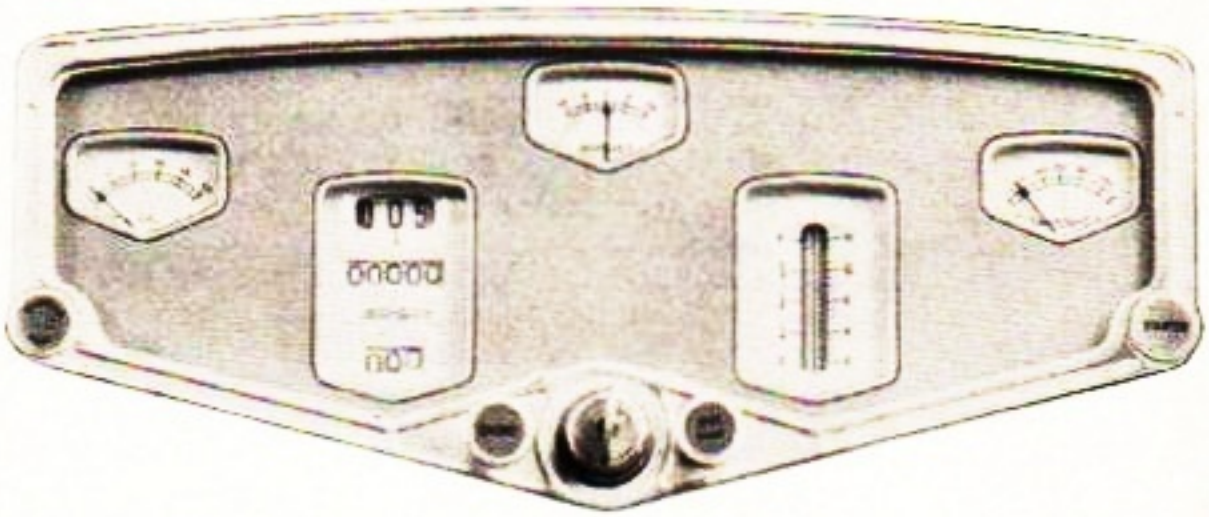
INSTRUCTIONS

for the Care and Operation of

AUBURN
76
MODELS

AUBURN AUTOMOBILE COMPANY
AUBURN, INDIANA, U. S. A.



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"BREAKING-IN" A NEW AUBURN 76

Although all Auburn cars are delivered from the factory in first class running order, they must be carefully handled in the first 500 miles of driving and should not be speeded up in excess of 25 miles per hour during the "wearing-in" period.

Care in operation until all parts are thoroughly adjusted and worn to a proper fit, will result in much longer life to the car and more satisfactory performance.

Each engine is thoroughly tested under actual working conditions in our motor test department before being mounted in the frame. After the car is completed it is given a road test to see that all units are working in harmonious relation and in proper adjustment.

All parts, especially the engine, are fitted to closer limits than necessary for running and these parts will soon wear in to the correct fit under careful handling.

It is important that all working parts be kept lubricated with the proper oils and greases at all times. Study the lubrication instructions which are incorporated in this manual.

AUBURN SERVICE

The Auburn Automobile Company, through its distributors and dealers, aims to give all owners of Auburn cars uniformly fair, courteous and businesslike treatment, and to assist them in every reasonable way to keep their cars in good running condition.

This policy requires careful cooperation on the part of our distributors and dealers with the factory. Orders for repair parts must be made clear, shipping instructions given and detailed information furnished in all cases.

Owners should order parts through the Auburn dealer, but if this is not practicable, orders may be sent direct to the factory, in which case it is necessary to carefully describe the parts needed and give serial number of car.

OPERATING INSTRUCTIONS

STARTING THE ENGINE:

First, be sure that you have proper amount of oil in engine crankcase, radiator full of water and gasoline in tank.

See that gear shift lever is in neutral position.

Turn on ignition by unlocking ELECTROLOCK which is done by turning the key one-quarter turn to the right allowing the lock cylinder to spring out. The ignition is now on.

Advance spark lever (left lever on steering post) about two-thirds downward. Draw gasoline throttle lever (at upper right on steering post) slightly downward from the upper position.

In cool weather the carburetor choke knob to the left on instrument panel should be drawn out.

Draw out the starter control which is at right on instrument panel. If the starting motor pinion does not mesh with the flywheel gear do not hold starter control out. Release it and after a pause, draw it out again.

As soon as the engine begins to fire, release starter control and push carburetor choke back to original position gradually or until the engine runs smoothly. Raise gasoline throttle lever so engine will not race.

DO NOT RACE THE ENGINE WHILE CAR IS STANDING IDLE, AS SERIOUS DAMAGE MAY RESULT.

Lower spark lever as far as it will go downward to driving position.

Never start the engine with full advanced spark on account of danger of back-firing which might seriously damage flywheel or starter mechanism.

LUBRICATING THE CHASSIS:

Immediately upon starting the engine, and before starting the car, depress the pedal of the Bijur Chassis Lubricator. This pedal is located on the dash above the clutch pedal, and may be reached with the left foot while sitting in the driver's seat. Press the pedal until it stops against the dash, then remove the foot.

STARTING THE CAR:

See that emergency brake is released and free. This is controlled by the lever to right of gear shift lever. It should be pushed to extreme forward position.

Push the clutch pedal (the one to the left) clear down. Move gear shift lever to the left and backward into first speed. If it does not enter first speed position smoothly and easily, lower clutch pedal once or twice and the shift lever will then easily slip into gear.

Then allow clutch pedal to come up gradually thus gently engaging the clutch and at the same time increase the engine speed slightly with the throttle or foot accelerator.

Beginners may find it easier to use the hand throttle at first.

The shift to second gear is made preferably at a speed of six to eight miles. Release the clutch by pushing pedal down and move gear shift lever forward to neutral, then to the right and forward again to second speed position.

DO NOT SHOVE THE SHIFT LEVER STRAIGHT FORWARD THROUGH NEUTRAL INTO REVERSE.

The instant the lever is in gear, re-engage the clutch slowly, at the same time accelerating the engine slightly.

The shift to third or high speed should be made at from ten to fifteen miles per hour under ordinary circumstances. This shift is made in the same way except that the lever is moved straight back into the right rear position.

In making the shift always pause, slightly, in neutral. Practice the gear shifts so they may be made without clashing the gears.

If you have not had experience in driving, you should become thoroughly familiar with the operation of the car at low speed before attempting to drive the higher speeds. Practice gear shifting, starting, stopping, steering, turning and backing at a low rate of speed.

TO STOP THE CAR:

Slow down; dis-engage the clutch; move gear shift lever to neutral. Brake the car speed gradually with the right foot pedal, slowly bringing the car to a stop.

Always have the gear shift lever in neutral position before re-engaging the clutch.

Set the hand or emergency brake by drawing brake lever back as far as it can be drawn.

TO STOP THE ENGINE:

Disconnect the spark by moving spark lever up as far as it will go to "off" position and press the ELECTROLOCK cylinder completely in, thus closing the ignition.

TO BACK THE CAR:

Do not reverse the direction of car until it has been brought to a complete stop.

When the car is at rest and gear shift lever in neutral position, release the clutch, move shift lever to left, then forward into reverse; engage the clutch. Carefully watch the steering, do not back rapidly, and always be ready to operate the clutch and brake pedals instantly.

In running backward it is well to use the hand throttle instead of the accelerator pedal and leave the right foot ready to operate the brake pedal.

GENERAL DESCRIPTION OF SIX CYLINDER ENGINE USED IN OUR 76 MODELS

CRANKCASE: Cast integral with cylinder of special grade alloyed gray iron. Integral water jacket extends around barrels and provides large water passages around valves. A large opening on the side of the jacket extending nearly the full length of the block facilitates setting of cores and cleaning, and also insures uniform water passages and uniform wall thickness of cylinder barrels. The lower part of the block is thoroughly ribbed to give maximum strength and rigidity. A one-piece flywheel housing is bolted to the rear end of the block and this is amply ribbed to take the weaving strains of the car frame. The oil pan of pressed steel is bolted with cork gaskets to insure an oil tight fit.

CYLINDER HEAD: Close grain gray iron, detachable, permitting easy access to valves and pistons, thoroughly water jacketed. Combustion chamber shape is of special design allowing a high compression pressure to be used without detonation.

PISTONS: Invar-Strut type of special aluminum alloy, permitting closer fitting than is possible with cast iron. These pistons are extremely light in weight and are fitted with two compression and one oil regulating ring.

PISTON PINS: Made of case hardened steel drilled hollow, hardened, accurately ground, lapped and held stationary in rod by a special locking device.

CONNECTING RODS: Aluminum alloy; drop-forged and heat treated, to give ample strength together with light weight, reducing reciprocating loads to a minimum.

CRANKSHAFT: Drop forging; 40-50 carbon steel; double heat treated. All bearing surfaces are accurately ground and drilled for force feed lubrication. Vibration dampener securely keyed to front end effectually eliminates torsional vibration of shaft.

BEARINGS: Connecting rod bearings are cast directly into the large end of the rod by a centrifugal process, which insures proper density of the bearing metal and perfect bond between the bearing and rod. Main bearings are bronze back babbitt lined, handfitted to proper clearance.

Camshaft bearings are renewable bronze bushings pressed into place.

VALVES: Exhaust valves are of Silcrome, an alloy steel developed especially for exhaust valves. It resists burning and warping, insuring freedom from valve leaks, and rendering frequent regrinding of valves unnecessary.

Intake valves are of special alloy steel particularly adapted for this use. Seats and stems of exhaust and intake valves are subjected to a special heat treatment which gives the proper degree of hardness to resist wear.

VALVE TAPPETS: Mushroom type; fitted with hardened steel adjusting screws and lock nuts. Tappet guides are arranged in easily removable clusters.

CHAIN: The camshaft is driven by a silent chain 1-¼" wide with the distance between crankshaft and camshaft sprockets so close that the free portions of the chain are short enough to eliminate all tendency to whip.

CAMSHAFT: Drop forging; cams integral. Every cam is tested for hardness, and accuracy of timing. A special cam contour has been developed to give quiet operation.

FLYWHEEL: Cast iron completely machined and perfectly balanced, provided with teeth for starting motor.

DISTRIBUTOR DRIVE: Driven from camshaft by hardened spiral cut gears. Mounted on top of cylinder head and adapted to any standard make distributor. This mounting is ideal, being accessible and reducing the wiring to a minimum.

LUBRICATION: Full force feed. Entire lubricating system contained in upper half of crankcase. An automatic pressure relief valve maintains proper oil pressure at all times.

COOLING SYSTEM: Centrifugal water pump mounted in readily accessible position on side of the end of the generator. The water inlet to the cylinder is taken through a pressed steel plate attached to the side of the cylinder. The water is forced between all the cylinder barrels to the valve side insuring uniform cooling of all cylinders and valves. Fan is mounted on an adjustable bracket. Fan drive is by 5/8" "V" Belt.

OIL STRAINER: Rectangular type. Removable for cleaning.

OIL PUMP: Gear type; mounted in upper half of crankcase extending into oil reservoir. Lower end of pump always immersed in oil and requires no priming. This construction permits oil reservoir to be removed without interfering with any part of lubricating system.

INTAKE MANIFOLD: Swan design assuring complete vaporization and equal distribution of gases.

INSTRUCTIONS FOR CARE AND OPERATION

PISTONS: The pistons are readily removable without taking off the cylinder head. Proceed thus:

1. Drain off the oil from oil pan.

2. Remove all cap screws and bolts holding oil pan to crankcase.

3. With starting crank turn crankshaft until piston will slide by the crankcase.

4. Assemble cap to connecting rod in the same position it was originally.

When fitting Bohnalite Invar-Strut pistons, the clearance in the cylinder bore must be such that a feeler shim .0015" thick and 1/4" wide, placed in the bore on a line at right angles to the piston pin bore, can be easily pulled from under the piston, while one .0025" in thickness cannot be withdrawn.

CONNECTING RODS: The connecting rod cap must be replaced in exactly the same position that it was originally. For example, No. 1 Connecting rod and cap have a "1" stamped on the side of the rod and also on the cap. Tais number must be on the same side.

The large end of the rod is offset 1/4". In replacing rods, care should be taken to see that they are replaced with the offset on the same side as they were originally. The short side of the rod is assembled nearest to the main bearing in every case. Rods 1-3-5 have the short side toward the front of the motor, and rods 2-4-6 have the short side toward the rear of the motor.

The connecting rods are of the shimless type. The babbitt is cast directly into the rod by the centrifugal casting process. The clearance between the bearing and the shaft is set at the factory .0015".

This clearance is checked by using a piece of paper .0015" thick and 1" square. The paper is assembled between the shaft and the bearing and the nuts drawn up tightly. The side clearance should be from .004" to .008" as checked with feeler gauge.

As Duralumin connecting rods are considerably lighter and softer than steel, care must be taken by the mechanic not to draw up too tightly on the connecting rod bolt nuts as the large end of the rod will be forced out of round, thereby taking up the bearing clearance which will result in bearing failure. After refitting, as a check against any tight fitting bearings, the engine should be turned over freely by hand.

Adjustment should be made when wear of .004" or more has taken place. The work of adjusting the connecting rod bearings should be undertaken only by an expert mechanic in a properly equipped service station. Adjustment can be made by filing off the face of the cap. Care must be taken in filing to see that the surface is kept straight.

A loose connecting rod bearing is usually most noticeable on a hard pull and an experienced mechanic can usually determine which bearing is giving the difficulty by listening closely or by removing the oil pan and

noting any looseness in the cap. Pressing against this cap and at the same time rocking the crankshaft will usually enable the mechanic to determine which bearing is in need of adjustment.

GRINDING THE VALVES: It is necessary that valves be reground into their seat whenever they become pitted or scored sufficient to cause loss of compression. To remove the valves proceed thus: (1) Drain the water and remove the cylinder head as described in the paragraph under Cylinder Head and Gasket.

(2) Remove the valve tappet cover plates from the side of the engine. (3) With a suitable valve lifter raise the valve springs and take out the horseshoe valve spring seat supports. Be careful that the horseshoe supports do not drop through the oil holes in the cylinder into the crankcase. (4) Lift out the valves.

When grinding the valves, it is advisable to place under the head a spring of sufficient tension to hold the valve from its seat when not under pressure from the valve tool.

Valve grinding compound may be purchased at any accessory store and is usually sold in combination tins containing coarse and fine grades. A little of the coarse grade should be placed on the valve and with an oscillating movement of the valve it should be worked into the seat, aways bearing lightly on valve and being careful not to make more than 1/8 to 1/2 a revolution of the valve before reversing its direction of motion, or otherwise grooves in the valve face will result. When all pits and black spots have disappeared and the valve presents a dull, silvery appearance, finish the grinding with a fine compound. The valve face should have a uniform surface, free from grooves and pits, but should not necessarily have a polish. The valve acquires a glassy polish while in use. Each valve should be ground and returned to the seat from which it was removed.

An excellent test to determine whether a perfect seat has been ground is as follows: With a soft lead pencil, mark lines across the face of the valve head, spacing them approximately 1/8 inch apart around the entire face of the valve. Then replace the valve and make a quarter rotation backward and forward. All pencil lines should be broken. If not, continue grinding until such time as all pencil marks are broken, which indicates that the valve is seating all around. Remember, all of the pencil mark is not to be rubbed out, but the pencil mark should be broken at one point on the seat, wherever the valve comes in contact with the seat in the cylinder block.

After regrinding valves and seats, make certain that every trace of the grinding compound is removed, especially around valve stems, as well as cloth or other material used to prevent the grinding compound from reaching the cylinder bores.

PISTON PIN: After having removed the connecting rod and piston as directed above, test the pin for looseness in the piston bosses. The pin is held in the connecting rod by means of a screw which passes through the sawed end and engages in a notch in the piston pin clamping the pin tightly and preventing it from turning in the rod. This screw is locked by a

flat plate under the head bent against the head of the screw after tightening. A loose pin will cause a knock in which case replacement of the pin is necessary.

It is very important in reaming the piston pin holes in the piston bosses to see that the holes are reamed smooth and in alignment so that the pin will have a perfect fit.

PISTON RING: When the piston rings become worn to any extent as indicated by lack of compression or excessive oil consumption immediate replacement should be made.

In fitting new piston rings to the pistons they should have about from .0015" to .003" side clearance between the ring and piston groove. The gaps between the ends of the piston rings should be .006" to .012".

MAIN BEARINGS: The main crankshaft bearings are of bronze back babbitt lined. No shims are used and adjustment is secured by filing off the faces of the caps the same as described under Connecting Rod Bearings.

When adjustment of connecting rod or crankshaft bearings is necessary, it is our suggestion that the work be done in a properly equipped service station. This class of work is for an experienced mechanic only. In case this procedure is not possible or desirable the following points should be noted:

The proper clearance between the crankshaft and the main bearings is .002" to .0025". The bearing clearance can readily be checked by inserting a feeler gauge of the proper thickness between the shaft and the bearing and drawing the cap nuts up tight. The bearings should be adjusted after wear of .004" or more has taken place. Never fit them so tight that the shaft cannot be turned by hand with a .002" feeler 1/2 inch wide, assembled between the bearing and shaft. This insures the proper clearance for oil film. The bearings are extra large and well lubricated. Adjustment is required only at comparatively long intervals.

However, overheating or overloading of a new engine, due to operation without sufficient quantity of oil, or with inferior oil, is sure to cause loosening of the bearings by the melting of a small portion of the facing.

A loose bearing always causes in the engine a knock of a magnitude depending upon the degree of looseness. It is readily discernable by any person in the immediate vicinity, and ignorance of its existence is inexcusable. Proper attention must be given immediately or the wrecking of the entire engine may result. A loose or burned-out bearing will pound the crankshaft out of round, necessitating replacement. Pounding will crystalize the connecting rod and the connecting rod cap bolts, resulting in their failure and generally the smashing of both halves of the crankcase, camshaft and piston.

We cannot too strongly impress on the inexperienced owner the necessity of having an expert mechanic do all the work on adjustment and replacement of main or crankshaft bearings. In the great majority of cases there is no necessity for having to replace main bearings, as they will last the lifetime of the car if proper attention is given to lubrication and necessary adjustment for looseness.

CAMSHAFT: The camshaft has five large bearings which under normal conditions will not have to be replaced during the life of the engine. All end play is taken up by a spring actuated plunger in the front end of the shaft which forces the chain sprocket flange against the bearing face. The clearance between the shaft and bearings when refitted should be .0025" to .0035".

VALVE ADJUSTMENT: It is important that sufficient clearance be had between the end of the valve and the head of the adjusting screw on the valve tappet, to insure the proper fitting of the valve in its seat. With the engine hot the clearance should be not less than .006" and not more than .008".

The clearance is readily adjusted by removing the valve tappet cover plates and adjusting the screw on the top of the tappet with suitable wrenches.

VALVES AND TIMING: The intake valves are larger than the exhaust to provide a full charge at high speed. The firing order is 1, 5, 3, 6, 2, 4. The valve timing is as follows:

Intake open upper dead center. Intake close 45 degrees past lower dead center. Exhaust open 50 degrees before lower dead center. Exhaust close 10 degrees after upper dead center.

When checking the valve timing the clearance between the valve stem and the tappet must be exactly .010". This clearance should then be reset to .006" to .008" for quietness with the engine hot. A change in the valve timing is possible only by removing the front end chain.

In resetting the camshaft, the sprockets on the camshaft and on the crankshaft should be lined up so that there are twelve chain links on the lower side of the chain between the prick punch marks on the two sprockets. With the sprockets in this position the top dead center mark for No. 1 and 6 cylinders will be in line with dead center mark on the crankcase.

IGNITION TIMING: The ignition is the semi-automatic advance type, the distributor head rotating in order to advance the ignition manually.

In order to secure correct timing, which is of the utmost importance, the flywheel must be set so that No. 1 cylinder is at top dead center on the firing stroke. In this position, the spark lever on steering column should be set in the full advance position. The distributor should then be set so that the contact points are just breaking for No. 1 cylinder. A small amount of variation can be taken up by loosening the clamp on the advance arm and then turning the distributor head. If there is not enough clearance between the cables and the cable-tubes, it will be necessary to remove the distributor and re-adjust the driving coupling on the end of the shaft.

Rotating the distributor clockwise advances the ignition, and rotating anti-clockwise, retards it.

The opening in flywheel housing used for timing purposes is on bottom front face of housing. No. 1 dead center mark on the flywheel should be opposite the center line of this opening.

The ignition should not be advanced beyond a point where a spark knock occurs except under full load conditions.

OIL CIRCULATION: The oil is drawn from the reservoir through the strainer, and is pumped to the main bearings. The main bearings are all supplied by copper tubing manifolds which are connected to the bottom of the bearing caps. Oil is forced to the connecting rod lower bearings through drilled passages leading through the shaft from the main bearings. The front end chain is supplied through a special lead from the front camshaft bearing to which oil pressure is supplied.

The surplus oil from the front end drains back into the oil reservoir. The cylinder walls, piston pin bearings, valve operating mechanism and valve stems are oiled by spray thrown from the connecting rod bearings.

OIL SUPPLY: Oil is poured through the filler tube on the side of the crankcase. Keep filled between the two marks on the bayonet type gauge located near the filler. Six quarts are required to fill to the high level. Do not carry oil above the high mark. The oil should be drained from the reservoir and replaced with a fresh supply every 500 miles unless a test shows the oil has lost its viscosity before this time, in which case it should be drained more frequently. The oil is drained by removing a plug in the bottom of the reservoir. To clean the oil strainer, drain the oil and remove the oil pan, when the screen may be detached.

OIL PUMP: The gear type pump is held in place by a set screw from the outside of the case and is located in the oil reservoir about even in height with the normal oil level. It is operated by a shaft driven by a spiral gear on the camshaft. The pump may be removed for cleaning or inspection by taking off the lower half of the crankcase and disconnecting the oil manifolds.

OIL PRESSURE REGULATOR: The oil pressure is controlled by a regulator located on the valve side of the engine towards the front end of the crankcase. The pressure is controlled by a spring with tension on a piston valve. Any excess pressure causes the valve to rise. The excess oil goes through the regulator body into the crankcase and is returned to the oil reservoir. The pressure of the spring on the valve which regulates the oil pressure is controlled by a screw which may be adjusted to give the oil pressure desired.

To adjust the pressure, loosen the lock nut and turn the regulating screw with a screw driver to the right to increase the oil pressure, and to the left to reduce the oil pressure. The oil pressure will vary somewhat depending on the viscosity of the oil.

With the motor idling and with oil in good condition, the oil pressure should be at least five pounds. When the motor is cold, the pressure will be high until the oil thins down. The maximum oil pressure should be 40 to 60 pounds at car speed of 40 miles per hour. During extremely cold weather, the oil may show excessive pressure due to congealing of oil in the oil pipes which prevents free circulation. Running the motor slowly for a few minutes, will give the oil a chance to warm up and become thinner.

Failure of the gauge to show pressure is an indication that something is wrong, lack of oil or a clogged strainer. The motor should be stopped immediately and cause determined.

COMPRESSION: Compression in all cylinders should be equal. Weakness or loss of compression is probably due to badly worn piston rings or imperfectly seated valves, which latter may be caused by insufficient clearance between the valve stems and tappets or by sticky valve stems or tappets.

The use of a poor or improper grade of lubricating oil, or running with too rich a mixture, may cause carbon deposits to collect on the valve seats preventing valves from seating properly. If the compression varies greatly between the various cylinders, it will result in a loss of power and the cause should be determined and remedied.

FRONT END CHAIN: The camshaft is driven from the crankshaft by a Link-Belt silent chain 1-1/4" wide with fixed centers between sprockets.

To remove chain take out camshaft sprocket screws and pull off sprocket.

TO REPLACE THE CHAIN PROCEED AS FOLLOWS: First line up the timing marks on the crankshaft and camshaft sprockets, as described under Valves and Timing, wrap the chain over the sprockets, then fasten the camshaft sprocket in place with the dowel properly lined up.

CARBON: If the motor knocks easily under load and does not seem to develop its normal amount of power, it is generally an indication that there is carbon in the cylinders. The carbon can readily be cleaned by raising the cylinder head. Before replacing the cylinder head, be sure that the cylinder and surface of the cylinder head gasket are clean.

CYLINDER HEAD AND GASKET: To remove the cylinder head proceed as follows:

(1) Drain water. (2) Disconnect the upper hose. (3) Disconnect the spark plug wires. (4) Disconnect the cable tube brackets from the cylinder head. (5) Loosen the distributor set screw. (6) Lift the distributor together with the cable tube and cable tube brackets off the cylinder head out of the way. (7) Remove the cylinder head and then the gasket, being very careful of the gasket.

The method of replacement of the gasket and head is as important as the method of removing them. Put the gasket in position on the studs and press it down on the cylinder face.

The cylinder head nuts should be tightened gradually and in such a manner as to insure their pressure being equally distributed throughout the entire head. After partially tightening down the nuts, those in the center of the cylinder head should be finally drawn up, working both ways towards the ends.

This is important and will insure freedom from strains in the cylinder head casting.

DETERMINING THE CORRECT LUBRICANT

The selection of the correct grade and character of oil for an automotive engine is a problem requiring careful 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. These four fundamental factors are the operating temperatures of the engine, as influenced by its size, design, and class of service in which it is used, and the capacity of the cooling system; the ability of the lubricating system to distribute the oil at these operating temperatures, taking into consideraion the particular type of lubricating system employed; the possibilities of the formation of carbon deposit, with resultant "sensitiveness" of the engine; and proper piston ring seal.

LUBRICATION RECOMMENDATIONS

SUMMER: Under the intermittent loading of passenger cars, the engines operate under moderate temperatures. Under such conditions an oil of the body and character of Gargoyle Mobiloil "A", or its equivalent, will provide adequate engine lubrication and will not result in objectionable carbon deposits or undue fluid friction drag.

WINTER: When freezing temperatures are encountered, an oil of somewhat greater fluidity than Gargoyle Mobiloil "A" should be used in order to provide immediate and thorough circulation and distribution to all engine parts. Under winter operating conditions, an oil of the body and character of Gargoyle Mobiloil "Arctic", or its equivalent, should be used.

If the above recommendations are followed and careful attention given to the draining instructions, the engine should function perfectly and give the utmost in satisfactory service.

Lubrication is the cheapest item of expense in operating a motor car and pays extra dividends in the form of uninterrupted service and long life of the car, if the oil be of high quality.

GENERAL SPECIFICATIONS

TYPE—Six cylinders integral with crankcase, four cycle, detachable "L" head.

Model	Bore	Stroke	Piston Displacement	N. A. C. C. H. P. Rating	H. P. Developed
"WS"	2-7/8"	4-3/4"	185 Cu. In.	19.84	61 @ 3400

FIRING ORDER—1, 5, 3, 6, 2, 4.

BELL HOUSING FLANGE—SAE No. 5.

COOLING—Centrifugal water pump.

IGNITION—Battery.

GENERATOR MOUNTING—Hinged bracket, belt driven.

STARTING MOTOR MOUNTING—SAE standard No. 1 flange outboard type with reduction gear in starter.

INTAKE—For 1-1/4" Vertical carburetor.

SUSPENSION—Four point.

DETAIL AND DIMENSIONAL SPECIFICATIONS

CAMSHAFT—Five bearing, .15-.25 carbon steel, cams integral.

CAMSHAFT DIAMETER—1-1/8".

CAMSHAFT BEARINGS—

	Diameter	Length
Front	2.037"	1-7/32"
1st Inter.	2.007"	3/4"
2nd Inter.	1.991"	3/4"
3rd Inter.	1.975"	3/4"
Rear	1.944"	1-1/16"

CONNECTING ROD—"I"-Beam section Duralumin. Length (center to center) 9-1/2".

CONNECTING ROD BEARINGS—Diameter and length 2-1/8 x 1-1/4".

CONNECTING ROD BOLTS—Nickel steel 7/16"—two per rod.

CRANKSHAFT—Four bearing type, .40-.50 Carbon Steel.

	Diameter	Length
Front bearing	2-3/8"	1-7/8"
1st Inter. bearing	2-3/8"	1-5/8"
2nd Inter. bearing	2-3/8"	1-5/8"
Rear bearing	2-3/8"	1-7/8"

PISTON RINGS—Three per piston.

PISTON PIN—Diameter 7/8".

VALVES—Effective working diam. (port diameter) Intake 1-3/8"; Exhaust 1-1/4".

VALVE LIFT—11/32".

COOLING SYSTEM MODEL 76

CAPACITY 3¾ Gallons Water.

Soft water should be used whenever possible. Old water should be drained off occasionally and replaced with fresh water.

To drain water, open drain cock at lower part of radiator which can be reached with a screw driver through small hole in lower radiator shell.

If car is to remain standing unused for a long time, or in extremely cold weather, start the motor and run it for a minute or two after water has stopped dripping from drain cock.

This will insure perfect drainage.

During freezing temperatures it is necessary to use anti-freeze solutions with the water in the radiator of a proportion and strength sufficient to keep the water from freezing. It is advisable to test the resistance of the system at frequent intervals during the period of cold weather, as most anti-freeze solutions have a tendency to evaporate, and it will be found necessary to add a further supply from time to time.

A good all-around solution is a mixture of denatured alcohol and water.

When alcohol is added, care must be taken not to spill it on the hood, as it will ruin the lacquer finish.

Do not pour cold water into an empty or partly empty radiator while the engine is hot, as this practice might cause serious damage to the engine.

GASOLINE SYSTEM

The Gasoline supply tank holds approximately 18 gallons. The drain plug at bottom of tank should be removed occasionally and the water and sediment drained out. Dirt which accumulates in bottom of tank may be drawn into feed lines and carburetor, and cause trouble.

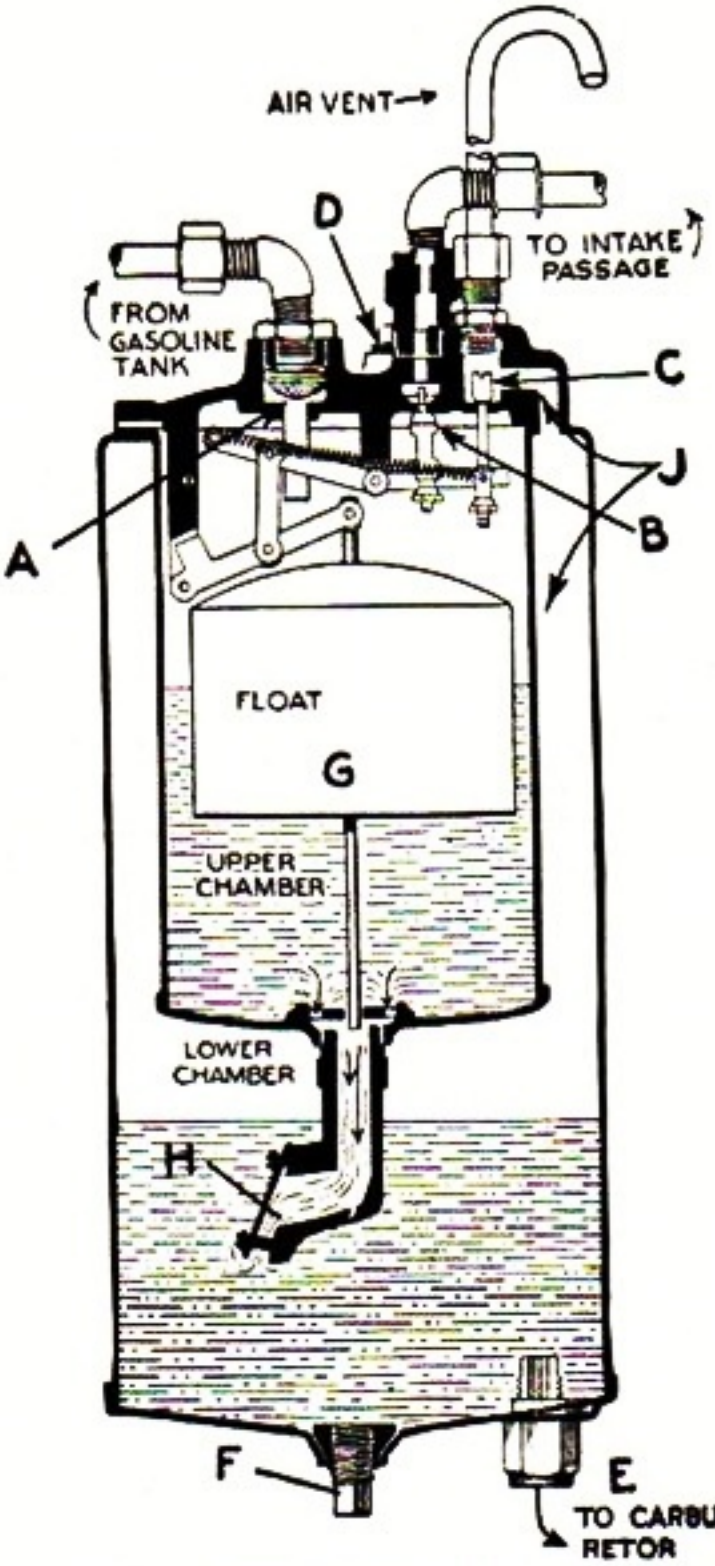
The flow of gasoline from main supply tank to the carburetor is controlled by a vacuum system.

VACUUM TANK

The vacuum system provides a steady flow of gasoline from the supply tank to the carburetor with the supply tank located at a lower level than the carburetor.

The pumping action of the pistons in the engine creates a high vacuum or suction in the intake manifold, and by piping this suction to the tank, the gasoline is drawn up into it. As the tank is always installed at a point higher than the carburetor, the gasoline gravitates to the carburetor.

The vacuum tank has two separate units, the upper or inner chamber, and a lower or outer chamber. The upper chamber has four openings at the top.



REFERENCE LETTER APPLICATIONS

A=Gasoline inlet

B=Suction or vacuum valve that opens and closes connection to engine intake passage or manifold.

C=Atmospheric valve that permits or prevents an atmospheric pressure condition in "upper chamber."

D=Plug giving access to tank for wetting valves with gasoline when dry, washing dirt or sediment from flapper valve H, and for temporary removal while driving to service station in case of trouble due to leaky float.

E=Outlet to carburetor connection extending upward into "lower chamber" so as to form a pocket in which sediment and water may collect.

F=Plug in opening for pet cock for drawing off any sediment or water that may collect in lower chamber.

G=Float with guiding stem.

H=Flapper valve of upper chamber outlet, held closed by suction whenever the valve B is open, but it opens whenever the valve B is closed and atmospheric valve C is open.

J=Passage between inner and outer shells leading to air vent that keeps the lower chamber under atmospheric pressure at all times and thus insures a free flow of fuel to carburetor by gravity. In case the fuel supply tank should be higher than vacuum tank, as when descending some steep declivity, the air vent, because of its height above vacuum tank, serves to prevent an overflow of gasoline.

1—The gasoline inlet "A" which is connected to the supply tank and through which the gasoline is drawn.

2—The vacuum inlet "B" which is connected to the intake manifold.

3—The air opening "C."

4—The opening "D" into which a plug is screwed. The lower chamber has two outlets at the bottom. "E" is connected to the carburetor, and "F" is a plug in opening for pet-cock for draining or cleaning tank. Gasoline can be drawn here for priming or cleaning purposes.

Do not tamper with the tank unless absolutely necessary.

Its simplicity and durability make it unlikely that owners will ever have to make internal repairs. Before attempting to repair tank be sure that the trouble is not due to some other cause.

Should engine refuse to start, find out first if gasoline is being supplied to carburetor. If so, the trouble is not due to the vacuum system.

If carburetor is dry, disconnect the tubing at bottom of vacuum tank. If gasoline flows from the vacuum tank, it is evident that the line between the tank and the carburetor is obstructed, or that there is dirt in the carburetor itself. Remove strainer in carburetor and examine for dirt.

If the vacuum tank is dry, see if you have gasoline in the supply tank. If your supply tank is not dry, remove strainer at gasoline inlet "A" of the vacuum tank, and look for dirt. Then blow back through the supply line to clear it of dirt and water.

Examine all connections for leaks. There may be a crack in the gasoline or vacuum line causing an air leak which would render the system inoperative until the cracked line could be replaced.

Remove the plug at "D" and pour a half pint of gasoline into the tank. It may be possible that a small particle of dirt is lodged under the flapper valve.

The float is made of sheet copper, nickel plated to withstand corrosion. If it should develop a leak and fill with gasoline, it will not rise and shut off the vacuum as the gasoline is drawn into the upper chamber, and the vacuum tank will flood over.

It is not necessary to remove the entire vacuum tank to repair the float. In removing the top of the vacuum tank, run the blade of a knife under the gasket so it will not be damaged. Punch a small pin hole in the float and empty it of gasoline. Solder the leak first, then the pin hole. Test in a pan of hot water for leaks. If no bubbles are seen the float is air tight.

If you are without soldering facilities you can get to the nearest service station by filling the outer shell with gasoline.

Carburetor trouble cannot possibly be attributed to the vacuum system.

If the engine speeds up when the tank is drawing gasoline from the main supply, the carburetor mixture is too rich or a loose connection is allowing air to be drawn into the manifold. There should be no change in the engine speed when the tank is operating.

If the carburetor backfires, carburetor adjustment, ignition, or valve trouble is at fault.

If the gasoline in the vacuum tank is exhausted, the engine will stop. As long as the engine continues to run, you may be sure the trouble is not due to the vacuum system.

To fill the tank, should it become entirely empty, turn over the engine with the throttle closed. In a few seconds gasoline should flow to the carburetor.

If the tank has been allowed to stand empty for a considerable time, it is advisable to remove the plug at "D" and pour about a half pint of gasoline into the vacuum tank. This will remove any dirt on the flapper valve.

Drain some gasoline from tank frequently to clear away any sediment which collects in bottom.

CARBURETOR

When installing a new carburetor, or in making adjustments to obtain best results, we suggest the following precautions:

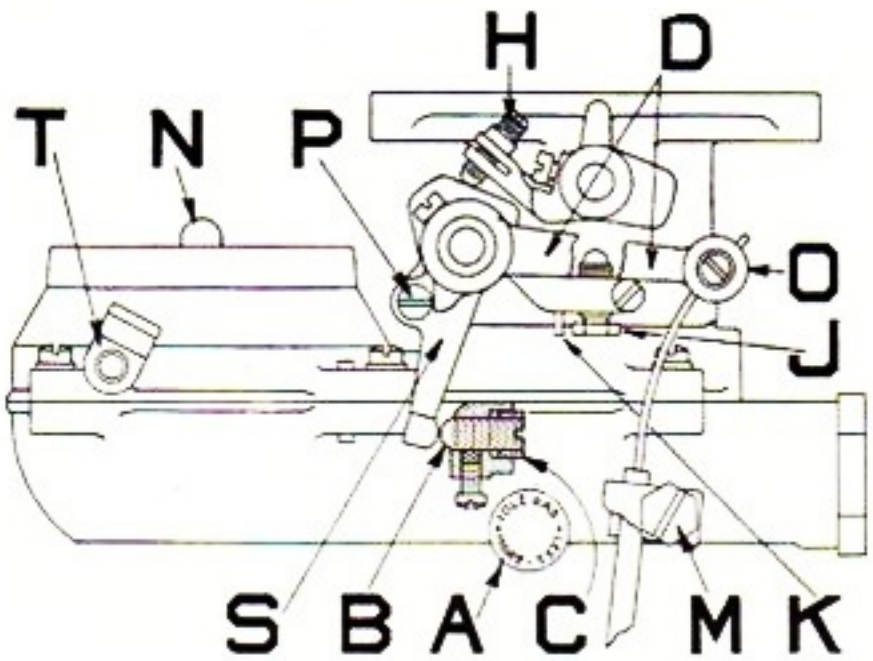
Be sure that the gasoline tank vacuum system and lines are free from sediment. Dirt will interfere with the flow of gasoline or cause the carburetor to flood. Water will rust the vacuum tank parts, cause hard starting and freeze in the line in cold weather.

See that the ignition is properly timed and working correctly. The breaker points, free from pits, must be properly spaced, usually from .018 to .024 of an inch. Also see that the spark plugs are clean and points have proper gap, usually .025 to .031 of an inch.

Try the engine for compression as proper carburetion cannot be obtained with faulty ignition or poor compression in one or more cylinders. Bad compression may be caused by scored cylinders, bad valve seats, warped valves, bad piston rings or improper tappet clearances.

When an idle adjustment cannot be obtained, examine the vacuum system for a possible flow of gas through the suction line.

Examine the intake manifold gaskets for leaks by pouring a little gasoline over each gasket. Should there be a leak the engine will immediately speed up and run smoothly for an instant. Worn intake valve stems and guides also will cause trouble at idle speed.



INSTALLATION AND ADJUSTMENT

CONTROL HOOK-UP:

One standard hook-up is made as illustrated in cut. The control tubing is fastened securely in the clamp and screw assembly M with tubing projecting about 1/16" beyond the clamp and the control wire in binding post O, so there is about 1/16" play between the loose lever D and screw P when throttle is closed. After tightening binding post O, straighten out the control wire so that the loose lever D does not bind the dash control lever S, and cause it to stick open when moved.

Another standard control hook-up is made by removing screw P and swinging the loose lever D straight down (clockwise) and then changing the clamp and screw assembly M to lug T. Screw P is replaced in the dash control lever S and the control tubing and wire hooked up as above.

STARTING AND WARMING UP:

Move dash control to extreme position, turn on ignition switch and start engine. After engine fires immediately move dash control about half way back or to the position where car will operate satisfactorily. As motor warms up move dash control further back gradually. Do not use dash control any longer than is necessary.

WHEN MOTOR IS HOT DO NOT USE DASH CONTROL.

If trouble is experienced in starting a hot motor, open the hand throttle part way.

IDLING ADJUSTMENT:

The motor should be thoroughly warmed up before adjusting the idle A. Both the spark and throttle must be fully retarded.

Turning A to the right (clockwise) makes the mixture leaner; to the left (counter-clockwise) makes the mixture richer.

Push air valve N down slightly (about 1/32"). If the motor stalls the mixture is too lean, so richen up on A by turning counter clockwise. If motor speeds up the mixture is too rich, so lean down on A by turning clockwise. If there is no noticeable difference in the running of the motor the mixture is right. The idle adjustment A is not sensitive—about five clicks is required to make a noticeable change in the running of the motor. After turning A five clicks in either direction repeat the above test of pushing down the air valves. Repeat this procedure until results are satisfactory.

To obtain a satisfactory idle speed turn stop screw H clockwise to speed up the motor and counter-clockwise to slow it down. If you change the idle speed of the motor much it may be necessary to readjust the idle mixtures.

CAUTION:

Care should be taken not to turn the idle A so far clockwise, or in the lean direction, that the air valve N will be held off from its seat. Fifty clicks counter-clockwise or rich from the point where the air valve just begins to leave its seat will give an approximate idle adjustment.

SUMMER ADJUSTMENT:

The range screw B should be flush with the end of the knurled bushing C. Idle A should be adjusted as described.

WINTER ADJUSTMENT:

The range screw B may be screwed in (clockwise) 3 to 5 times, depending on how quickly the inlet manifold warms up and whether the car is operated in traffic or cross country. This makes the mixture richer on part throttle driving. Idle A should be adjusted as described.

GASOLINE GAUGE

The gasoline gauge on the instrument board indicates at all times the amount of fuel in the rear tank, allowance being made for a reserve of approximately 1 gallon. It is operated by the weight of the gasoline pressing on a column of air, which in turn causes the red liquid in the gauge head to rise or fall.

The construction of the gauge is very simple and rugged, there being no moving parts except the red liquid in the head.

Should the car be left standing for a week or longer, the gauge may show several gallons less than the tank contains. Driving several blocks will cause the reading to be corrected.

If any difficulty is encountered with the gasoline gauge, proceed as follows:

Disconnect Air Line at instrument board.

Adjust instrument to zero by adding liquid (can be obtained from a dealer) at the top of the brass tube with a medicine dropper. To remove liquid, hold a toothpick or match in the brass tube to absorb some.

Remove filler cap and blow out Air Line with a HAND TIRE PUMP, removing metal connection from pump hose to obtain a tight union with line. Give 40 full strokes of the pump. Do not use compressed air; it is usually wet.

Reconnect Air Line at instrument board and see that connection between Air Line and Tank Unit is tight.

The gauge will read zero until the car is driven a few blocks. Start and stop several times and turn corners to bring the reading up quickly.

If gauge does not operate satisfactorily after carrying out these instructions, refer the matter to an AUBURN dealer.

ELECTRICAL EQUIPMENT DELCO-REMY SYSTEM

FOR AUBURN MODEL 76

The electrical system is one wire, which means that one side of the circuit is completed through the insulated wires, and the other side thru the metal parts of the car, such as the engine and car frame.

The car wiring should be examined occasionally for loose or corroded connections and worn insulation.

Authorized service on the electrical units can be obtained at any United Motors Service Station, directory of which can be obtained by writing United Motors Service, Inc., Detroit, Michigan.

GENERATOR

The purpose of the generator is to supply current for the ignition and lights at average driving speed, and the excess current charges the storage battery for the starting purposes and lights when the car is not running.

CHARGING RATE:

The maximum charging rate of the generator when cold and measured at the generator terminals is 20 amperes. When the generator becomes hot, the maximum output will be from 9 to 12 amperes. The ammeter on the dash will register about 2 amperes less, which is taken by the ignition. Never set the output higher, as there will be danger of burning the generator windings, but it can be reduced if the battery is being overcharged.

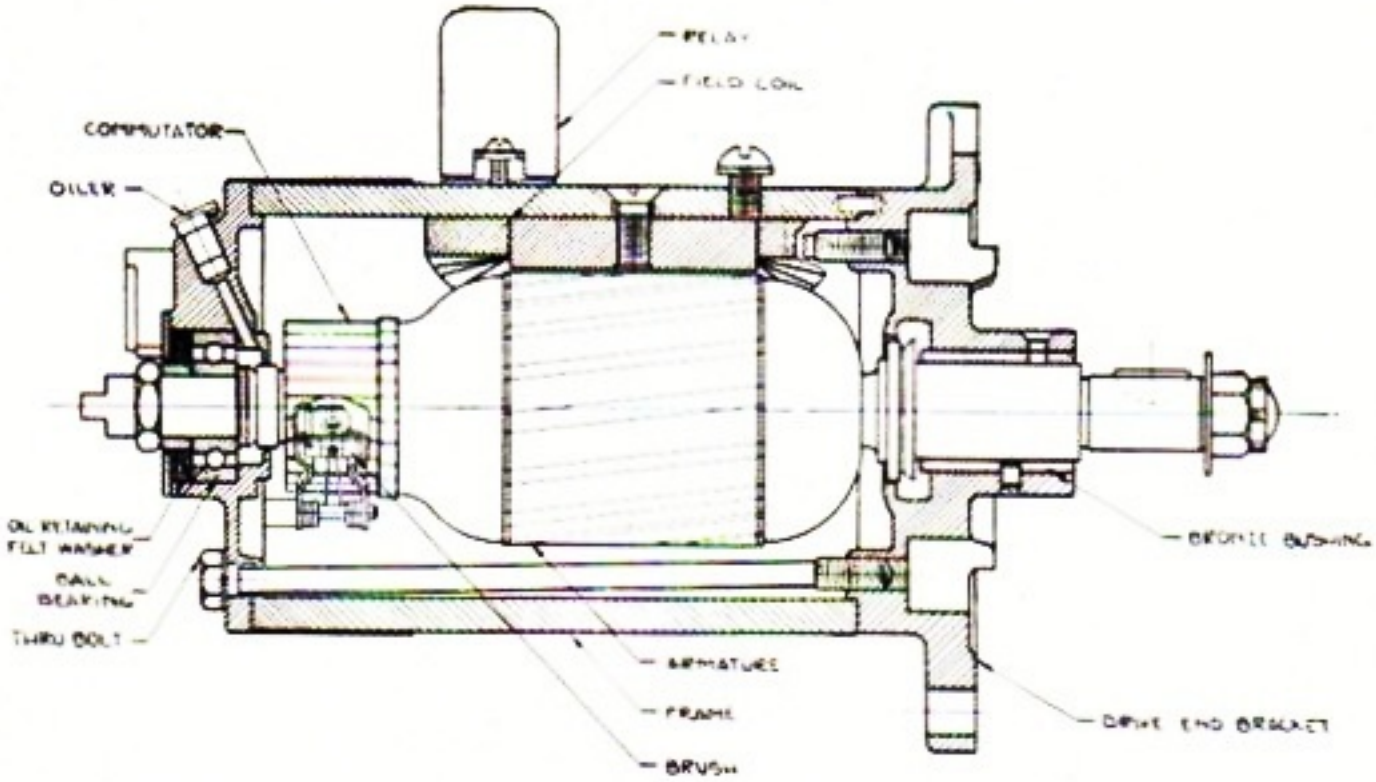
ADJUSTING CHARGING RATE:

The generator is third brush control and the charging rate is governed by the position of the third brush, which is between the two main brushes that are diametrically opposite. To change the output, loosen the round head screw on the outside of the commutator end bracket and then move the third brush in the direction of armature rotation to increase the charging rate and in the opposite direction to decrease it.

THERMOSTAT:

The third brush control is supplemented by a thermostat which is an automatic switch that is operated by the heat inside the generator. When the inside of the generator reaches about 162° F., the thermal blade of the thermostat bends down, opening the contact points and this inserts in series with the generator field, a resistance unit, and as a result, the generator output is decreased.

An advantage of this type of control is a higher charging rate on short drives and for a longer period in the winter time which helps to restore into the battery, current taken out by the starting motor. It also helps to



protect the battery from overcharge on long drives. An additional feature in the thermostat is that it acts as a protection to the generator windings in case of an open or high resistance connection in the generator charging circuit to the battery when the resistance unit will burn in two.

If the generator will charge for a while and suddenly cease charging, the thermostat resistance unit may be burned in two. If so, always examine the charging circuit for loose or high resistance connections.

Never attempt to adjust the thermostat, as this cannot be done, except at the factory. If the points are burned or out of adjustment, replace the thermostat complete.

LUBRICATION:

Add a few drops of a good grade of engine oil in the hinge cap oilers on front and rear of generator every 1000 miles.

Examine the distributor gear case in the commutator end bracket every 20,000 miles by removing the retainer plate, which is held on by three screws. If lubricant is needed, put in a good grade of medium cup grease.

Be careful not to lubricate too much, for this is just as harmful as not enough lubrication.

TROUBLE:

If the commutator becomes oily or gummy, clean with a fine grade of sandpaper (Never use emery cloth). When the generator stops charging, first notice the commutator and if dirty, clean it. Connect lead between the two relay terminals and if generator charges, the relay is at fault. Examine the circuit from generator to battery and if all right, trouble is in generator and should be taken to an Authorized Delco-Remy Service Station.

CUT-OUT OR RELAY

This device serves to connect and disconnect automatically the generator and battery. When the generator voltage exceeds the battery terminal voltage, the relay points close and connect the generator with the battery. Likewise, when the generator voltage becomes less than the battery voltage, the relay points open, disconnecting the relay from the battery and preventing the battery from continuing to discharge into the generator.

ADJUSTMENT:

The relay should cut in at two amperes charge and cut out at two to three amperes discharge. This adjustment is made by bending the brass post which the flat steel spring bears against that is riveted to the contact arm.

The contact point opening will affect the cut-in and cut-out of the relay and should be from .015" to .025", being adjusted by bending the brass plate that is over the contact arm near the contact.

STARTING MOTOR

The starting motor's duty is to crank the engine, drawing its current from the storage battery. The current required is many times the range of the dash ammeter, and for that reason the current does not go through the dash ammeter and it will not register any discharge when the starting motor is operating.

There are no adjustments to be made to the starting motor.

BENDIX DRIVE:

The bendix drive is used, which is automatic in its operation. Upon closing the starting switch, the armature begins to turn over and with it the screw shaft of the bendix. The bendix gear is carried forward on the threaded shaft and engages with the flywheel. As soon as the flywheel is turning faster than the starting motor armature, the bendix gear is threaded back on the shaft and is disengaged from the flywheel. This device does not require any lubrication. If the gear will not travel along the screw shaft, clean the drive thoroughly, and do not oil the screw shaft.

If the bendix gear becomes locked with the flywheel, place gear shift lever in high with ignition off, and rock car backward and forward.

LUBRICATION:

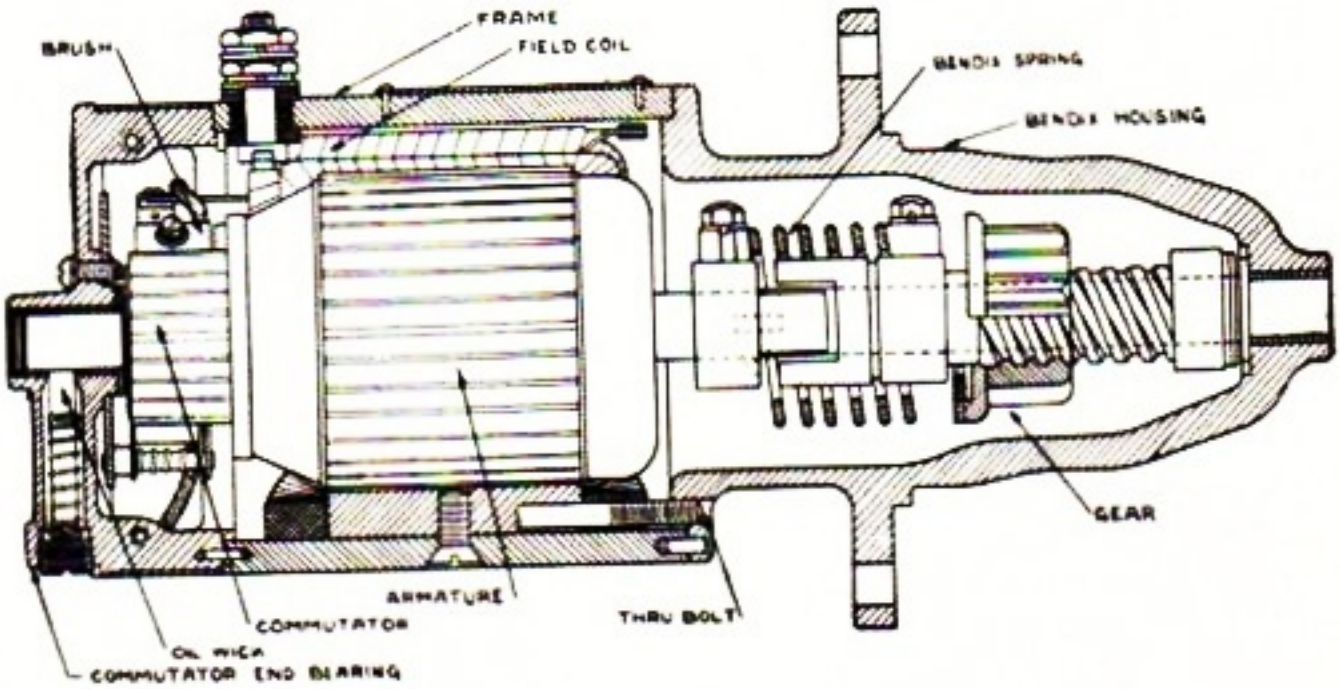
The only place the starting motor requires lubrication attention is the commutator end bracket and a few drops of a good grade of engine oil every 1000 miles into the hinge cap oiler will be sufficient. The bearing in the bendix housing, being inaccessible to oiling has a graphite impregnated bushing which does not require lubrication.

TROUBLE:

If the starting motor is sluggish, it can be due to the following:

Low Battery.

Poor Battery connections.



Burned or partially grounded starting switch.
Starting motor at fault.

To determine if starting switch is the cause, connect a heavy cable between the switch terminals and if starting motor performs all right, trouble is in switch.

If starting motor fails to start, close starting switch and with screw driver, touch the motor terminal and any part of the motor frame that is clean from paint and dirt, and if a spark is obtained, circuit to the motor is all right, but trouble is in the motor.

If starting motor is at fault, take it to an Authorized Delco-Remy service Station for repairs.

IGNITION DISTRIBUTOR

The purpose of the distributor is to interrupt the circuit through the coil, to distribute the high tension current to the spark plugs in the proper order, and to advance and retard the spark.

AUTOMATIC ADVANCE:

The distributor spark advance is semi-automatic in that part of the advance is made automatically and part manually, the latter by moving the spark lever on the steering wheel. The manual advance is 22 engine degrees and the automatic advance is 25 engine degrees.

The automatic mechanism consists of two centrifugal weights and springs which have no adjustment and require no attention. As the speed of the distributor shaft increases, the weights will gradually throw outwards and in doing so, will advance the cam in the direction it is rotating, which is counter-clockwise, viewed from top, and this will open the contact points earlier, thus advancing the spark.

CONTACT POINTS:

The contact point opening is .018" to .024". The adjustment is made by loosening the screw just back of the contact points and which holds the crescent shaped contact plate. Then turn the offset screw that is in the plate and near the breaker arm post.

If the points become dirty or rough, dress them with a fine grade hone. Under normal operation, they will acquire a gray finish.

CONDENSER:

The condenser's function is to prevent arcing and burning at the contact points and is connected across them. If the points burn and pit, causing the engine to miss, first tighten all the condenser connections and clean the points, and if the action continues, replace the condenser.

LUBRICATION:

Turn the grease cup cap one complete turn every 1000 miles and refill with a good grade of medium cup grease.

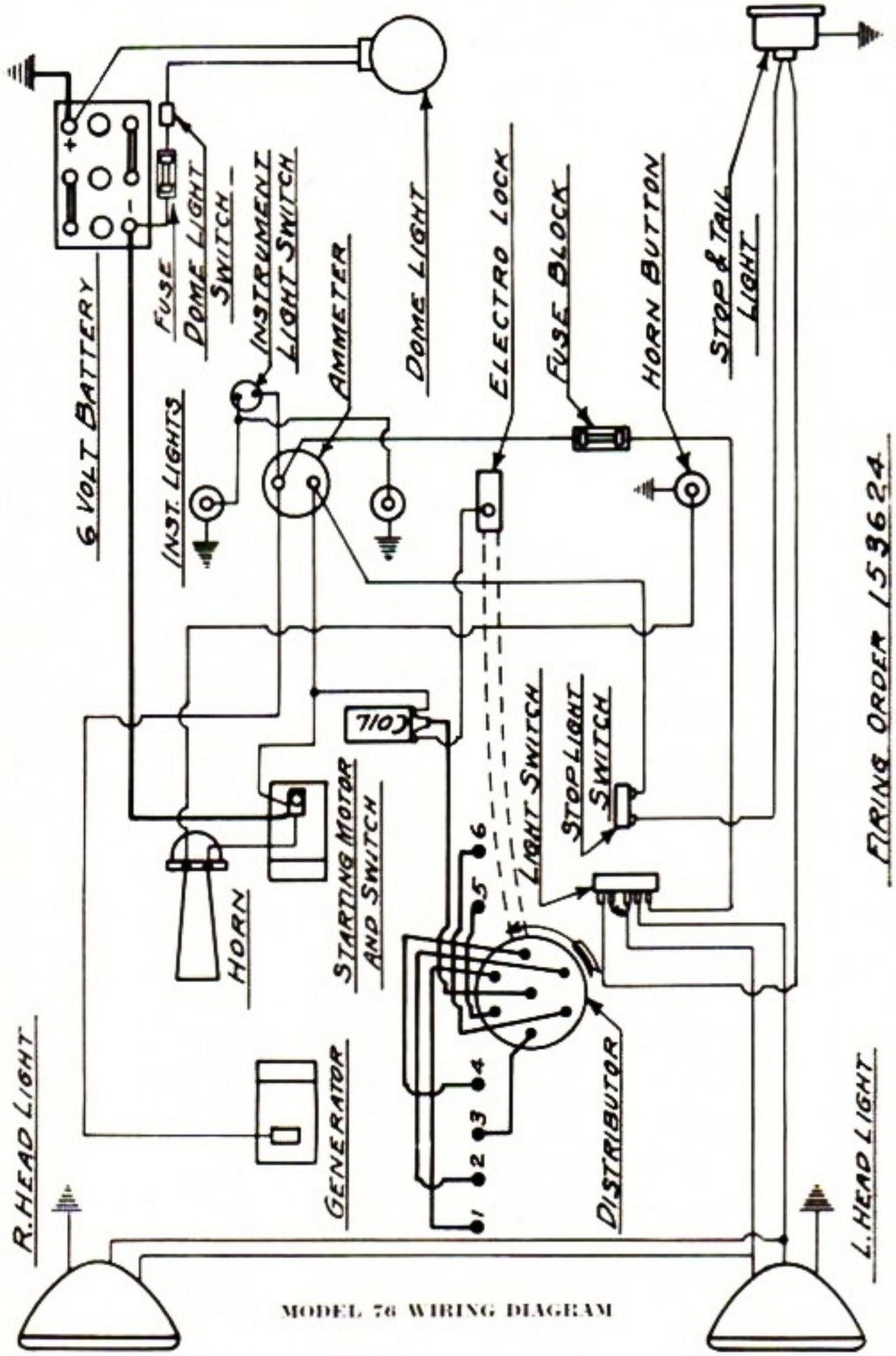
IGNITION COIL

The battery voltage is too low to jump the spark plug gap, and the ignition coil, acting as a transformer, raises the battery voltage to a voltage many times higher to jump the gap under pressure.

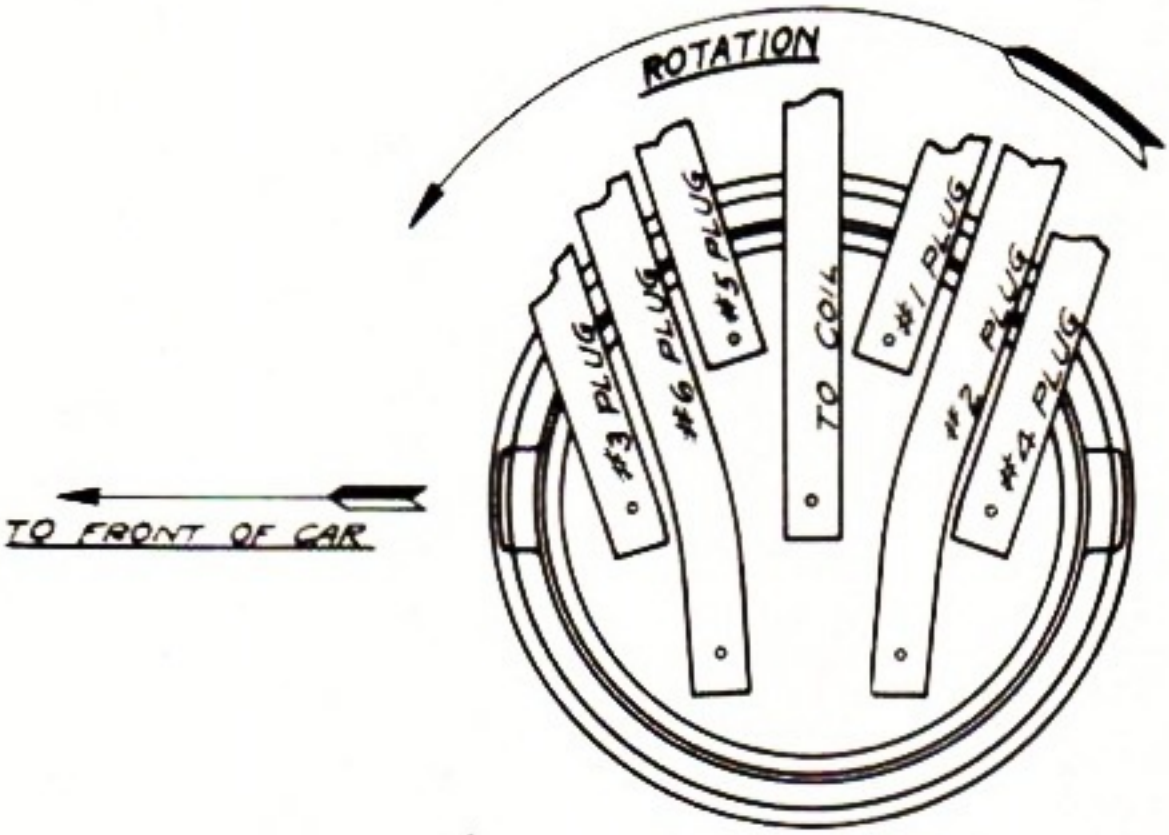
TEST IGNITION

If the ammeter shows about 4 amperes discharge when the ignition switch is on and the distributor contact points are closed, the ignition circuit is complete. If not, trace the open by touching a wire from some grounded part of the car, such as the engine, to successive connections in the ignition circuit and a flash will mean the circuit is complete to that point.

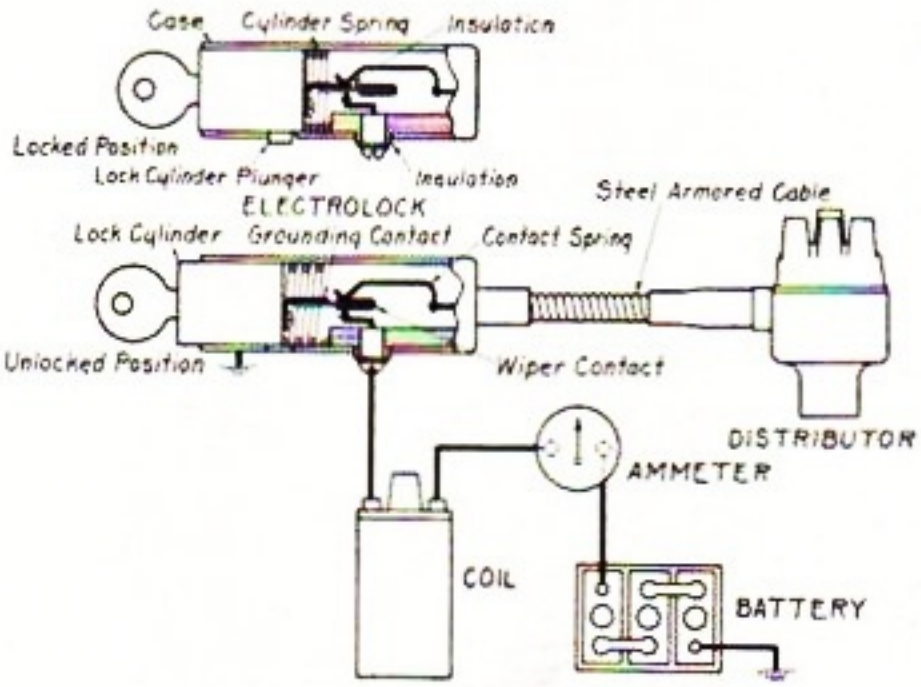
To test the coil, turn ignition switch on, and with the distributor contact points closed, remove the high tension lead from the distributor cap that comes from the coil and hold the end about 1/8" from a place on the engine free from paint and dirt. Take off the distributor cap and pull back the contact arm with the thumb. If coil is all right, the spark will jump the 1/8" gap.



MODEL 76 WIRING DIAGRAM



WIRE OUTLETS FROM SIDE OF DISTRIBUTOR HEAD



ILLUSTRATING ELECTROLOCK AND CONNECTIONS

ELECTROLOCK

This model is equipped with an "Electrolock" which is an Ignition Switch Lock carrying the highest classification of the Under-Writers Laboratories—A Group No. 1 coincidental lock.

The lock cylinder is mounted in the instrument panel and is easily accessible to the car driver. When the lock cylinder is in, the Ignition is shut off and the car locked. To unlock Electrolock, turn key one-quarter turn to the right at which time the lock cylinder springs out and closes the Ignition Switch. The key is not required to lock the car and should be removed after the operation of unlocking is completed.

To lock Electrolock press the cylinder completely in. BE SURE THAT IT STAYS IN to avoid the possibility of running down the battery the same as with an ordinary ignition switch.

After the cylinder is pressed in, the ignition circuit is not only broken, but also grounded, and Electrolock is itself locked to the car. Mechanical protection to the wire between Electrolock and the distributor is accomplished by enclosing this wire in a steel cable. The cable is attached to the distributor in such a way that it is difficult to remove. The grounding of the ignition switch takes place both through the lock casing and through the attachment at the distributor.

Should ignition trouble develope, to ascertain if it exists in the Electrolock, the following tests should be applied. First, the wire should be disconnected from the terminal on the lock case. The switch may then be tested by using a six-volt circuit and the conventional insulated handle test points. In making these tests the breaker points should be open.

FIRST TEST: Place one test point on the primary terminal inside the distributor and the other test point on the lock terminal. With the switch unlocked, the lamp should burn. With the switch locked, the lamp should not burn.

SECOND TEST: Place one test point on the primary terminal inside the distributor as in the first test, and the other test point on the lock casing. With the switch locked, the lamp should burn. With the switch unlocked, the lamp should not burn. If the lamp burns, either there is a ground in Electrolock or the distributor condenser is shorted or grounded. It will be necessary to disconnect condenser from distributor to determine whether the trouble is in Electrolock or condenser.

If the above tests show up satisfactorily and there is still ignition trouble evident, this trouble must be located elsewhere in the ignition circuit.

Should the above tests indicate some trouble in the Electrolock switch, the lock should then be unlocked and removed from the mounting. The wire should then be disconnected from the terminal. The lock cylinder then can be removed by taking out the small set screw on the side of the lock casing. Remove the coil spring which is directly behind the lock cylinder and pull out the metal wedge which holds the bakelite terminal block in position. With the terminal screws removed, that part of the bakelite piece in which the terminal screws are located can be

pushed into the lock casing and the lock casing can then be slid back on the cable, allowing the switch to be inspected. Any trouble with the switch due to broken parts will then be readily discovered. The necessary parts for repairs can be obtained through your dealer.

In order to make distributor repairs which cannot be accomplished on the car, the lock can be unlocked, removed from the mounting, and the distributor taken to the bench with the lock and cable attached.

Should the lock plunger not work freely on account of dirt or foreign matter getting into the lock case, the cylinder should be removed and cleaned off so that it will work freely.

Never put grease or oil in lock cylinder; if tumblers seem to stick use graphite.

Replacement keys may be obtained from the service stations.

All wire terminals should be insulated down to screw head so as to eliminate possibilities of shorting by touching one another or nearby metal parts.

LUBRICATION

The constant and careful lubrication of all wearing parts is the best and most economical service you can render to your car. Careful attention to this very important feature is repaid, many times over, by long wear and good service. It is just as important to see that correct quality of lubricating materials is used as it is to see that these are applied correctly and at proper intervals.

Our Model 76 is equipped with the Bijur Chassis Lubricating System, which reaches 21 important chassis points, and which is fully explained in following pages.

Below we are outlining correct data on additional chassis lubrication points, which are not reached by the Bijur System. Further information regarding these points will be found in our description of the various units under their respective headings.

ENGINE—Every 500 miles the crankcase should be drained and 6 quarts of new oil supplied. Use Mobiloil A for summer and Mobiloil Arctic for winter, or any other high grade oil of similar body.

GENERATOR—Every 1000 miles add a few drops of good grade light engine oil in front and rear hinge cap oilers.

STARTING MOTOR—Every 1000 miles add a few drops of good grade light engine oil in hinge cap oiler on commutator end bracket.

DISTRIBUTOR—Keep grease cup filled with good, clean, medium cup grease, and give it a complete turn every 1000 miles.

CLUTCH THROWOUT SHAFT—At intervals of approximately 2000 miles fill the two oil cups with engine oil.

TRANSMISSION—Keep housing filled to oil level plug with 600W Oil or its equivalent.

UNIVERSAL JOINT—Pack both joints with high grade grease every 5000 miles, oftener if needed. It is recommended that they be examined every 1000 miles for condition of lubrication.

STEERING GEAR—Keep housing filled with lubricant, using either Sunoco Special Steering Gear Lubricant, or Whitmore's No. 70 in cold weather and No. 65 in warm weather.

DRAG LINK—Fill the two cups with good, clean cup grease every 500 miles, or oftener if necessary.

FRONT AXLE TIE ROD—Fill cup at each end with good, clean cup grease every 500 miles, or oftener if necessary.

FRONT WHEEL BEARINGS—Clean and pack with good, clean cup grease every three to six months, depending on the service.

REAR WHEEL BEARINGS—Clean and pack with good, clean cup grease every six to twelve months, depending on the service. A grease plug located on the flange may be removed, and cup grease added at intervals if needed.

DIFFERENTIAL—Keep housing filled with lubricant to oil level plug. See Page 57 for lubricant recommendations.

In addition to the above, oil all brake rod connections, yokes and levers with hand oil can once every 1000 miles.

BIJUR CHASSIS LUBRICATING SYSTEM

All chassis bearings requiring frequent lubrication may be oiled from the driver's seat by a single push on the pedal of the Bijur Chassis Lubricator mounted on the dash board well above the clutch pedal, where it can be reached by the driver's left foot.

Daily, when starting the engine, and before starting the car, depress the pedal of the Bijur Chassis Lubricator. Push it until it stops against the dashboard, then let go quickly. The pedal will return slowly of its own accord, while oil will be fed to the following chassis bearings:

Front spring front bolts	2 points.
Front axle king pins	4 points.
Front axle thrust bearings	2 points.
Fan bearing	1 point.
Water pump bearing	1 point.
Front spring rear bolts	4 points.
Clutch release bearing	1 point.
Rear spring front bolts	2 points.
Rear spring rear bolts	4 points.

In wet weather it is important to keep water out of the bearings in order to prevent rust and wear; therefore when driving over wet or muddy roads, give the bearings an extra shot of oil. When driving long distances, the pedal should be depressed at least every 100 miles.

LUBRICATOR TANK INDICATIONS

Normally, when there is oil in the Lubricator Tank, the pedal, after being pushed, will return to its original position slowly. At ordinary temperatures (70°F.) with moderately heavy oil this will take about four minutes. In cold weather, owing to the oil being much more viscous at low temperatures, the pedal will take much longer to come back to its normal position.

However, **IF THE LUBRICATOR TANK IS EMPTY**, the pedal will spring back instantly to the normal position, and will be felt to follow the foot back even though pushed several times in succession. When this occurs, the lubricator tank is empty and should be refilled immediately, as under no circumstances should the chassis bearings be allowed to go without oil.

AVOID IMPROPER OIL

All oil passing from the lubricator tank into the oil line is filtered through a disc of dense wool felt in the tank outlet. If this filter disc should become clogged through use of oil containing suspended wax, grease, graphite, or other foreign substance, the lever will return much slower than usual.

While this filter disc may readily be removed, cleaned, and replaced as explained later on, such procedure will be wholly unnecessary if oil free from suspended substance is used. On this account use no black oil unless specifically approved by Bijur Lubricating Corp.

CHOICE OF OIL

As chassis bearings are exposed to water, snow, mud, etc., chassis lubricating oil should have the necessary penetrating and water excluding properties, besides being thick enough to remain in the bearings for considerable periods. It should be anti-corrosive, free from gumming, have high lubricating value, etc., etc., and, for cars in unheated garages, should remain fluid in cold weather.

Motor oils while useable, are far too thin, besides lacking other qualifications. Although any clear, amber, or dark amber oil should pass through the tank filter without clogging it, a partial list of the more suitable oils is given below. Oil should be purchased only in sealed packages to insure getting the oil specified.

For the convenience of owners Bijur Lubricating Corp. markets oils especially manufactured for chassis lubrication under the name of BIJUR OIL. These are obtainable in sealed quart and gallon cans from Auburn dealers and elsewhere and a gallon ordinarily is a year's supply.

For Auburn cars in unheated garages, Bijur Oil Moderately Heavy may be used the year round, as it operates nicely at Zero F°, besides having all the desired lubricating characteristics.

For cars where greater cushioning effect is desired, or where garages are heated or extremes of cold are unusual, Bijur Oil Heavy operating down to plus 10°F or lower, may be used.

APPROVED OILS

If for any reason it is desired to use other oils consult the list below. Purchase in sealed containers is advised. Oils intended primarily for purposes other than chassis lubrication are subject to change from time to time to meet some particular requirement. This list is based on composition as tested at the time of issue of these instructions. Oils lighter than those listed as "Moderately Heavy" are apt to have less anti-corrosive qualities, as well as less cushioning and lubricating values than the heavier grades. Thin oils are usually quite deficient in these respects. Where cold weather fluidity is not given the use of such oil for temperatures below freezing is not advised.

OILS

CLASSIFIED WITH REGARD TO CHASSIS LUBRICATION ONLY. CLASSIFICATION HAS NOTHING TO DO WITH TRADE NAME

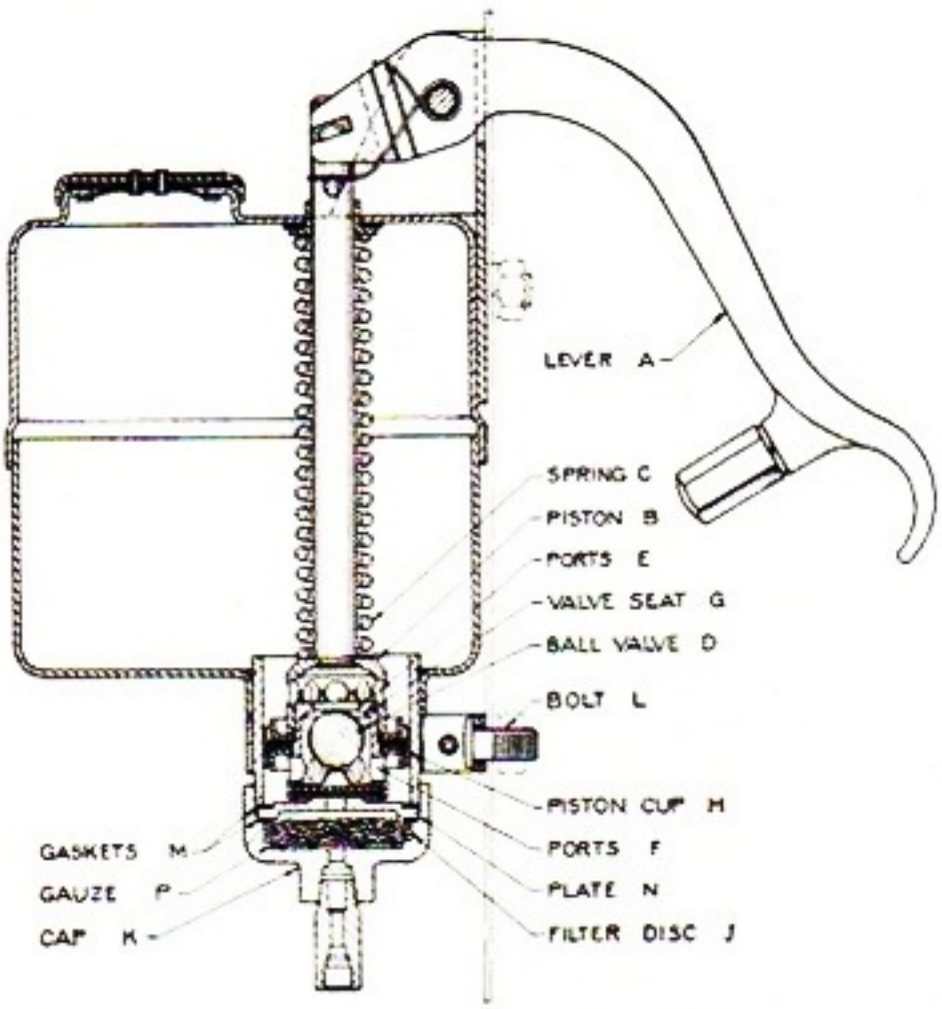
CLASSIFICATION	NAME AND MAKER	COLOR	COLD WEATHER FLUIDITY
Heavy	Bijur Oil Heavy Bijur Lubricating Corp.	Dark	Good
Heavy	Texaco Thuban "B" Texas Company	Black (for temporary use)	Good
Moderately Heavy	Bijur Oil Moderately Heavy Bijur Lubricating Corp.	Dark	Very good
Moderately Heavy	Veedol Extra Heavy No. 5 Tidewater Oil Corp.	Dark	.....
Moderately Heavy	Sunoco M. O. XX Heavy Sun Oil Company	Dark	.....
Moderately Heavy	Enterprise Marine Engine Oil "Z" Enterprise Oil Company	Dark Amber	.....
Thick Medium	Texaco M. O. Superheavy The Texas Company	Golden	Fair
Thick Medium	Tiolene Extra Heavy The Pure Oil Company	Dark Amber	Fair
Medium	Atlantic Extra Heavy Atlantic Refining Corp.	Dark Amber	.....
Medium	Caspar Special Extra Heavy Caspar Oil Company	Dark Amber	.....
Medium	Wakefield Castrol G. P. C. C. Wakefield & Co., Ltd.	Dark Amber	.....
Medium	Wolf's Head Extra Heavy Wolverine Lubricants, Inc.	Dark Amber	.....
Medium	Polarine Transmission Oil, Winter Grade Only Standard Oil Co. of Indiana	Black (for temporary use only)	Very good
Medium	Shell "Golden" Shell Mex., Ltd.	Golden	Very good
Light Medium	Sunoco M. O. Special Sun Oil Company	Golden	Very good
Moderately Heavy	Wolf's Head Extra Heavy "A" Wolverine Lubricants, Inc.	Dark Amber	.....
Light Medium	Castor Oil (Medicinal)	Water White	Very good
Light Medium	Wakefield Castrol "R" C. C. Wakefield & Co., Ltd.	Pale Yellow	Very good
Light Medium	Vacuum Mobiloil "B" The Vacuum Oil Company	Dark Amber	.....
Light	Gulf Supreme Auto Extra Heavy The Gulf Refining Co.	Dark Amber	Very good
Light	Wakefield Castrol XL C. C. Wakefield & Co., Ltd.	Dark Amber	.....
Light	Vacuum Mobiloil "BB" The Vacuum Oil Company	Dark Amber	.....
Thin	Medium Motor Oils of Various Colors and Viscosities.		

AEROPLANE ENGINE OILS

Moderately Heavy	Gulf 120 Aero Oil The Gulf Refining Co.	Dark	.....
Thick Medium	Sinclair Liberty Aero Oil Sinclair Consolidated Oil Corp.	Dark	.....
Thick Medium	Caspar Aero Oil Caspar Oil Company	Dark	.....
Thick Medium	Socony Aircraft No. 4 Standard Oil Co. of N. Y.	Dark Amber	.....

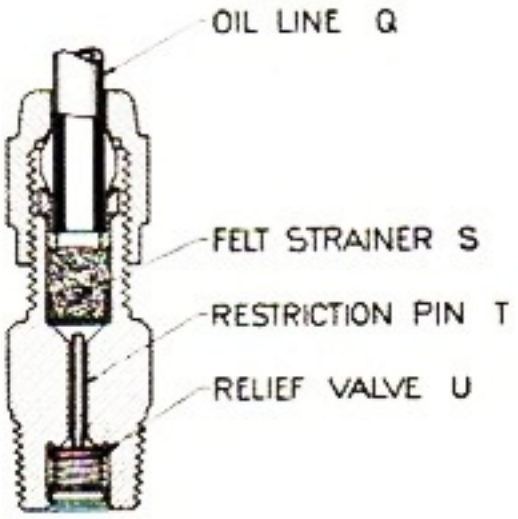
EXPLANATION OF BIJUR CHASSIS LUBRICATION SYSTEM:

If operated daily and refilled with authorized oil whenever indicated by the tank lever, no further attention will be required. However, the working of the system may be understood from the following:



Depression of lever A by the left foot of the driver raises piston B against the downward pressure of spring C. The piston is hollow and contains a ball valve D and is provided with oil ports E and F, so that, on the up-stroke of the piston, oil flows through the hollow piston, past the seat G of ball valve D, to the lever end of the piston below cup leather H. Upon removal of the foot the backward rush of oil lifts the ball valve against its seat G, so that the measured charge of oil trapped below the cup leathers is forced by the pressure of spring C, through felt filter disc J into the chassis pipe line. Filter disc J prevents any solid matter in improper oil from entering the pipe lines. (In correspondence, if the tank should be referred to, always identify it by giving the type and serial letters stamped on the nameplate on the side of the tank lever bracket.)

The predetermined division of the measured quantity injected into the line at each shot, is accomplished by metering outlets called drip plugs having various pre-determined rates of flow at 100 lbs. oil pressure. These are screwed into the chassis at each place where oil is to be delivered, and they are connected to each other and to the tank outlet by the shortest convenient tubing.

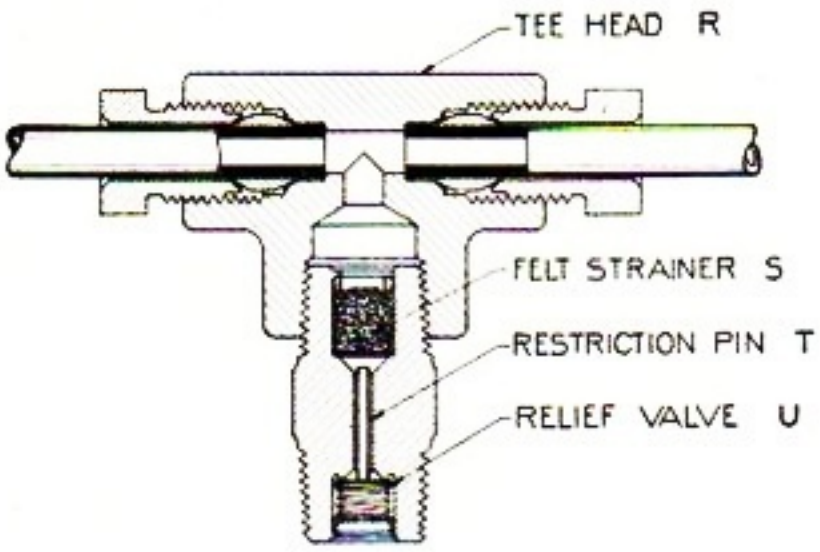


STRAIGHT DRIP PLUG.

(Figure 2)

Drip plugs are either straight to receive the end of an oil line Q or have a "T" head R to permit the oil line to be carried on beyond them.

Each drip plug contains three elements: First, a felt strainer plug S, which strains all oil entering the fitting to protect the restriction crevice and relief valve from foreign matter by catching such chips, dirt, or copper oxide as might originally be in the pipe line. This strainer cannot become clogged because all fresh oil entering the piping is filtered by the tank filter disc J. The restriction crevice which governs the rate of oil flow consists of a very accurate hole in which lies an accurately sized pin T so that the clearance between the pin and the hole forms an accurately sized restricted aperture.



TEE DRIP PLUG

(Figure 3)

In all drip plugs the hole is of the same size, but the pins are of different diameters, thus affording different restrictions and consequently different rates of flow. All drip plugs are numbered in accordance with

their flow rate, the numbers ranging from 0 to 6 as this rate increases.

The relief valve shown at U opens while the line is under pressure from the tank and allows the oil to escape. Whenever the tank pressure ceases the valve closes and keeps the pipes full of oil ready for the next operation.

As the drip plug felt strainers catch any loose foreign matter in the pipe lines without being in the least clogged thereby, and as the felt filter disc in the tank outlet prevents any further dirt from reaching them, they never require cleaning, are unchangeable, and need no attention at any time.

Drip plugs are suitably adjusted when made and cannot be disassembled without destroying their proper operation. Each drip plug is numbered according to its rate of flow, and if removed, must be replaced by one of the same rate number, and same type as indicated by letters stamped on each plug.

CLEANING TANK FILTER DISC

Disconnect both pipes from the double outlet by backing off the hexagon-headed connections. Relieve cap K from the pressure of the piston spring, by depressing the lever and tying the lever in partially depressed position to bolt L using wire or cord for this purpose. Cap K should now be unscrewed with a wrench applied to the hexagonal part of the cap. In the cap, note the position of ring gaskets M and piston seat plate N before disassembling, then lift these out, exposing the white felt filter disc.

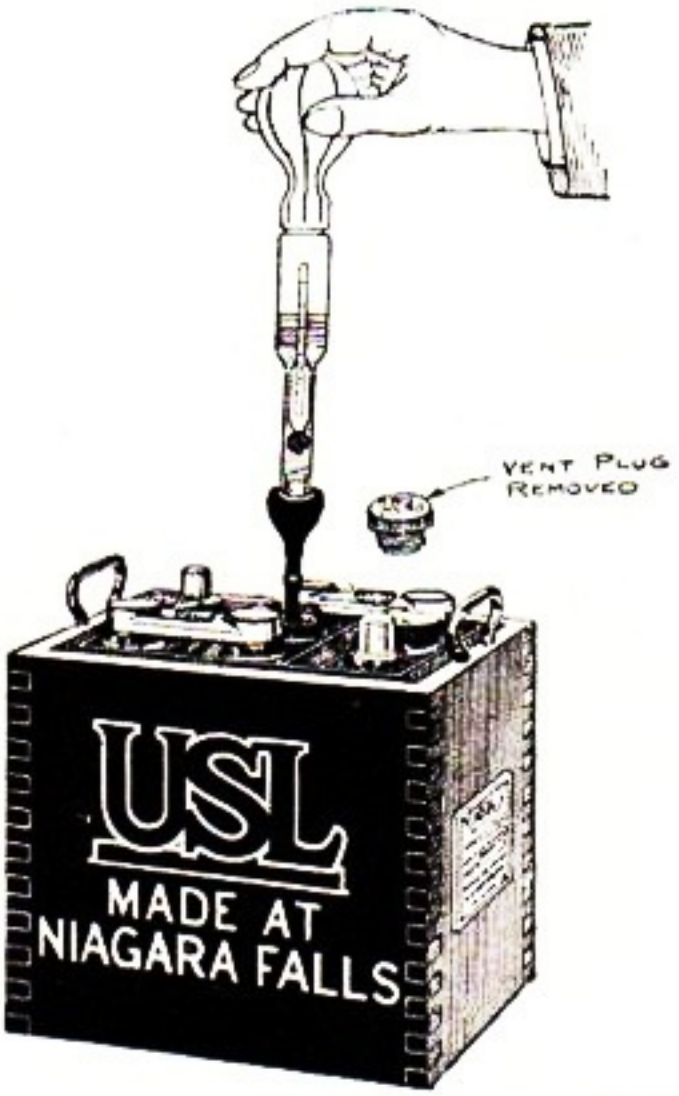
Unless this is covered with a deposit, there is no occasion to clean it. If so coated, it may be removed, washed in benzine, carbona, cleaning fluid, or even gasoline, until clean and white. Leave wire gauze disc P in cap with ridges against cap. Replace felt disc with printed side next to gauze. Lay one ring gasket on top of felt so that it rests upon metal ledge of outlet cap. Now replace piston seat plate with its hollow side facing felt. Lay second ring gasket on outer edge of piston seat plate, and the cap assembly is ready to be replaced on tank, and screwed home with a wrench as far as it will go.

THE STORAGE BATTERY

We use the "USL" storage battery which is manufactured by the U. S. Light and Heat Corporation, Niagara Falls, New York.

Besides starting the car it supplies the electricity for ignition and lighting. It is one of the essential parts of your car and must not be neglected. Most battery and ignition trouble is caused by negligence and lack of care.

Add distilled or clear rain water to the cells often enough to keep the level one-half inch above top of plates. This should be done at least every two weeks in summer and every month in the winter and this level should be inspected every week in summer and every two weeks in winter. When adding water in winter it should be done before driving, so the water may be thoroughly mixed with the acid and thus prevent freezing.



Should the car be laid up for any length of time the battery should be taken out and stored in a warm dry place. It should be recharged by a regular "USL" Service Station before again going into use.

It should be inspected at intervals by a "USL" Service Station for height of electrolyte, specific gravity, voltage, charging rate, corroded terminals, loose hold-downs, loose ground connections, etc.

Keep filling plugs and electrical connections tight, and the battery clean.

Should you experience lack of current for lights or horn or failure of starting motor, tighten the battery connections before looking elsewhere for the trouble.

See that ammeter always shows **charge** when running above ten miles per hour with lights out.

Have battery recharged whenever inspection shows it to be necessary.

Determine condition of battery at frequent intervals by testing specific gravity of the solution in each cell. The illustration shows how to use a hydrometer in testing the specific gravity of the acid. A hydrometer can be purchased at any accessory store for approximately $1.00.

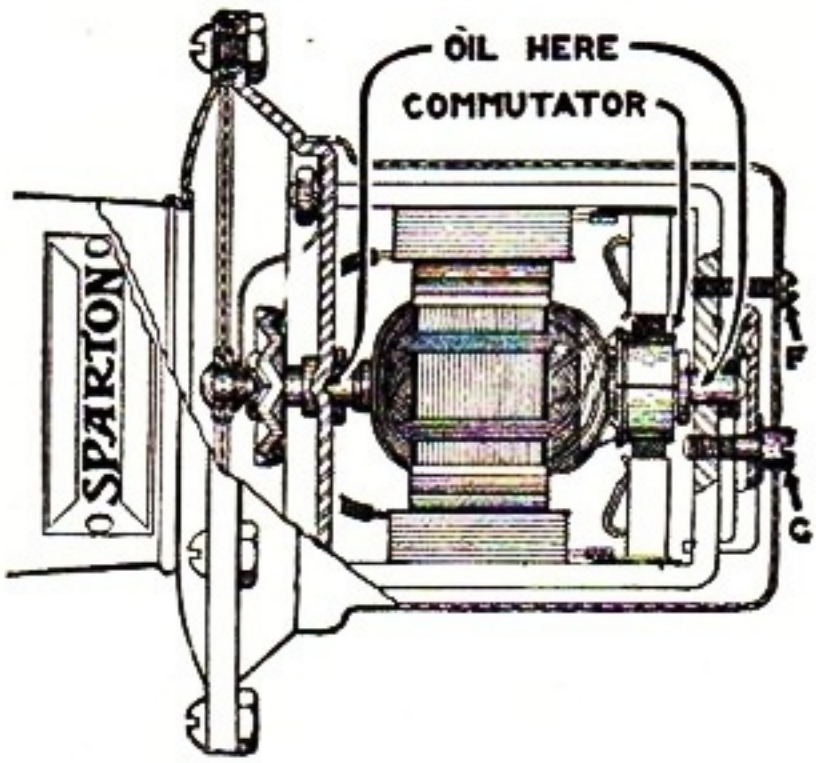
If the specific gravity is found to be as low as 1.225, the battery should be charged, immediately, until the gravity of each cell is up to normal.

The gravity at full charge is between 1.285 and 1.300.

HORN

The quality of tone and length of service of the horn depends entirely on the care of it. To produce the best warning signal the armature must revolve at a high rate of speed. This speed is impossible unless the bearings are oiled and the commutator and brushes are clean.

The armature and field coils may burn out due to lack of oil, and if proper contact with the commutator is prevented by dirt or corrosion in the brushes, the tone will be diminished on account of the reduction of speed of the armature, or the motor may fail to operate entirely.



Oil once each month with **light, fine oil.** Remove motor cover in rear and drop a few drops of oil at each end of the armature shaft in the oil hole or groove indicated on illustration.

If horn fails to give proper results after bearings have been oiled, set the motor in motion by pressing button, and sandpaper commutator. After this has been done, clean air gaps between commutator segments with piece of wood. Do not use metal of any kind for cleaning air gaps.

ADJUSTMENT:

Turn adjusting screw in rear end of motor cover (a dime will serve as a wrench) to the right to tighten, to the left to loosen, until the desired tone is attained.

Do not adjust too tightly. The armature should always turn easily, when turned with the fingers.

If horn fails to operate, do not take it apart—you may lose some essential part. Oil and clean carefully in accordance with above instructions. If this does not cause it to operate, examine the wiring, battery and push button.

If trouble cannot be found send the horn by parcel post to the factory where it will be taken care of promptly in accordance with the Sparton guarantee. With the horn should be sent a letter giving the serial number of the car, length of service, and a description of the trouble.

A regular charge will be made for cleaning, oiling and adjusting, made necessary by lack of attention on the part of the owner.

In ordering parts for horn, always specify model and serial number of the horn which are designated by letters imprinted on the name plate.

CLUTCH

The clutch used on our model 76 is of the single plate design and composed of three (3) major units, namely, the cover plate assembly, driven member assembly and the release sleeve.

The cover plate assembly contains the cast iron pressure plate, the pressure springs, the release levers and release lever studs. These parts are carefully adjusted by the manufacturer and should need no further attention.

The driven member unit consists of the splined hub, driven disc and two moulded friction facings. The driven disc is made of spring steel and is spoked to relieve the outer rim tension. This member is slightly conical in form to provide for a smooth even clutch engagement.

The release sleeve is of the anchor type and has a cored oil reservoir for supplying lubrication to the release bearing. The clutch release bearing is lubricated from the central chassis lubricator and requires no attention.

No method of clutch adjustment is provided as the pressure springs automatically compensate for all wear of the friction facings. The total spring pressure is approximately 1400 pounds and this is more than sufficient to prevent clutch slippage.

When the clutch is fully engaged the clutch pedal should have about one inch clearance or lash so it will not ride against the floor board. This is the only adjustment, and should be checked every 1000 miles.

SERVICE SUGGESTIONS

When reassembling the clutch to the flywheel, it is necessary to use a splined dummy shaft. This will align the splined clutch hub with the pilot bearing and permit the transmission to be placed in position.

The driven disc is riveted to the front shoulder of the splined hub and the member should be placed in this position when assembling the clutch to the flywheel. Be sure that the outer edge of the driven disc stands away from the flywheel.

When the friction facings of the driven member become so worn that the rivet heads are flush with their surfaces, they should be replaced. Especial care must be exercised when assembling new facings to the disc. As this member is dished, hand clamps should be used to bring the new facings tightly together before being riveted. If the facings are not rigidly riveted to the driven disc, trouble will result because of the fact that their unevenness will cause the clutch to drag.

The original friction facings and the rivets are particularly suited to this type of clutch, and it is recommended that these parts be secured only from dealers handling genuine Auburn parts, or direct from the factory at Auburn, Indiana.

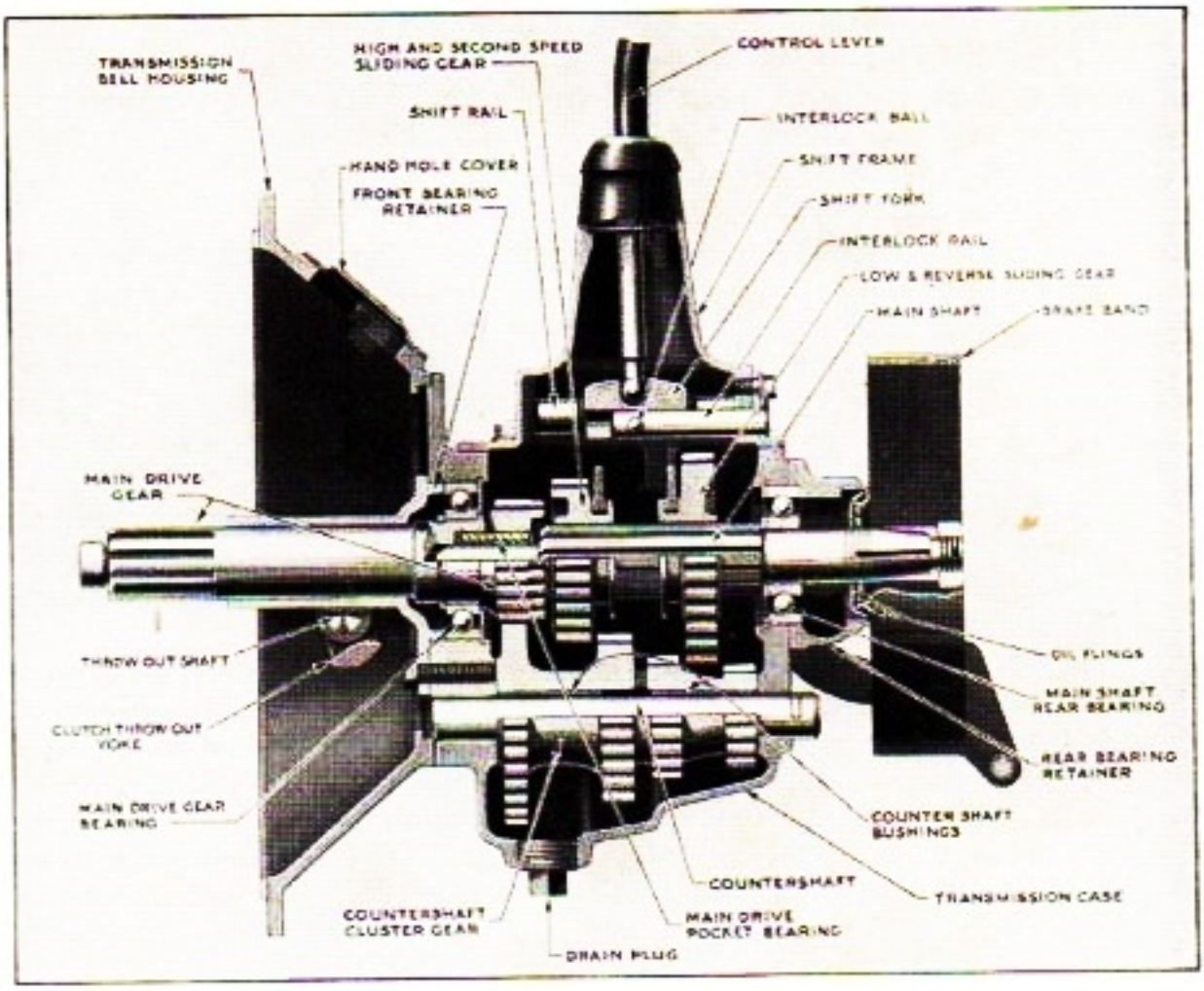
When properly operated, the shifting of gears is a very easy matter. Like any other clutch, however, it is necessary that the operator become familiar with its shifting characteristics. The principal thing to bear in mind is that the driven member is so light and the flywheel effect so small that a very short interval is required to synchronize the gears. It is equally easy to change from high to intermediate at speeds that would be prohibitive with other types of clutches. In order not to put too great a strain on the driving mechanism by increasing the engine speed, it is better to let the clutch in slowly.

DO NOT REST YOUR FOOT ON THE CLUTCH PEDAL WHILE DRIVING.

IMPORTANT

In assembling the cover plate assembly it is very important to see that the cover plate itself enters the pilot on the flywheel face, and that the bolts holding the cover plate assembly to the flywheel are evenly pulled down so as to prevent distortion of the plate. It is also important to see that the clutch release bearing return spring which fastens from the release bearing sleeve to the transmission has the proper tension. This spring should be strong enough to pull the bearing away from the release fingers when the pedal is back against the floor board.

TRANSMISSION



The transmission used on our model 76 has four speeds, three forward and one reverse, which are controlled by the hand control lever.

The transmission consists of the case, containing two shafts, a main or sliding gear shaft, and a countershaft, a main shaft drive gear, and a series of gears, together with bearings and means of adjustment. The main shaft is in a direct line with the main shaft drive gear, or constant-mesh pinion, the end of the main shaft turning in a Hyatt Roller Bearing in the end of the main drive gear. The countershaft is parallel with the main shaft and is stationary, the gear revolving on bronze bushing.

The main shaft carries two gears of unequal size designed to slide into mesh with gears of correspondingly unequal size on the countershaft.

One of the sliding gears may also be moved into mesh with the reverse idler gear which is on a shaft supported by the transmission case, thus obtaining the change called "reverse."

The countershaft carries the following revolving but non-sliding gears: Countershaft drive gear, intermediate or second-speed gear, low-speed gear, and reverse gear. Although the countershaft drive gear is always in mesh with the main shaft drive gear it does not transmit power when in direct or high gear. However, it keeps the lubricant agitated and

in circulation, which is essential.

The transmission is so constructed as to be oil-tight. To prevent oil leakage, the shifter rails in the top housing are a drive fit, as are also the countershaft and idler gear shaft. Care must therefore be used in handling these parts when dis-assembled, so as to avoid battering and damaging them: Should any oil be found on the case, the reason for the leak should be sought immediately.

Just back of the bearing, at rear end of main shaft, there is a space that contains the speedometer parts. Oil is prevented from leaking out of this space around the sliding gear shaft by the use of a double oil fling. If grease were to be put in the transmission case the drain hole from this space or chamber might become plugged up, thus causing oil to overflow at this point. Any undue gear noise may be due to an improper kind or amount of lubricant.

When refastening the transmission to the engine after overhauling is done, care must be taken to see that all burrs are removed from the face of the bell housing. The bell of the transmission housing must be drawn up tightly against the engine flywheel housing to prevent misalignment.

Be careful with the lubrication. See that the right grade of oil is used whenever necessary. Some grades of oil sold for transmission lubrication function satisfactorily in moderate weather but become very heavy and stiff at low temperatures, not only making gear shifting difficult, but in some cases actually resulting in damage to the parts, such as breaking of shift levers; bending of gear-shifting forks, due to forcing the shift too much.

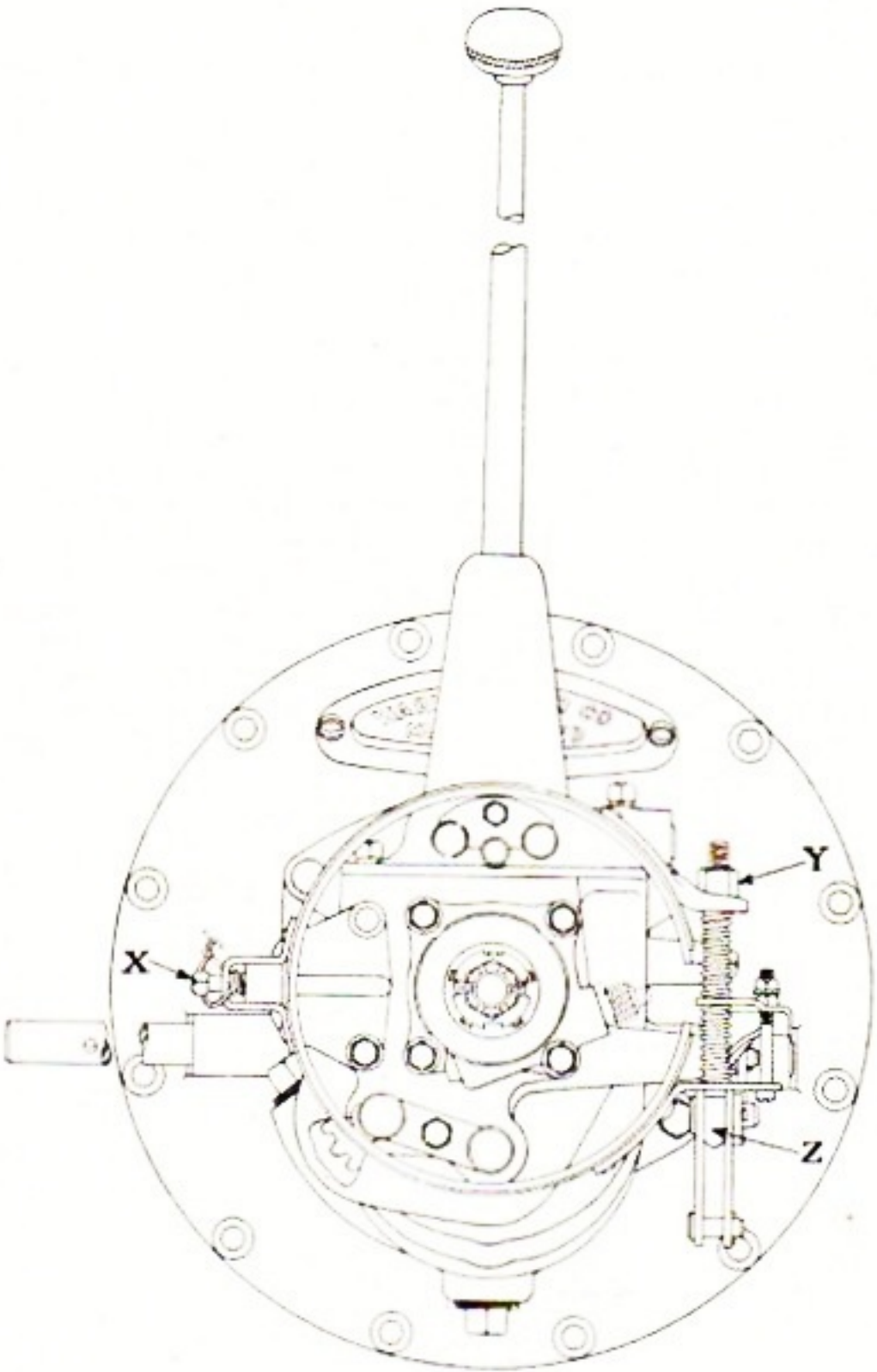
If a too heavy-bodied lubricant is used, there is a tendency either to throw out to the side walls of transmission case or to "channel out" in such a way that very little lubricant actually gets on the gear teeth, or into the bearings and bushings.

Some lubricants are so light that when thoroughly whipped up, or in warm weather, they result in noisy gears. It is recommended by our Engineering Department that when cold weather appears, the transmission case be thoroughly cleaned out with kerosene, and then filled again with a high-grade transmission oil, such as 600-W, Mobiloil C, Polarine transmission oil, or something of equal lubrication strength, adding to it about 10% of Kerosene.

As soon as freezing weather is over, the transmission should be drained, cleaned and refilled with any of the above oils, but not adding Kerosene.

The oil transmission filler plug is located at the left side of housing and lubricant should reach the level of this plug.

EMERGENCY BRAKE ADJUSTMENT



The accessible emergency brake is a feature of this model as it is located on the transmission shaft, and two points of adjustment are all that is necessary.

It can easily be reached for adjustment by lifting the floor boards.

The brake band and lining may be adjusted at "X" so as to obtain a firmer grip on the drum, and the ends of the brake band and lining may be adjusted at "Y".

At the brake anchor "X" turn the screw to the right until the clearance between the lining and the drum is about one thirty-second of an inch, and at "Y" turn the nut upon the bolt to the left until the clearance at both ends of the band and lining is approximately one thirty-second of an inch. When it is necessary to remove the brake band for relining, the bolt "Z" can be easily removed by unscrewing nut "Y".

Keep movable parts well oiled. The clevis pins at brake connections should have a few drops of lubricating oil at least once a month.

UNIVERSAL JOINT

The Ball Bearing Universal Joint and Drive shaft consists of a one-piece tubular shaft, which, having no abrupt changes of section, and being largest in diameter where bending moment is greatest, permits minimum weight consistent with rigidity.

It is proof against eccentricity and whipping, being firmly guided at either end by the spring guides. These guides transmit the spring pressure to the shaft member through a spherical bearing surface, and keep the ends of spring parallel and in line with each other.

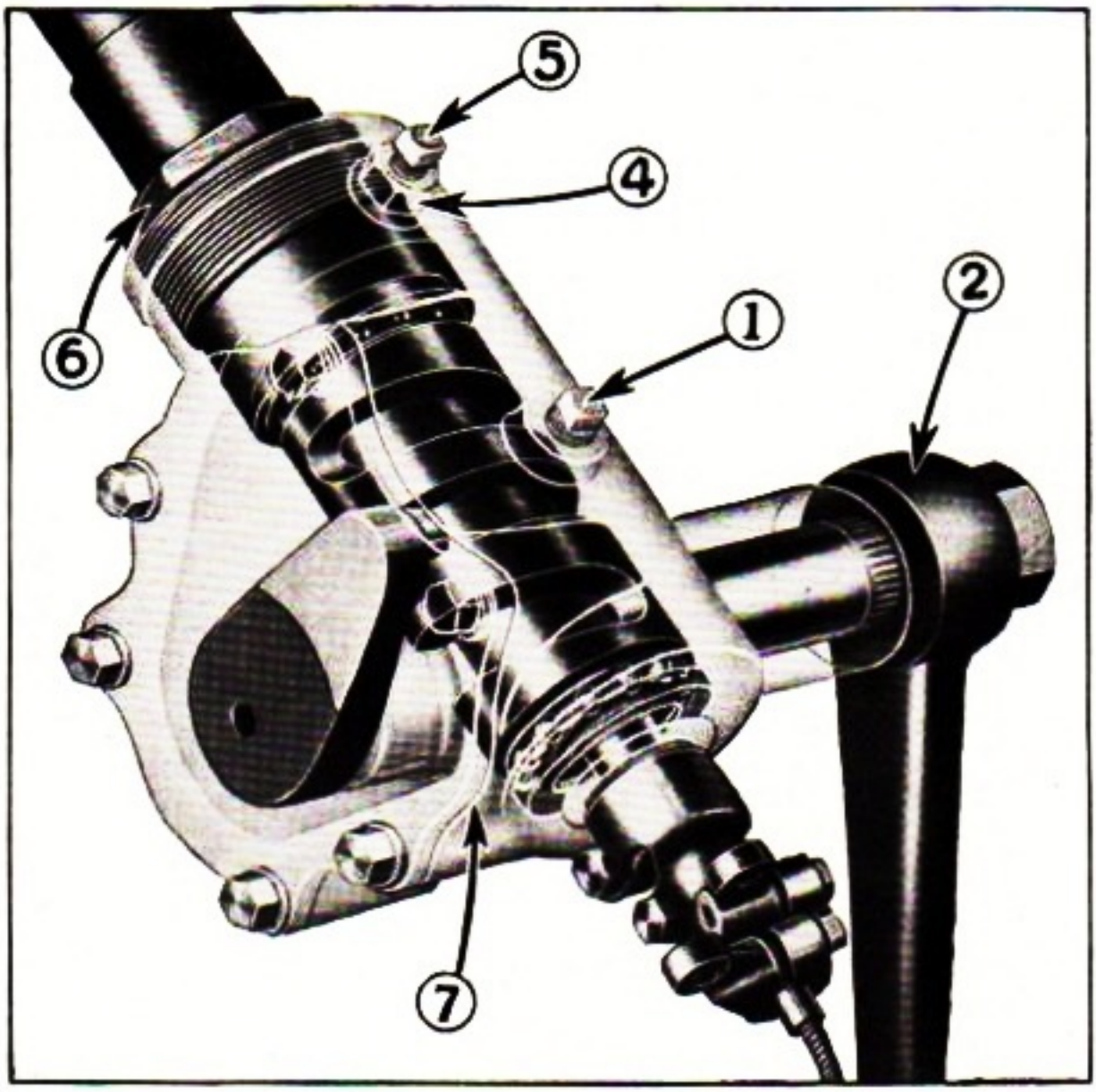
The spring guides also function as cross heads in piloting the shaft in the housings, taking up any clearance due to wear and keeping the shaft running true permanently.

The universal joint should not be packed completely full of grease because it would leak out through the dust boot. A chunk of grease that can conveniently be gathered on two fingers should be placed in the open end of either ball race before assembling. For best service a slight amount of grease should be applied to the joint at intervals of approximately 5000 miles, or oftener if necessary.

Upon reassembling a joint attention should be given to the following points:

1. Be sure that a small quantity of lubricant is placed in the hole of each ball or on each end of the pin and on the outside surface of the spring cup or guide.
2. Assemble the joint with clean hands and be sure there is no grit on the parts or in the lubricant.
3. Be sure that the spring cup or guide is properly entered in the central bore of the housing before bolting joint in place.
4. Be sure the spring is seated squarely in the flange and guide.
5. To check the operation of the joint after it is assembled, take hold of the tube and shove it back and forth, seeing that it remains in a midway position when released.
6. Be sure that the gasket is intact and in its proper position.
7. Make certain that all flange bolts are tight and securely locked.

STEERING GEAR



The steering gear used on this model is scientifically designed to afford the utmost ease and comfort in driving. The actuating member is a cam, very similar to a single thread screw of variable pitch, mounted between ball bearings which take both thrust and radial load. It is connected by a serrated splined joint with the steering tube. In turning the steering wheel, the cam turns in its bearings and the stud projection on the inner side of the lever and in contact with the cam moves up and down. This rotates the lever and in turn rotates the trunnion shaft and the steering arm. The steering arm is attached to the outer end of the shaft by a 36 tooth, V shaped, serrated, tapered spline.

Longitudinal grooves on the sector tube and machined in the lower end of the housing prevent this tube from rotating and hold the upper throttle control set in stationary position when the steering wheel is turned. These grooves also prevent the oil from leaking out of the bottom of the steering gear.

LUBRICATION

Lubrication is the most important factor in maintaining a steering gear at its highest efficiency. Attention to it is important.

It prevents wear and rattle.

After the steering gear has been mounted in the chassis and every 1000 miles thereafter remove the pipe plug (1), fill housing with lubricant, and replace the pipe plug.

Keep the steering gear housing filled with lubricant.

Sunoco Special Steering Gear Lubricant has been found to be a very satisfactory lubricant for these steering gears. This is a very heavy oil of a fibrous nature and must be forced into the housing with a pressure gun.

For previous models we have recommended the use of this lubricant exclusively, but later experiments enable us to also recommend the use of Whitmore's No. 70 and Whitmore's No. 65.

The No. 70 is the lighter of the two and would on that account be better for use in cold weather, although experiments show that it gives satisfactory results in hot weather in most cases. In some particular cases in very hot weather, Whitmore's No. 65 would be preferable in the latter two lubricants.

ADJUSTMENTS

(All adjustments should be made with the front wheels jacked up or preferably with the steering arm removed from the gear).

Before making any adjustments, determine the nature and location of the adjustment. A blind adjustment of the steering gear may result in a heavy repair bill.

The thread in the cam is cut to give a low ratio in the mid-position, thus eliminating road shocks while traveling at a high speed. On each side of the mid-position the pitch of the thread increases, giving a progressively higher ratio which permits sharp turns without excessive movement of the steering wheel.

For this reason it is very important that the gear be properly centered. To do this, the steering arm (2) should be removed from the gear and the front wheels jacked up. Turn the steering wheel in one direction as far as it will go, then reverse the direction to the other extreme, counting the total number of turns of the steering wheel. Turn wheel back just one-half of the total movement, thus placing the cam lever in the mid-position. Place the front car wheels in the position for straight ahead driving and place the steering arm on the cam lever shaft of the steering gear, which should bring it in a vertical position. Replace the lockwasher and nut, tightening the latter with a wrench. Do not drive the arm on, but use a long-handled wrench, or use a piece of pipe to give greater leverage.

After a few hundred miles, inspect the arm to see that it is tight and then inspect occasionally. If kept tight when the car is new, no trouble will be encountered with a loose steering gear arm.

UP AND DOWN MOVEMENT OF THE STEERING WHEEL is caused by the thrust bearing adjustment being too loose.

Loosen the lock nut (4) and back off the lock screw (5). Turn the adjusting nut (6) to the right until the gear just binds, then back off a trifle to free the bearings. They must be free but without perceptible end shake.

Tighten the lock screw and then the lock nut.

STEERING WHEEL PLAY (without end play)

This adjustment is made at (7) by removing shims, which, owing to the taper of the sides of the cam thread and the tapered construction of the stud on the cam lever, brings these parts into closer contact. These shims are made in three thicknesses—.003", .007", and .014", and are placed between paper gaskets whose function is to prevent oil leakage.

Place the gear in mid-position for straight ahead driving as described above. This is necessary as the cam thread is narrowest at this point to compensate for cam wear.

Test the cam lever shaft for end play and estimate the amount.

Remove the side cover plate, shims and gaskets by removing the cap screws and lockwashers. Be careful not to damage the shims and gaskets.

Remove sufficient shims to take out nearly all of the end play. There must be some, otherwise the gear will be damaged owing to excessive pressure between the cam and the stud breaking down the oil film. This adjustment is like that of the front wheel bearings in that the play should be as small as possible and yet there should be some. Probably the best method is to reduce the shims until there is no play and then insert a .003" shim.

Refill gear housing with lubricant.

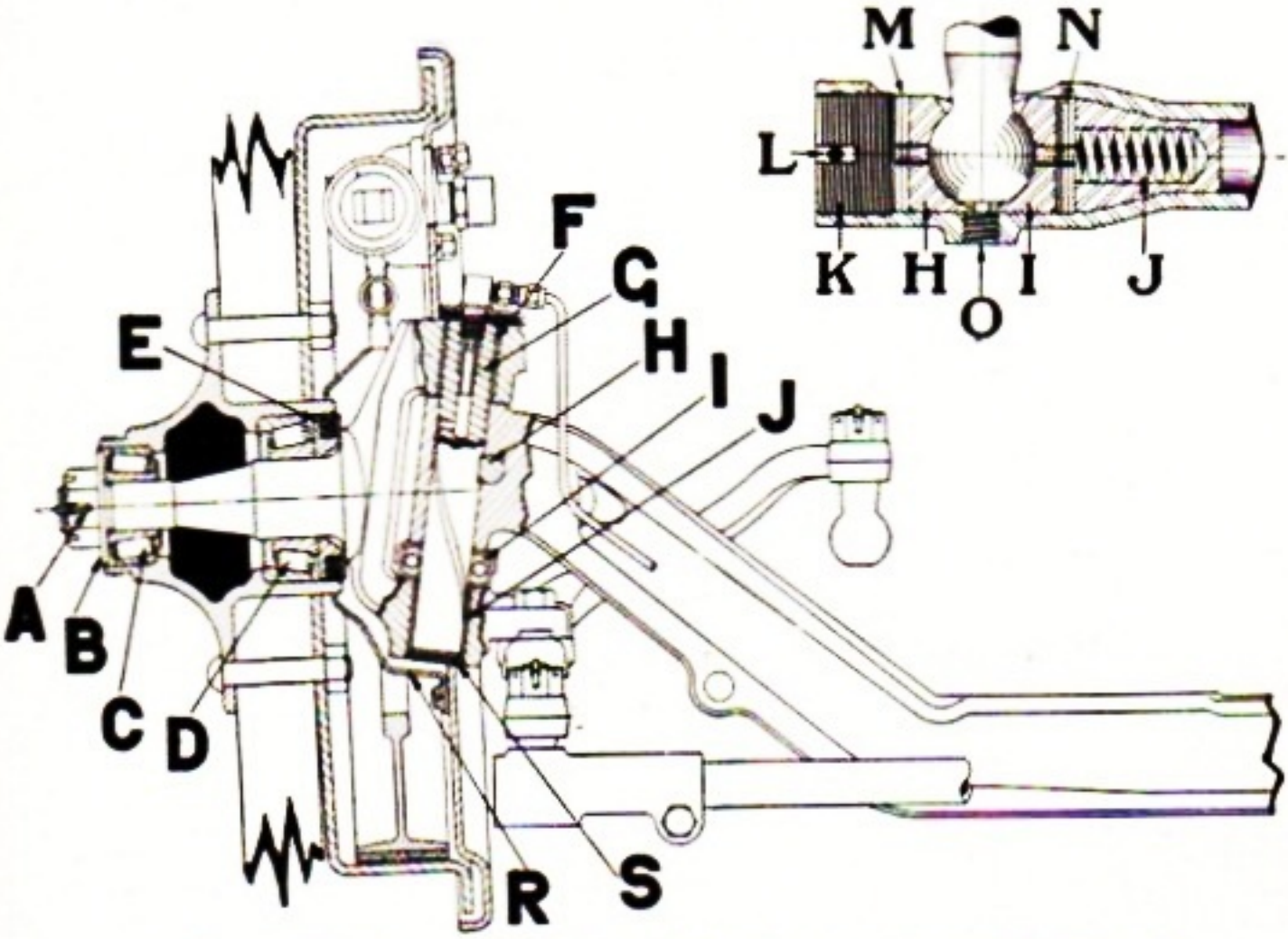
DRAG LINK

The steering gear is connected to the ball arm of the left hand steering knuckle of the front axle by means of what is known as a Drag Link, at each end of which is a ball socket that receives the ball of the steering knuckle arm and steering gear arm respectively. These balls operate against hardened steel ball cups behind which are heavy springs that prevent road shocks from being transmitted to the steering gear.

Lubricate the ball sockets with cup grease every 500 miles. Occasionally draw out the cotter pins and unscrew the plugs. Wash out the sockets thoroughly with gasoline and re-lubricate.

In reassembling, be absolutely sure that plugs and cotter pins are in correct position and adjustment.

FRONT AXLE ASSEMBLY



The safety of the car and its load depends largely upon the front axle, therefore, our front axles are built unusually strong.

The steering arms and steering spindles are heavy drop forgings.

The I-beam or axle center is of extra sturdy construction, particularly designed for use with front wheel brakes.

IMPORTANT: If the I-beam is bent due to accident, do not attempt to straighten it even if heating facilities are available, as ordinary heating destroys the effect of heat-treatment. It is always best to return I-beam to the factory for alignment.

FRONT WHEEL ALIGNMENT AND TIE ROD ADJUSTMENT

Correct alignment of front wheels must be maintained to assure continuous easy, comfortable steering and long tire wear. Guard against excessive "toe-in" as it shortens tire life.

In "toe-in" the wheel rims are nearer to each other at the extreme forward extremities. The correct "toe-in" is 1/16 to 1/8 of an inch for balloon tires.

The tie rod section is shown in small cut (figure 1). The ball on each arm works in a socket consisting of two halves (H & I) and is held in

position by spring (J) and adjusting plug (K) and locked with a cotter pin (L).

Shims (M and N) are provided for changing the distance between the right and left hand steering balls. To increase the amount of "toe-in" re-arrange the shims so as to increase the distance between ball centers. To decrease, reverse the operation.

To adjust for looseness, remove cotter (L), tighten up on adjusting plug (K) to the locking point, then back off just enough to relieve tension and still have no play. BE SURE TO LOCK PLUG WITH COTTER (L). Oil hole for lubrication of tie rod sockets and ball is shown at (O).

Correct wheel camber, in which the wheel rims are nearer together at the ground than at the highest point directly above, is built right in the spindles when the parts are machined and cannot be altered or adjusted without new parts.

CAUTION—INSPECT THE NUTS AND COTTER PINS OF THE FRONT WHEEL STEERING MECHANISM WITH REASONABLE REGULARITY. THIS IS IMPORTANT.

STEERING ASSEMBLY

The King pin, bushings, thrust bearing, steering ball, and sockets are wearing parts of the front axle steering assembly.

The thorough and constant lubrication of these parts is assured by connection to the central chassis lubricator. The lubricator must be operated daily, however, as instructed on page 3, or excessive wear of these parts will result, requiring expensive replacements.

Every precaution is taken to assure the close and proper fitting together of these parts, and as they are built from the best materials obtainable for the purpose, they will outlast most of the other parts of the vehicle if properly cared for.

If the front wheels develop shake, the wheel bearings may need adjustment, or it may be that excessive wear makes it necessary to replace such parts as king pins, bushings, washer cups and felts, or thrust bearings.

In testing for shake or wear, grasp the front wheel by two spokes on a vertical plane, and note particularly whether the play or shake takes place between the wheel and spindle, that is, in the wheel bearing,—or between the king pin and I-beam, in the king pin bearings.

If you have determined that shake or play develops at the latter point, jack up the car and remove front wheels as described heretofore. Next remove the tie rod assembly to avoid bending these parts. Then remove the brake shoes and the grease drain pan.

Disconnect the lubricator tube and remove the drip plug from the elbow fitting in the top of the king pin. Place the drip plug in a clean place and unscrew the elbow fitting which will permit the removal of the cap and felt closure disc. Next drive out the taper locking pin (H). Using a punch, with an end not less than 5/8" diameter in order to avoid damage to the small oil-dividing tube in the top of the king pin, drive the king pin (G) downward far enough to displace the welch plug (S) which caps the bottom

of the lower bearing. After the welch plug is displaced, the king pin can be driven upward and out the top. Clean all parts with a stiff brush and gasoline. Open all oil ducts in king pin and inspect for wear.

Special bronze bushings (F and J) are used. These are pressed into the spindles and then burnished, which gives them exceptionally long life, and require replacement only after exceedingly long service. As a general rule, replacement of the king pin is sufficient to remedy any looseness at this point, therefore DO NOT ATTEMPT TO REMOVE BUSHINGS until you have tried new King Pins and are absolutely sure new bushings are necessary. Then, proceed as follows:

USE CAUTION in the installation of bushings. NEVER DRIVE them in with a hammer, but always press them into place, supporting the spindle so as to avoid springing and the misalignment of the king pin holes. After the bushings are pressed into place, they must be line-reamed, using a soft automobile soap mixed with warm water as a cutting compound for the reamer. These bushings are too hard to ream any other way.

NOTE: SPECIAL LINE REAMERS for doing this work will be furnished at cost, or these spindles may be returned to our factory for this re-bushing operation. SPECIAL ATTENTION IS GIVEN THESE RUSH JOBS.

In reassembling parts, MAKE SURE King pins (G) are properly locked with taper locking pin (H).

The ball bearing (I) which makes for easier steering, requires no attention other than an occasional inspection and lubrication.

BE SURE THAT ALL NUTS AND LOCKING COTTER PINS ARE IN PLACE. MANY ACCIDENTS MAY BE TRACED TO A FAILURE TO PROPERLY LOCK THE VERY IMPORTANT RETAINING NUTS ON THE FRONT AXLE BY FITTING A GOOD PIN IN PROPER POSITION AND OPENING THE ENDS AND BENDING THESE ENDS BACK AGAINST THE NUT.

BE SURE TO OIL ALL PARTS, PARTICULARLY THE FELT CLOSURE DISC AT THE TOP OF THE KING PIN, AS YOU ARE ASSEMBLING, AND AFTER EVERYTHING IS ASSEMBLED OPERATE THE CHASSIS LUBRICATOR THREE OR FOUR TIMES TO FILL ALL VOIDS WITH OIL AND ASSURE CORRECT LUBRICATION WHEN THE CAR IS NEXT DRIVEN.

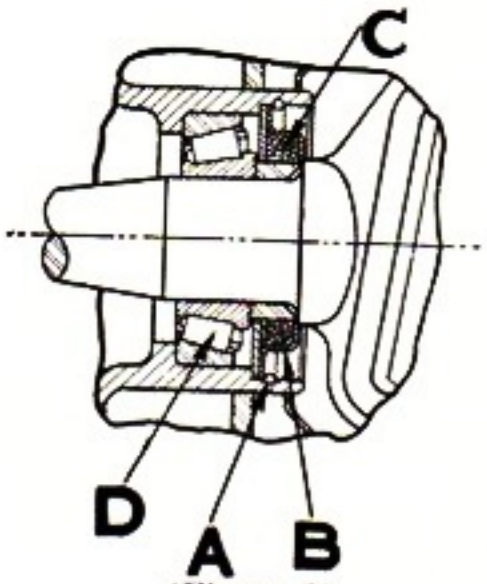
FRONT HUB ASSEMBLY AND BEARING ADJUSTMENT

The front wheel hub, wheel spokes and the drum are held together as one assembly by the spoke bolts, and the bearing cups are pressed securely into the hub.

The bearings should be removed, cleaned, greased and readjusted every six months in ordinary service, and every three months if the service is severe.

To remove the bearings, remove the hub cap and jack up the wheel clear of the ground. For safety's sake, block up car alongside the jack.

Next, remove castellated nut (A) after pulling out cotter pin which locks it. Also remove keyed lock washer (B). Standing at the side of wheel and facing it, grasp wheel with both hands and pull directly toward you, being careful not to let the outer bearing (C) slip from the hub and fall to the floor, as this may damage cage or allow dirt to get into it. After removing bearing (C), lift wheel off; the spindle bearing (D) will remain in the hub as this is held in by the felt retainer assembly and lock ring as shown in small cut (Figure 2), and which is the type felt retainer assembly used on this model.



(Figure 2)

To remove bearing (D) from hub, remove retainer ring (A) (Figure 2). This will permit removal of felt retainer assembly and bearing (D). With a stiff brush and gasoline, clean all old grease from the bearings, spindle and inside of hub.

Having thoroughly cleaned and dried the bearings, replace inner bearing (D) in the hub, covering it well with a good grade of cup grease free from acid, grit, or any solid matter. Using a new felt (C) (Figure 2) assemble it to felt retainer (B) (Figure 2). First replace the washer in position in hub, then retainer (B) with felt assembled in it, finally locking with locking ring (A).

IMPORTANT: After re-assembling inner bearing (D) and retainer parts, pack the hub between the two bearing cups with a good grade of clean cup grease and assemble wheel to spindle. Next, place bearing (C) on spindle, then press lightly by hand into position in hub.

Replace keyed washer (B) and adjust nut (A) up tightly against washer (B) to a point where the bearings bind slightly, at the same time revolving the wheel to insure all working surfaces of the bearings coming in contact.

Now back off nut (A) so the wheel will rotate freely but with no noticeable end play.

IMPORTANT: GUARD YOUR SAFETY BY LOCKING NUT (A) WITH A COTTER PIN.

In making bearing adjustments, make sure that the front brakes are free before adjusting the bearings.

MODEL 76 REAR AXLE

This axle is of the helical bevel gear type, semi-floating design. The materials are the best obtainable for the purpose for which they are used, and the workmanship is carefully guarded by a rigid inspection system.

The gears are made from specially selected alloy steel with wearing surfaces hardened by scientific processes.

The drive shafts are made from selected alloy steel scientifically heat-treated to secure the ultimate in toughness and strength.

All bearings which support the pinion shaft, differential, driving gears and wheels are heavy duty tapered roller bearings which permit proper adjustment to compensate for wear after extensive usage. The hubs are each fitted with two taper roller bearings which carry both the radial and thrust loads from the wheels.

The Hub, wheel spokes and brake drum are held together by the spoke bolts. The hub is keyed onto the tapered end of the drive shaft. The drive shafts carry the entire load of the rear end of the car.

REAR WHEEL BEARING ADJUSTMENT

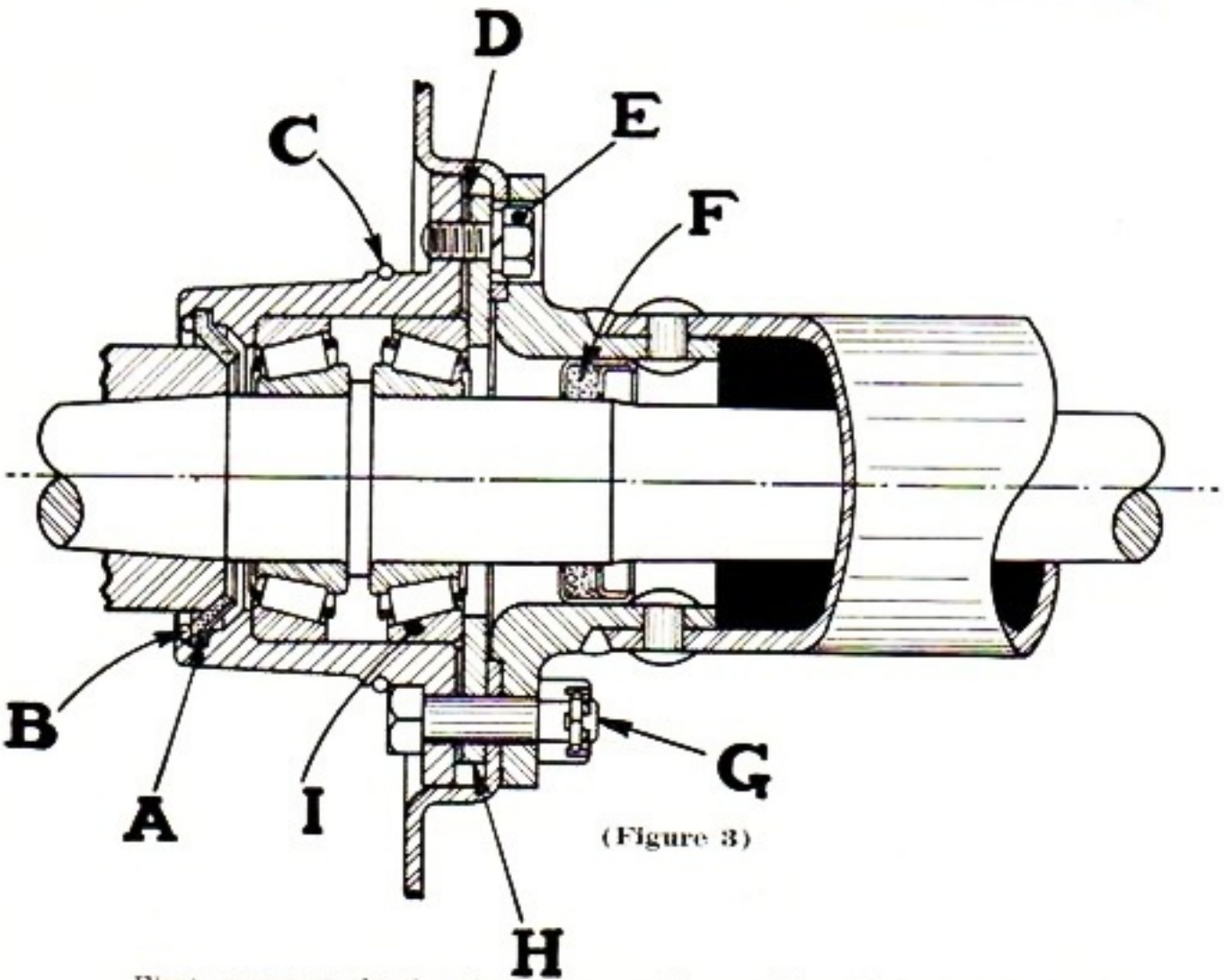
The wheel bearings are provided with an oil hole, located on the flange back of (E) (Figure 3). This should be given attention at the same time the rest of the chassis is given a general oiling. The bearings should be removed, cleaned, greased and re-adjusted at least once a year, or twice a year when the service is severe.

To remove bearings, first jack up both wheels clear of the ground. Remove hub cap, drive shaft cotter and hub retaining nut, then pull wheel from drive shaft with a wheel puller.

Next, remove nuts from bolts (G); this will permit removal of the drive shaft and bearing assembly. Remove cap screws (E) which will allow for removal of shim plate (H) and adjusting shims (D). Use an arbor press, and by supporting bearing cage on the flange end, press on shaft at the threaded end, forcing shaft (with bearings assembled to it) from the bearing cage.

NOTE: Do not support the bearing cup as it must be free to move.

Thoroughly clean all bearings and the bearing cages with a stiff brush and gasoline, also clean out the end of the housing, removing all old grease. Boil the bearings in washing soda and water at least once a year. When all parts have been thoroughly cleaned and dried, cover the bearings with a good grade of clean cup grease free from acid or any solid particles. Pack the bearing cage with grease, then assemble shaft and bearing to bearing cage.



(Figure 3)

First, support the bearing cage on the small end, insert the shaft, (which has the two bearings assembled to it) into the bearing cage. Then press or tap the outer bearing cup into the bearing cage until it is in position on the bearing and no end play of shaft is noticeable. Next, assemble shims (D) and shim flange (H) and draw up cap screws (E) tight. BE SURE LOCK WASHER IS IN PLACE BACK OF HEAD OF THESE CAP SCREWS.

IMPORTANT: NOW CHECK TO MAKE SURE BEARING ADJUSTMENT IS CORRECT. This is made by adding or removing shims at (D). These shims are made in varying thickness. As wear takes place, looseness of bearings will develope; this is overcome by removal of shim or shims at (D) as required.

CAUTION: AVOID A TOO TIGHT ADJUSTMENT OF BEARINGS AT THIS POINT OR FAILURE WILL OCCUR.

With shaft and bearing assembly properly adjusted and assembled they may now be assembled to axle. When in position, replace bolts and nuts (G), making sure they are cottered. Make sure lock ring (C) is in place in slot on bearing cage, as this is a safety lock for bolts (G).

(F) is a felt oil retainer and should be replaced at least once a year, oftener if the service is severe.

(A) is a leather oil seal which is held in place by retainer (B). These oil seals will last indefinitely.

DIFFERENTIAL ASSEMBLY

Any pair of gears running in mesh will vibrate, due to the blows or concussion of the contacting teeth. The amount of vibration and the resultant sound will vary. Therefore, it is not to be expected that all gears will be absolutely noiseless. A slight hum may be present in some cases, and this should be expected.

All gears are carefully tested, adjusted, and locked in their quietest running position before leaving the factory, therefore, no adjustments should be made unless unusual noise develops.

IMPORTANT: Unusual noise developing is a signal that the axle needs attention such as

1—Lubrication

2—Adjustment of the Pinion or Differential side Bearings.

Do not jump at conclusions, but at the first sign of unusual noise, check as follows:

First, check the lubrication in the rear axle housing by removing oil level plug (I, Figure 4) from housing cover. The lubricant should be kept to this level at all times.

NOTE: The pinion bearings as well as the differential, differential bearings, also the ring and pinion gears, are lubricated from the supply in the rear axle housing, therefore, the life of these parts is dependent on the kind and quantity of lubrication they receive.

Gear noise, also gear and bearing failures, result from a lack of proper lubrication; therefore, it is of the UTMOST IMPORTANCE to check the lubricant in the rear axle housing regularly, KEEPING THE LUBRICANT UP TO THE OIL LEVEL AT ALL TIMES.

The differential used in this model is of the two pinion type, the construction of which is shown in Figures 5 and 6. In this type, the thrust is taken care of by two Timken taper roller bearings at the outer ends of the axle.

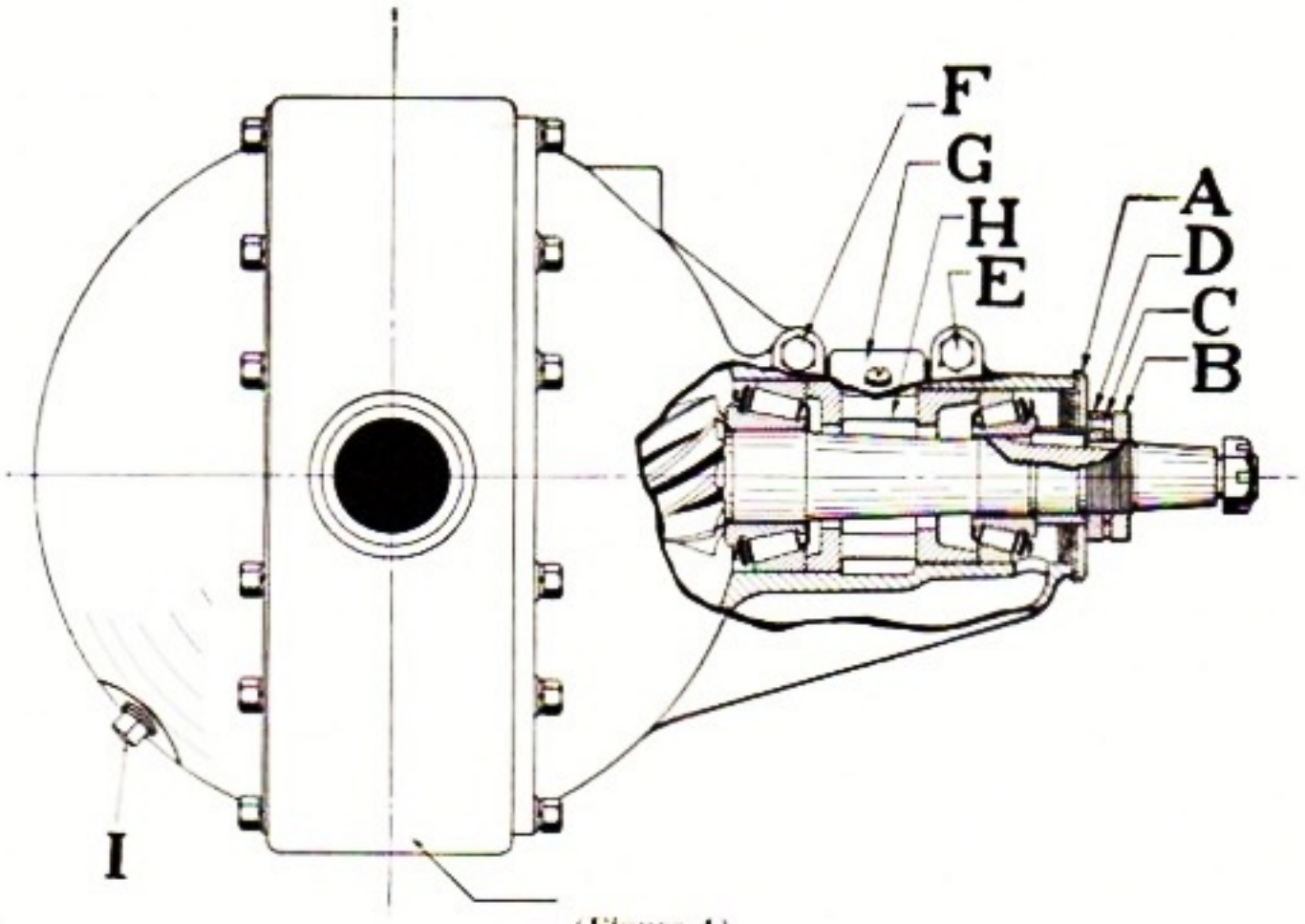
To remove differential gear parts, remove locking pin (H) which will permit removal of pin (I). Removal of gears is accomplished by revolving the side gears.

PINION AND BEARING ADJUSTMENT

End play in the pinion bearings will also cause unusual noise, and if allowed to run in this condition (even for a short period of time) will cause gear or bearing failure. Therefore it is of the UTMOST IMPORTANCE to watch this point and check at the first sign of noise. We recommend a check-up for end play in the pinion bearings after the first 300 to 500 miles.

To check and adjust for end play:

(1) Take hold of washer (A-Figure 4) which is locked by a tongue fitting into the keyway in pinion shaft. If this washer shows the slightest



(Figure 4)

movement when turned back and forth by hand, there is end play in the pinion bearings.

(2) Loosen the nut (B) and back it off far enough to allow for removal of lock washer (C) from the dowel in the nut (D). This will then permit adjustment to be made with adjustment nut (D).

(3) Draw up on the nut (D) until all the bearing play is taken up and no movement of the washer (A) is noticeable; then replace lock washer (C) in position, making sure that it fits properly over the dowel in nut (D); finally, draw up on the outer nut (B) until snug but not to a strained position.

CAUTION: Avoid a too tight adjustment of bearings as failure will result from a too tight adjustment.

Lock outer nut (B) by center punching nut (B) on one of the flat sides so as to throw the metal into one of the slots on the outer edge of washer (C). Make no further adjustment, but test for noise.

This adjustment alone should eliminate unusual noise to within commercial limits in practically all cases and further adjustment should not be necessary. If, after making this pinion bearing adjustment, satisfactory results are not obtained, proceed with caution in accordance with the following instructions.

Loosen clamp bolts (E) and (F), and strike the head of the bolts

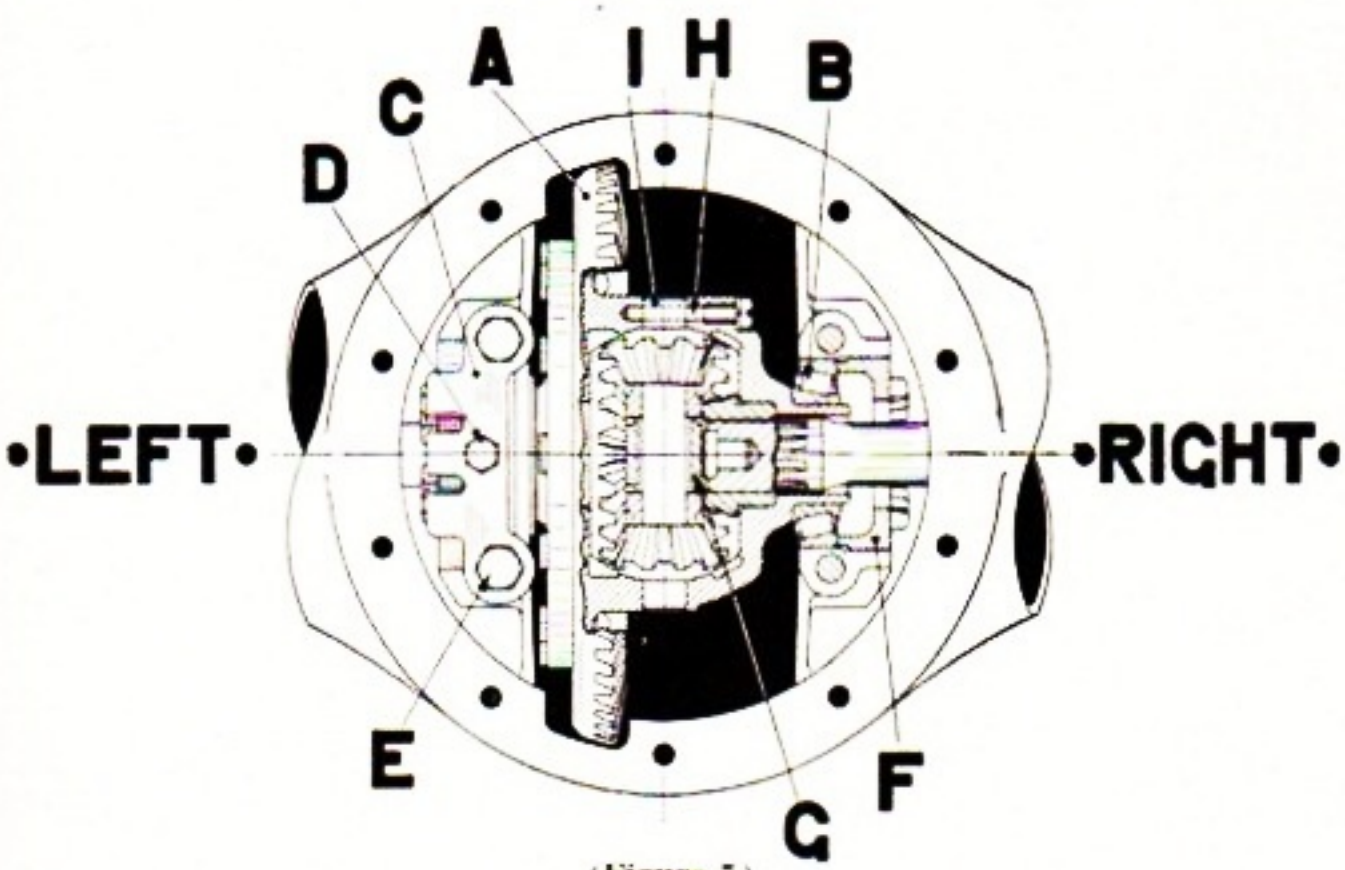
several blows with a hammer to make sure the bearing cups are free. Next remove the pinion adjuster lock (G) by removing the two small cap screws. Adjustment of the pinion is then made by placing a bar in one of the slots of the adjuster (H) and turning either to right or left as required.

If coast noise is present, move adjuster to the **left** (looking toward rear of car). If drive noise is present, move adjuster to the **right.**

CAUTION: Move the adjuster only one notch or slot (not one turn) at a time; then test for noise. If the noise is reduced, move same way one notch at a time until the quietest point is obtained. If, after moving the adjuster in one direction, results are not obtained, try moving in the opposite direction. After the quietest point is obtained, tighten nuts on clamp bolts (E) and (F) and replace adjuster lock (G).

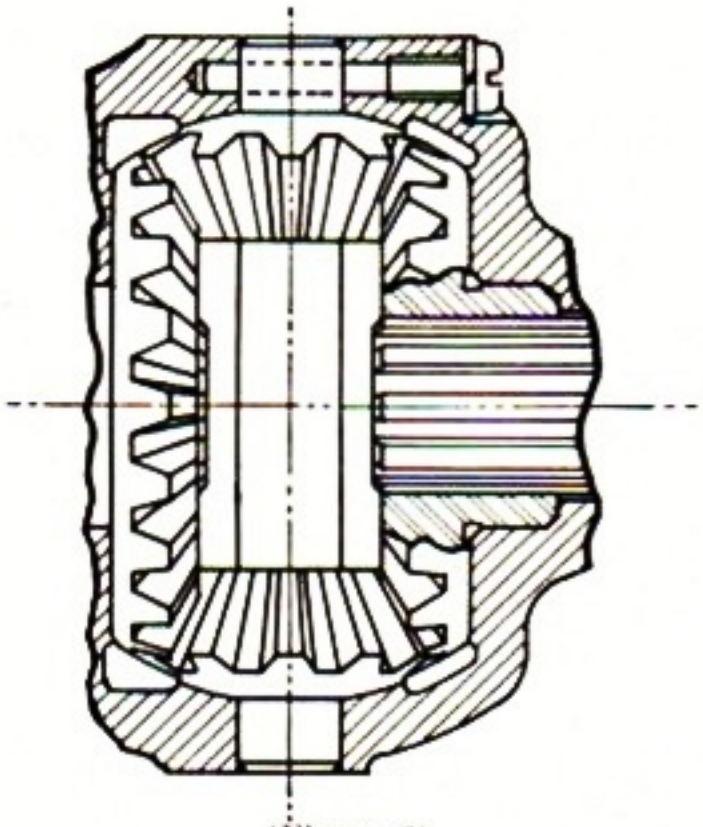
CAUTION: Never run the car without first tightening clamp bolts (E) and (F), and locking adjuster (H) with adjuster lock (G). THIS is IMPORTANT. Be sure that dirt, grit or hard substances are excluded as these particles will destroy the bearings and gears.

RING GEAR AND DIFFERENTIAL BEARINGS



(Figure 5)

The Ring Gear (A) and Differential Bearings (B) (Figure 5) are adjusted and tested, then locked in the quietest running position before leaving our plant; therefore, the only adjustment that may be necessary



(Figure 6)

is the adjustment of the left hand differential bearing to compensate for wear due to the bearing taking the thrust, and is the one that will require attention when looseness or play develops.

Looseness or play of the differential bearings will allow the differential and ring gear to shift from its original position; therefore, when pinion bearing or pinion gear adjustment does not eliminate unusual noise to within reasonable limits, proceed with caution. Check and adjust as follows.

First, remove rear axle housing cover. Now remove lock screw (D) (Figure 5 left side only). This will permit removal of lock (C-left side only). Next loosen cap screws (E-left side only) slightly. Do not disturb right hand side at this time. Place a small bar in one of the slots at the edge of differential bearing adjuster (F).

If play in bearings is present you will be able to move adjuster (F) by turning to the right or downward (this is right hand thread). Move the adjuster one notch only at a time until all movement or play in bearings is taken up. CHECK CAREFULLY and AVOID A TOO TIGHT ADJUSTMENT.

Now check for backlash between ring and pinion, making sure that this adjustment has not taken up all backlash, as there must be a slight backlash, just enough so it can be felt. An average backlash should be from .005" to .010".

In case this adjustment has removed all backlash between ring and pinion gears, it will then be necessary to back off on adjuster (F)—left hand side, and take up on adjuster (F)—right hand side, moving each adjuster one notch at a time until the desired backlash is obtained.

NOTE: Backlash or looseness of the inside differential gears will develop with wear. In these cases replacement of the parts is the only remedy.

CAUTION: In checking for backlash be careful and do not confuse inside differential lash with lash between ring and pinion gears.

The adjustments, as outlined, if carefully followed out, should bring the gears to their original position and therefore reduce any unusual noises to within reasonable limits.

OF SPECIAL IMPORTANCE

The quality of the lubricant used in the rear axle housing is of **SPECIAL IMPORTANCE.** Certain lubricants congeal in cold temperatures, therefore, to INSURE LONGER LIFE OF THE GEARS, DIFFERENTIAL AND BEARINGS in the rear axle, we must select and use a lubricant that will not congeal; but will flow freely in temperatures of 10° below zero. We have tested and recommend the following lubricants for use in Columbia Rear Axles.

	MADE BY
Mobiloil C	Vacuum Oil Co., New York City.
Whitmore No. 33	Whitmore Mfg. Co., Cleveland, Ohio.
Polarine Rear Axle Lubricant—Light Body A	Standard Oil Co.
G & B Rear Axle Lubricant No. 20	Gibb and Brown Columbiana, Ohio.
Damascus E-C Zero Lubricant	Damascus Mfg. Co., Cleveland, Ohio.
En-Ar-Co Differential oil	National Refining Co., Cleveland, Ohio.
Panoleum Lubricant PT-2 light	Panoleum Products Co., Cleveland, Ohio
Sinclair Opaline Gear Lubricant	Sinclair Refining Co., Cleveland, Ohio.
No. 847 Rear Axle Lubricant	American Oil Corp., Jackson, Mich.

Having cleaned out all old oil from housing, inspection made of GEARS and bearings, assemble housing cover in place, remove oil level plug from housing cover, and fill housing to Oil Level, using any of the above lubricants, or a lubricant of the same consistency that will flow freely at 10° below zero.

CAUTION: Do not use grease or a Heavy Lubricant that will not flow freely at 10° below zero.

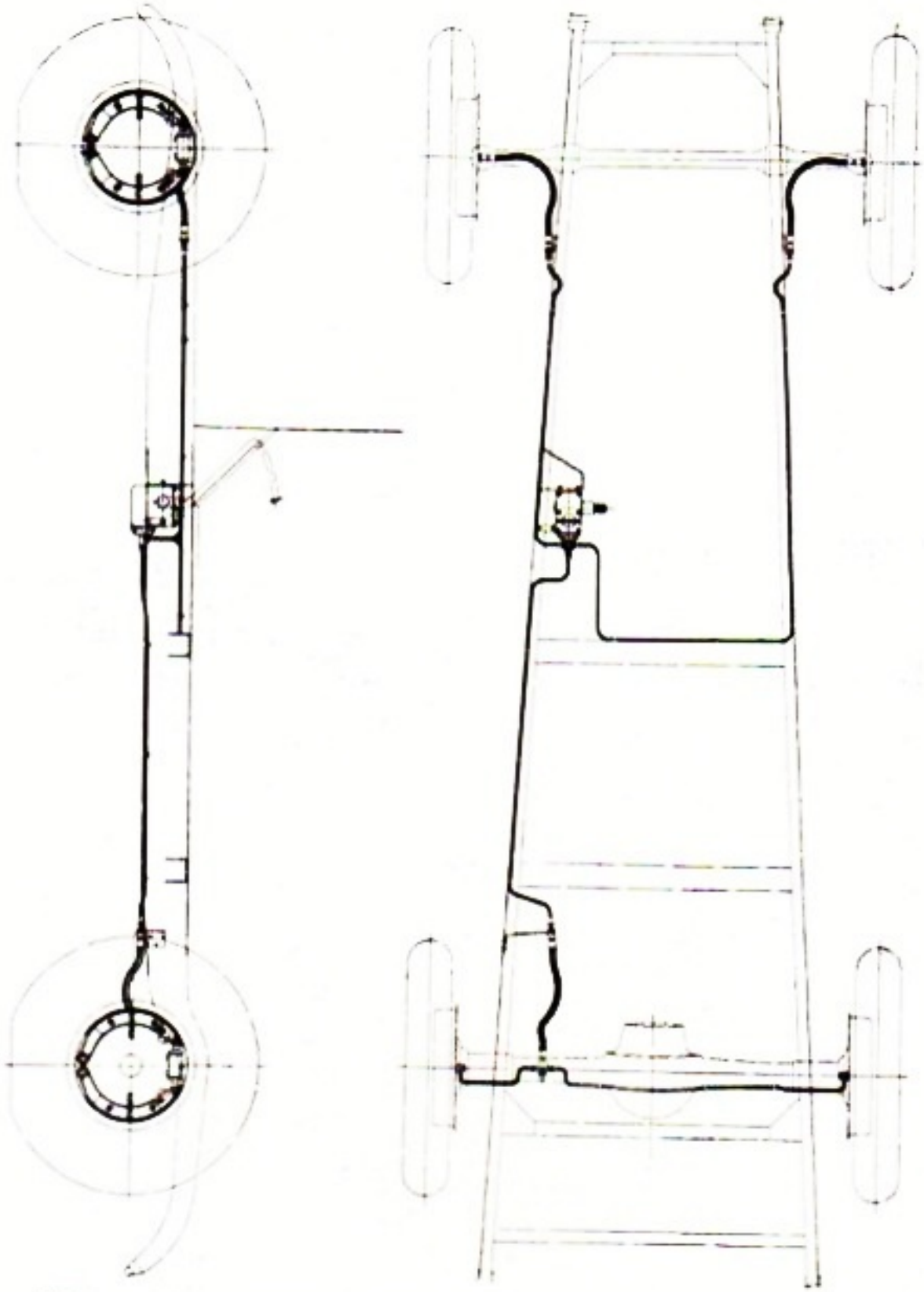
Do not fill housing above oil level hole in cover or leakage into brakes, etc., will occur.

With new cars the differential bowl should be drained and refilled after the first 500 miles of operation in order to remove any fine metal particles caused by initial wear of bearings and gears which might collect in the oil.

After this first draining and refilling period, the lubricant level should be inspected every 2,000 miles. If the level is low, fresh oil should be added.

Every Fall and Spring the rear cover plate should be removed, the bowl drained, and the housing flushed out with kerosene or light engine oil to remove any accumulation of sludge or foreign matter which may have remained in the bottom of the bowl. After flushing, replace cover plate and refill to proper level.

SERVICE BRAKE EQUIPMENT



This model is equipped with the Lockheed Internal Hydraulic Four Wheel Brake System, by which brake shoes are brought in contact with the drums by means of a column of liquid forced through pipes. This liquid, being incompressible, transmits pressure applied by the foot pedal, to each

wheel brake by means of displacement of pistons in master and wheel cylinders. Inasmuch as the pressure must be equal in all parts of the system, no braking action can take place until all the shoes are in contact with the drums; therefore the brakes are self-equalizing and not subject to individual adjustment, except for wear of lining.

The system consists of a master cylinder in which hydraulic pressure is originated; a wheel cylinder operating the brake shoes against each wheel drum, in which wheel cylinder the hydraulic pressure is applied; a supply or reserve tank by which the operating fluid is maintained at a constant volume; and the "line," consisting of copper tubing, flexible hose, brackets and unions, interconnecting the master cylinder and wheel cylinders.

The master cylinder is fitted with a piston and the wheel cylinders are each fitted with opposed pistons; all of which are provided with cup packings which act as a seal to maintain pressures and prevent loss of brake fluid.

The brake pedal, when depressed, moves the piston within the master cylinder, thus displacing the brake fluid from the master cylinder through the copper tubing and flexible hose connections into the four wheel cylinders.

The brake fluid enters into each of the wheel cylinders between their opposed pistons causing them to move outwardly against the brake shoes, bringing the shoes into contact with the drums. As pressure on the pedal is increased, greater hydraulic pressure is built up within the wheel cylinders, and consequently greater force is exerted against shoes.

When pressure on foot pedal is released, the return spring on brake shoes retract and return wheel cylinder pistons to their normal or "off" position, thus forcing the brake fluid back through the flexible hoses and copper tubing into the master cylinder.

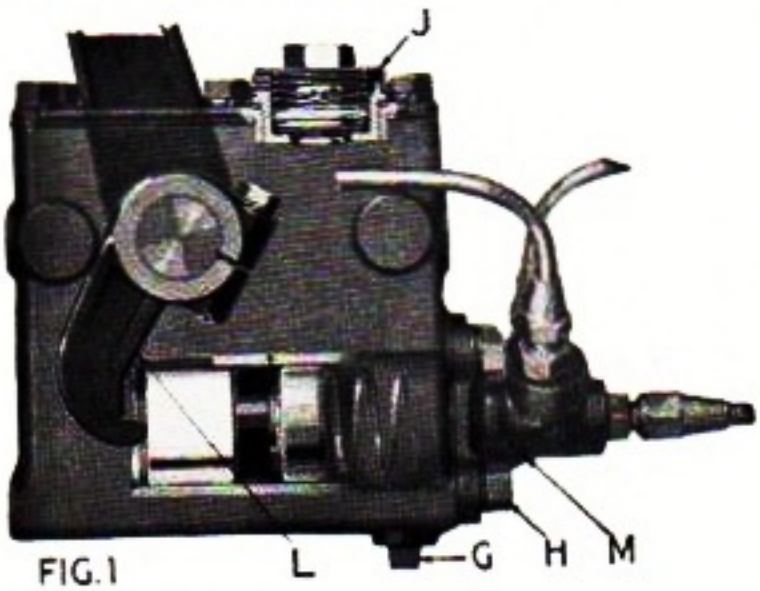


FIG. 1

THE MASTER CYLINDER: The master cylinder is contained within the supply tank. The supply tank is mounted to frame of car. It carries the reserve supply of fluid and protects the master cylinder submerged in the fluid from any danger of taking in air, dirt or water.

The master cylinder submerged in the fluid is known as the compensator type, it being so designed that it automatically maintains a constant volume of liquid in the system—"compensating" for expansion or contraction of fluid due to temperature changes and from any loss which might result from gravity seepage. Inspection should be made at regular intervals and tank kept filled with fluid. To fill tank, remove floor board and unscrew filler plug (J) (Fig. 1). Care must be exercised to prevent dirt getting into tank through this opening. Remove filler plug unit.

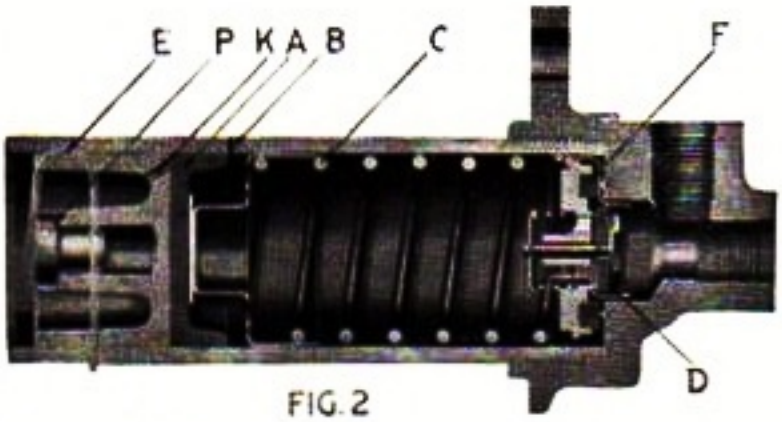


FIG. 2

WHEEL CYLINDER: The wheel cylinder is mounted rigidly to the dust shield (See Fig. 3) and stems of the opposed pistons are connected to brake shoes (G). The ends of the wheel cylinder are fitted with rubber

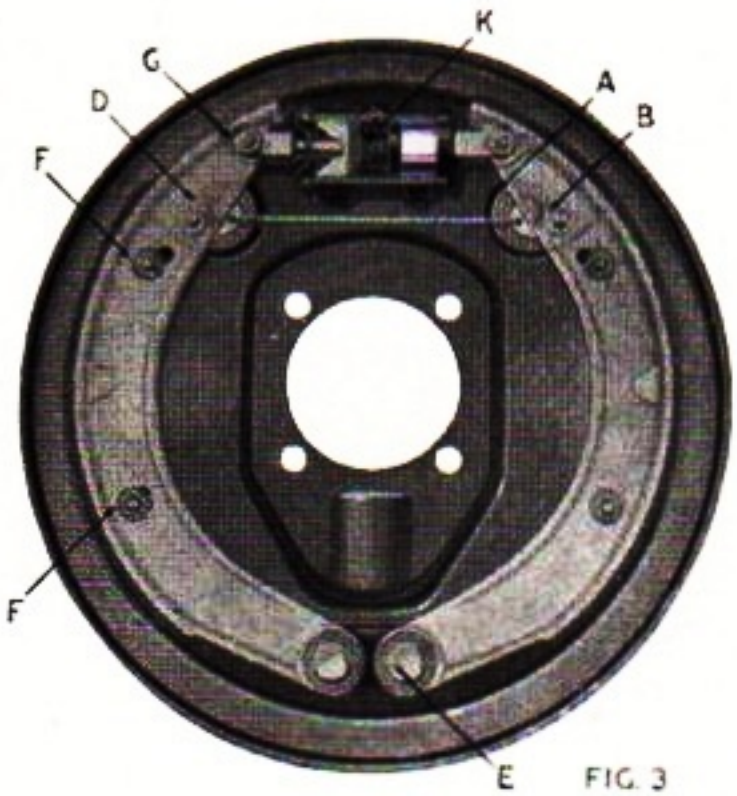


FIG. 3

boots to protect the cylinder. At the uppermost position, and between the pistons, is a bleeder valve, required for expelling the air when filling the system. (See L— Figure 4).

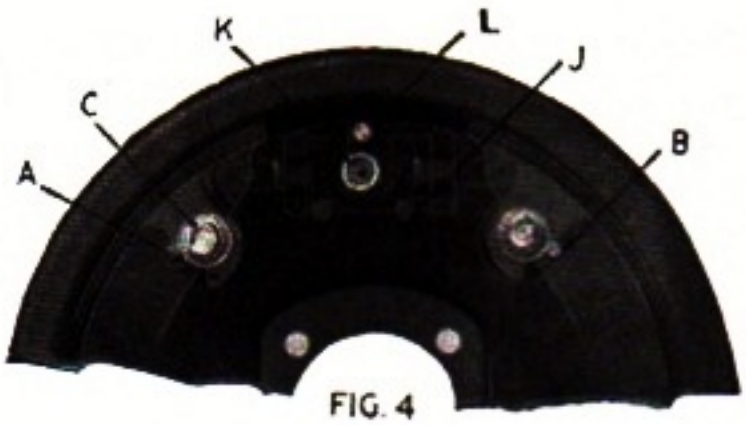


FIG. 4

BRAKE MAINTENANCE: No adjustment is required for equalization. Adjustment is only necessary to compensate for wear of the lining. The frequency of such adjustment will depend upon the character of service to which the brakes have been subjected.

If braking effect is unequal, the cause will be found in the lining. Foreign substances on brake lining, changing its frictional value, is a common cause of this condition, and can usually be overcome by thoroughly cleaning with gasoline or alcohol and then roughen with file or wire brush. However, if linings are so saturated with oil or grease that cleansing will not correct the unequal braking effect, it will be necessary to reline the shoes.

It is imperative that all shoes be relined with lining of the same specifications, otherwise the brakes on individual wheels will not be equally effective in their action.

ADJUSTMENTS: When brake lining becomes extensively worn, manifested by foot pedal going almost to the floor board, and thereby reducing braking effect, necessary adjustments can readily be made to bring brake shoes into closer relation with the drum. (See Fig 4).

Jack up wheel to clear ground. Adjustment is made by rotating the adjustment cam (A) against stop pin (B) on shoe. Rotate adjustment nut (C) with wrench until shoe comes into contact with drum, then back off adjustment slightly until wheel rotates freely.

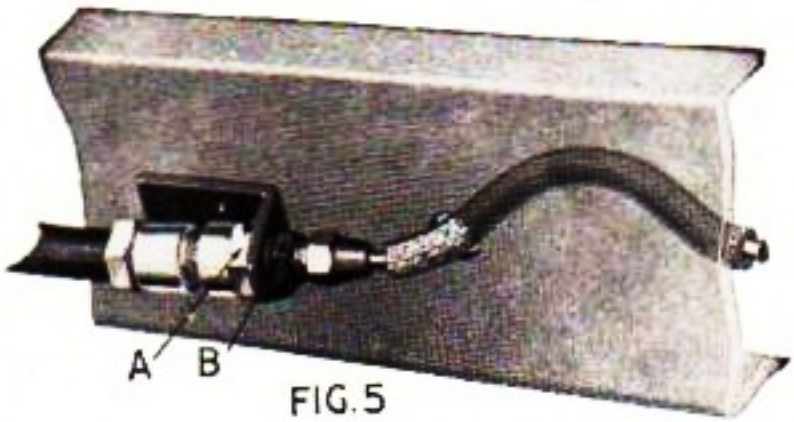


FIG. 5

Proceed in like manner on the brake shoes of all wheels. To bring shoe into closer relation with drum, adjustment nut must be turned towards rim of wheel when wrench is pointing upwards. The tension of friction spring automatically keeps the cam locked in any position.


FIG. 6

TO REMOVE SHOES: The washers are removed from anchor pins (E) and guide pins (F). Unhook the shoe return spring (D). The shoe may then be pulled off. (See Fig. 3).

In assembling, these operations are reversed.

TO DISASSEMBLE BRAKES: To remove Front wheel cylinder, disconnect copper tubing from hose union (A) at the frame, then remove nut (B) and lockwasher. Hose union may then be removed from bracket. Unhook brake shoe return spring (D) (Fig. 3.)

Removal of the two cap screws (J) holding cylinder to brake dust shield allows cylinder to be withdrawn with hose. (See Fig. 4).

To remove Rear cylinder, follow above instructions except that the copper tubing must be disconnected at the cylinder inlet (K) (Fig. 4).

BLEEDING OF LINE: Whenever any part of the system has been disconnected it is necessary to "bleed" the system in order to expel all air.

Fill the supply tank with genuine Lockheed Brake Fluid before commencing this operation, and keep tank at least half full of fluid.

Remove cap screw (L) (Fig. 4) from end of bleeder connection and screw in bleeder drain provided for this purpose, which is a fitting with rubber tube attached. Allow tube to hang in clean container, such as a pint mason jar. Unscrew bleeder connection three-quarters of a turn and depress foot pedal slowly by hand, allowing return spring to return pedal to "off" position. This gives a pumping action which forces fluid through

tubing and out at wheel cylinders, carrying with it any air that may be present. Approximately ten complete strokes of pedal will be necessary to bleed each wheel cylinder.

Watch flow of fluid from hose, the end of which should be kept below surface of fluid (Fig. 6), and when all air bubbles cease to appear or when stream is a solid fluid mass, close bleeder connection. Open connection again to allow a slight amount of fluid to drain, then tighten bleeder connection securely.

Fluid withdrawn in "bleeding" operation should not be used again. The bleeding operation should be repeated on each wheel cylinder, and fluid should be replenished in the supply tank each time. Should supply tank be drained during bleeding operation, air will enter the system and "re-bleeding" will then be necessary.

CAUTION

DON'T use a substitute for Lockheed Brake Fluid. A substitute may do much damage to the system.

DON'T allow grease, paint, oil, or brake fluid to come in contact with the brake lining.

DON'T clean rubber parts or inside of cylinders with anything but alcohol. Don't use kerosene or gasoline.

DON'T reline one wheel with a different make of lining than is used on the others, as you cannot expect equal braking effect if this is done.

DON'T allow the supply tank to be less than half-full of brake fluid.

BRAKE FLUID

Lockheed Brake Fluid is prepared by the originators of Lockheed Brakes with an exact knowledge of the requirements and the dangers of substitution. It is therefore important to use only Genuine Lockheed Fluid and thus avoid damage to brake system.

Lockheed Brake Fluid is put up in convenient containers with necessary instructions for use and may be procured from your dealer or from Wagner-Lockheed Service Stations.

SERVICE

When in need of service, repairs, or parts, get in touch with the nearest Auburn distributor or dealer.

The Wagner-Electric Corporation, St. Louis, Mo., maintains a nation-wide organization for the service of Lockheed Hydraulic Brakes.

Following is a list of Wagner-Lockheed Service Branches:

Atlanta, Ga.
145 West Peachtree St.

Baltimore, Maryland
2018 N. Charles St.

Boston, Mass.
342 Newbury St.

Buffalo, N. Y.
769 Main St.

Chicago, Ills.
1725 S. Michigan Ave.

Cincinnati, Ohio
2125-27 Reading Road

Cleveland, Ohio
1412 E. 25th St.

Dallas, Texas
2815 Commerce St.

Denver, Colo.
1360 Bannock St.

Detroit, Mich.
2843 East Grand Blvd.

Indianapolis, Indiana
1032 N. Illinois St.

Kansas City, Mo.
1615 Baltimore Ave.

Los Angeles, Calif.
818 West 13th St.

Memphis, Tenn.
1114-16 Union Ave.

Milwaukee, Wis.
501 Broadway

Minneapolis, Minn.
111 S. 12th St.

Toronto, Canada
217 Dundas St., East

New York, N. Y.
321 W. 54th St.

Omaha, Nebr.
2566 Leavenworth St.

Philadelphia, Pa.
1720-26 Callowhill St.

Pittsburgh, Pa.
5031 Liberty Ave.

Portland, Oregon
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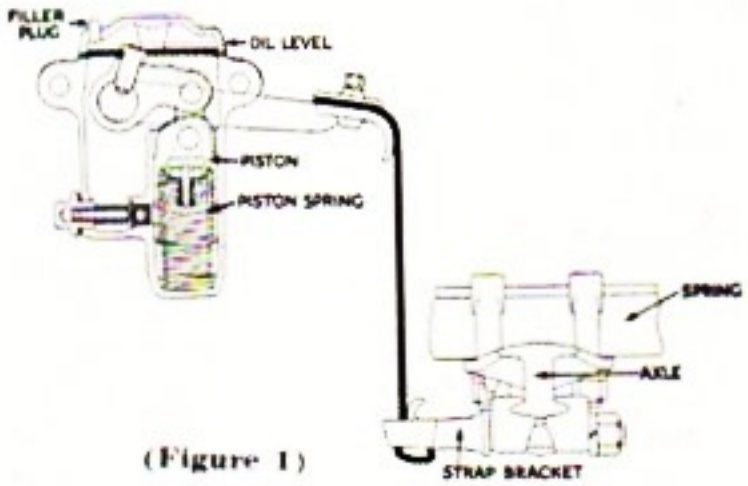
San Francisco, Cal.
457 Ninth St.

Seattle, Washington
1918 First Ave., South

St. Louis, Mo.
3029 Locust St.

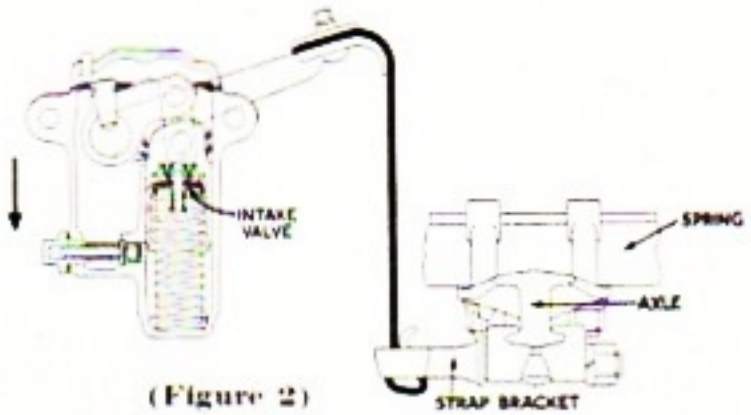
LOVEJOY SHOCK ABSORBERS

Delco-Remy Lovejoy Hydraulic Shock Absorbers are standard equipment on this model. This device is single action, rebound control, offering resistance to the spring operation in only one direction, and working against the rebound of body or chassis. The resistance of the absorber is caused by the piston pumping oil through a variable valve or orifice. The oil used is a special low viscosity oil that will remain fluid at temperatures as low as 40° F. The same oil is used for winter and summer, and will have similar operating characteristics the year around.



(Figure 1)

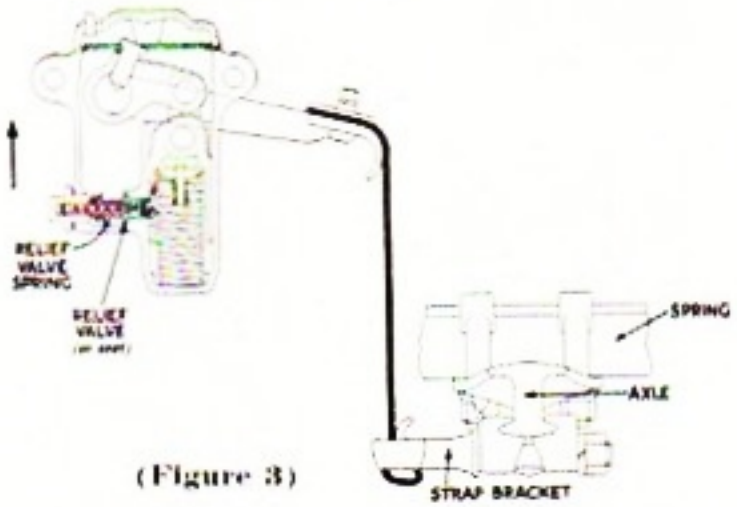
Figure No. 1 shows the normal, at rest, position of the absorber. The arm is slightly below horizontal and the intake and relief valves are both closed. The large spring working through the piston, lever and arm keeps the strap taut no matter how many strokes the absorber makes per minute. The strap is always in the same position so there is no wear on it. The oil level is shown by dotted line and the absorber must always be filled to this height for proper operation.



(Figure 2)

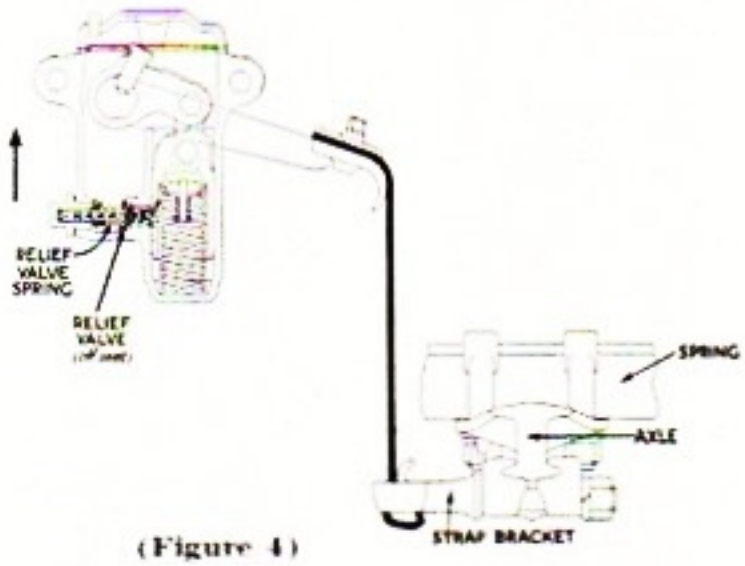
Figure No. 2 shows position of absorber and valves when the car strikes a bump and the springs are being compressed. During this action

the arm is moving upward, although the strap and the end of arm are in same relative position to the axle as they were when springs were in normal position. The piston moves up when the arm does, tending to cause a vacuum under the piston. This action opens the intake valve and draws oil from top of cylinder to bottom, filling the lower part of cylinder. During this stroke of the piston and arm, the absorber does no work and has no control over the movement of car spring.



(Figure 3)

Figure No. 3 shows position of absorber and valves during the rebound due to a light shock. The arm is moving down slowly and the piston is forcing oil through the small hole in relief valve. The valve is still seated. The intake valve is closed. The small hole in the relief valve is used in order to give easy riding qualities for slight bumps.



(Figure 4)

Figure No. 4 shows position of absorber and valves during the rebound due to a hard bump. The arm moves down rapidly and the piston creates enough pressure beneath it to unseat the valve. Oil is passing through the small hole in valve and through the valve part itself. The resistance of the absorber is due entirely to the resistance of the oil passing through and around the relief valve.

SERVICE INSTRUCTIONS

When checking for noise, make certain that the absorber is bolted tight to the frame. See that arm is not striking the fender brace, rubbing on steering apparatus, or striking floor boards, gas lines, etc. Check spring shackles for side play. They should be loose enough to operate freely, but not loose enough to cause noise.

After these points have been checked, and it has been determined that the absorbers are noisy, they should be taken to an authorized Shock Absorber Service Station where they can be properly taken care of.

All Shock Absorbers are filled with oil and sealed before installation. The oil used has a very low viscosity and temperature changes will have little effect on its fluidity. This oil, only, should be used and it can be obtained from AUBURN dealers or from any authorized Shock Absorber Distributor or United Motors Service Station. The oil is supplied in half gallon cans which is more than required to fill a complete set.

Most oil leak complaints are caused by the fact that oil on the absorber collects dust and looks unsightly. The oil may come from inside the absorber or it may be squeezed out of the gaskets.

All the cork gaskets are soaked in 600-W oil before being used. This heavy oil will gradually be forced out of the gaskets onto the metal of the absorber where it accumulates a coating of dust.

Any actual leak will cause a shortage of oil in the absorber which can be determined by pushing down on the absorber arm. If the arm goes down easily at first, then comes to a stop and goes slowly the rest of the way down, there is not enough oil in the absorber and it should be replenished. If, after wiping off the oil and driving the car a few days, the absorber continues to leak, take the car to an authorized Shock Absorber Service Station, where the absorbers can be properly repaired.

When replenishing oil, exercise extreme care to prevent grit or foreign matter from getting in the absorber.

Straps are used on these Hydraulic Shock Absorbers to give a strong, flexible, and quick mechanical connection between the absorber arm and the axle. They do not require greasing or painting. They must be fastened tightly to the arm by means of the strap cleat and nut. If the cleat is loose and the hole in the strap has been elongated, a new strap should be installed, for a strap of incorrect length is liable to cause noise and poor action of the absorber. The strap anchor must be clamped tightly to the axle to prevent slipping and probable interference with the steering or brake mechanism.

The relief valve and spring combination with which the absorbers are equipped is considered the best combination for the purpose and we advise against making any change in it.

WIRE WHEEL EQUIPMENT

The following information will be of interest in connection with No. 76 models which are equipped with Dayton Dental Drive wire wheels.

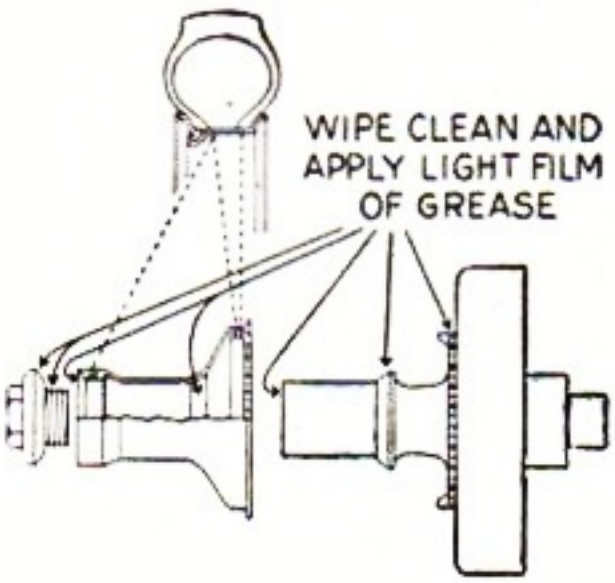
A set of wire wheels includes five wheels, four inner hubs and four

hub caps. A wrench is not necessary with wing type hammer lock hub caps.

Front hubs are machined to take same bearing retainers and bearings that are furnished with wood wheels. Rear hubs are machined to fit rear axles of car for which wheels are furnished, and all hub bolts, nuts and washers necessary for installation are included.

All hubs and hub caps are plainly stamped RIGHT SIDE or LEFT SIDE. Hubs and caps have right hand threads for right side of car and left hand threads for left side of car. Right and left side of car always means your right or left side when sitting in the driver's seat.

After inner hubs have been adjusted to the axle spindles, be sure to insert cotter keys through castellated nuts and spindles. Wheels are now ready to be mounted. Clean the taper in hub shell and the other surfaces indicated by arrows on the diagram and apply a light film of grease to these parts. Mount wheel and screw hub cap tight. Arrows stamped on hub cap indicate the direction the cap revolves in screwing on. Final tightening of hub cap should be made by several smart blows of mallet on ears of wing type cap. Do not pack hub caps with grease.



After car has been driven about 500 miles, inspection should be made of all hub caps to BE SURE THEY ARE TIGHT. To do this, and always in changing wheels, be sure that the inflated tire is clear of the ground. Loose hub caps result in damage to the wheels. Care must be used to keep them tight. Wheels should be removed occasionally, and tapers and other parts cleaned and greased as directed above.

NOTE: Due to the design of these wire wheels, with thread for hub cap on inside of hub, the hubs are installed on the car just the reverse of other types of wire wheels having thread for hub cap on outside of hub. Such wheels require hubs and hub caps with left hand threads for the right side of car and hub caps with right hand threads for the left side of car.

It is necessary to keep in mind this difference in design and carefully

follow the instructions above for installing the model 76 type wire wheels.

When cleaning wire wheels that are very muddy, use a wire wheel brush. To obtain the best results use soft soap and warm water. Allow the soapy water to remain on wheels a few minutes to eat off the dirt, then clean the wheels with the wire wheel cleaning brush and rinse with cold water. In most cases wire wheels only need one rinsing with spray from hose.

CARE OF TIRES

An automobile tire must not only meet the wear of the roadway, but must withstand a chafing action within itself caused by the constant flexing of the tire as it comes in contact with the road.

With normal load and correct inflation, a tire flexes without undue strain, but if it carries a load greater than its rated capacity or is run at a lower air pressure than that recommended, the tire is worked out, not worn out.

MAINTAIN AIR PRESSURE

Inflate your tires every week.

Air pressure recommendations are always minimum and must be maintained or reduced mileage and tire troubles are sure to result.

If a valve inside leaks, replace it with a new one.

After inflation, apply the small valve cap, screwing it down tightly with fingers. It protects the delicate valve inside and serves as a double seat to prevent leakage of air.

	Tire size on wood wheels	Tire side on wire wheels	Recommended inflation front and rear
MODEL 76, Standard	28x5.50	30x6.00	35 lbs.

VARIABLE TREAD WEAR

The two tires shown on next page were run 7000 miles, at same time, on opposite wheels. The tire at right was run at the recommended pressure. Note the normal tread wear.

The tire at left was run five pounds below the recommended pressure. The tread is uneven and badly worn. Excessive flexing due to under-inflation caused the tread to be wiped away, resulting in the loss of many miles of service. Speed, quick starts and sudden stops cause faster tread wear, and in these days of high speed engines, with quick acceleration,

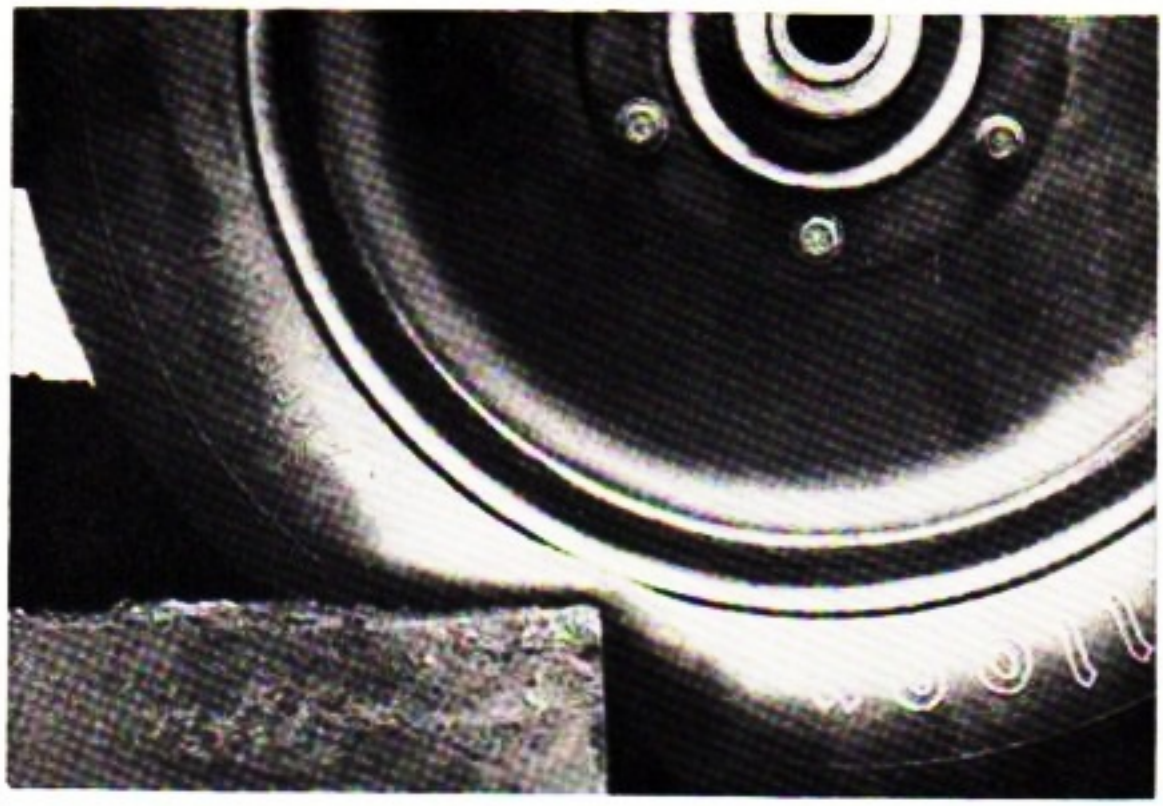
(Figure 1)

four wheel brakes, heavy traffic and good country roads, many car owners are shortening the life of their tires.

RIM BRUISES

A rim bruise is a break in the carcass of a tire, caused by hitting some obstacle with sufficient force to drive the tire up against the rim. See figure 2. The tread and sidewall rubber will not as a rule show where the tire came in contact with the object.

A rim bruise is usually due to underinflation. With the weight of the car moving at average speed, the impact of the tire against an object in the road is tremendous. With the tire underinflated, there is not enough resistance to prevent its being jammed against the rim and crushed



(Figure 2)

in same manner as placing a small rope on a rock and hitting it with a hammer.

(Figure 3)

One type of rim bruise is shown in Fig. 3. Rim bruises on the inside vary in appearance. They can occur at any point in the tire, they may run with or against the cords.

A tire injured in this way seldom fails at once. It may run many miles and go flat on a perfectly smooth road, or while the car is standing still.

Everytime the injured spot comes in contact with the road it flattens out and the break opens, then when it leaves the road, and becomes round again, the break closes. This constant opening and closing increases the size of the break.

The tube, being elastic and filled with air, presses tightly against the inside of the casing and works its way into any opening. Sooner or later the tube is pinched through and the tire goes flat.

(Figure 4)

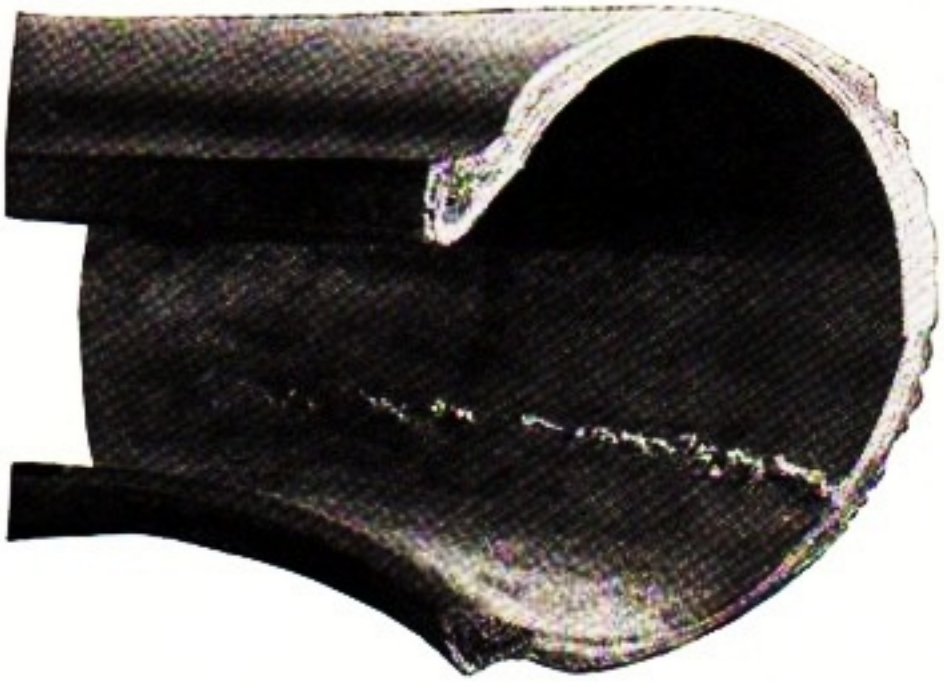
A rim bruise on the outside, Fig. 4, is usually due to tire hitting an object at an angle, driving the sidewall of the tire up against the edge of the rim flange, crushing the fabric at the point of contact.

BEAD INJURY

Figure 5 shows a damaged rim and the tire injury which it caused. A straight side tire requires the support of the rim flanges. When one of the flanges has a bent spot, the tire bead does not get proper support at this point and air pressure from within causes a bulge in the tire. This bulging causes chafing of the bead covering whenever the tire at this

(Figure 5)

point comes in contact with the road, ultimately weakening the bead and causing tire failure. If a rim is damaged so that it cannot be trued up, replace it with a new one.

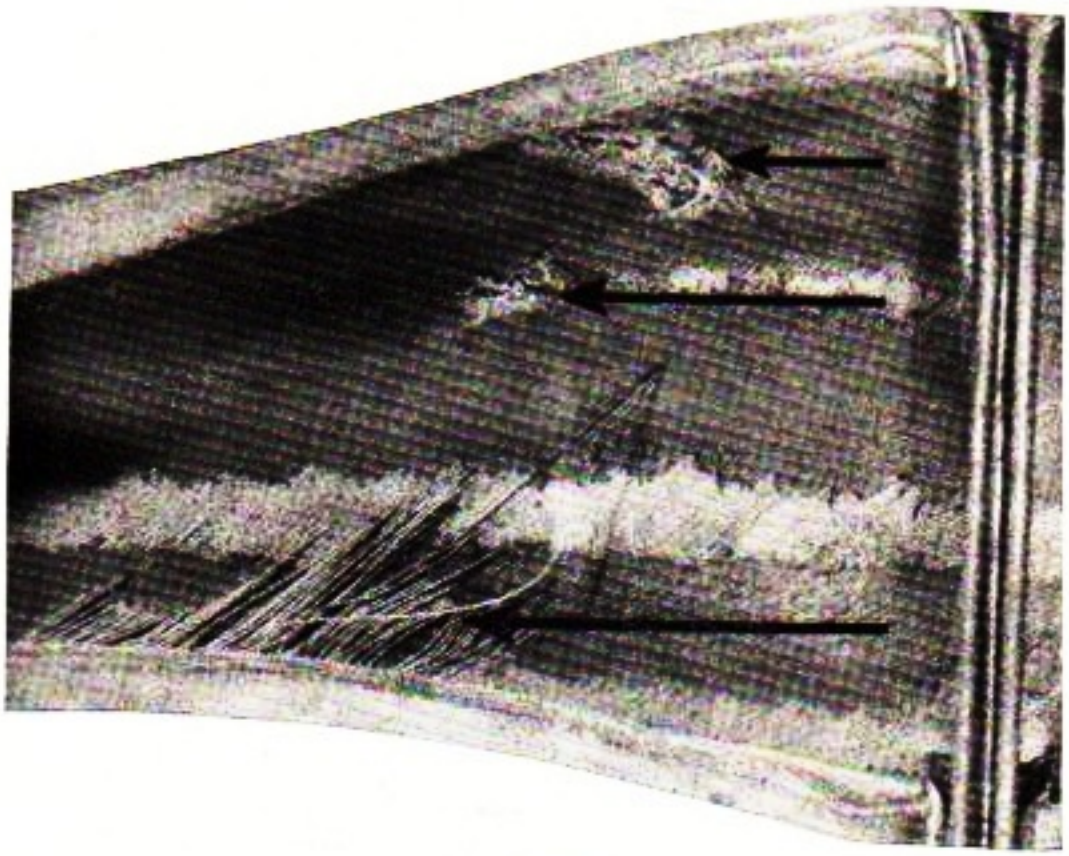


(Figure 6)

CIRCUMFERENTIAL BREAKS

A break of the type shown in Fig. 6 may be due to either overload or underinflation, usually the latter. When the pressure is below the mark recommended, the result is excessive flexing.

The tire is overworked and breaks down. Continued excessive flexing increases the extent of the injury. The tube is forced into the break and is either pinched through or the casing blows out.



(Figure 7)

In Figure 7, is shown a section of casing that was run totally deflated for some distance and so badly injured that it was unfit for further service. No evidence of the damage, however, appeared on the outside. The same condition will result if a casing is driven for a considerable distance at extremely low pressure.

If a tire goes flat stop the car at once, remove the tire and have the cause remedied. If the casing is injured and no spare is available, a blowout patch may be used as a temporary repair. Continued use of the patch will chafe the casing so badly that it cannot be satisfactorily repaired.

The inside appearance of tires injured by running them totally deflated or with extremely low pressure will vary according to the amount of air pressure, speed, load, distance travelled, and condition of the road. The variations may run from slight chafing on the inside to a combination of broken and loosened cords and ply separation.

(Figure 8)

MISALIGNMENT

Misaligned wheels will cause the abnormal tread wear shown in Fig. 8. One side of the tread is worn more than the other because the wheel on which this tire was used had too much pitch or camber.

A wheel that is out of line drags or side-slips the tire over the road, scuffing away the tread just as if it were done with a file. A 30x6.00 tire on a wheel that is ½ inch out of line will be side-slipped 87 feet in one mile.

Misalignment of front wheels should be promptly corrected as described under Front Axle Assembly.

SPEEDOMETER

The speedometer head (on instrument board) requires no attention and should operate perfectly throughout the life of the car. It is properly lubricated when assembled and under no circumstances, should be taken apart.

If repairs become necessary, before sending the speedometer to the nearest Stewart-Warner Speedometer Service Station, examine the driving equipment very carefully.

Failure to register speed and mileage may be caused by one of the following reasons.

1. Loose connection between the speedometer and the flexible shaft.
2. Loose connection at transmission drive end of flexible shaft.
3. Gears in speedometer drive housing (at transmission) may be stripped.
4. Flexible shaft may be broken.

The flexible shaft consists of a series of links which drive the speedometer by revolving inside of a steel casing. This casing is filled with a special grease when shipped and should be taken to a Stewart-Warner branch or service station AT LEAST ONCE EVERY 3,000 MILES FOR GREASING. This is very important for if allowed to run dry, the shaft will break, causing added expense and delay.

If the flexible shaft is replaced at any time, be sure that it is the same length as originally furnished. The shaft should make a sweeping curve from the transmission to the speedometer, avoiding any sharp bends. Be careful that the shaft does not lie against wiring or metal surface as chafing and noise will result.

SHAFT LUBRICATION

Disconnect the upper end tip (at instrument board) and also transmission end; then pull chain out of the casing from the lower end. Cover the links liberally with graphite grease or Stewart lubricant and insert chain in the casing.

DO NOT USE A FLUID OIL OR HARD GREASE, for the oil will work through the casing and the grease will cause excessive friction and will not lubricate properly.

We recommend the use of the SPECIAL STEWART LUBRICANT and it can be procured from any Stewart Distributor or repair station.

A worm gear is fastened to the main drive shaft of the transmission between the rear transmission bearing and the front universal joint. A pinion is mounted in a housing which meshes with the driving worm. The gears receive their lubrication from the transmission.

At the back of the speedometer head is a small knob that can be pulled out. By turning the knob you can reset the figures to any tenth of a mile desired or back to zero. Be sure that after resetting the speedometer, you again push the knob to its original position; if you do not, it will fail to record.

DETECTING DIFFICULTIES

ELECTRIC CRANKING FAILS

1. Loose Battery Connections. Battery terminals are subject to corrosion that usually takes place between the battery post and terminal where it can not be seen. Therefore, when testing for a loose connection, remove terminal entirely from post and thoroughly wipe off both post and terminal. Replace terminal by again clamping it tightly to the post. A sudden dimming of the lights when the starter button is drawn out usually indicates a broken or loose battery terminal.

2. Depleted Battery. Dim lights with failure to crank usually indicate a run-down battery.

3. Starting motor brushes making faulty commutator contact.

4. Seized motor bearings or transmission gears engaged.

FAILURE OF ENGINE TO START

1. Switch not turned on.

2. No gasoline.

3. Water in gasoline, or poor grade of gasoline in extremely cold weather.

4. Weak ignition.

5. Contact points in distributor head out of adjustment.

6. Open circuit in the ignition resistance unit. Resistance coil may be disconnected or broken.

7. Water on coil, distributor or spark plug terminals.

8. Spark plugs improperly adjusted. Clean and set to gap gauge mounted on distributor wrench.

9. Over-rich mixture, or what is commonly called "Carburetor Flooding" caused by continued use of choke. If there is good, clean gasoline in the carburetor and a good spark at the plugs, your engine will start if properly handled.

ENGINE STOPS

1. Lack of gasoline. A popping or choking usually precedes the final stopping of the engine when the gasoline ceases to flow into the carburetor.

2. Vents in main gasoline supply tank at rear may be clogged. (Vents are in upper end of gauge tube).

3. Disconnected spark plug terminals or other loose electrical connections between distributor head to coil or spark plugs.

4. Contact arm adjustment loose.

5. Engine out of oil, usually indicated by a knocking in the engine followed by an abrupt stop. If this occurs, do not attempt to use either the electric starter or hand crank. Let the engine cool off. This usually is a serious matter, and the engine should have the attention of a good mechanic before attempting to put the car into service again. This same condition may be the result of a sudden loss of water from the circulating system. Should this be the case DO NOT pour a fresh supply of water into the radiator until the engine has had ample time to cool off thoroughly.

REASONS FOR ENGINE MISSING

1. Short-circuited or dirty spark plug or plug out of adjustment.

2. Partially short-circuited or broken secondary terminals. These are the wires running from the distributor head on top of engine to spark plugs.

3. Poor contact between the various ends and clips of wires.

4. Loss of compression in one or more cylinders. Valves may be stuck in their guides. Valves may need regrinding or reseating. A valve spring may be broken or the adjustment of a tappet may have become loosened to a point where the tappet is either holding the valve open continually or not raising the valve off the seat at all. An inspection of all the tappet clearances will show this at once.

5. Air leaks around inlet manifold, or float stuck in carburetor bowl.

6. Improper functioning of vacuum tank.

ENGINE KNOCKS

1. Connecting rod bearings loose. Loose bearings give a light knock at high speed or when under a heavy pull. If you are convinced that this is the trouble, go to your dealer for assistance. Do not attempt to make major adjustments of this kind unless you are skilled in motor mechanics.

2. Loose main bearing. This can be distinguished from a loose connecting rod bearing by a heavy pounding under low engine speed or a heavy pull.

3. Too rich a mixture. See that dash carburetor adjustments are in "lean" position.

4. Carbon in cylinders, due to the use of improper oil. Have carbon cleaned out. Wash out present engine oil in reservoir and begin using an oil of better quality.

5. Worn valve tappet (light tapping sound). Tappet adjustments loose.

ENGINE RUNS BUT WILL NOT PULL ON GRADE, OR HEAVY ROADS

1. Loss of compression due to leaky valves. This is usually due to running with too rich a mixture, or too much oil may have caused valve seats to become gummed up.

2. Too rich a mixture through some trouble in the carburetor—flooding in all probability, due to grit or foreign matter getting under the float valve seat.

3. Float in carburetor sticking.

4. Late ignition.

5. Cold engine. Improper vaporization is usually the result of a combination of cold and a poor grade of gasoline. This applies only to extremely cold weather and should prevail only for a few minutes when first starting out when the engine is thoroughly chilled.

6. Lack of water in the radiator or proper amount of oil in the engine.

7. Improper flow of gasoline to the carburetor, usually caused by some foreign matter getting into the gasoline line, and made known by "spitting back" through the carburetor, especially when you are about to open the throttle.

ENGINE OVERHEATS

Stop Engine immediately and investigate when this condition prevails. Some of the causes are as follows:

1. Low supply of water.
2. Carburetor choke improperly set.
3. Lack of engine oil.
4. Improper ignition timing.
5. Loose or broken fan belt.
6. Cylinders carbonized.

CARE OF LACQUER FINISH

Auburn 76 Models are finished in the Lacquer process, a protective covering designed to meet present driving conditions more successfully than the old time paint and varnish system.

Lacquer must, however, receive proper care and attention. A grimy deposit will form over it, just as it does on the windshield, due to the constant presence of dust and moisture in the atmosphere. This deposit should be removed at intervals by washing with clean water, followed by thorough drying with a clean cloth.

Washing is not always necessary if the car is frequently wiped off with a good dust cloth, just as you would wipe the dust off of furniture.

Good results may be obtained by occasionally using a good polish, like Simonize Kleener or something of equal quality, followed by a thorough rubbing, being careful to not use too much of the polish, and not rub too hard.

We believe it advisable not to use polish more than two or three times during the year.

Do not use soap in washing, as many kinds of soap are harmful to Lacquer.

INSTRUCTIONS FOR ORDERING AND RETURNING PARTS

READ THESE INSTRUCTIONS CAREFULLY BEFORE ORDERING PARTS.

Send a money order, New York or Chicago draft with all parts orders.

DO NOT USE CHECKS DRAWN ON LOCAL BANKS.

This is no reflection on your financial standing but it is necessary in order to avoid a vast amount of bookkeeping and correspondence.

If no remittance is enclosed, we will refuse the order or send C. O. D. at our discretion.

All prices on parts are quoted F. O. B. Auburn, Indiana, and are subject to change without notice.

ORDERING BY MAIL, TELEGRAPH OR TELEPHONE

Give car number. This number will be found upon the name plate on the foot board. THIS NUMBER MUST ALWAYS BE GIVEN WITH ANY ORDER.

If, for any reason, the part cannot be identified, describe the part and its location in the car, enclosing a sketch or return the part for sample if necessary. It is always best to give the part numbers whenever possible.

NEVER LEAVE ANYTHING TO BE GUESSED AT.

Always consider the right side of the car at the right when SITTING IN THE CAR FACING FORWARD.

Some parts are kept in stock painted standard, but most parts requiring painting will have to be painted to order, taking several days' time. IF YOU WANT PARTS PAINTED ALWAYS STATE WHAT COLOR AND STRIPING.

We reserve the right to ship parts unpainted if not ordered painted.

State whether we shall ship by Mail, Parcel Post, Express or Freight. Write your name and address carefully and plainly.

IF WE ARE NOT ADVISED WE SHALL USE OUR JUDGMENT AT THE PURCHASER'S RISK.

RETURNING PARTS

If parts are returned for any purpose, follow these instructions:

Put YOUR name and address prominently on the outside of the package as well as addressing the package to us. If you do not do this, we will be unable to know who sent it.

PACK CAREFULLY TO PREVENT DAMAGE IN SHIPMENT.

Always prepay transportation charges. Parts will not be accepted otherwise. Tag each article carefully with information asked for in the next paragraph.

Then write us stating why part is returned, giving circumstances in detail, also all of the above information. You can not give too much detailed information as to why you are returning parts. Also state how parts are shipped and enclose transportation company's receipt.

STANDARD WARRANTY

Should the parts of any new automobile manufactured by us prove defective in workmanship or material, under normal use, within ninety days after the shipment thereof from our factory, and such defective part be returned to us at our factory in Auburn, Indiana, within said time, transportation charges paid, we will deliver to the purchaser, f. o. b. Auburn, Indiana, a new part in lieu of such returned part, providing the returned part be determined by us to have been defective in material and workmanship.

We make no warranty with respect to tires, rims, ignition apparatus, horns or other signaling devices, starting devices, generators, batteries, speedometers or other accessories, or with respect to used or second hand cars, nor are we responsible for any warranties or agreements made by our dealers. In no case will we pay any bills for repairs made outside our factory, nor shall the above agreements apply to any automobile which may be in any way altered or repaired outside our factory, nor to any defects developed by misuse, negligence or accident.

Except as above expressly provided, no warranty or guarantee of the quality of any automobile manufactured by us, or the parts thereof, or any parts, accessories or repairs, or of the other materials or workmanship therein, or of the suitableness thereof for the purpose intended, or the freedom thereof from defects, latent or patent, is made or given, nor shall any such warranty or guaranty ever arise by implication of law or otherwise.

AUBURN AUTOMOBILE COMPANY

Auburn, Indiana, U. S. A.