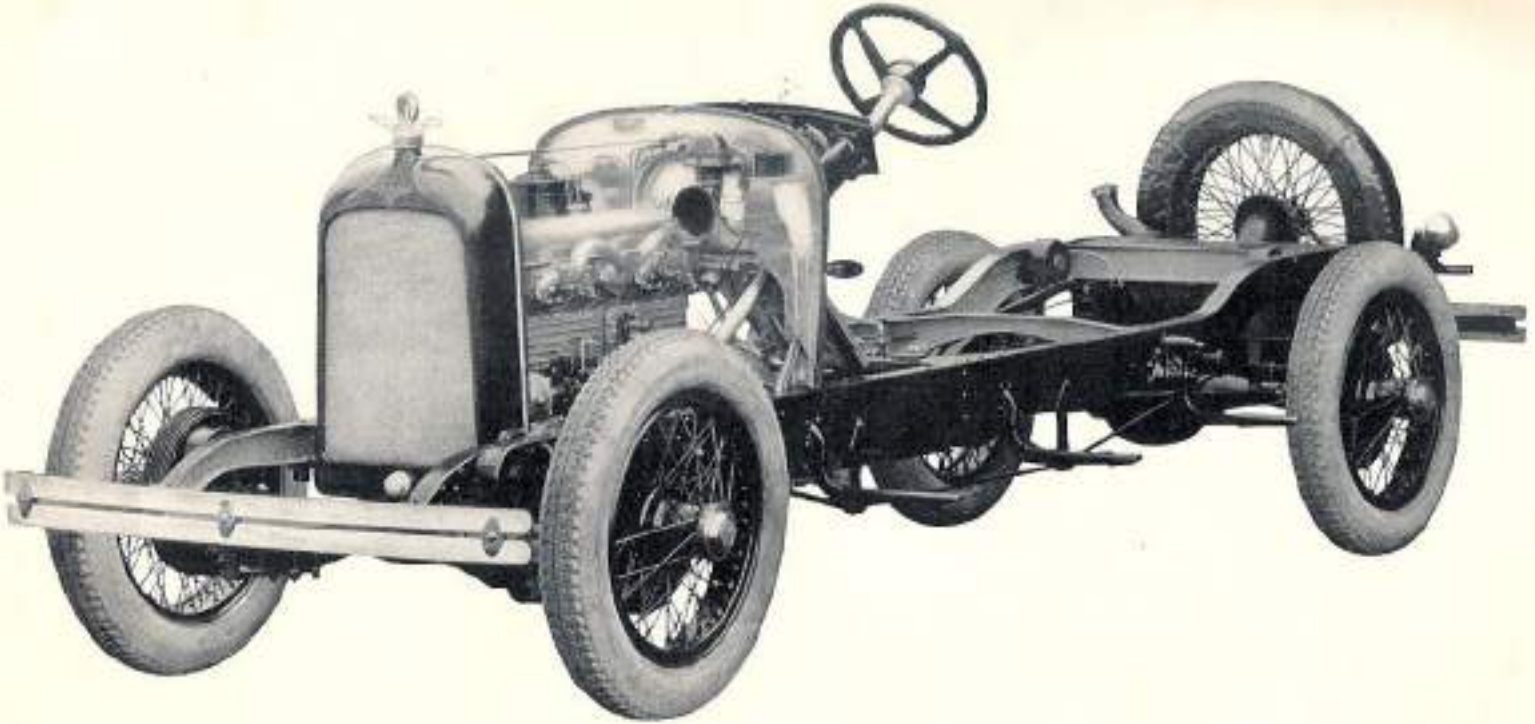
To Time Motor

This edge of steel to line up with center of slot with slack taken up as indicated by arrow and the fly wheel set lead center on the compression stroke of the number one piston

center line of slot or notch in casing

The Original Straight-Eight---
Pioneers of Four Wheel Brakes

Duesenberg Motors Company
Indianapolis, Ind.
U. S. A.



View showing clean lines of Duesenberg Straight Eight

Foreword

N sponsoring a passenger car, Duesenberg has realized to the full its purpose of preserving in an automobile of utmost gentility and irreproachable good taste, the highly desirable attributes of victorious racing design —indomitable ruggedness to minimize the need for attention—power without practical limitation—a degree of safety beyond the remotest necessity.

All this implies advanced engineering, modern facilities and an organization of skilled artisans capable of producing an automobile of unmatched endurance.

Nevertheless, like any other fine piece of mechanism, intelligent care and attention is necessary if the owner is to profit by the painstaking effort the maker has taken to give him a car of unqualified worth, that it may continue to render the service it is capable of, undiminished, with unfaltering regularity.

This becomes particularly pertinent when applied to the matter of lubrication, the neglect of which may mean uncalled for expense, if not more serious consequences.

In keeping, therefore, with our appreciation of the intrinsic value to the Duesenberg owner of correct lubrication and for his profitable guidance, we respectfully submit the following suggestions.

Duesenberg Motors Company,
Indianapolis, Ind., U. S. A.

set intake valves 6,000. th of inch.
" exaust " 8,500. th of "

Description of Duesenberg "Straight Eight" Engine

{Frame Body & Fender Co.}

Specifications:

Bore 2⅞ inches
Stroke 5 inches
Cylinders cast in block
Displacement 260 cubic inches
S. A. E. rating 26.45 HP.
Aluminum alloy pistons
Valves in head
Overhead camshaft
One piece counter-balanced crankshaft in accurate static and dynamic balance, supported by three large bearings.
Water circulated by centrifugal pump.

{Brake fluid. 60% Glisereen 40% Alcohol}

Lubricating System

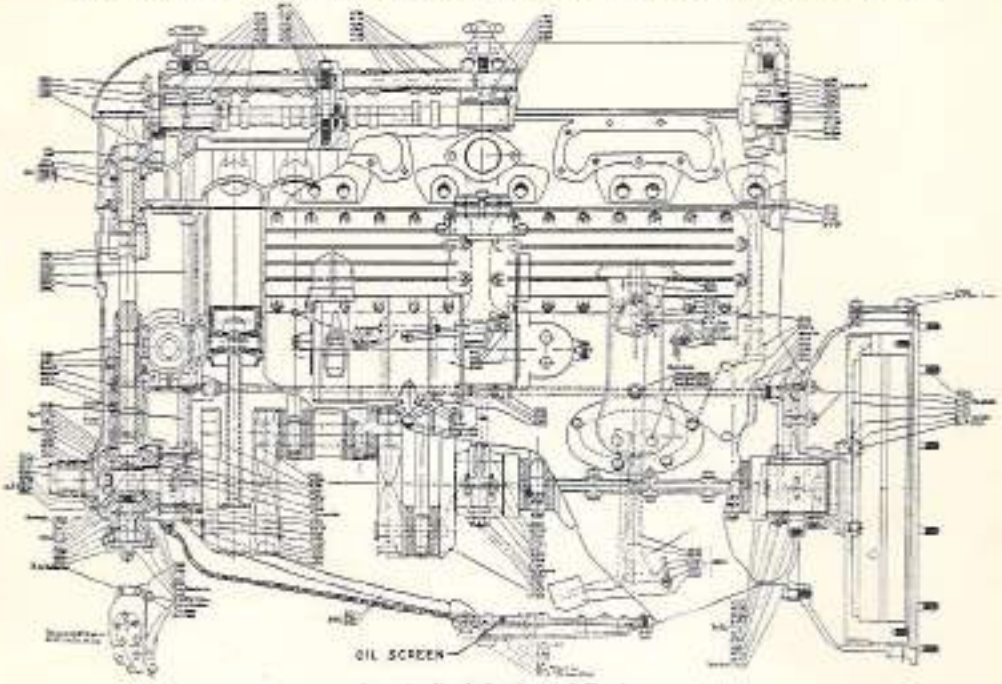
A force feed lubricating system is employed. (See Figs. 1 & 2). A gear pump, located beneath the front end of the crankshaft and driven by it, draws oil from the reservoir in lower half of crankcase and delivers it under pressure through suitable piping to the three main bearings.

After lubricating these, it passes on, through drilled holes in the interior of the crankshaft—entering through a radial hole in the crankshaft journal and leaving through a similar hole in the crank-pin journal—to the connecting rod bearings. The surplus oil continues on and out of each end of the connecting rod bearing where it is acted upon by centrifugal force (due to the rotation of the crankshaft) and whipped up into a fine mist, or spray, lubricating cylinder walls, pistons, and all other friction surfaces within the engine.

Another line leads the oil, from the pump, up through the forward end of the cylinder block into the head, thence to the front bearing of the camshaft. The latter is hollow and radial holes supply each of the camshaft bearings with oil under pressure. Another lead from the same source, in the front bearing of the camshaft, permits oil to reach the inside of the rocker arm tube, or shaft, which is also drilled radially, to feed each of the rocker arm bearings with oil under pressure.

Excess oil leaving the camshaft and rocker shaft bearings drains into a trough, lubricating the cams and rocker arm rollers by a bath of oil. Valve stems are lubricated by the spray resulting from the action of the moving parts on the oil.

From the trough it drains into the head and back into the crankcase through two sources—at the forward end it passes over the bevel gears on the hollow vertical drive



Longitudinal Section of Engine
Figure 1

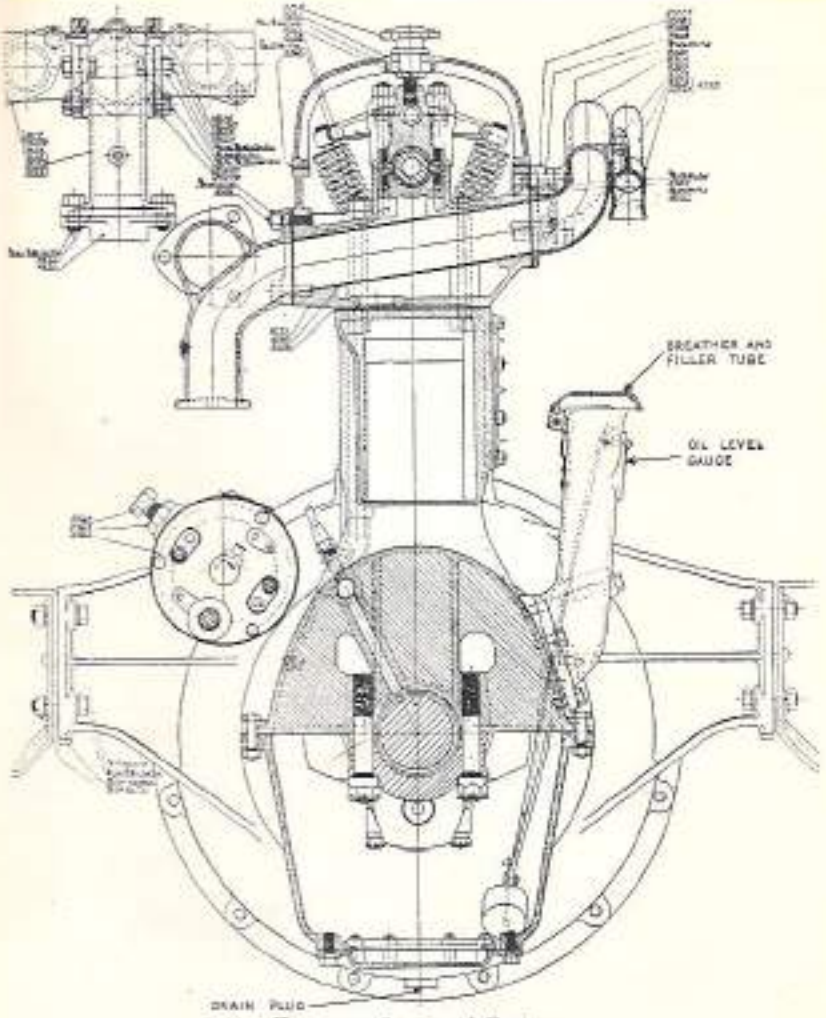
shaft and on down through the tube, and at the rear end down through a tube provided for the purpose.

A by-pass or pressure regulating valve is located at the forward end of the head, under the cover, at the right side of the front camshaft bearing. It serves the purpose of (1) controlling the amount of oil reaching the bearings and, ultimately, the cylinder walls and combustion chambers, by diverting a quantity of the pump discharge (depending on the spring pressure holding the check valve to its seat) away from the bearings back to the reservoir, and (2) limits the maximum pressure in the oil line.

LUBRICATION OF ENGINE

The Essentials of Correct Lubrication

To correctly lubricate an engine it is not only essential that the oil be of highest quality, but it must be of the proper body and character to meet the operating conditions with scientific exactness. To satisfy all the conditions met with in service it must be intelligently selected



Transverse Section of Engine
Figure 2

and properly used, so that the proper amount of oil in good condition is delivered to all friction surfaces at all times. Unless these conditions are consistently fulfilled the neglect will quickly be apparent in interrupted service and costly repairs. It is a known fact that incorrect lubrication is responsible for more than 50% of the expensive repairs and costly interruptions encountered in service.

Determining the Correct Lubricant

The selection of the correct grade and character of oil for an automotive engine is a problem requiring care-

ful study by competent engineers, familiar with the design and construction of automotive units, as well as the performance of lubricants under the various conditions of service encountered.

The selection of the correct grade of oil depends upon the consideration of four basic lubrication factors in connection with the design and operation of the engine, operating temperature, distribution, carbon sensitiveness and piston seal.

Engine operating temperatures are affected principally by the service the engine performs, the type of cooling system, kind of fuel employed, the engine speed and the size of the cylinder bore.

To make sure that the oil which satisfactorily meets the temperature conditions will be properly distributed, it is necessary to thoroughly analyze the lubricating system, as the selection of the oil to ensure proper distribution to the various parts requiring lubrication is governed largely by the design of the system. Some lubricating systems are adapted for perfect circulation of all oils from the heaviest bodied to the lightest; others function best on oil of light or medium body. As the proper functioning of the lubricating system depends entirely upon the correct oil being used, the correct oil must be of such body as to be perfectly circulated and distributed to the frictional surfaces of the engine by the system under practically any temperature encountered in service.

The lubricant which is correct for both operating temperatures and the lubricating system must be of such character as to minimize carbon formation and at the same time seal the piston rings against the highly compressed gases on the compression and power strokes.

LUBRICANT RECOMMENDED

Summer — To satisfactorily meet the conditions of operation and design referred to in the foregoing paragraphs we recommend the use of a high grade heavy medium bodied oil such as Gargoyle Mobiloil "A" for use during the warm months of the year.

Winter — When freezing temperatures are expected, a somewhat more fluid oil, such as Gargoyle Mobiloil Arctic, is desirable to

facilitate starting and assure prompt circulation throughout the system immediately thereafter.

DETAILED INSTRUCTIONS for ENGINE LUBRICATION

Filling

The oil filler and oil level indicator (gauge) is located on the generator side of the engine.

Fill the reservoir with 6 quarts of oil, and add a sufficient amount as required to keep the level well above the "half full" mark on the gauge.

Caution

Do not overfill the crankcase, as too much oil will bring the level high enough for the connecting rods to dip, thus causing excessive quantities of oil to be thrown onto the cylinder walls, resulting in oil pumping, smoking, excessive carbon deposits and fouled spark plugs.

Never operate the engine with the filler cap in the open position as the breathing action of the motor will draw dust and grit into the engine, which, when mixed with the oil, forms as abrasive resulting in rapid wear of the cylinder walls, piston rings and bearings.

OIL PRESSURE

At 30 miles per hour the oil pressure gauge on the dash should register about 30 pounds pressure with the engine warmed up, when the recommended oil is used. In starting, the pressure will be somewhat higher due to the chilled condition of the oil.

The failure of the oil gauge to show the required pressure may be due to the following causes:

1. Use of an oil too light in body (follow recommendations in this book).
2. Oil excessively diluted with fuel (follow instructions for draining crankcase).

3. Worn or loose fitting bearings, particularly end play. (Replace bearings).
4. A leaky or broken oil tube (tighten connections, replace tubes if necessary).
5. Clogged oil screen (follow instructions for cleaning).
6. By-pass valve improperly adjusted (follow instructions for adjusting).
7. Broken oil gauge (have new one installed).

TO ADJUST OIL PRESSURE

Adjustment of the oil pressure regulator, is very rarely required. Reduction of pressure is usually due to one of the preceding causes. When loss of pressure has been caused by too much clearance in the connecting rod bearings it is obvious that the cylinders are already getting more than the normal oil supply, and any increase of pressure will result in over-oiling. The causes of reduced pressure should always be checked before changing the regulator.

If, however, it becomes necessary to increase the pressure by the regulator it may be done by loosening the lock nut and adjusting the valve spring pressure by turning the slotted screw with a screw driver. Turning it to the RIGHT (clock-wise) increases the pressure and to the LEFT (anti-clockwise) decreases the pressure in the line, as shown by the gauge on the dash.

WHEN THERE IS NO OIL PRESSURE ON STARTING, STOP ENGINE IMMEDIATELY and look for:

1. No oil in reservoir. Replenish supply.
2. Oil excessively diluted with fuel. Follow instructions for draining and refilling crankcase.
3. Clogged oil screen. Follow instructions for cleaning.
4. Broken oil line. Inspect for leaks.
5. Clogged oil tube leading to gauge. Test for clogging. Open connection at engine and turn engine over slowly. If the trouble is due to a clogged pipe a stream of oil will come from open

connection. Remove the pipe and blow it out with compressed air.

6. Broken pumpshaft (this is always due to negligence on the part of the operator in not draining the crankcase at frequent intervals in winter. (See paragraphs on sludge formation, page 16).

DRAINING CRANKCASE OIL

Periodic draining of the oil reservoir is one of the most important factors in reducing wear and maintaining maximum efficiency of the engine.

Even the best of oil deteriorates in service. Its lubricating value is not actually destroyed, but the oil becomes thinned with fuel absorbed by the oil film on the cylinder walls, and which is scraped back by the piston rings and mixed with the crankcase oil. This dilution is of course, greatly increased when the choke is used excessively or when the carburetor is adjusted for an over-rich mixture. The dilution by fuel is most rapid on new engines and when the engine is operated in cold weather without some provision being made to ensure the proper operating temperatures.

The crankcase oil also becomes further contaminated with road dust drawn through the carburetor, particles of worn metal and by carbon particles. Due to the wearing-in period of all friction surfaces, the accumulation of worn metal particles is greatest in a new engine.

During cold weather, unless the engine is kept warm by partial covering of the radiator, water is likely to accumulate in the crankcase. This is due to condensation of the steam which is always present in the gases that blow past the rings when the oil becomes diluted by cold operation of the engine, the steam being one of the products of combustion of the fuel. With dirty oil this water may form sludge or emulsion which is likely to clog the oil screen and passages. In order to avoid trouble from this source, the following procedure should be adhered to.

DRAIN THE CRANKCASE OIL after the first 500 miles of service of a new engine and every 1000 miles in summer and every 500 miles thereafter in winter. To do this, remove the crankcase drain plug which is directly under the oil screen (Figure 1). The best time to drain the oil is after a run while the engine is still hot. The oil

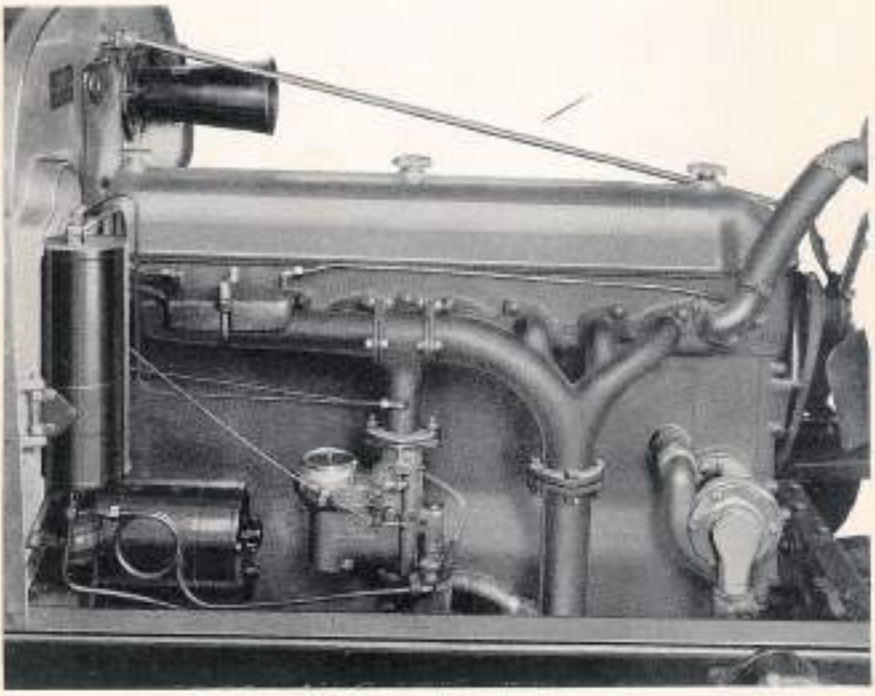
is then more fluid and thoroughly agitated and, therefore, will carry off most of the sediment.

DO NOT FLUSH WITH KEROSENE

When kerosene is used to flush out a lubricating system, a large percentage of it will remain in the system, regardless of how much care is taken to remove it. When fresh oil is added, this kerosene will dilute it considerably and greatly reduce its lubricating value.

After draining, replace the plug. Instead of using kerosene, it is preferable to put a quart or two of fresh oil into the crankcase and turn the engine over several times to wash out the system. Remove the plug and drain again.

Finally refill crankcase with 6 quarts of fresh oil of the correct grade.



Side View of Engine
Figure 3

TO CLEAN THE OIL SCREEN

At least every 1000 miles the oil screen should be cleaned so as to prevent stoppage of the oil flow. To do

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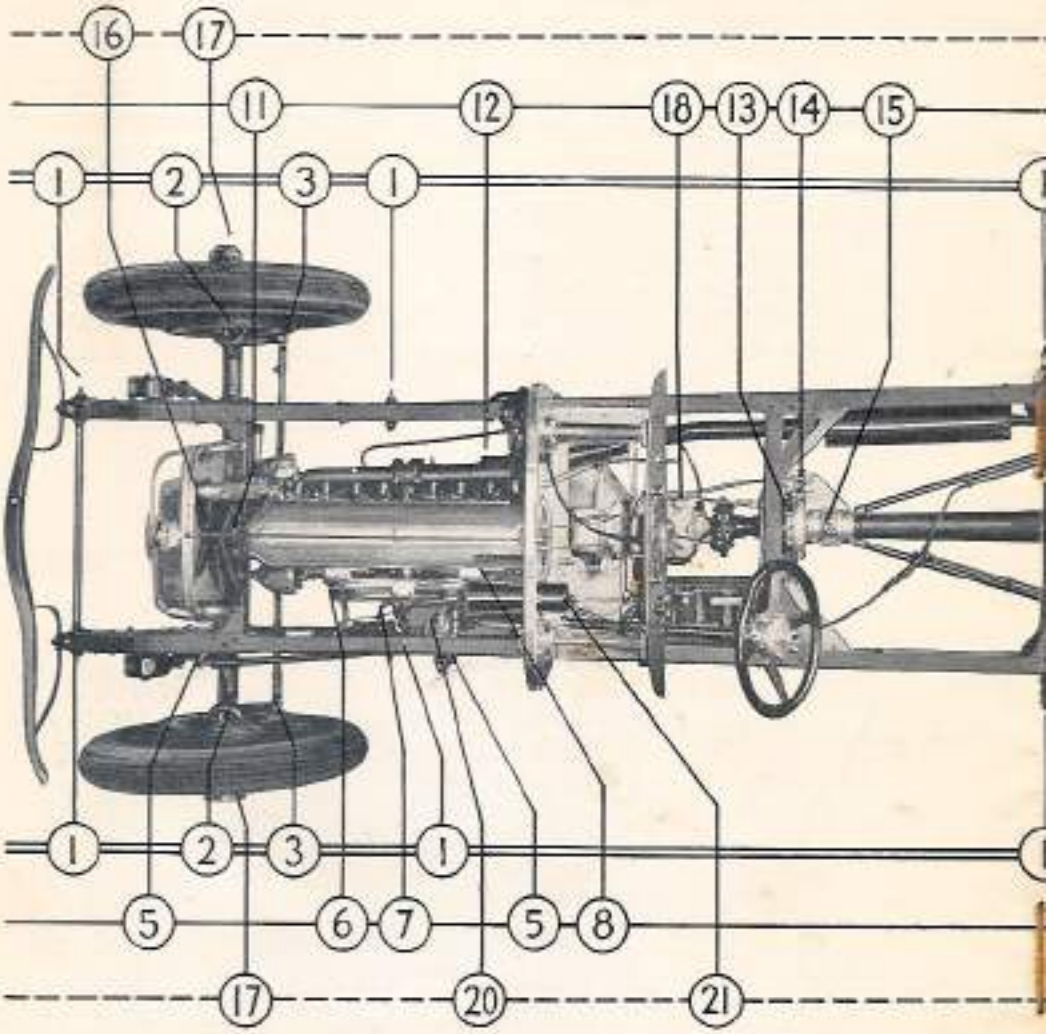

1 Spring & Shackle Bolts
2 Steering Knuckle Pivots
3 Tie Rod Bolts
5 Steering-Gear Connecting Rod (Drag-Link)
6 Generator
7 Spark & Throttle Ball Joints
8 Engine-Crankcase R
10 Rear Spring
11 Engine Front
12 Starting Mot
13 Torque Yoke
14 Hand Brake

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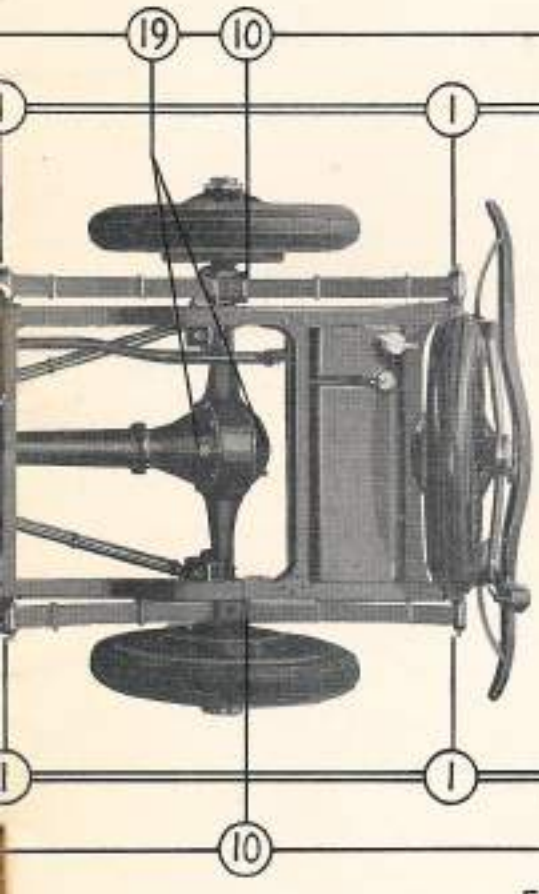
ON CHART



See Text for More Complete Instructions.

eservoir
Saddles
Support
or
Pivot Pins
Connections

15 Torque Yoke Cap
16 Fan Hub Filling Plug
17 Front Wheel Bearings
18 Transmission (Filling & Level Plug)
19 Differential (Filling & Level Plug)
20 Steering Gear Housing (Filling Plug)
21 Horn

this, it is only necessary to remove the plate on the bottom of the oil pan when the screen may be taken out. Wash with kerosene or gasoline and dry with compressed air or a lintless cloth. Do not use waste. A few strands of hair or lint will quickly block a screen.

HOW TO AVOID CRANKCASE DILUTION

1. Avoid excessive use of the "choke". After starting give the engine time to warm up somewhat before driving.
2. Use a radiator cover during winter to allow your engine to warm up more rapidly and also to run at a high temperature. A cold running motor acquires dilution much more rapidly than a hot one because all the fuel injected into the cylinders does not vaporize. Some of it finds its way into the oil pan. Heat aids vaporization and promotes perfect combustion.
3. Avoid idling for long periods or excessively slow driving.
4. Keep your engine in good mechanical condition.
5. Drain the crankcase frequently, at least as often as specified elsewhere in this book.
6. Do not flush the crankcase with kerosene. It is impossible to drain all the pockets without dropping the oil pan—and the kerosene which is trapped remains to dilute the fresh oil. Drain the crankcase while the engine is warm and the oil is agitated—this will carry off the sediment.

HOW TO AVOID OIL PUMPING AND CARBON DEPOSIT

"Oil pumping," in the common use of the term, refers to the accumulation of oil in the combustion chamber rather than to the quantity which actually passes the pistons. With adequate cylinder lubrication, there is normally a certain quantity of oil passing into the combustion chamber. If it is burned, its presence is not objectionable—but if it accumulates, fouled spark plugs, sticky valves and excessive carbon deposits are likely to result.

An engine operating under a fairly heavy load will burn up cleanly even an excess of oil, while one which is

lightly loaded or running idle cannot consume large quantities of oil, particularly if the lubricant is richer than the operating temperatures call for. The result is oil pumping troubles which are always aggravated when an oil heavier than recommended is used.

Wear of cylinders and pistons which has increased the normal clearance, or wear of the piston rings may be responsible for an excess of oil in the combustion chamber. Wear of the rings in their grooves will cause a definite pumping action—lifting the oil mechanically into the combustion chamber. When wear occurs, it must be remedied by renewing or refitting the parts affected. With correct lubrication, wear of this nature will be greatly reduced.

Carbon accumulation in the engine is the result of incomplete combustion—either of the oil or of the fuel or both. This failure to burn the oil and fuel completely may be due to the lack of sufficient air for complete combustion or to the lack of sufficient heat for proper vaporization.

Oil pumping and excessive carbon deposits may be controlled by careful observation of the following suggestions:

1. Fill the crankcase carefully to its proper level daily. Do not over-fill. Over-filling may cause over-oiling with consequent oil pumping and carbon formation.

2. Use a high quality oil of the body and character recommended in this book. Either an incorrect grade or a poor quality oil may make trouble.

3. Do not try to compensate for wear by using a heavier bodied oil than has been recommended. The heavy oil when heated will pass the pistons almost as readily and will be harder to burn. The trouble will therefore be aggravated instead of corrected.

4. If the oil pressure falls off gradually, with this oiling system, a probable cause is worn bearings, which allow too much oil to be sprayed from the bearing clearances to the cylinder walls. If this is the case, it is obviously wrong to try to correct the condition by increasing the pressure and feeding still more oil, or by changing to oil of a heavier grade. If the oil pressure is not what it should be, an investigation should be made by a competent service man. Oil diluted by fuel will also cause a falling off in the oil pressure. It is therefore advisable to drain

the crankcase completely and refill with fresh oil before concluding that the bearings are at fault.

5. Be sure that the carburetor is not feeding too rich a mixture. If there is not enough air to consume all the fuel, there certainly will not be enough to consume any excess oil which passes into the combustion chamber. Incomplete combustion means carbon.

6. "Missing" promotes oil pumping and carbon formation because the oil normally passing into the combustion chamber is not burned. Keep the ignition system in good condition and do not use the engine as a brake on long hills with the switch off.

7. Compression losses affect the efficiency of the engine and the complete combustion of oil and fuel. Keep the valves properly ground in—the tappets properly adjusted—and the cylinder head gaskets tight.

HOW TO AVOID SLUDGE FORMATION

"Sludge", as already stated, is an emulsion of oil, water and impurities which accumulates most frequently in engines run too cold. Water vapor constitutes a large percentage of the exhaust gas in normal combustion. Unless the piston sealing is absolutely perfect, a small portion of this burned gas passes into the crankcase. If the crankcase is kept normally hot, the water vapor will pass off through the breather without condensing. In a cold crankcase, it will condense. The water may settle to the bottom of the case or may be continually circulated and mixed with the oil. In either case, sludge is apt to form from the agitation of the fuel and water, together with the impurities which are always found in the crankcase. In winter this difficulty is aggravated from the fact that crankcase temperatures are lower and condensation is more rapid. The danger is increased from the fact that the condensed water may freeze and completely stop the oil circulation.

If the water has not been thoroughly mixed with the oil, this freezing may be localized at the low point in the crankcase. If there is a sufficient quantity, the oil circulation may be blocked with ice. If the water is kept in constant agitation, it may freeze in crystalline form throughout the whole body of the oil, with the apparent result of thickening the oil so that it will not circulate. The oil

screen may strain out an accumulation of this snow or ice deposit so that circulation will be completely stopped.

This difficulty is most evident at extremely low temperatures and can only be avoided by the use of adequate means to keep the engine and crankcase normally warm.

Sludge formation can be controlled by careful attention to the following details:

1. Drain the oil at specified intervals—or oftener if the service consists of short intermittent runs in which the engine does not reach its normal operating temperatures. This will prevent the accumulation of too much water.

2. Use a suitable radiator cover or shield in winter. By keeping the engine normally warm the condensation of water vapor in the crankcase will be avoided.

3. Clean the oil screen at least as often as specified on page 11.

4. If the oil shows signs of thickening when the crankcase is drained, remove the oil pan and clean it thoroughly with a lintless cloth. All trace of sludge should be removed as its presence will start new formations.

HOW TO PREVENT RUST AND CORROSION TROUBLES

Occasionally some of the polished parts of engines, such as the piston pins and valve stems, are found to be rusted or corroded. This trouble is due, first, to the presence of water in the crankcase and, second, to the fact that badly diluted oil does not protect the working parts from the rusting action of the moisture. If this moisture is made acid, as it can be through the use of fuels containing excessive amounts of sulphur, the surfaces may become corroded very rapidly.

Any sulphur which is contained in the fuel burns in the cylinders and forms sulphur trioxide (SO_3). If there is leakage past the pistons and rings, part of this sulphur trioxide will find its way into the crankcase along with a considerable quantity of water vapor, one of the products of combustion. After the engine is cold, this water vapor will condense into liquid form and unite with the sulphur trioxide to form sulphuric acid (H_2SO_4). If the crankcase oil is badly diluted, it will drain off of the parts, leaving

them exposed to the action of this acidulated moisture which of course tends to corrode them. Even if the fuel is free from sulphur compounds which would form acid the parts may rust due to their becoming coated with moisture.

Rusting and corrosion troubles may be avoided by observing the following precautions:

1. Keep the engine warm so that excessive dilution will not take place or water collect in the crankcase. There can be no rusting or acid formation without water, or corrosive action if the parts are protected by oil.

2. Keep the engine in such mechanical condition that the burning gases will not readily pass the pistons and rings.

3. Use the correct oil and keep it in good condition so that the pistons will be sealed against leakage.

4. Follow the draining suggestions given in the section "Draining Crankcase Oil".

5. When storing your car for a prolonged period drain the engine crankcase, refill it with fresh oil and run the engine only long enough to assure thorough distribution of the fresh oil to every working part.

OPERATING A NEW ENGINE

Under no circumstances should you drive your car more than 25 miles per hour during the first 1,000 miles or more. The object of this is self-evident. By driving the car slowly and thus preventing the over-heating of any parts, all the wearing surfaces become glazed and smooth. After this period of slow operation, provided proper lubrication has been maintained, high speeds can be attained for long periods without danger of injury to any of the wearing surfaces.

OPERATING AN ENGINE EQUIPPED WITH MAGNALITE PISTONS

Cars equipped with magnalite pistons which are properly fitted for operating under normal temperature conditions must be handled with reasonable care. The engine should be warmed up gradually and not be subjected to sudden bursts of speed after it has been standing.

This is readily explained if you will consider the difference in characteristics of the metals used in the cylinders and the pistons. The cast iron has only about one-third the expansion of aluminum alloys such as magnalite. It absorbs heat only about one-third as fast as magnalite. The temperature of the cylinders can only be brought up to operating level by the heat of the explosions in the combustion chamber. The amount of metal in the cylinders which has to be warmed up in this manner is around 200 lbs. The weight of the pistons about 8 lbs. Both are exposed to the same heat conditions and it is obvious that the same amount of heat applied to the 8 lbs. of magnalite pistons with their greater conductivity and expansion will cause them to enlarge much more rapidly than the cylinders and as a result it is possible to start any motor with magnalite or aluminum alloy pistons after it has been standing and by rapid acceleration stick the pistons badly enough to injure some of the vital parts of the engine as well as the cylinders and pistons themselves.

On the other hand, if the engine is gradually brought up to temperature and not forced at high speed until it is warmed up there is no liability whatsoever of damage either to the engine parts, the cylinders or pistons.

CLUTCH THROW-OUT BEARING

This bearing is lubricated by the oil from the transmission which reaches it through a channel drilled in the center of the clutch shaft, communicating in turn, with a hole drilled radially and in line with the bearing. No attention is necessary other than to maintain the lubricant in the transmission case at its proper level.

If clutch acts erratic, plug up bottom hole with wood plug and pour in a half and half mixture of light engine oil and kerosene. Block out clutch and crank engine over several times to allow the mixture to penetrate the clutch surfaces, then drain.

TRANSMISSION

Like the motor and other working units of the car, the transmission should be carefully "broken in" if maximum service is to be obtained. Using the gear frequently under light loads while the car is new will polish the teeth, bearings, shafts, and bushings to perfect surfaces; whereas, abusive use of the transmission before these parts are

properly worn in, will damage them in such a way that they will not wear to the smooth-running fit.

It is very essential that the proper lubricant be used in the transmission. We recommend a heavy bodied gear oil, such as Mobiloil "C", for this work. Grease or light oils should never be used as the former not only will not lubricate, but will stop up the oil passages, while the latter will not properly cushion the gear teeth to prevent wear and noise. Cheap oils or "soap-oil" mixtures should not be used.

The transmission should be filled through the plug opening (Fig. 4) on the left hand side, to the edge of this opening. This level should be tested every 1,000 miles and the supply replenished if low.

After the first 500 miles of service, the transmission should be drained by removing the plug at the bottom of the case, flushed out with kerosene or light engine oil and refilled with fresh lubricant. This should then be repeated every six months or after every 5,000 miles of service.

DIFFERENTIAL

A semi-floating rear axle is employed. The differential is carried by two ball bearings on either side and held in place by two caps.

Inside the split differential case is a four armed spider carrying a small bevel gear on each arm—the four gears engaging the two side gears which drive the two axle shafts. The outer ends of the latter terminate in and are a part of the wheel hubs.

The bevel-drive (ring) gear is riveted to a flange on the differential case and is driven by a pinion whose shaft is supported by two double row ball bearings.

Lubrication is supplied by a pool of oil in the axle housing in which the lower teeth of the ring gear is submerged.

We recommend the use of high grade gear oil, of the body and character of Gargoyle Mobiloil C, for this purpose.

TO FILL: Two plugged openings are provided—one on top of the carrier housing and another in the back cover plate. (See Fig. 5).

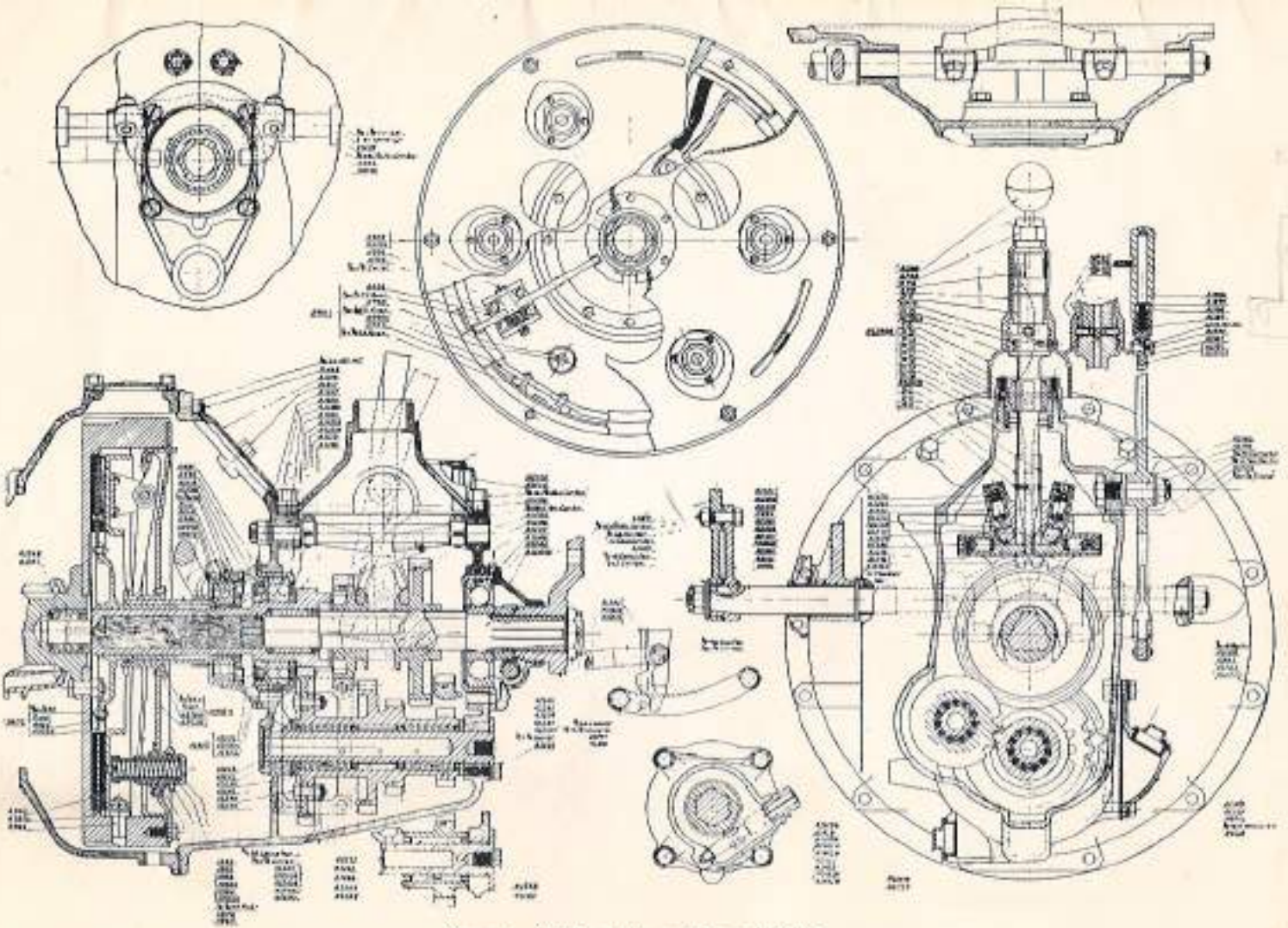
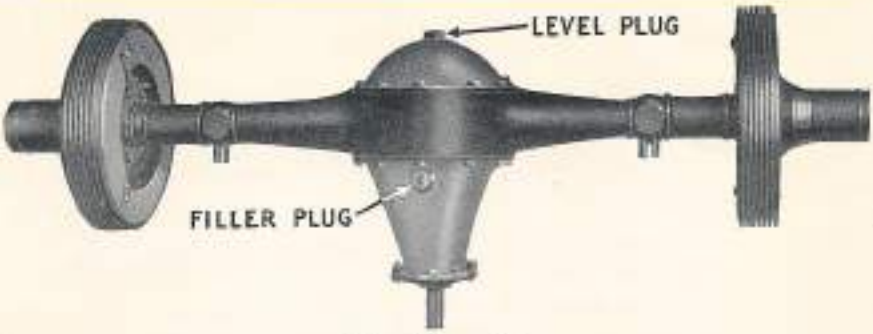


Figure 4. Details of Transmission and Clutch



View of Rear Axle
Figure 5

The latter is intended to serve as a level testing plug but may also be utilized to fill the housing if a garage pump and tank is available. Otherwise, fill through the plug opening on top of carrier housing until oil is just ready to run out of plug opening in back cover plate.

Do not overfill. Overfilling will cause leakage on brake drums with resultant brake slippage.

Every 5000 miles the housing should be drained, thoroughly cleaned out with kerosene or light engine oil and refilled to the proper level. Replace plugs.

WHEEL BEARINGS

Every 2000 miles the lubricant in the front wheel hub caps should be replenished with a good grade of cup grease, such as Mobilubricant.

Every 5000 miles the front wheels should be removed, bearings thoroughly cleaned and repacked with Mobilubricant or other high grade grease of similar consistency.

Caution:—See that wheel bearings have the proper amount of play when adjusting bearings. Wheels should turn freely without excessive shake. Replace locking device securely.

Lubrication of the rear wheel bearings is provided for by the lubricant from the axle housing. Every 5,000 miles, however, the wheels should be removed, bearings thoroughly cleaned and repacked with a high grease, such as Mobilubricant.

WHEEL HUBS

Every 2000 miles the wire wheels should be removed and hubs greased with Mobilubricant. This will prevent corrosion with its resultant difficulty in changing wheels and tires.

STEERING GEAR HOUSING

At least every two months, or two thousand miles, the steering gear housing, at the foot of the steering column, should have its lubricant replenished. Fill slowly with a semi-fluid lubricant, such as Mobiloil "CC", through plug opening.

FAN

The air circulating fan is located at the front of the engine and draws air through the radiator to cool the latter more rapidly.

To lubricate, remove slotted screw plug and fill slowly with a semi-fluid lubricant such as Gargoyle Mobiloil "CC". Replace plug to prevent leakage of lubricant. This should be done at least every 2000 miles.

UNIVERSAL JOINTS

Only one joint is required with the torque tube construction used on the Duesenberg car. The necessary flexability is provided by rubberized fabric and does not require lubrication.

ELECTRICAL UNITS

The generator and starting motor are equipped with small oil cups which should be given a few drops of engine oil once a month or every 1000 miles. More oil than this is unnecessary and may cause trouble. They should, however, receive regular attention to make them perform in the consistent way of which they are capable.

LUBRICATION WITH HIGH PRESSURE OIL GUN

All high pressure fittings should be lubricated with a semi-fluid lubricant such as Gargoyle Mobiloil "CC". These include the following:

WEEKLY OR EVERY 250 MILES	Steering Knuckle pivot pins
	Tie rod bolts
	Steering gear connecting rod (drag link)
	Spring and shackle bolts
MONTHLY OR EVERY 1000 MILES	Rear spring saddles
	Front engine support
	Torque yoke pivot pins
	Torque yoke cap

BRAKE CLEVIS PINS

Every 5000 miles the wheel brake drum covers should be removed and the pins lubricated with penetrating oil. Clevis pins on master cylinder should also be lubricated in the same manner.

DISTRIBUTOR

Every 2000 miles, the lubricant in the distributor gear housing should be replenished with a high grade cup grease, such as Mobilubricant.

MISCELLANEOUS PARTS

Brake connections, pedal and clutch shafts, spark and throttle ball joints, steering column, etc., should get a few drops of engine oil every 1000 miles with hand oil can. The horn rotor should be given similar treatment every 2000 miles through the two holes provided for the purpose.

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