

REFERENCE BOOK



LINCOLN MOTOR COMPANY
Division of Ford Motor Company
DETROIT, MICHIGAN

15.00

LINCOLN-ZEPHYR

REFERENCE BOOK



1937

LINCOLN MOTOR COMPANY

Division of FORD MOTOR CO.

DETROIT, MICH.

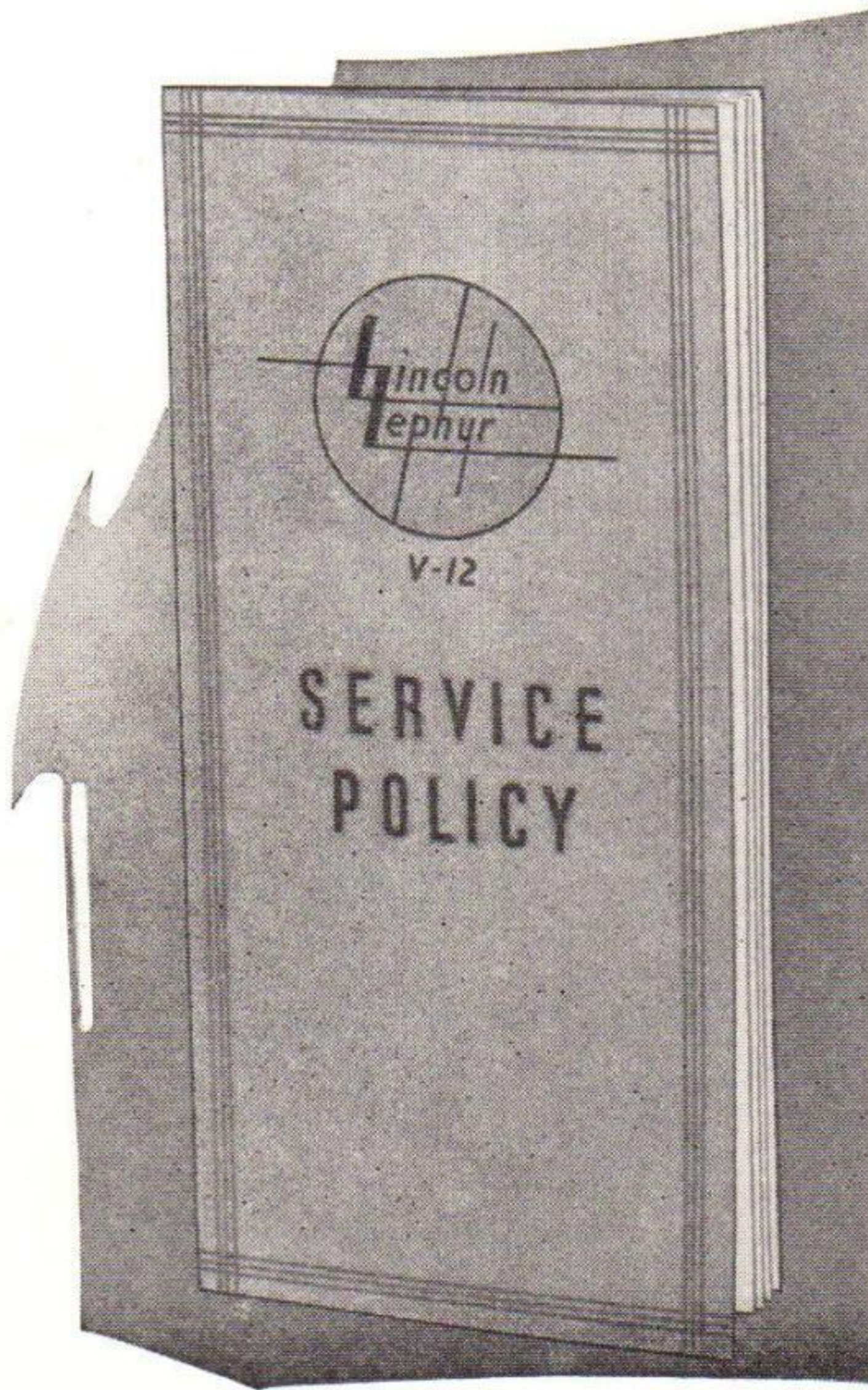
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FOREWORD

Knowing that you want to give your car proper attention, with the least effort and expense, Lincoln-Zephyr service engineers have prepared this reference book for your information and guidance. You will find it written in non-technical language and it is our thought that after reading it, you will have an even deeper appreciation of Lincoln-Zephyr quality. For convenient reference, we suggest you keep this book in the car.

INSPECTION SERVICE

The efficiency of any car depends largely upon the care it receives during the first few months following delivery. Systematic attention to lubrication and mechanical adjustments will insure that excellence of performance which is a feature of all Lincoln-Zephyr cars.



Free inspection service is rendered on a new car for a specified time as outlined in the Service Policy Folder which purchaser receives at time of delivery.

The inspection service rendered during the free service period covers the checking of 31 points on the car, 12 of which are checked with a Laboratory Test Set. This test set analyzes all engine conditions with more than human accuracy.

Throughout the life of the car the owner is entitled to have it tested without charge as often as desired by an authorized service station provided no dismantling of parts is required.

LINCOLN ZEPHYR SERVICE

One of the features of Lincoln-Zephyr service is the nation-wide organization of Lincoln-Zephyr and Ford dealers.

Through this group, service is available throughout the country and in most parts of the world.

Lincoln-Zephyr dealers are best equipped to render complete service where your car will be serviced by men of mechanical ability, trained in appreciation of quality and precision manufacturing and are qualified to render satisfactory service.

Ford dealers throughout the country are in a position to assist Lincoln-Zephyr owners should emergency service become necessary.

Service Charges

In order that maintenance cost may be kept as reasonable as possible, Lincoln-Zephyr dealers are provided with a manual suggesting uniform charges for service work. Service operations for which a flat rate can possibly apply are in this manual. The labor charge is based on the shortest time for performing the particular operation consistent with good workmanship.

Repair Parts

Lincoln-Zephyr dealers carry a stock of genuine Lincoln-Zephyr repair parts. Genuine parts have the same quality and precision as those originally used in the car.

DATA

Engine

V-type. Included angle of cylinders.	75 degrees
Number of cylinders	12
Cylinder bore	2 $\frac{3}{4}$ inches
Stroke	3 $\frac{3}{4}$ inches
Piston displacement	267 cubic inches
Horsepower (S. A. E. rating)	36.39

Body Number

A plate giving the body number of the car is attached to the front of the dash.

Engine Number

The engine number is also the serial number and is located at rear of engine on the top of the clutch housing.

Key Number

Key numbers should be noted so that in case of loss, new keys may be obtained.

Wheelbase

122 inches.

Size of Tires

7.00 x 16. Recommended tire pressure 28 pounds.

Capacities

Engine oil pan	5 quarts
Transmission	2 $\frac{1}{2}$ pints
Differential	2 $\frac{1}{2}$ pints
Cooling system	27 quarts
Gasoline tank	19 gallons

Weights

Information on the weight of various body types can be obtained from authorized Lincoln-Zephyr dealers.

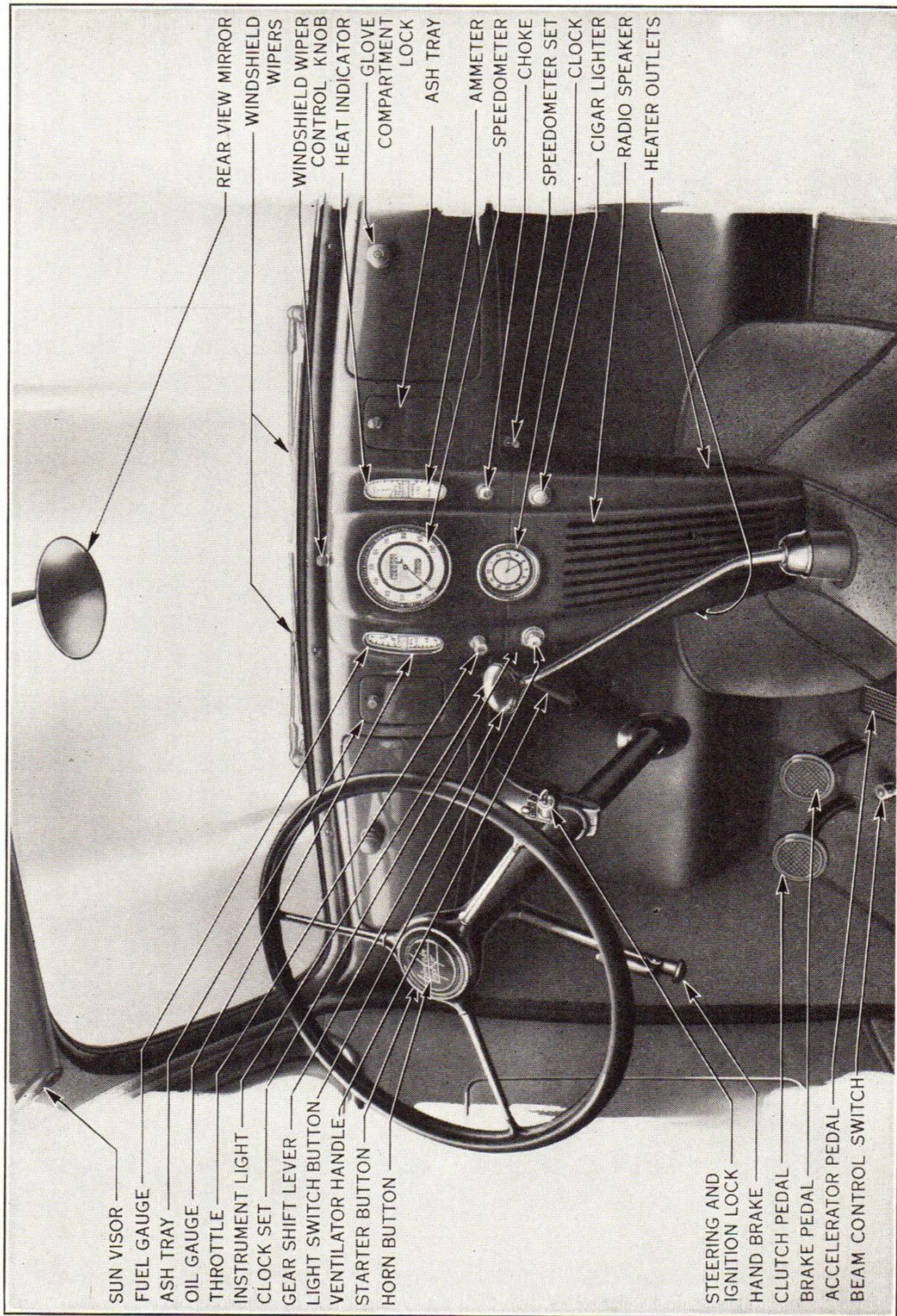


Fig. 1—Instruments and Controls

STARTING ENGINE

Be sure that the gear shift lever is in neutral position.

Depress accelerator pedal slightly.

Turn the ignition switch lever "ON." Pull out the choke button on the instrument panel. (When the engine is warm it is not necessary to do this.) Press starter button on lower left side of instrument board panel and while the engine is cranking, push choke button in until it is about three quarters open.

The engine will usually start in a few seconds. Longer periods of cranking with choke button out should be avoided as the engine may be flooded, in which case it is necessary to pull the hand throttle button all the way out and crank engine with the switch still on. When the engine starts, release the starter button at once and at the same time move the choke button to a point which gives the smoothest running condition. The choke button should be pushed all the way in as soon as the engine runs smoothly.

Cold Weather Starting

In extreme cold weather it is advisable to keep the clutch released until engine starts. By keeping the clutch released while engine is cranking, the starter motor is relieved of the extra load resulting from turning the transmission gears in the stiffened lubricant. Cold weather starting requires a judicious use of the choke button. When starting the engine in extreme cold weather, the choke button may be kept fully out until the engine starts as the auxiliary valve in the choke

butterfly will open and permit sufficient air to enter so that the engine will continue to run. However, as soon as the engine starts the choke should be pushed in to best running position. When the engine runs smooth it should be pushed all the way in.

COOLING SYSTEM

General Description and Operation

Two water pumps are used to circulate the water in the cooling system. A pump is located at the forward end of each bank of cylinders.

The pumps and the generator are driven by a V belt from a pulley on the crankshaft.

The pumps differ from the conventional type pump as no adjustable packing gland is used. The water seal around the shaft is accomplished by an automatic feature inside the pump and should need no attention other than lubrication.

Pump Lubrication

Use engine oil in the oilers located at the top of each water pump. Lubricate each 1000 miles.

How to Adjust the Generator Belt

The adjustment is made by loosening the generator support bolt and moving the generator upward. The proper adjustment is $\frac{3}{4}$ " to 1" movement in the belt at a point half way between the water pump and the generator pulley.

Radiator

The radiator is of the flat tube type. The hot water flows downward from the upper tank through the tubes to which are attached thin copper plates or fins. Air is drawn between these fins around the tubes by the fan and heat is carried away, thus cooling the water.

The radiator filler cap is located on top of the radiator under the hood and when removed is secured by a chain.

Draining the Radiator and Engine

A drain valve is provided at the bottom of the radiator on the left side.

A drain valve located at the forward end of each bank of cylinders, just below the water pumps, is provided for draining the water from the cylinder block. (See Fig. 2.)

Important—All three drain valves must be opened to completely drain the cooling system.

To control rusting, and corrosion (of aluminum cylinder heads) in the cooling system, a rust inhibitor is put in the radiator at the factory. In case of draining the water it is recommended the system be refilled with fresh water and rust inhibitor again added. This rust inhibitor can be obtained at Lincoln-Zephyr service stations.

Among the inorganic anti-freezes commonly offered to the public, calcium chloride solutions are probably the most destructive, particularly to aluminum. However, other solutions such as honey, glucose, sugar, also oils, are harmful and are not recommended.

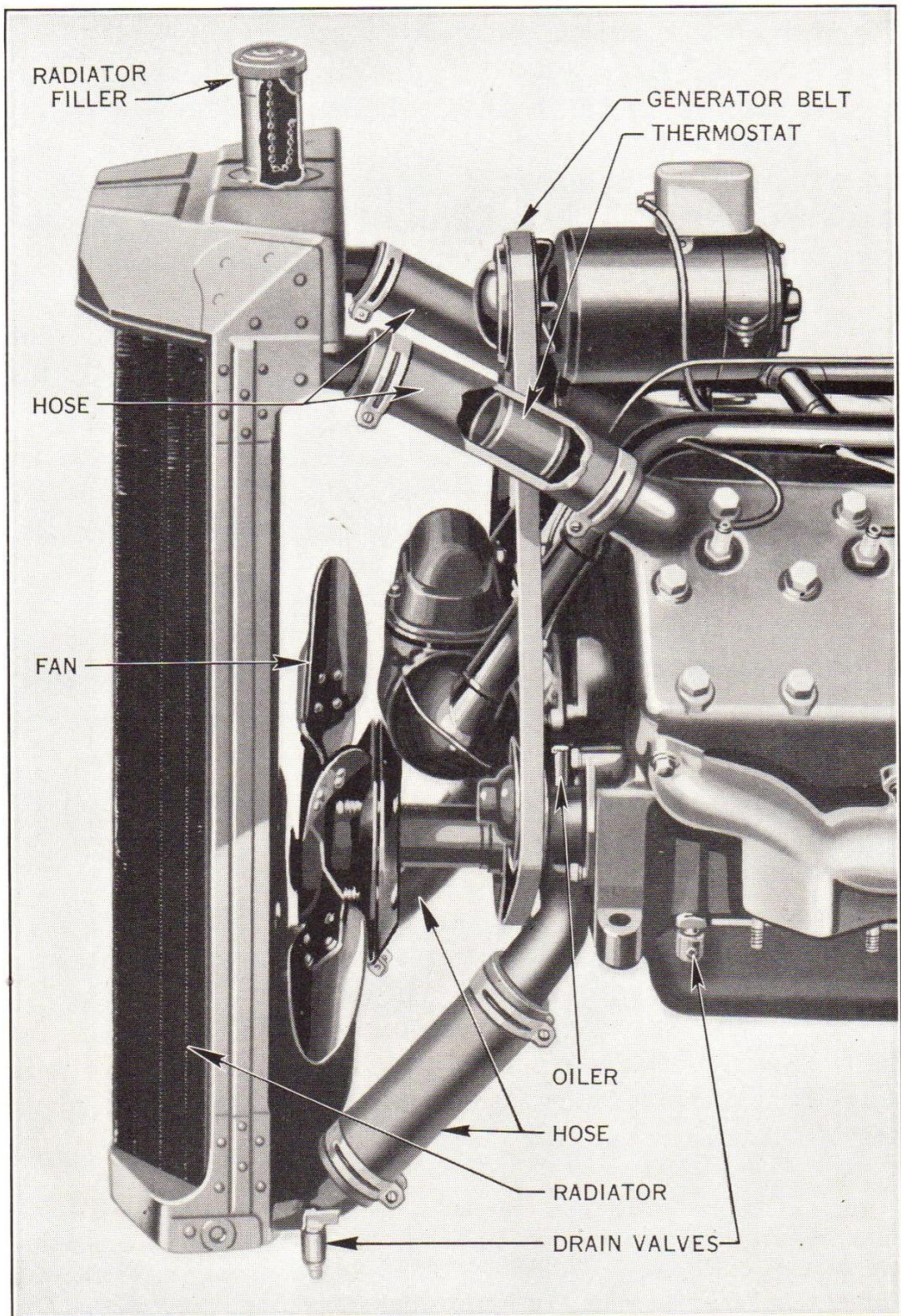


Fig. 2—Cooling System
[12]

FUEL SYSTEM

Fuel Tank

Fuel may be drained by removing the plug in the bottom of the tank.

The tank is provided with a trap to catch water or sediment. This trap is cleaned by removing the drain plug and allowing a small quantity of fuel to run out.

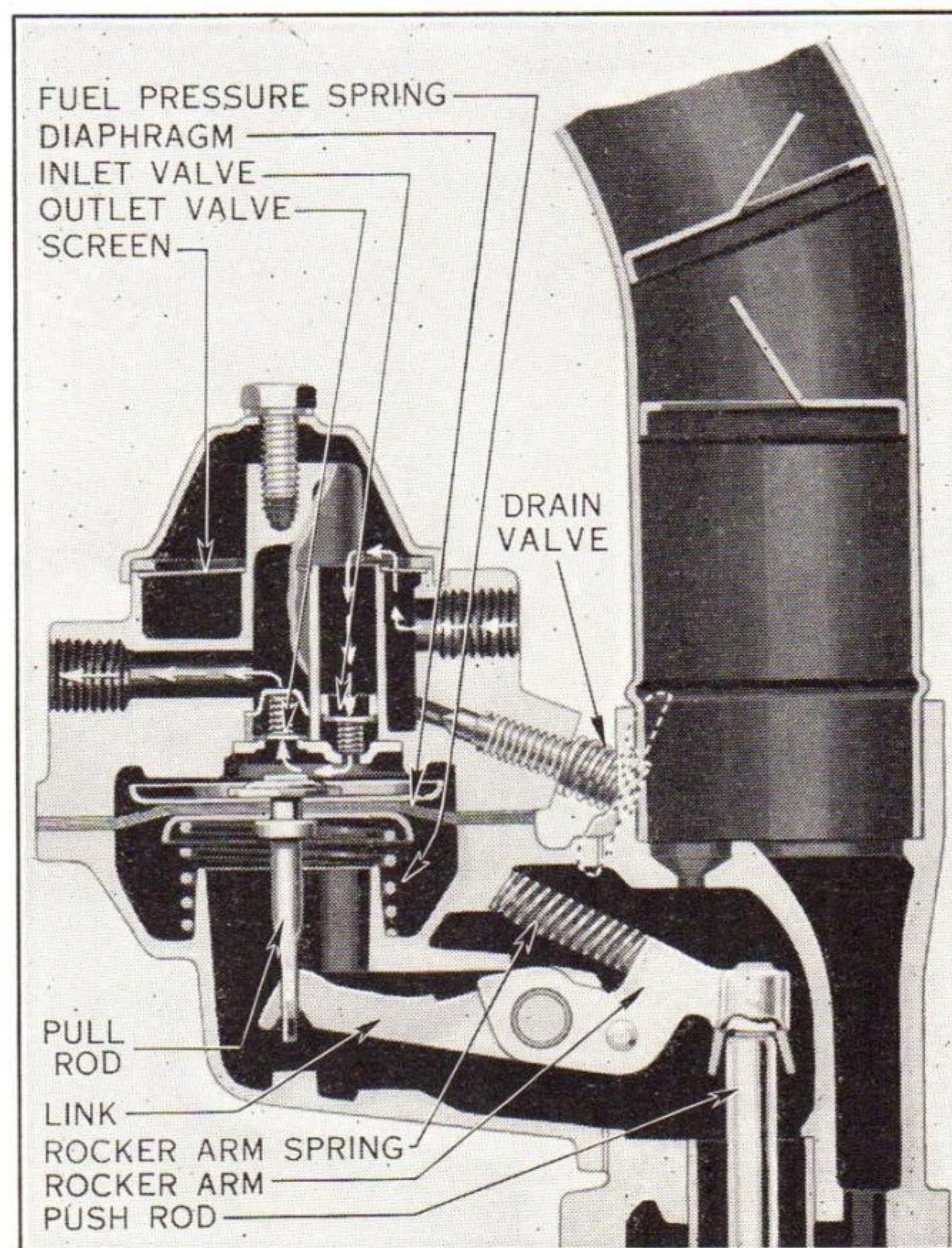


Fig. 3—Fuel Pump

Fuel Gauge

The fuel gauge located in the instrument group is of the electric type and is operated by a float in the gasoline tank. This gauge is automatic in its action and should require no attention.

NOTE—The ignition switch must be "ON" before the gauge will register.

Fuel Pump

The fuel pump is located on the top of the engine behind the carburetor and is driven by a push rod actuated by an eccentric on the camshaft. It draws the gasoline from the tank and supplies it to the carburetor. Being automatic in action, the pump requires little attention other than occasional draining to keep it free from dirt and keep all connections tight. (See Fig. 3.)

The construction of the pump is such as to provide a trap for sediment or water which can be drained off by means of the valve on the side of the pump.

In case of running out of gasoline, it will require approximately 20 seconds of cranking the engine with the starter before the pump is primed and again supplies gasoline to the carburetor.

Carburetor

The carburetor is of the dual down draft plain tube type with accelerating pump and auxiliary valve choke. The carburetor is entirely automatic in action. All orifices are fixed with the exception of the idling jets which are controlled by the idling adjusting screws. (See Fig. 4.)

Adjustment

The idle speed of the engine should be set by means of the throttle stop screw (See Fig. 4) to a speed equivalent to five miles per hour.

Idle mixture adjustment. Have the engine well warmed up and be sure that there are no air leaks at intake manifold or windshield wiper or distributor vacuum connections.

The idle adjustment shown in Fig. 4 controls the quantity of the gasoline-air mixture for low speed operation.

Turning "out" the adjustment gives a richer mixture. Turning "in" the adjustment gives a leaner mixture. Adjust one side of the carburetor at a time. Turn the adjustment in slowly until the engine begins to lag or run irregular, then slowly turn out until the engine begins to "roll." Finally, very slowly, turn in the adjustment again just enough so that the engine runs smoothly. This adjusts the mixture for one side of the engine; follow the same procedure for the opposite side.

It may be necessary after making these adjustments to correct the engine idle speed equivalent to five miles per hour by means of the throttle stop screw. (See Fig. 4.)

Caution—NEVER attempt to operate the engine and make carburetor adjustments in a small, unventilated garage. Carbon monoxide gas is a product of combustion, produced by all gasoline engines and is a deadly insidious poison to inhale.

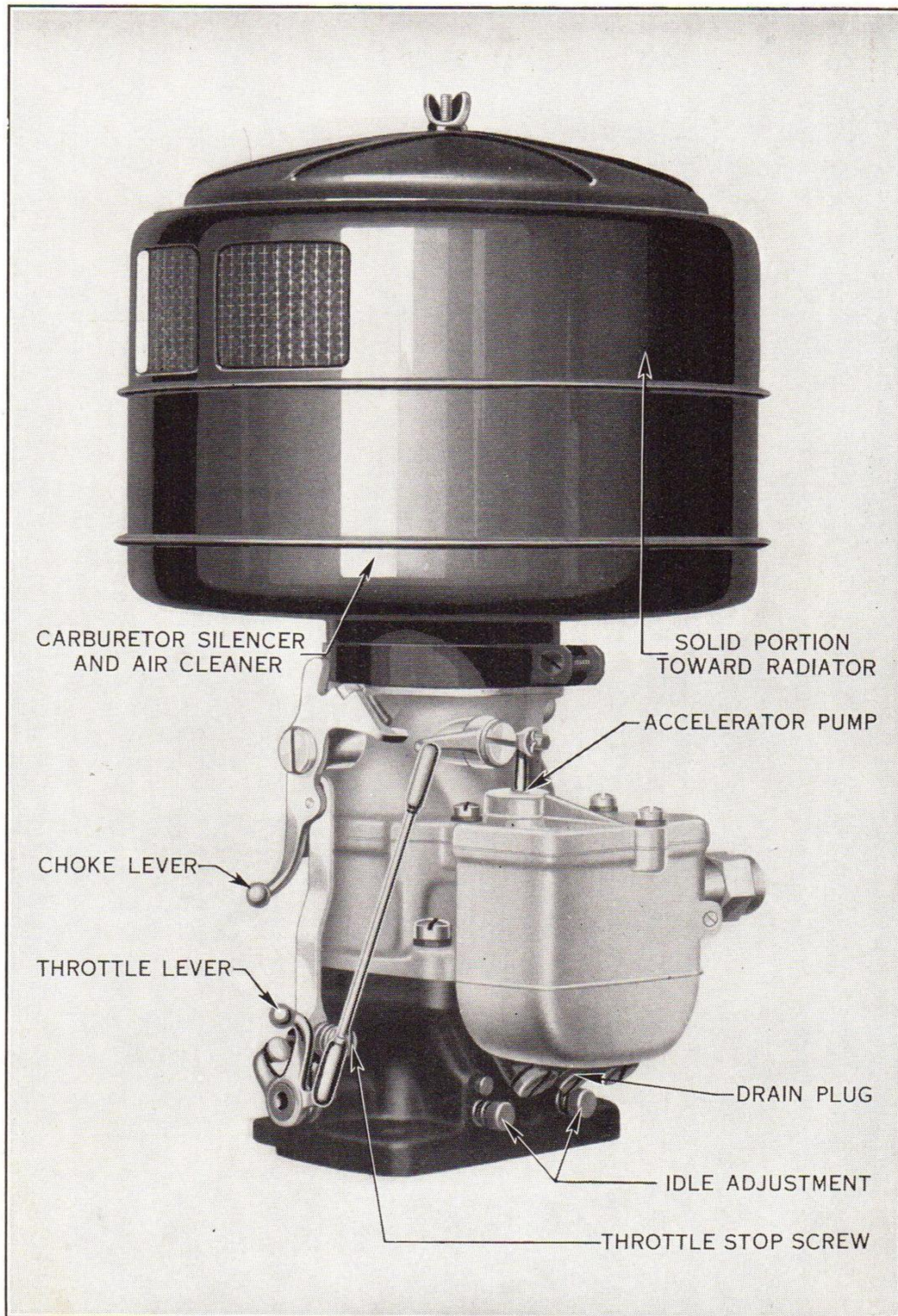


Fig. 4—Carburetor

Air Cleaner and Carburetor Silencer

The air cleaner and carburetor silencer (See Fig. 4) is attached to the carburetor air intake. This unit cleans the air going into the carburetor and also quiets carburetor operating noises.

The air cleaner should be cleaned periodically, depending upon the condition of the roads upon which the car is operated. To clean, remove and wash in gasoline, after which dry thoroughly, then submerge in a good grade of engine oil and allow to drip dry before reinstalling. (Do not oil felt in top cover.)

When cars are operated in excessive dusty road conditions an oil bath air cleaner is recommended. This type air cleaner can be obtained from Lincoln-Zephyr dealers.

ENGINE AND IGNITION

The Lincoln-Zephyr engine is accurately made, carefully assembled, and thoroughly tested. Every precaution has been taken to provide trouble free operation, and with normal care, the occasion for making emergency repairs, or adjustments on the road, should be rare.

The description and illustrations under this heading, is for general information, and the instructions are not intended to be complete in detail for making major repairs. It is recommended repairs or adjustments of a minor or major nature, be made at a Lincoln-Zephyr dealer.

ENGINE TROUBLE ON THE ROAD

If the engine will not start it is probably due to one of the following causes:

1. The cylinders have become flooded with gasoline, due to excessive use of the carburetor choke.

Remedy: Pull the throttle button all the way out. Without turning on the ignition switch, crank the engine with the starter for approximately thirty seconds to exhaust the rich gases; then proceed in starting the engine as outlined on page 9.

2. Insufficient gasoline reaching the carburetor may be caused by an empty gasoline tank, clogged gasoline line or faulty fuel pump.

Remedy: In case of running out of gasoline it will require approximately twenty seconds of cranking the engine with the starter before the pump is primed and will again supply gasoline to the carburetor. Clogged gasoline line can be cleaned by disconnecting the lines at each end and blow out the obstruction. In case of faulty fuel pump, remove and clean strainer and drain sediment trap (See Fig. 3), and make sure the inside of the pump is free from dirt, also check to see if all gas line connections are tight. In case replacement of pump parts becomes necessary it is advisable to consult a Lincoln-Zephyr dealer.

If sufficient gasoline is reaching the carburetor, a spray of gasoline will be produced at the high speed discharge nozzle in the carburetor every time the accelerator pedal is depressed. (It will be necessary to remove the air cleaner to observe this.)

3. Faulty ignition may be determined by holding a spark plug wire approximately $\frac{1}{4}$ inch away from the cylinder head as the engine is cranked with the starter. If a spark is not noted from each of the wires the cause is due to open ignition circuit, distributor points or coils. It is, of course, assumed the storage battery charge has not become exhausted.

Remedy: Check for loose connection or broken wire. If fault is located to be the distributor or coils, it is suggested you consult a Lincoln-Zephyr dealer.

Crankshaft Main Bearings

There are four crankshaft main bearings of the replaceable type. They do not require adjustment.

Connecting Rod Bearings

The connecting rod bearings are of the replaceable type and do not require adjustment.

Valves

The clearance is accurately set and no adjusting screws are used.

The correct clearance for both intake and exhaust valves is .0125 to .0135 inch.

The correct position of the valves when checking clearance is as follows: Turn engine until number one piston is at top of cylinder on the compression stroke. Both intake and exhaust clearance on this particular cylinder may be checked at this point. Proceed with the balance of cylinders in rotation according to firing order. (Firing order 1-4-9-8-5-2-11-10-3-6-7-12.)

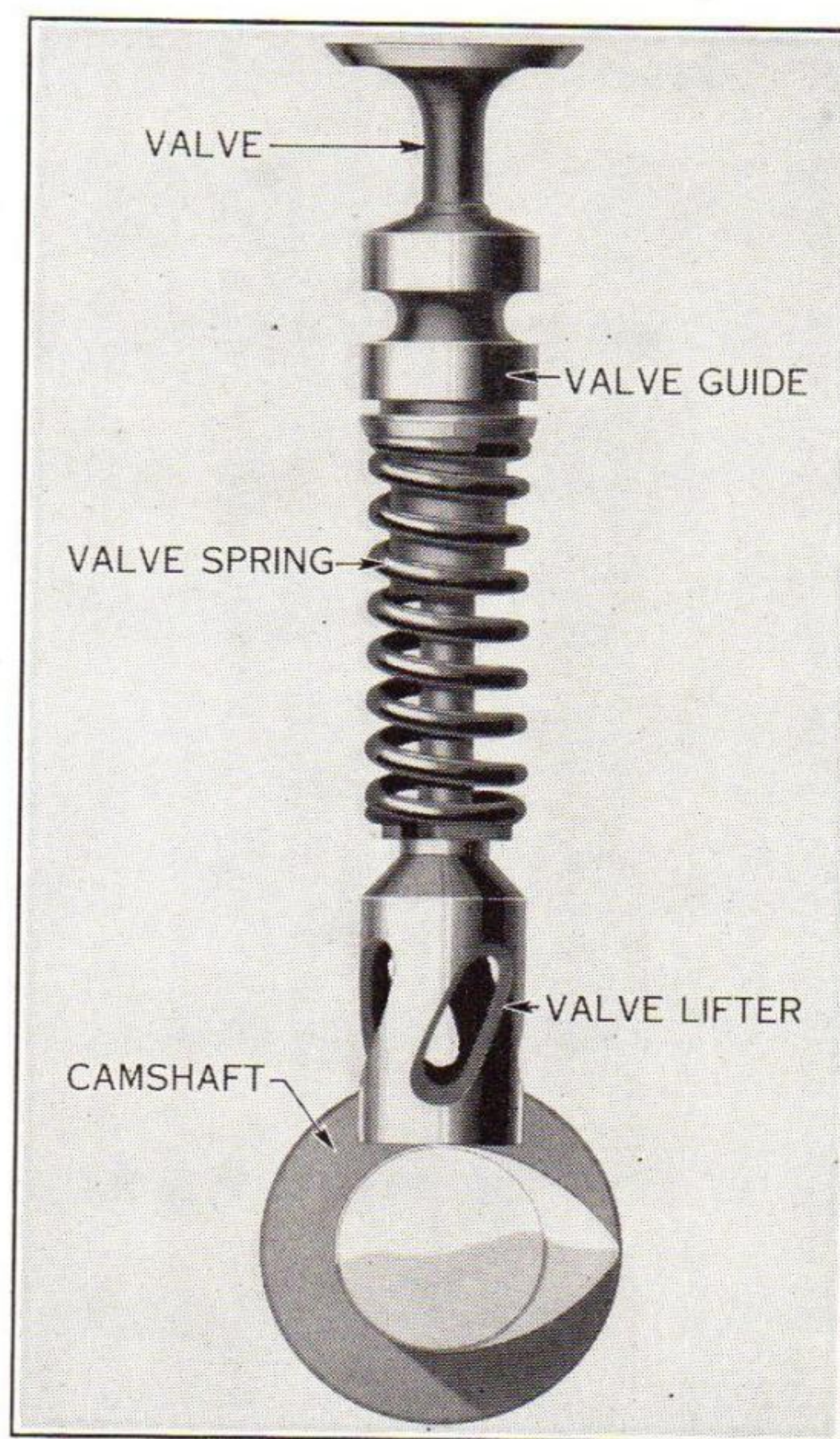


Fig. 5—Valve Lifter Assembly

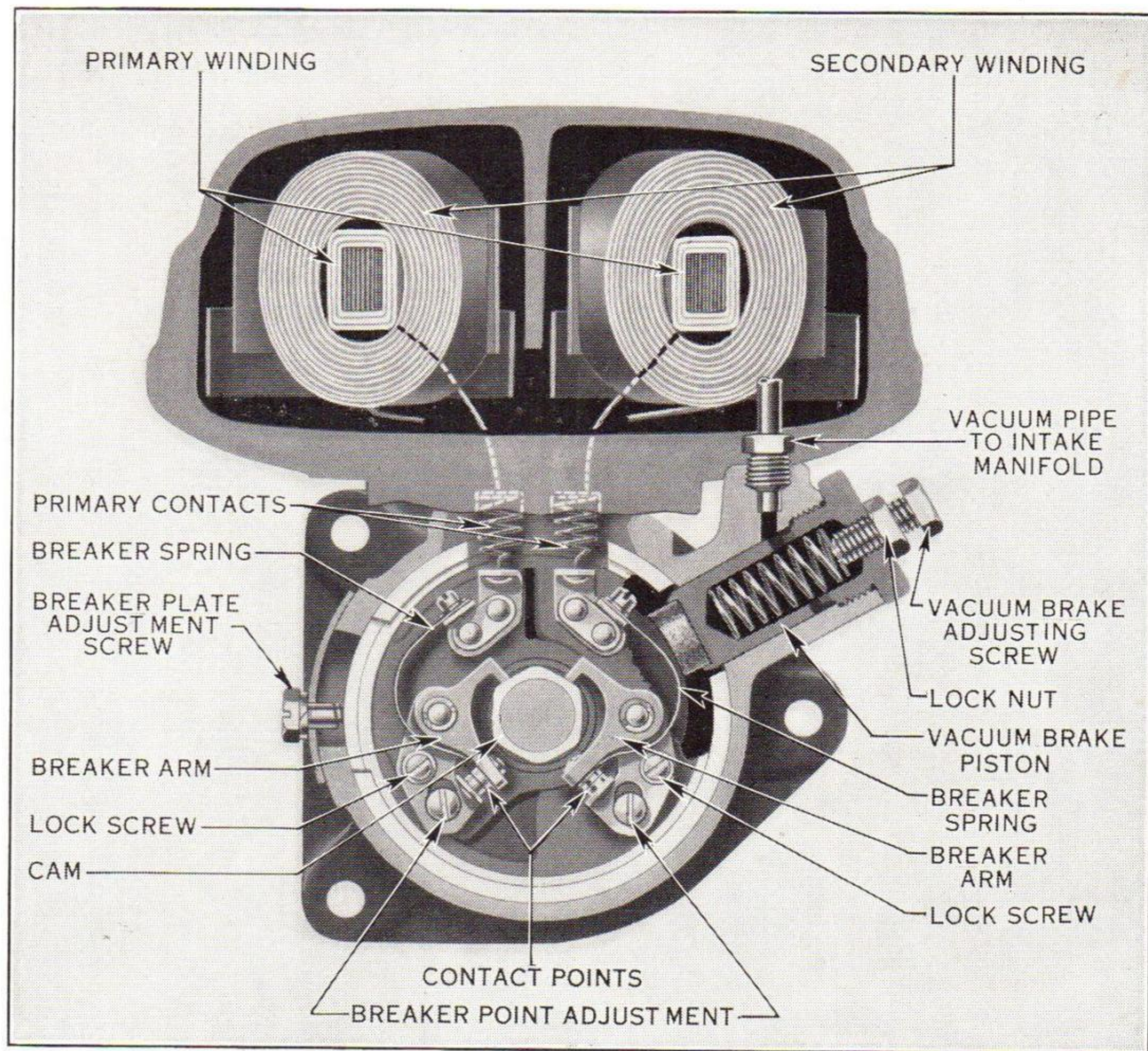


Fig. 7—Front View of Distributor

Breaker Mechanism

The breaker mechanism includes the six lobe breaker cam, two sets of breaker points and two condensers (See Fig. 7). The right hand breaker points called the fixed points, with the right hand coil fires the right hand cylinders while the left hand breaker points called the adjustable points, with the left hand coil, fires the left hand cylinders.

In the above reference to right hand and left hand, the engine and distributor should be viewed from the driver's seat and not as shown in Fig. 7.

The proper setting for the distributor breaker gap is from .014 to .016 with breaker arm on the high point of the cam.

Breaker arm spring tension should be from 20 to 24 ounces.

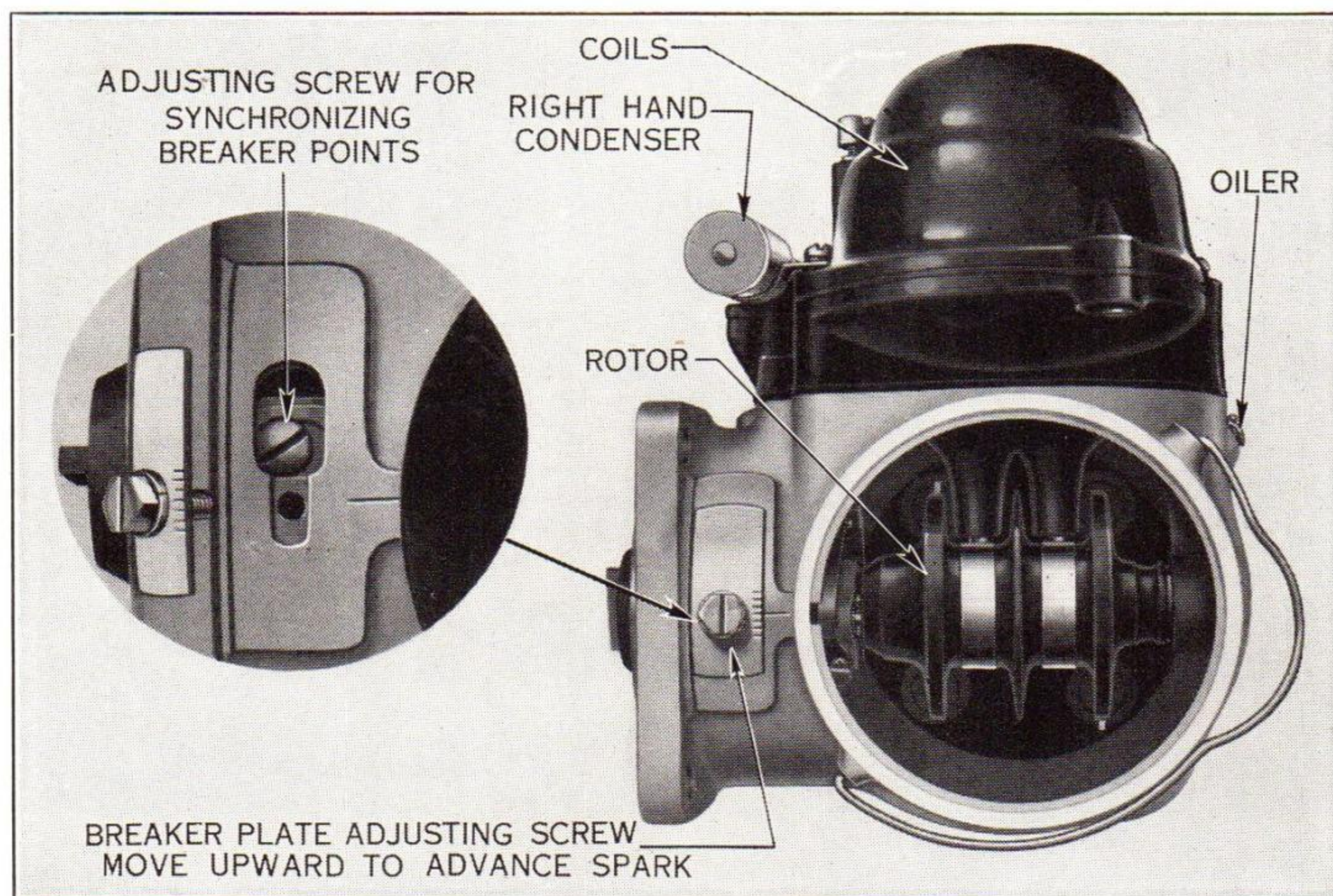


Fig. 8

Rotor and Adjustment

The rotor distributes the high tension current to the spark plugs. (See Fig. 9.) The 12 high tension terminals which are placed around the distributor plates are numbered. The wires from each of the terminals are connected to the spark plug on the cylinder which carries the corresponding number.

The forward contact on the rotor carries the current from the left hand coil for distribution to cylinders 1-3-5-7-9-11 in the left hand bank.

The rear contact on the rotor carries the current from the right hand coil for distribution to cylinders 2-4-6-8-10-12 in the right hand bank.

Spark Timing of Engine

It is advisable to have all major adjustments to the distributor made by an authorized service station, who have instruments for checking purposes. Major adjustments cover operations such as replacing the breaker points, breaker mechanism governor mechanism and synchronizing the points. Attempting such adjustments without this fixture would result in guess work. No other one thing affects the operation of a car as vitally as incorrectly adjusted ignition which reflects in poor performance, high fuel consumption and overheating of the engine.

To meet the requirements of the fuel used and the type of service in which the car is operated an adjustment is provided on the vacuum brake. (See Fig. 7.)

Adjustment is obtained for the particular fuel used as follows:

Back off the adjustment on the vacuum brake (See Fig. 7) until the engine "pings" under load. Then turn the adjusting screw in just enough to remove the ping. Tighten the adjusting screw lock nut to retain the adjustment.

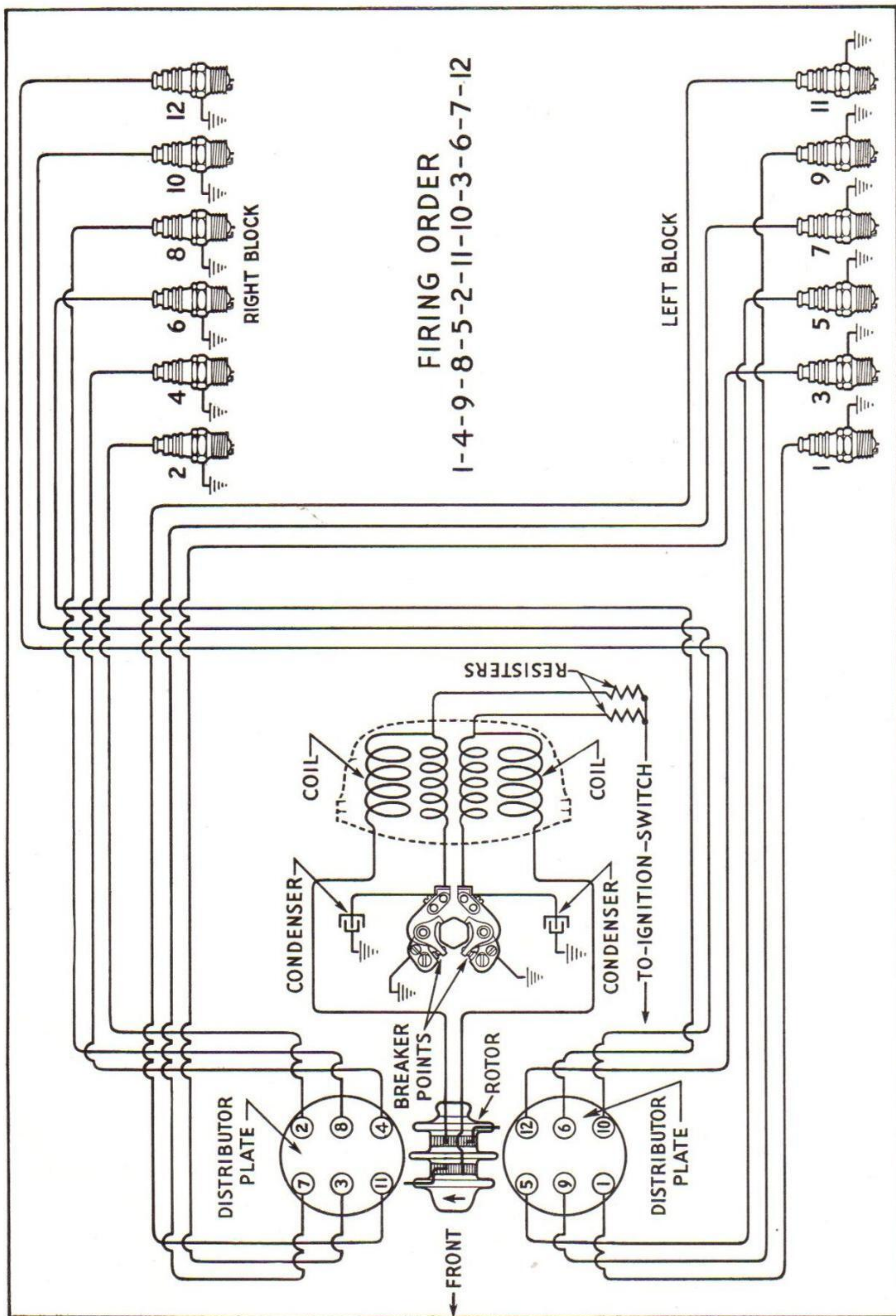


Fig. 9—Ignition Wiring Diagram

Spark Plugs

Spark plugs should be occasionally examined and cleaned. Care should be used in keeping the points set with gap of .028 to .030.

The spark plugs with which the engine is equipped at the factory are best adapted to the requirements.

Lubrication of Distributor

An oil cup is provided on the distributor housing for oiling the forward bearing of the distributor shaft. This oiler is accessible from the left side of engine. Oil each 1000 miles, using light engine oil. The bearing at the rear end of the distributor receives its oil from the interior of engine.

CLUTCH

The clutch is single plate type and is composed of two major units—the pressure plate and cover assembly and the clutch disc. (See Fig. 14.)

The pressure plate and cover assembly contains the pressure springs, pressure plate and release levers.

The release levers are mounted on needle roll bearings and so designed that the centrifugal force from the rotation of the clutch increases the pressure on the driven member as the speed of the engine is increased.

This feature permits a lighter pedal operating pressure.

The steel clutch disc has friction facing rings riveted on each side. There are six segments formed in the disc which are so as to give the required amount of cushioning to insure smooth clutch engagement and long life of the friction facing.

A mechanical damper incorporated in the hub of the driven member serves to insure quiet operation of the transmission and absorbs the shock of sudden clutch engagement. This damper is adjusted correctly at the factory and should not require further attention.

No adjustment is required on the clutch other than to maintain a required amount of free travel in the clutch pedal.

Pedal Adjustment

The pedal should have approximately $1\frac{1}{2}$ to 2 inches free movement before it disengages the clutch, with engine idling or stopped. *This is important.*

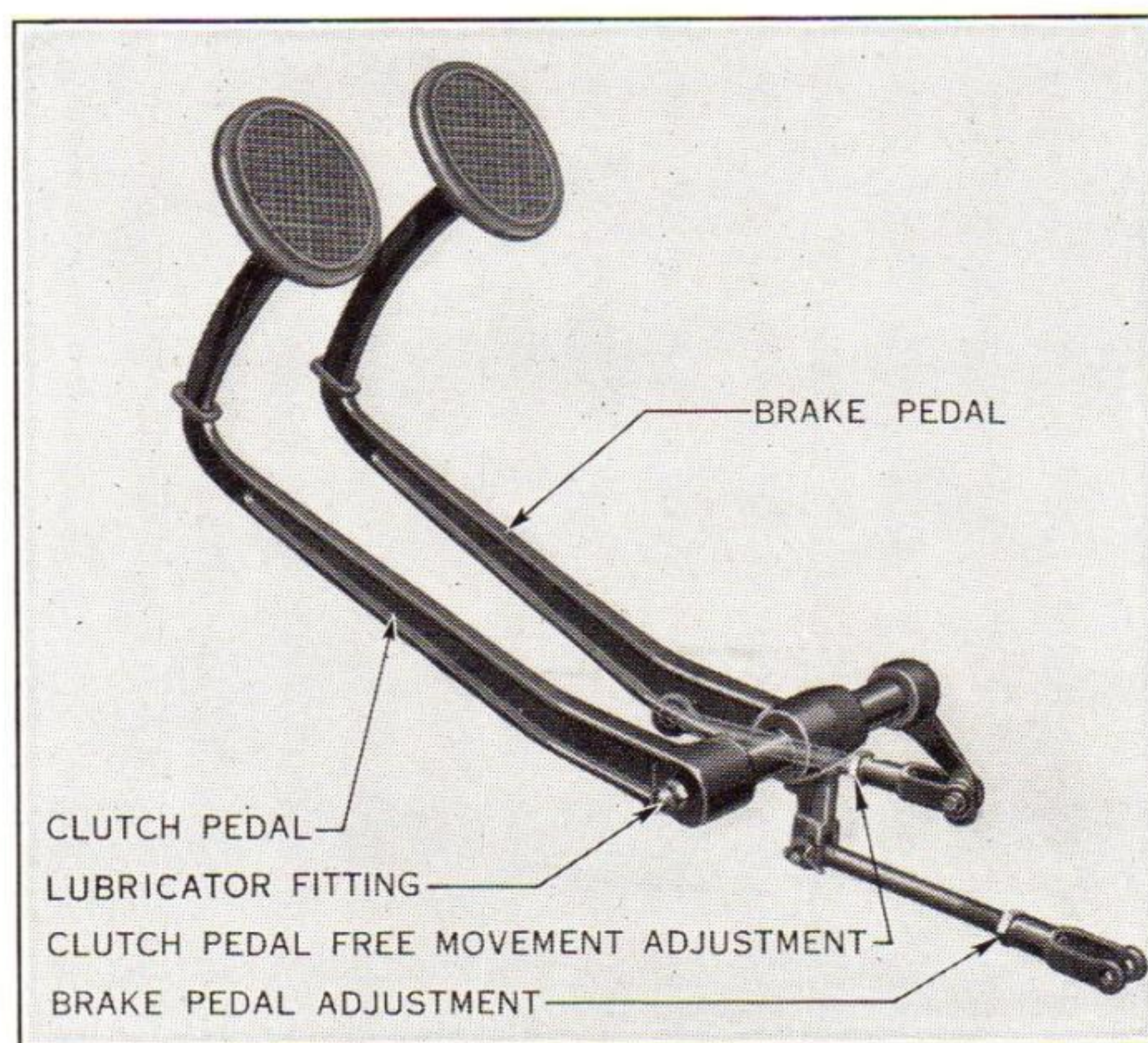


Fig. 10—Clutch Pedal Adjustment

The amount of movement can easily be determined by moving the clutch pedal down with a slight hand pressure, this will become less as the car is used. If a decrease of free movement is noted, the clutch pedal adjusting rod should be adjusted. (See Fig. 10.) Screwing the rod out of the clevis increases the amount of free movement.

Caution—Don't ride the clutch pedal. Driving with the foot resting on the pedal may result in excessive wear of the clutch facings and clutch throw-out bearing and will necessitate frequent adjustment of the clutch pedal.

The pilot bearing located in the center of the flywheel for supporting the front end of the clutch shaft and the needle rolls in the clutch fingers also the clutch throw-out bearing are lubricated at time of assembly and no further lubrication is required.

GENERAL LUBRICATION

Transmission

Summer lubricant for transmission should conform to S. A. E. specification No. 160.

Winter lubricant should conform to S. A. E. specification No. 90 to 110.

2½ pints required to fill.

Rear Axle

Summer lubricant for rear axle should conform to S. A. E. 160 (Extreme Pressure.)

Winter lubricant should conform to S. A. E. 90 to 110 (Extreme Pressure.)

2½ pints required to fill.

Water Pumps

An oiler is provided on the top of each pump for lubricating. Fill oilers every 1000 miles with engine oil.

Chassis

All moving parts of the chassis, steering knuckle, king pins, spindle connecting rod ball joints, etc., are to be lubricated only with pressure gun lubricant (See Lubrication Chart, Fig. 12). Suitable lubricator connections for pressure gun use are provided at these points.

Wheel Bearings

Use Ford fiber grease for packing wheel bearings. This grease is available from Lincoln-Zephyr dealers.

Universal Joint

Use cylinder oil soda soap grease.

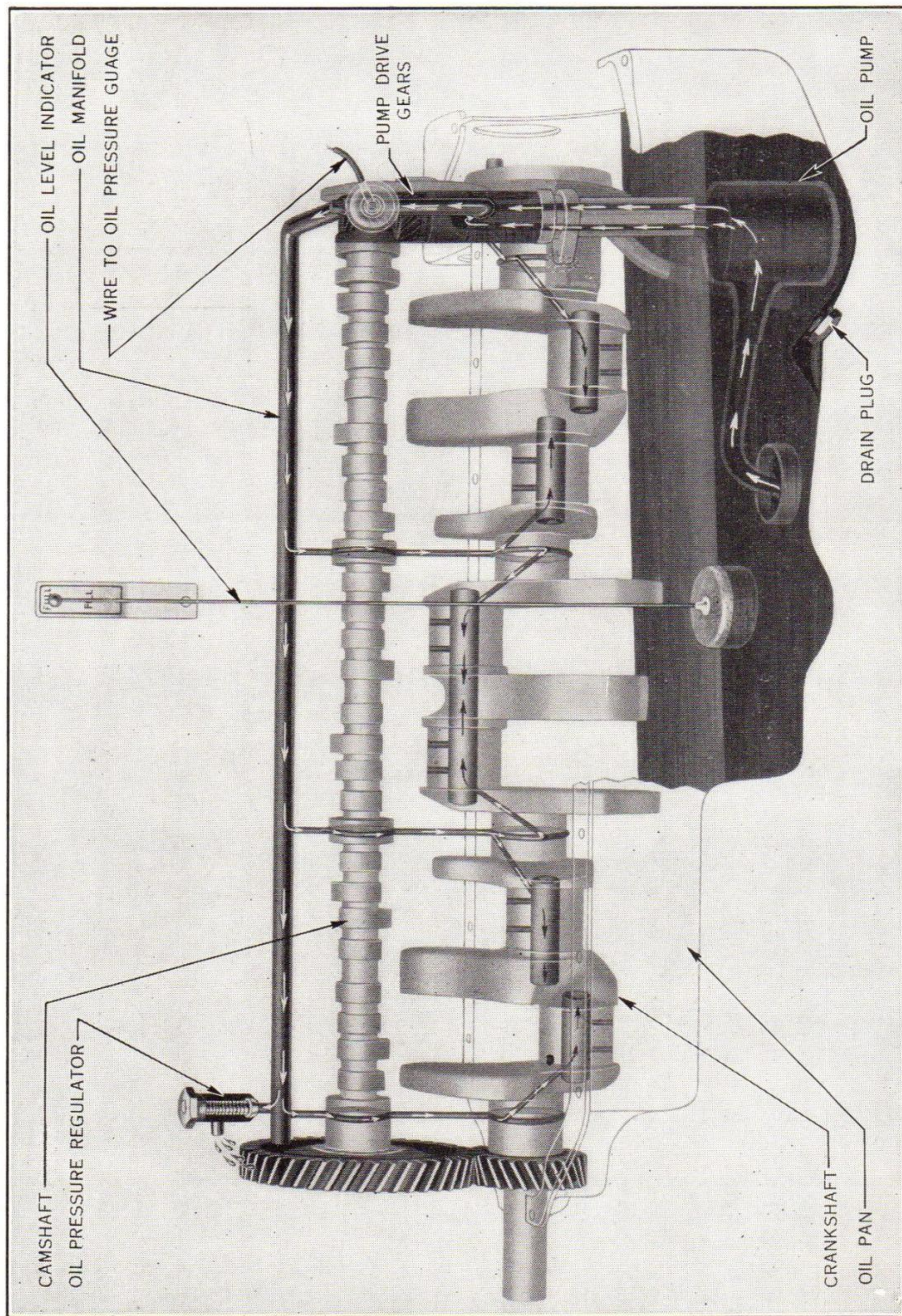


Fig. 11—Engine Oiling System



CHART

MAINTENANCE 1936-1937 CARS

0 MILES

(F)

LES

90° F.-

20 TO 20 W),

US 10%

(G) DRAIN SEDIMENT

(H) ADD DISTILLED WATER

(J) UNIVERSAL JOINT GREASE
(CYLINDER OIL SODA SOAP GREASE)

(K) FORD SPRING LUBRICANT M-4628

(M) FORD DISTRIBUTOR GREASE M-4601
ON CAM LOBES

(N) LUBRICANT IMPREGNATED WAX ON HOOD LACINGS,
DOOR STRIKER PLATES AND DOVETAILS

(O) PENETRATING DRY TYPE LUBRICANT FOR DOOR
HINGES

(P) WASH SCREEN IN GASOLINE-WET WITH ENGINE OIL

(Q) REPLACE FILTER CARTRIDGE EVERY 8000 MILES

CARBURETOR SILENCER
AND AIR CLEANER
ENGINE

CLUTCH RELEASE SHAFT

TRANSMISSION (CAPACITY 2½ PINTS)

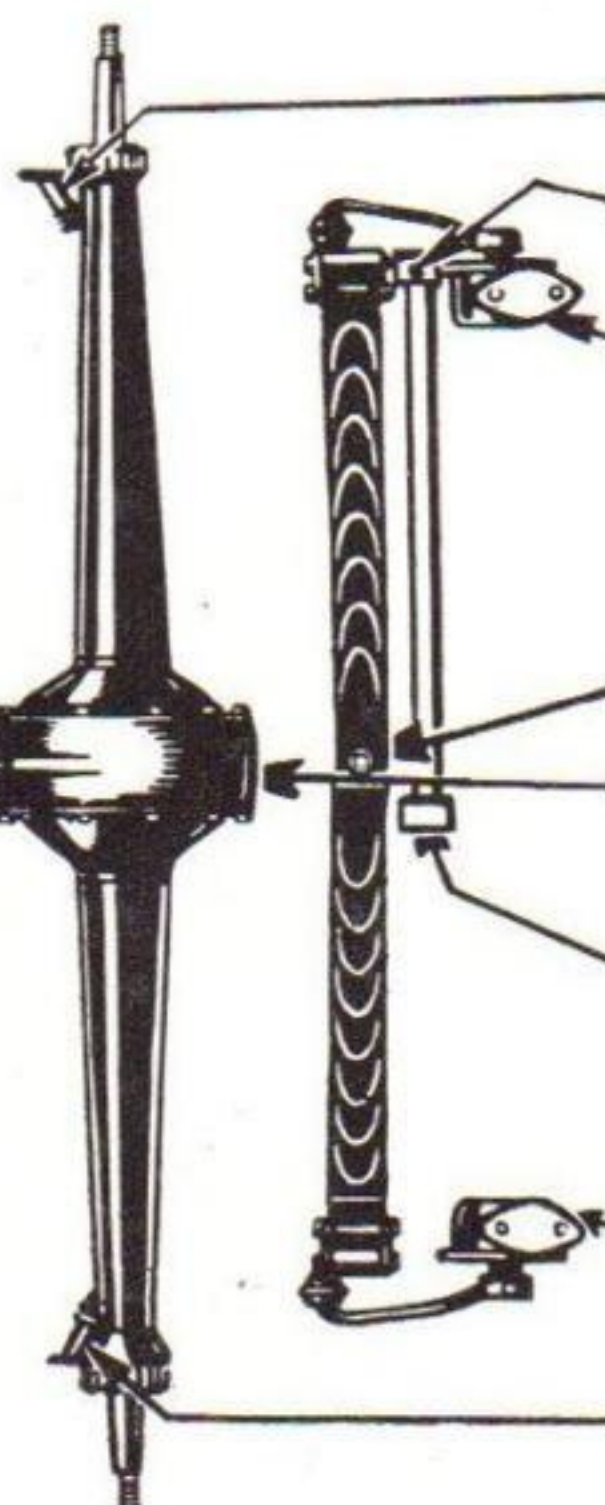
UNIVERSAL JOINT

(A) CLUTCH RELEASE SHAFT

(H) BATTERY

(A) CLUTCH AND BRAKE
PEDAL SHAFT

(Q) OIL CLEANER



(A) REAR WHEEL
BEARING

(A) STRUT ROD

(X) SHOCK ABSORBER

(K) SPRING TIE BOLT

(E) REAR AXLE
(CAPACITY
2½ PINTS)

(A) STRUT ROD

(X) SHOCK ABSORBER

(A) REAR WHEEL
BEARING

AND SPRING

(WHICHEVER OCCURS FIRST)

(W) REMOVE AND CLEAN SCREEN

(U) DRAIN, FLUSH AND REFILL WITH
EXTREME PRESSURE GEAR OIL:
WINTER S.A.E. VISCOSITY 90 OR 110
SUMMER S.A.E. VISCOSITY 160

D MAINTENANCE CHART

Chassis Springs

To avoid clogging of oil grooves in spring leaves and insure proper lubrication, it is imperative that the *recommended special lubricant* be used. See your Lincoln-Zephyr dealer about this.

Engine Lubrication

The engine is lubricated by means of a gear type oil pump driven by the camshaft through spiral gears. (See Fig. 11.)

Oil under pressure is carried to the oil manifold and distributed to the camshaft and crankshaft bearings.

The pressure is regulated by a valve located on the oil manifold. A by-pass is provided in this valve which allows a portion of the oil to flow directly on the timing gears. An auxiliary oil relief valve is also provided in the oil pump. (See Fig. 11.)

Oil Change

After running a new car 300 miles, the oil should be drained from the engine by removing the drain plug located at the left near the bottom on the right side of the oil pan. After the oil has drained, replace plug and refill with 5 quarts of oil of the proper viscosity (See page 36). Oil pan should be drained and fresh oil added every 5000 miles thereafter. (See page 36 for oil recommendations.)

Oil should be added between oil changes as the individual engine requires (driving speed, etc., will effect oil consumption.)

Oil Cleaner

The oil cleaner requires no other attention than replacing filter cartridge every 8000 miles. To assure

proper installation of the genuine cartridge it is recommended this service be obtained from an authorized Lincoln-Zephyr Dealer.

Oil Level Indicator

When the oil pan is "FULL" the oil level indicator should be approximately $\frac{1}{8}$ inch below the top stop position (See Fig. 13). Any excess oil will be quickly consumed and give the effect of excessive oil consumption.

To *avoid over-filling* it is important that oil is not added while the engine is running, or immediately after the engine has been stopped. The reason for this is that approximately one quart of oil is suspended in the circulating system and until this has had sufficient time to drain into the oil pan, the oil level indicator will not accurately register the amount of oil in the engine.

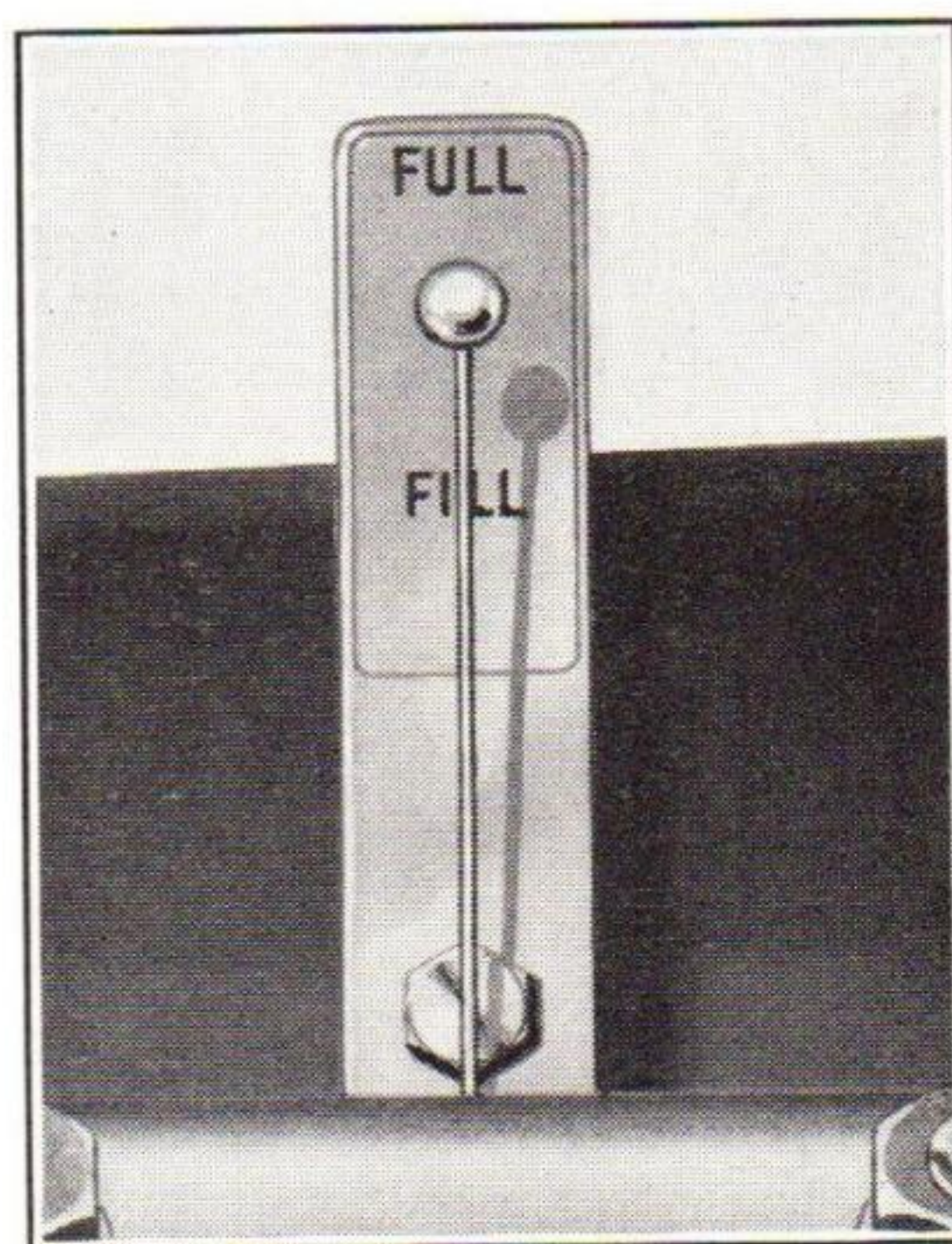


Fig. 13—Oil Gauge

Oil Pressure Gauge

The electric type oil pressure gauge located in the instrument group indicates the pressure under which the oil is being supplied to all the engine bearings. The pressure should show from 30 to 40 pounds with the oil at normal engine operating temperature. The oil pressure will be higher with a cold engine.

Failure of oil gauge hand to show pressure generally indicates low oil and the supply should be checked immediately.

Engine Oil

Engine oils of the following viscosity numbers are recommended for use in the various temperature ranges indicated.

<i>Prevailing Temperature Range</i>	<i>Viscosity No.</i>
Above 90° F.....	S.A.E. 40
100° F. to 40° F.....	S.A.E. 30
65° F. to 20° F.....	S.A.E. 20 to 20W
35° F. to —10° F.....	S.A.E. 10W
0° F. or Lower.....	10W plus 10% Kerosene

Operating conditions will necessarily modify these recommendations inasmuch as the intermittent driver will find it necessary to use an oil one or two grades lighter than the continuous operator. The grades recommended above are for average conditions of operation.

Five quarts are required to refill the oil pan.

TRANSMISSION

The transmission is of the synchronized gear type, providing for three speeds forward and reverse. Helical silent gears are used throughout. Fig. 14 shows the gears in neutral position.

Two units function in transmitting the power through the transmission; the transmission drive shaft and the countershaft gears. The main shaft projects into, and transmits power to the transmission.

The transmission main shaft is splined and carries the low and reverse sliding gear, the second speed main

shaft gear and also the synchronizing unit. This shaft and the clutch shaft form the direct or high speed power connection from the engine through the clutch to the propeller shaft which drives the rear axle. (See Fig. 14.)

The pilot bearing for front end of clutch shaft is mounted in the center of flywheel. This bearing is inoperative except when the clutch is released. It is lubricated when assembled into the car and does not require further lubrication.

The main drive gear, is integral with the clutch shaft and is constantly in mesh with the countershaft driving gear on the countershaft assembly.

When the car is at rest with the engine running, the clutch engaged, and the gear shift lever in neutral position, all gears are in motion except the gear synchronizing unit and the low and reverse sliding gear. No power can be transmitted to the propeller shaft and rear axle until either the gear synchronizing unit is meshed with the main drive or second speed main shaft gear, or the low and reverse sliding gear is meshed with the countershaft low speed driving gear or reverse idler gear. (See Fig. 14.)

Gear Synchronizing Unit

The gear synchronizing unit shown in Fig. 14, which slides on the transmission main shaft, is equipped with friction cones on either side and has an outer ring which is engaged by the shifter fork, controlled by the shifter lever. The ring is retained centrally on the unit by spring actuated plungers and is capable of sliding either forward or backward on the synchronizing unit to engage either the main drive gear or second speed main shaft gear at option. (See Fig. 14.)

When the shift is made either from first to second or second to high gear or from high gear to second, the

friction cone in the gear synchronizing unit come in contact with mating cone on either the main drive gear or second speed main shaft gear. (See Fig. 14.) This causes the gears to turn at the same speed. Further movement of the lever causes the outer ring of the synchronizing unit to be pushed further forward or backward as the case may be, meshing the main drive gear or second speed main shaft gear. This operation is completed in practically one continuous deliberate movement of the shifting lever.

Lubrication

Summer lubricant for transmission should conform to S. A. E. 160.

Winter lubricant should conform to S. A. E. 90 or 110.

Change oil Fall and Spring or every 5,000 miles whichever occurs first.

2½ pints of lubricant are required to fill to level of filler plug on right side of transmission case.

FRONT AXLE

The front axle is of the I-Beam type. The axle is held in position by a radius rod, supported at the rear end by a pivot connection.

This method of mounting holds the axle in correct position with respect to steering connections, regardless of road conditions or speed of the car.

The steering tie rod is at the rear of the axle and is adjustable for aligning the wheels in respect to toe-in.

Alignment of Front Wheels

Alignment of the front wheels is an important factor in tire economy and ease of steering. When wheels are improperly aligned, the tires when rolling over the ground, are given a sliding motion that wears the tire tread rapidly.

The front wheels should have a toe-in of $\frac{1}{16}$ ". This measurement is taken between the wheel rims at the front and rear of the wheels at a height equal to the center of the wheel from the ground. The rear measurement should never be more than $\frac{3}{32}$ inch greater than the front measurement. If the difference between the two measurements is other than this, it is an indication the wheels are out of alignment and the car should be taken to a Lincoln-Zephyr dealer for adjustment. In case of emergency, however, the following instructions should be observed.

Loosen the clamp bolts at each end of the steering tie rod. Turn the tie rod so that the distance between tie rod ends is lengthened or shortened the amount necessary to give the wheels the proper toe-in. To permit this, one end of the tie rod carries right-hand threads and the other end left-hand threads.

Adjusting Front Wheel Bearings

If there is excessive play in the bearings it can be adjusted as follows:

Jack up front of car and remove outer and inner hub caps. Remove cotter pin from the bearing nut and tighten bearing nut with a suitable wrench, with a slight hand pressure on the wrench, until

there ceases to be any looseness in the bearing. Then turn the adjustment back approximately $\frac{1}{4}$ turn and replace cotter pin in the nut. (Always back-off nut rather than tighten to replace cotter pin).

Lubrication of Front Wheels

The wheel bearings should be cleaned and repacked with grease about every 5,000 miles under normal conditions.

Use Ford wheel bearing grease available at Lincoln-Zephyr Dealers.

REAR AXLE

General Description and Operation

The rear axle is of the three quarter floating type, the weight of the car being carried directly on the axle housing (See Fig. 15). The axle shafts function only to rotate the wheels. The rear axle gears and bearings are very carefully adjusted at the factory and need no further attention other than proper lubrication.

Torque Tube and Propeller Shaft

While the primary function of the torque tube is to counteract axle torque and take the driving thrust, it also encloses the propeller shaft and determines the position of the rear axle. This latter feature relieves the rear spring of any duties except those for which they are primarily intended, carrying the load and absorbing road shocks.

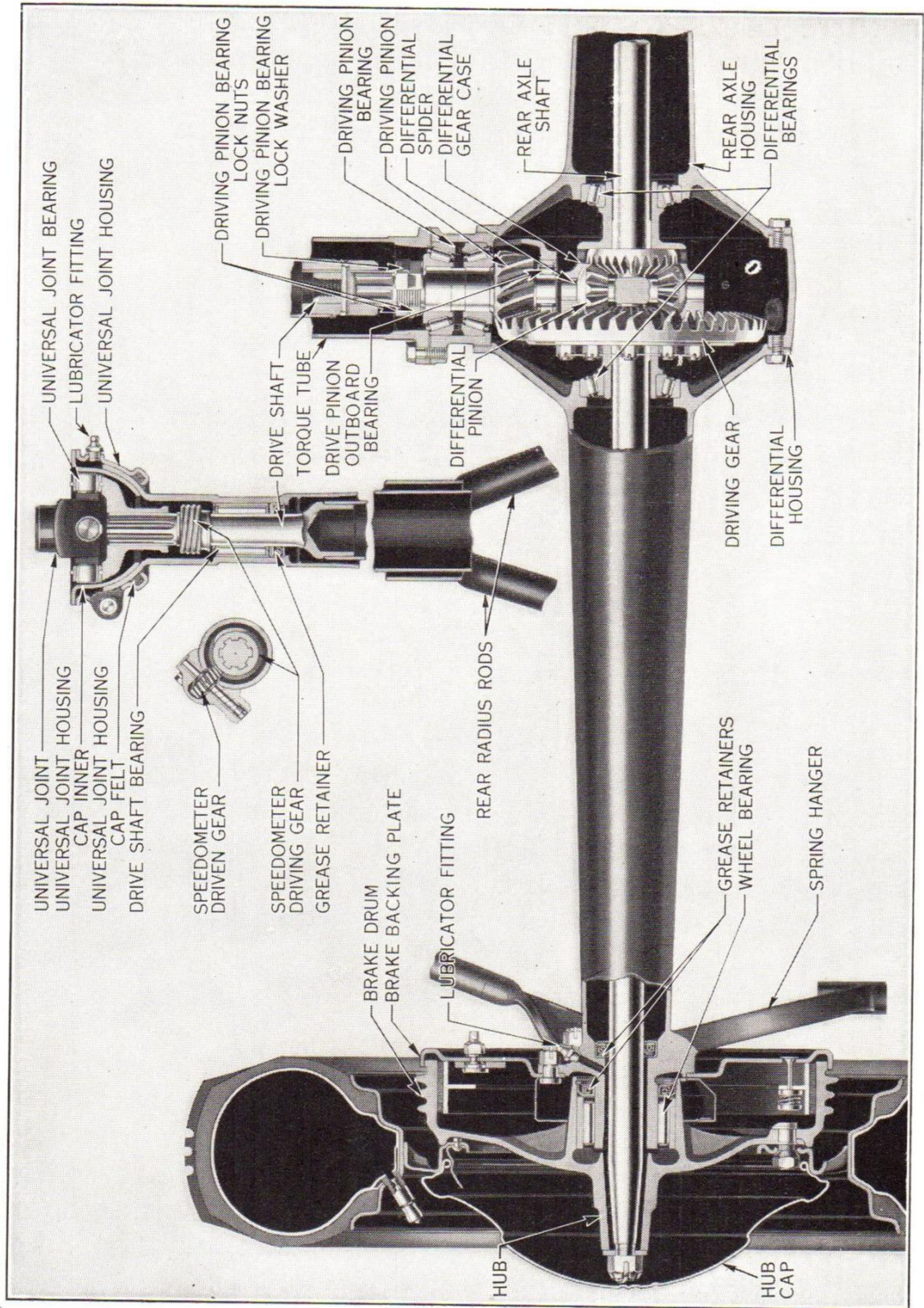


Fig. 15—Rear Axle

BRAKES

General Description and Operation

The braking system consists of internal expanding Servo brakes on each of the four wheels operated either by the foot brake pedal or hand brake lever. The hand

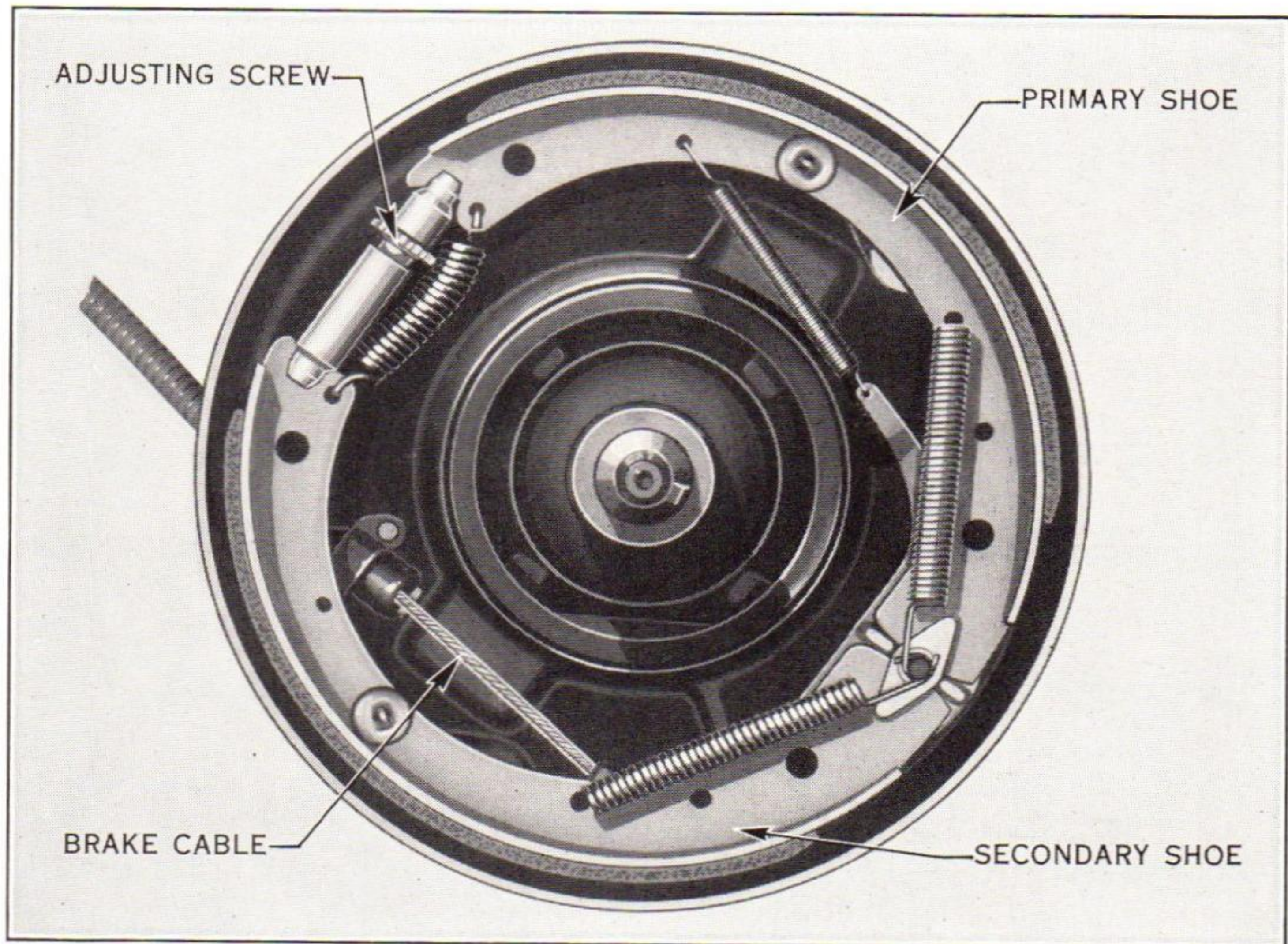


Fig 16—Brake Shoe Assembly

brake lever also provides for using the system as a parking brake.

Adjustments

The brakes should be adjusted before they are worn to such a point that the foot pedal reaches the floor board. It is recommended that all brake adjustments should be made by an authorized Lincoln-Zephyr dealer.

An emergency adjustment may be made however by proceeding as follows:

Jack up one wheel and remove plate over adjusting hole in the brake housing plate. (See Fig. 17.) The notched wheel on the adjusting screw (See Fig. 16) can be turned with a screw driver from this hole. Turn notched wheel away from the center of the axle (4 notches) to tighten brake, making same adjustment at each wheel.

It must be borne in mind that the above is merely a temporary adjustment and it is advisable as soon as possible to have the brakes inspected by a Lincoln-Zephyr dealer.

STEERING GEAR

The steering gear is of the "hour glass" worm and roller type. The worm rotates on taper roller bearings and the roller is mounted on needle roller bearings. The main roller shaft is carried on absorbent bronze bushings.

Adjustment for Wear

Adjustment is provided to take up end play in the main roller shaft. See Fig. 18 for location of the adjustment screw indicated above roller shaft needle bearings. Loosen lock nut and turn adjusting screw clockwise until the end play is compensated for, then tighten lock nut.

End play in the steering worm and the clearance between the worm and roller is controlled by shims. Adjustment at these points should not be required for many thousands of miles. It is recommended when they require adjustment, you consult a Lincoln-Zephyr dealer.

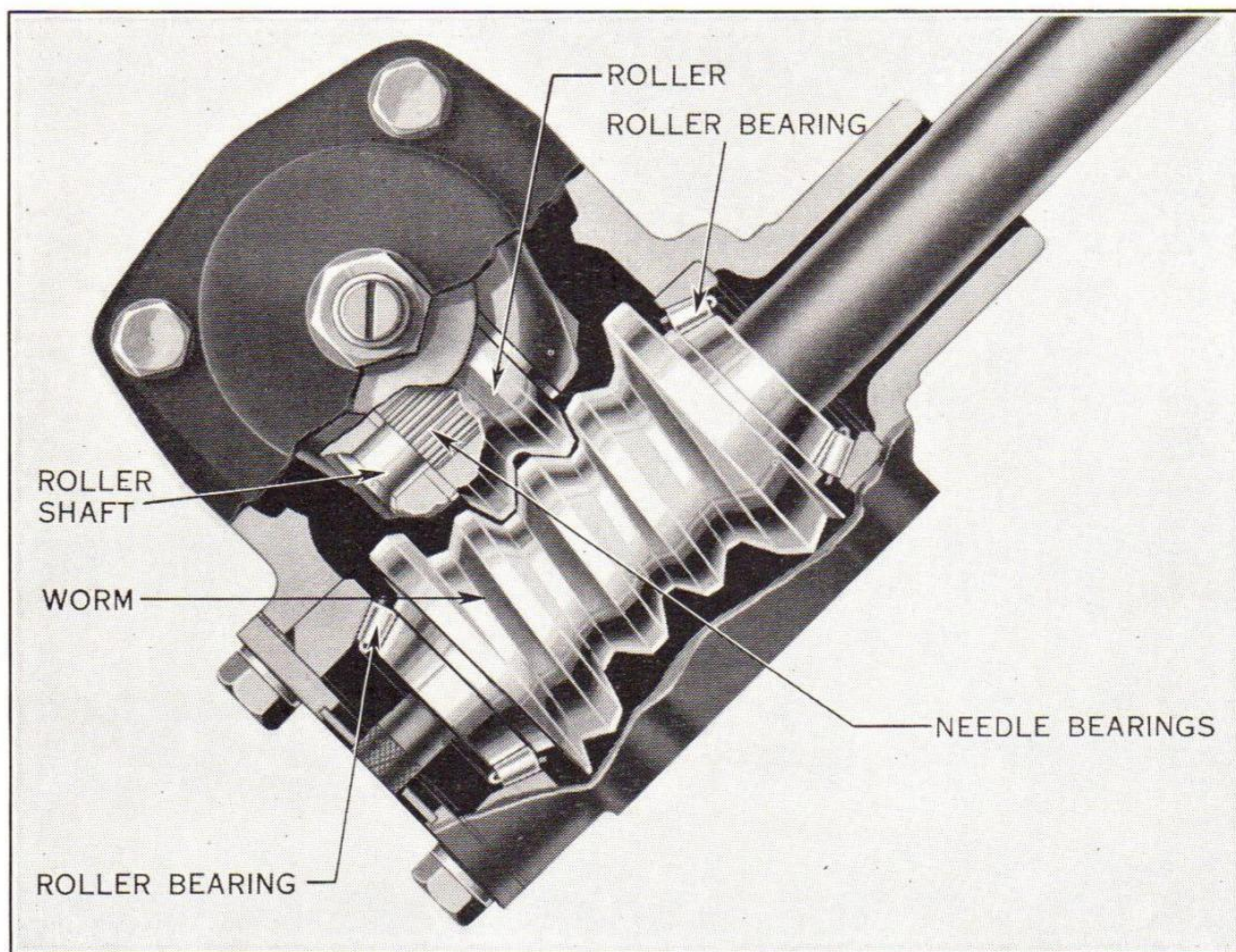


Fig. 18—Steering Gear Assembly

Lubrication

Add gear lubricant to level of filler plug every 1000 miles. See Fig. 18 for location of filler plug. Use S. A. E. viscosity number 90 to 110 in Winter. S. A. E. viscosity number 160 in Summer.

ELECTRICAL EQUIPMENT

Battery

The battery is carried under the front seat on the left hand side of the car and protected by a metal cover. It is of the 6 volt type, using 17 plates and has a capacity of 96 ampere hours.

Every two weeks check the solution (electrolyte) to see it is at the proper level.

Use only distilled water to maintain the proper level which is to the bottom of the filler tube.

After adding water to the battery in freezing weather, the engine should immediately run for a short period to mix the water with the acid solution to prevent freezing of the water which is likely to stay on top of the acid.

During cold weather a battery loses some of its efficiency and the demands upon a battery becomes greater due to more energy required to crank the engine in cold weather.

The charge in the battery can be conserved by the operator being cautious in the use of electrical accessories and special equipment all of which draw on the battery.

Generator

The generator delivers electrical energy for charging the storage battery

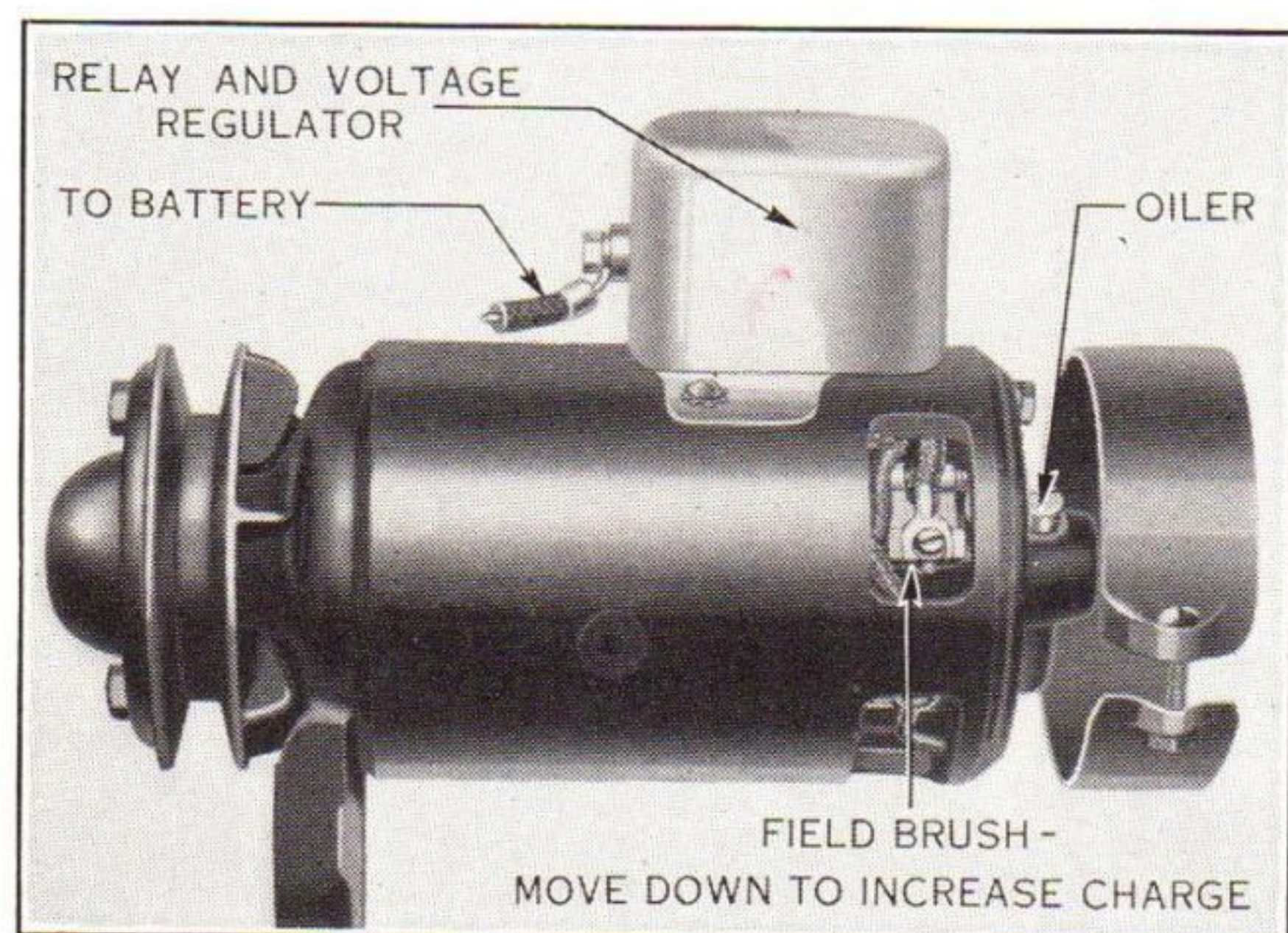


Fig. 19—Generator

and for operating the lights, ignition, horns, etc. The generator output is controlled by a field brush. The minimum output should be set at not less than 20 amperes (car ammeter reading) with generator hot. Low genera-

tor output will affect proper operation of the voltage regulator.

To increase the generator charging rate, remove the generator cover strap and shift the field brush downward. (See Fig. 19.)

To reduce the rate, shift the brush in the opposite direction.

The output of the generator is indicated by the ammeter located on the instrument panel.

Use engine oil sparingly in oiler of generator. (See Fig. 19 for location of oiler.)

Charging Rate

At a car speed of approximately 20 miles an hour with generator hot and set at maximum output, the car ammeter should show the battery is receiving approximately 18 amperes. When the car is run at a lower speed, it will be proportionately less, and at higher speed the maximum charge should be about 24 amperes. Any abnormal reading of the ammeter indicates trouble in the electrical system and should be checked at once by a Lincoln-Zephyr Service Station.

Relay and Voltage Regulator

This unit (See Fig. 19) is mounted on top of the generator. The relay section is an automatic switch which closes the charging circuit between the generator and battery as soon as the generator supplies sufficient current to charge the battery and immediately opens this circuit when the generator is not charging so as to prevent the battery discharging back through the generator.

The voltage regulator section of the unit is also automatic in its action and allows the generator to charge the battery at high charging rate until the battery is fully charged and the battery voltage has reached a predetermined value at which time the regulator adds

resistance to the field circuit of the generator and reduces the charging rate approximately one half of its former rate.

When the battery voltage drops from a predetermined value due to normal current consumption or when reducing engine speed, the high charging rate will be restored.

Ammeter

The ammeter is located in the instrument group. The dial indicates the amount of current in amperes flowing, either being charged into or discharged out of the battery, except that it does not indicate the heavy current used when using the starter.

STARTER MOTOR

The starter motor is mounted to the flywheel housing and its power is transmitted to the engine through a Bendix drive.

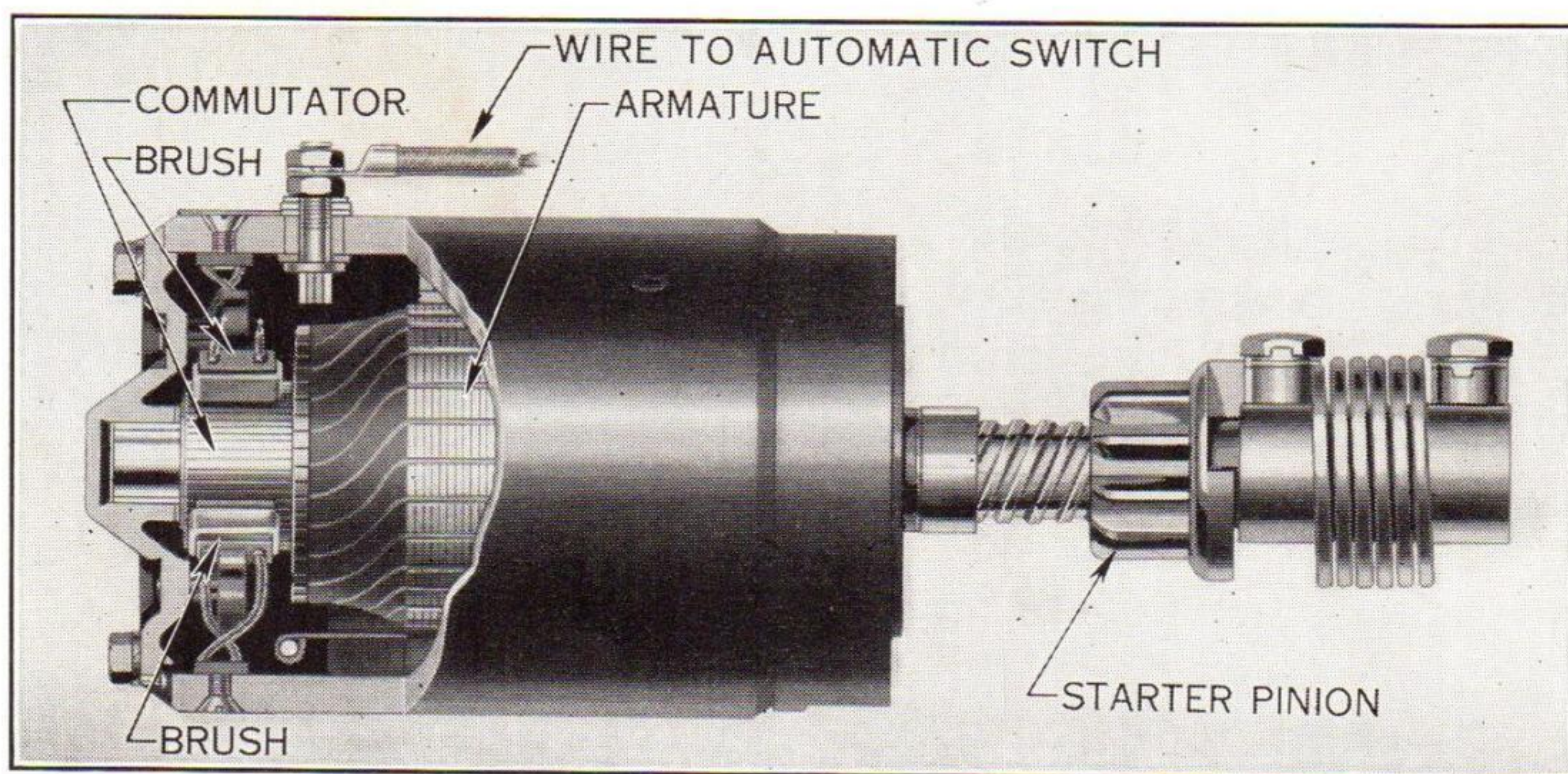


Fig. 20—Starter

An automatic switch is located on the engine side of the dash. To operate the starter to start the engine,

first turn the ignition switch "on" press the starter button on the instrument board. This button makes electrical contact which operates the automatic switch.

When the starter motor shaft rotates, it causes the pinion of the Bendix drive to advance and mesh with the flywheel. When the engine starts, and the flywheel speed exceeds that of the starter motor, the pinion releases from the flywheel automatically. The starter button should be instantly released when engine starts firing.

The starter bearings do not require lubrication.

LIGHTING

Lighting Switch

The light switch control button is located on the instrument panel and the beam control switch is on toe-board just below the brake and clutch pedals (See Fig. 21.)

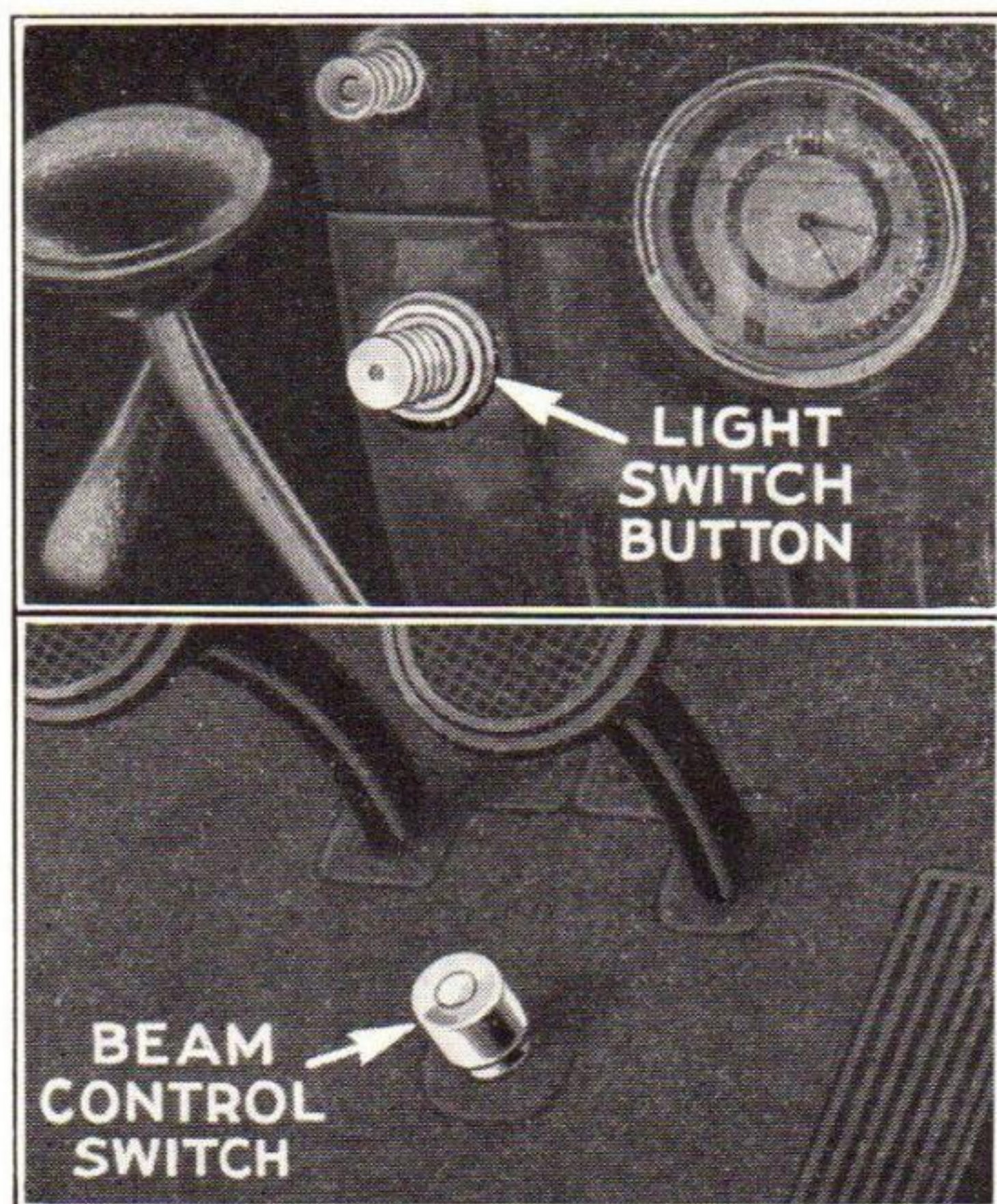


Fig. 21—Light Switch Button and Beam Control Switch

With the control button pushed all the way in, all lights are disconnected. Pulling the button out to its first position connects the parking and tail lights. Pulling the button all the way out to its definite stop connects the headlights through the beam control switch on the toe-board. Alternate pressing of the beam control switch lowers the headlight beam for city driving or passing other cars. A light appears in the end of the

instrument panel control button when beam is "high." A switch located on the instrument panel controls the instrument lights, independent of the other lights.

Circuit Breaker or Interrupter for Circuit Overload

The lighting system, horn and cigar lighter is protected by this unit.

A breaker or interrupter for circuit overload is located on the dash under the cowl. The normal demand for current does not affect the unit but in the event of an abnormally heavy demand for current, such as would be caused by accidental short circuit or defect in any of the lighting circuits, the unit is affected, causing the contacts to vibrate and intermittently cut off or interrupt the flow of current. This causes an audible clicking sound which gives a distinct warning that abnormal conditions exist in the circuit and at the same time, greatly reduces the current flow. This clicking and interruption will continue until the cause is removed or the light switch is turned off. This circuit breaker thus protects the switch and wiring from destruction, and the storage battery from being rapidly discharged. As soon as cause is removed, the circuit breaker automatically restores the normal circuit.

Headlamps

The headlamps have a double filament bulb. The two filaments are spaced above and below the center axis of the bulb and reflector. Lighting the lower filament gives the upper or "high" beam. (See Fig. 23).

Lighting the upper filament produces the low beam for city driving or wherever the high beam might cause annoyance to others.

The center of the low beam is directed downward about $2\frac{1}{2}$ degrees from the upper position or about eight inches on a wall 25 feet from the lens. (See Fig. 22.) The filament for the upper and lower beam is 32 C. P. The parking light bulb is $1\frac{1}{2}$ C. P.

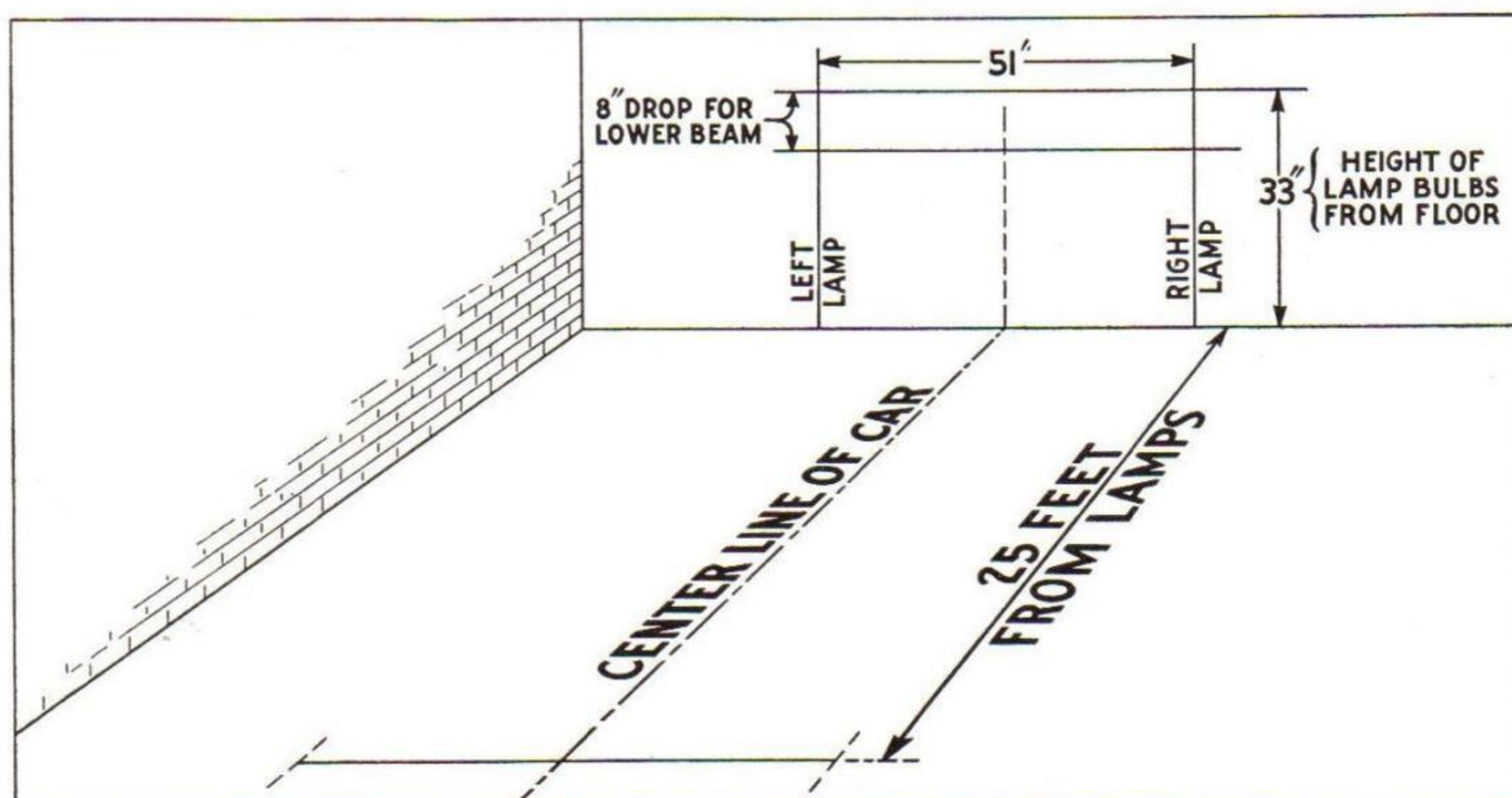


Fig. 22—Diagram for Headlight Adjustment

Headlamp Adjustment

To remove the lens first remove the screw holding the lens retainer. After the retainer is removed, turn lens slightly to right to remove.

Fig. 23 shows the three adjusting screws on the reflector. The bottom screw is for tilting the beam up or down and the screws on either side is for directing the beam to right or left.

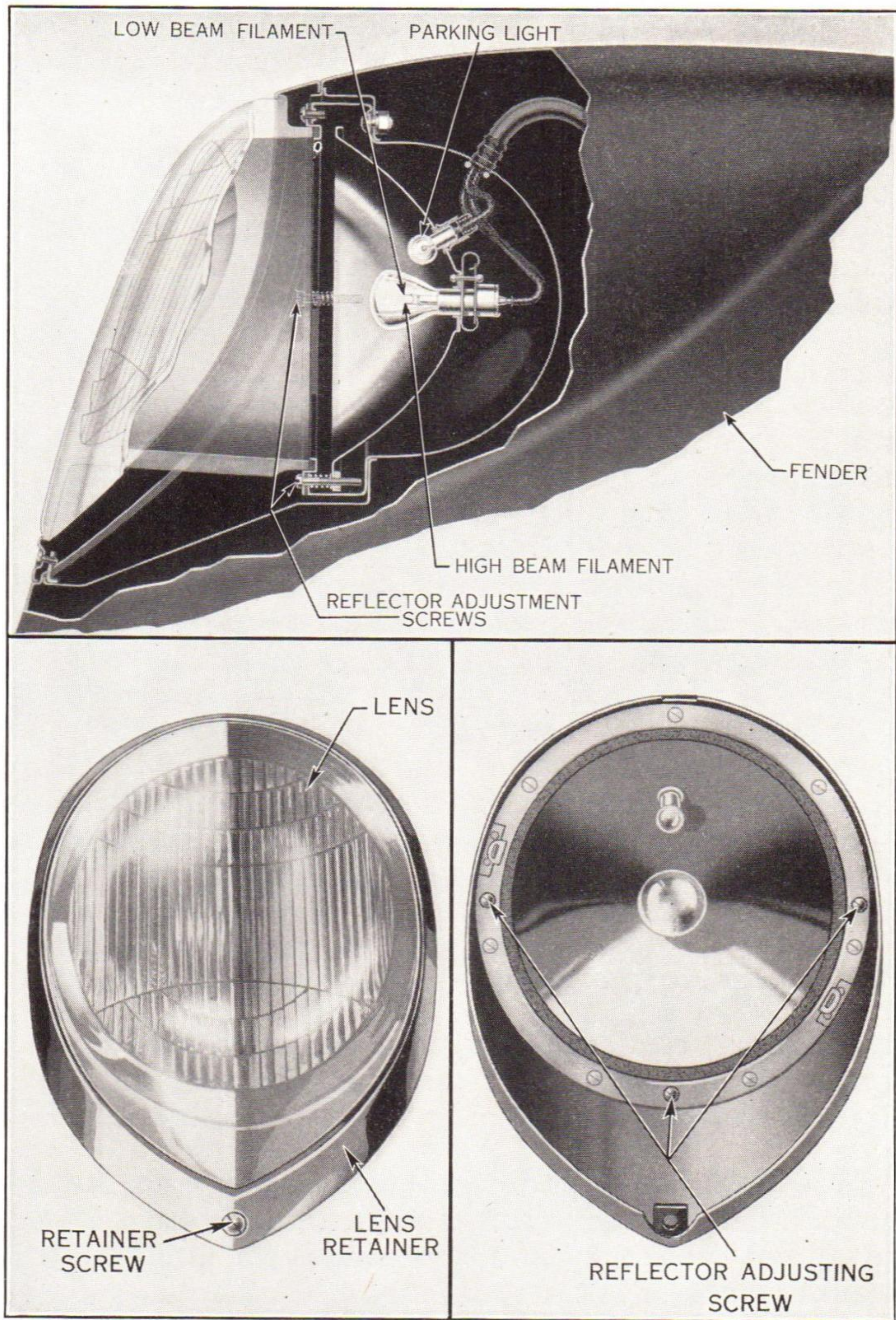


Fig. 23—Headlamps and Adjustments

To adjust, cover the right lamp, pull the light switch button to full out position with light in end of button indicating "high" beam, then aim the left reflector so that the center of the beam strikes the left hand vertical line on the wall and the top of the beam should touch the top horizontal line (Fig. 22). Having covered the left lamp, proceed to aim the right reflector the same as left lamp, except the center of the beam should strike the right hand vertical line. With the reflector set in this position the beam will be correct when beam control switch is changed to "low" beam.

NOTE—Make final check with lens on lamps.

CARE OF BODY

Lubrication of Body Parts

Oil door hinges at frequent intervals using penetrating dry type lubricant.

Hood lacing, door striker plates, door dove tails, bumpers, door check strap and door lock bolts should be lubricated, using impregnated wax lubricant as other oils may soil clothing.

EQUIPMENT

Speedometer

The speedometer indicates miles per hour, trip mileage and total mileage. A flexible knob, located at right side of instrument group under instrument panel, is for setting the trip mileage to zero.

Clock

An electric clock is provided below the instrument group. A flexible knob for setting clock is located at left side of instrument group under instrument panel.

CHANGING TIRES

REMOVE WHEEL WITH TIRE AND PLACE ON
LEVEL SURFACE WITH HUB CAP UP

1. To Remove Top Bead

Deflate tube completely. Loosen both beads from rim ledges, using tire iron if necessary.



Fig. 25—Removing
Top Bead

Stand on tire with feet about 15" apart opposite valve and force bead off bead seat into drop center part of rim. (See Fig. 25).

CAUTION—Care should be taken that the soft rubber tip on the inner edge of the tire bead is not damaged by tire iron, as such damage will have a tendency to

chafe the inner tube. It is advisable to coat the inside and outside of the tire beads with soft soap, which will assist in removing the bead over the edge of the rim and also protects the inner edge of the bead.

Insert the two tire irons about 8" apart between bead and rim flange near valve, and pry short length of bead over flange. (See Fig. 25.)

Leaving one tire iron in position, follow around rim with



Fig. 26—Removing
Bottom Bead

other iron to remove remainder of bead. Remove tube.

2. To Remove Bottom Bead

Stand wheel in upright position with bead in drop center part of the rim at bottom. Insert tire iron between bead and rim flange at top side of wheel, and pry wheel out of tire as shown in Fig. 26.

TO APPLY TIRE WITH WHEEL ON FLOOR

Inflate tube until barely rounded out and insert in casing. See that balancing mark on casing is opposite valve stem. Before mounting tire casing use soft soap on tire beads. Place tire on rim, guiding valve through valve hole.

1. To Apply Bottom Bead

Push bottom bead down into drop center part of the rim at valve and force remaining portion of bead over rim flange.

A tire iron may be needed to pry the last portion of bead over the flange. (See Fig. 27).



Fig. 27—Applying Bottom Bead



Fig. 28—Applying Top Bead

2. To Apply Top Bead

At point on opposite side of wheel from valve insert tire iron between top bead and rim flange, prying bead over rim flange. Holding this iron in position continue prying with other iron, working

around rim until bead is in place. (See Fig. 28).

Inflate slowly and see that tire is centered on rim on both sides. This may be done by bouncing tire after approximately 15 pounds of air pressure has been added. Finish inflating.

Car Jack

Fig. 29 shows the location for placing the car jack when raising a wheel. Place jack under the bumper arm in a position which will allow free movement of the jack handle.

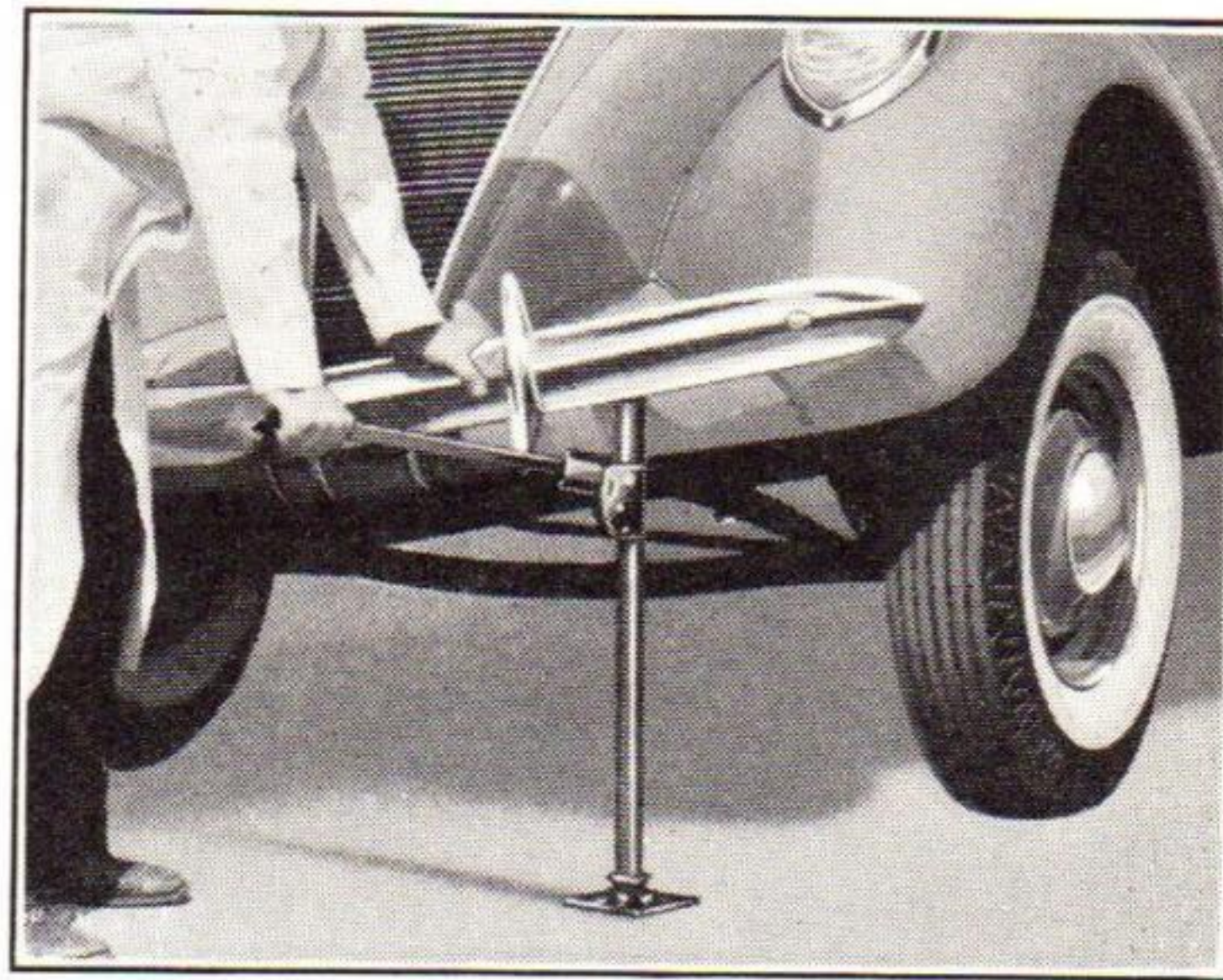


Fig. 29—Car Jack

Rear Fender Shield

To remove rear fender shield turn latch nut one quarter turn in direction of arrow to loosen. (See Fig. 30).

The wheel nut wrench provided in the tool kit may be used to turn latch.

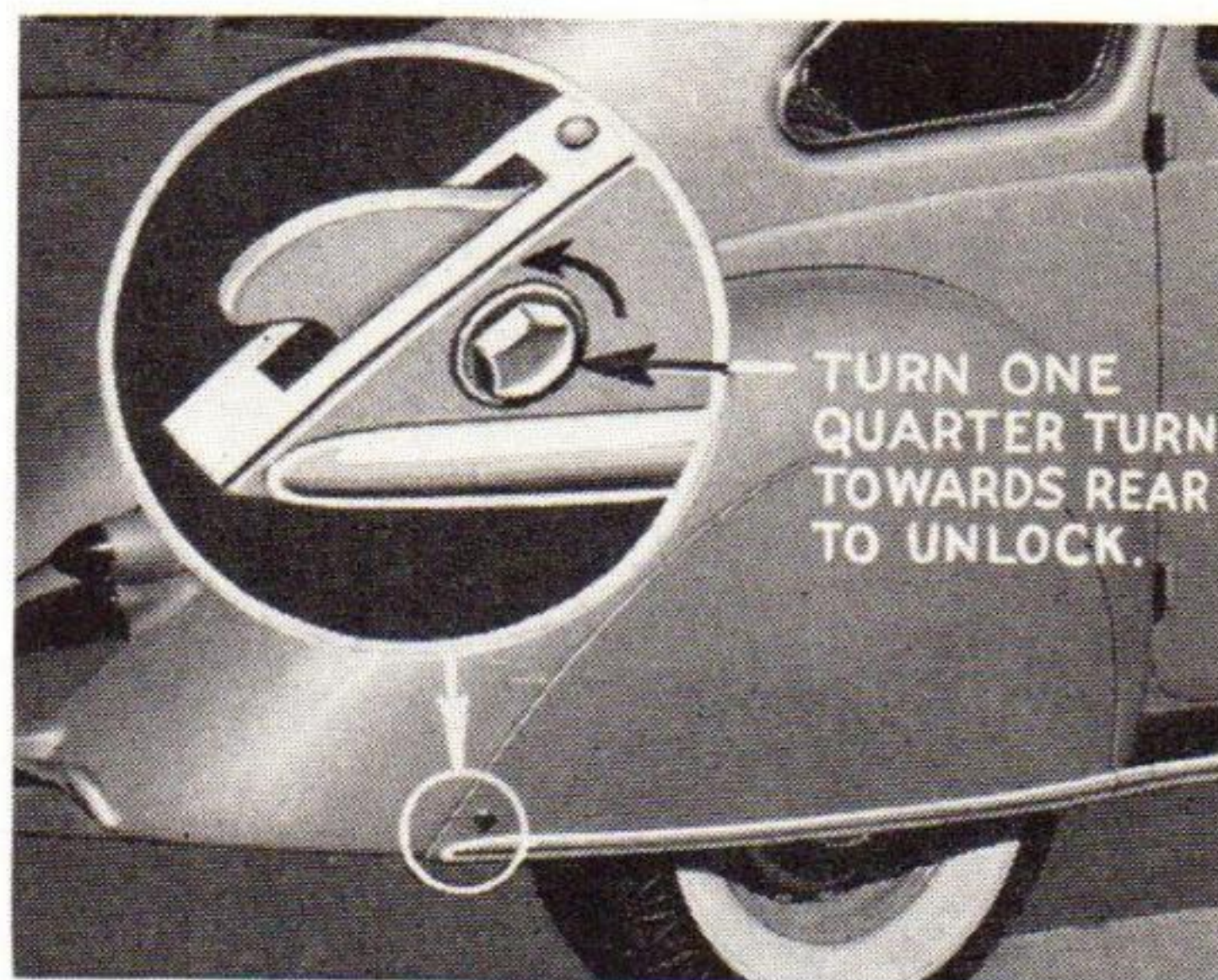


Fig. 30—Rear Fender Shield

INDEX

	Page		Page
Axle (Front)	39	Anti-Freeze Solution....	12
Alignment of Front Wheels.....	4	Data	6
Adjustment of Front Wheel Bearing.....	40	Engine.....	6
Lubrication of Front Wheels.....	41	Body Number	6
Axle (Rear)	41	Engine Number	6
General Description and Operation.....	41	Key Number.....	6
Torque Tube and Pro- peller Shaft.....	41	Wheel Base.....	6
Speedometer Drive Shaft.	43	Capacities.....	6
Propeller Shaft Bearing..	43	Weights.....	6
Lubrication.....	43	Driving New Car	8
Brakes	44	Locking Car.....	8
General Description and Operation.....	44	Electrical Equipment ..	47
Adjustments.....	44	Battery.....	47
Body	56	Generator.....	48
Lubrication of Body Parts	56	Charging Rate.....	49
Clutch	27	Relay and Voltage Regu- lator.....	49
Pedal Adjustment.....	28	Ammeter.....	50
Cooling System	10	Starting Motor.....	50
General Description and Operation.....	10	Lighting.....	51
Pump Lubrication.....	10	Lighting Switch.....	51
How to Adjust the Belt...	10	Circuit Breaker or Inter- rupter for Circuit Over- load.....	51
Radiator.....	11	Headlamps.....	52
Draining Radiator and Engine.....	11	Headlamp Adjustment...	53
Thermostats.....	12	Wiring Diagram.....	55
Heat Indicator.....	12	Ignition.....	22
		Distributor Vacuum Brake	22
		Breaker Mechanism.....	23
		Rotor and Adjustment...	24
		Spark Timing of Engine.	25
		Ignition Wiring Diagram	26
		Spark Plugs.....	27
		Lubrication of Distributor	27

INDEX—Continued

	Page		Page
Engine	19	Lubrication Chart ...	32-33
Engine Trouble on Road		Lubrication (General) ..	30
.....	19-20	Transmission.....	30
Camshaft Bearings.....	20	Rear Axle.....	30
Crankshaft Bearings.....	21	Water Pumps.....	30
Connecting Rod Bearings	21	Chassis.....	30
Camshaft Setting.....	22	Wheel Bearings.....	30
Equipment	55	Universal Joint.....	30
Speedometer.....	56	Engine Lubrication.....	34
Clock.....	56	Oil Change.....	34
Cigar Lighter.....	56	Oil Cleaner	34
Foreword	3	Oil Level Indicator.....	35
Fuel System	14	Oil Pressure Gauge.....	35
Fuel Tank.....	14	Engine Oil Specifications.	36
Fuel Gauge.....	15	Starting Engine	9
Fuel Pump.....	15	Cold Weather Starting...	9
Carburetor.....	15	Steering Gear	46
Adjustment.....	16	Adjustment for Wear ..	46-47
Idle Mixture Adjustment	16	Transmission	36
Air Cleaner and Carbure-		Gear Synchronizing Unit	38
tor Silencer.....	18	Lubrication.....	39
Fender Shield (Rear) ..	60	Tires	57
Inspection Service	4	Inflation.....	57
Lincoln-Zephyr Service	4	Changing Tires.....	58-59
Service Charges.....	5		
Repair Parts.....	5		

